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FILED
COURT OF APPEALS DIV I
STATE OF WASHINGTON
2014 MAY 16 PM 3:52

No. 70796-5-I

IN THE COURT OF APPEALS, DIVISION ONE
OF THE STATE OF WASHINGTON

WHATCOM COUNTY,

Appellant/Cross Respondent,

v.

ERIC HIRST, LAURA LEIGH BRAKKE, WENDY HARRIS and DAVID STALHEIM, FUTUREWISE, AND WESTERN WASHINGTON GROWTH MANAGEMENT HEARINGS BOARD,

Cross Appellants/Respondents.

APPELLANTS' BRIEF & BRIEF OF RESPONDENTS ERIC HIRST, LAURA LEIGH BRAKKE, WENDY HARRIS and DAVID STALHEIM, AND FUTUREWISE

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I. INTRODUCTION

The Growth Management Act ("GMA")[1] requires Whatcom County's ("County's") planning for its "Rural" area to protect rural character, which includes the protection of water quality and quantity, and fish and wildlife habitat. When the County amended the Rural Element of its Comprehensive Plan in 2012, however, the County failed to protect water quality. It did not even consider the availability of water. Both of these failures harm imperiled salmon runs.

Consequently, the Growth Management Hearings Board ("Board") found that the County's Comprehensive Plan violates the GMA. The Board found that "substantial evidence in the record about water availability limits and water pollution in rural Whatcom County"[2] supports a determination that "the Rural Element amendments adopted by Whatcom County in Ordinance No. 2012-032 and Policy 2DD-2.C do not constitute measures to protect rural character by protecting surface water and groundwater resources."

The Board's decision is firmly grounded in the GMA, which is "replete with requirements to protect ground and surface water and ensure

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[1] RCW Ch.36.70A.

[2] AR 1370, *Hirst v. Whatcom County*, Growth Mgmt. Hearings Bd., Western Wash. Region Case No. 12-2-0013, Final Decision and Order (June 7, 2013) ("FDO") at 23 of 51. "AR" refers to the Certified Administrative Record with sequential page numbers prepared by the Growth Management Hearings Board. We omit the preceding zeroes.

land uses are compatible for fish and wildlife."[3] Evidence supporting the Board's decision includes "reports on contaminated groundwater and drinking water; [an] increase in shellfish contamination; an increase in exempt wells for single residential use without required proof that the groundwater withdrawal will not impact stream flows; governing regulations from the last century (1985 state administrative regulations and a 1999 County Water Resource Plan); and the County's own resolution and Comprehensive Plan, stating its water resources are unknown and the future water uses are uncertain."[4]

The County's Issue 1 on appeal, addressing the Board's water availability determination, incorrectly asserts that an "Ecology interpretation" of state water law as it may have existed in 1985 supersedes and invalidates the GMA requirements. The Washington State Department of Ecology's (Ecology) 1985 Instream Resources Protection Program[5] ("1985 Rule") establishes instream flows and closes most of the Lower Nooksack basin[6] to further withdrawals, either year-round or seasonally. This issue of a governing "Ecology Interpretation" is raised for the first time on appeal, and the record does not support the County's

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[3] AR 1369, FDO at 22 of 51.
[4] AR 1377, FDO at 30 of 51.
[5] Chap. 173-501 WAC.
[6] This basin comprises most of Whatcom County. AR 1371, FDO at 24 of 51, n. 76.

claim of an "Ecology interpretation" that conflicts with the Board's decision.

The GMA, not "Ecology's interpretation" of a 1985 regulation, governs this appeal and supports the Board's decision that the County's Comprehensive Plan amendment did not meet GMA requirements. The 1985 Rule does not freeze Whatcom County's planning obligations in 1985, like a fly in amber. Ecology's intent and the County's obligations must conform to developments in state law since 1985 – including the adoption of the GMA itself, which requires the County to "protect ground and surface water and ensure land uses are compatible for fish and wildlife"[7] and to "enhance. . . . water quality, and the availability of water."[8] As the Supreme Court found fourteen years ago, in *Postema v. Pollution Control Hearings Board*,[9] Ecology's understanding of the effects of groundwater withdrawals in closed watersheds has changed dramatically since 1985.[10] State law now reflects this understanding, and "[n]o party has a vested right in ignorance.'"[11]

The County's Issue 2, addressing water quality, incorrectly claims that the Board's decision was not supported by substantial evidence and

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[7] AR 1369, FDO at 22 of 51.
[8] RCW 36.70A.020(10).
[9] 142 Wn.2d 68 at 81, 11 P.3d 726 (2000) ("*Postema*").
[10] *Id.* at 88 (discussing Ecology's concession that 1985 instream flow rules made incorrect assumptions about the effects of groundwater withdrawals on surface waters).
[11] *Id* at 92 (citations omitted).

applies the wrong legal standard. In fact, ample evidence that the County's land use planning fails to protect water quality supports the Board's thorough analysis. The County's claim that the Board erroneously requires "restoration" of water quality is wrong on the facts, wrong on the law, and emphasizes the County's failure to recognize its "duty to enhance water quality."[12]

Finally, the County challenges the Board's official notice of two documents published by government agencies. The Board's authority to take official notice of government documents is clear under the Board Rules of Practice and Procedure.[13]

II. ASSIGNMENTS OF ERROR, ISSUES, AND SHORT ANSWERS

Before the Board, Hirst *et al.* and Futurewise ("Hirst" or "Hirst Petitioners") argued that the Board should make a determination of invalidity.[14] This appeal challenges the Board's failure to make a determination of invalidity because the Board applied the wrong legal standard.

Assignment of Error 1: The Board erred in failing to make a determination of invalidity because the Board did not apply the legal

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[12] *Swinomish Indian Tribal Cmty.v. Western Wash. Growth Mgmt. Hearings Bd.*, 161 Wn.2d 415, 430, 166 P.3d 1198 (2007). See discussion at Sections IV C and D.
[13] WAC 242-03-640(2).
[14] AR 1270 – 71, *Hirst et al. v. Whatcom County*, GMHB Case No. 12-2-0013, Hirst Petitioners' Prehearing Brief at 24 – 25.

standards in RCW 36.70A.302(1).[15]

Issue 1: Did the Board apply the correct legal standard in concluding that the "Petitioners have not met the standard for a declaration of invalidity" and was that conclusion an erroneous interpretation or application of the GMA?[16] Yes. (Assignment of Error 1.)

Assignment of Error 2: The Hirst Petitioners assign error to the findings of fact in part "VII. Request for Finding of Invalidity" on page 50 of 51 of the Board's FDO (AR 1397). This section is set out in full in "Section IV. Argument" under Subsection "F" beginning on page 44.

Issue 2: Are the findings of fact inherent in the Board's conclusion that the "Petitioners have not met the standard for a declaration of invalidity" supported by substantial evidence and are they based on a proper interpretation and application the GMA?[17] No. (Assignment of Error 2.)

III. STATEMENT OF THE CASE

Whatcom County in Ordinance No. 2012-032 ("Ordinance")[18] adopted the comprehensive plan amendments at issue in this appeal. The Ordinance represents the County's response to a series of rulings from the Board and the Courts, going back to 2005, requiring that the County's

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[15] AR 1397, FDO at 50 of 51.
[16] *Id.*
[17] *Id.*
[18] AR 12-180.

rural comprehensive plan and development regulations be brought into compliance with the GMA.[19] The County's 2005 Comprehensive Plan "largely retained the rural land use designations in its 1997 comprehensive plan."[20] The 1997 Plan, in turn, was adopted two months prior to the effective date of amendments to the GMA intended to prevent sprawl by clarifying limits on rural development.[21]

The County's Rural Element is still out of compliance with specific GMA provisions, including those at issue in this appeal. The County's delayed implementation of GMA rural planning requirements has resulted in a Comprehensive Plan that allows substantial Rural development.[22] The GMA's requirements to ensure that this Rural development protects water quality and quantity is at issue in this case.

We concur with the County's description of the procedural history of this case.[23] We do not concur with the County's description of the "relevant amendments adopted in Ordinance No. 2012-032," which

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[19] AR 1356-57, FDO at 9-10 of 51.
[20] AR 1357, FDO at 10 of 51.
[21] *Gold Star Resorts v. Futurewise*, 167 Wn.2d 723, 727, 222 P.3d 791 (2009).
[22] See AR 1390, FDO at 43 of 51 (referring to "the intensity of rural development allowed under the County's plan"). *See also Governors Point v. Whatcom County*, Growth Mgmt. Hearings Bd., Western Wash. Region, Case Nos. 11-2-0010c and 05-2-0013, Final Decision and Order and Order Following Remand on Issue of LAMIRDs (Jan. 9, 2012) at 121 of 177 ("unrebutted evidence demonstrates that vacant lots in existing rural areas can accommodate 33,696 additional people, where only 2,651 are expected").
[23] We concur with the County's Statement of the Case from its commencement on page 5 of the Brief of Appellant Whatcom County ("App. Brief") through the first paragraph of Section III.A on page 6. We also concur with the last paragraph on page 11.

incorporates arguments and disputed legal conclusions.[24] In particular, we contest the County's statement that Policy 2DD-2.C "protect[s] water resources by requiring applicants to provide evidence of an adequate water supply prior to approval."[25] This assertion contradicts the Board's ruling and is, therefore, at the heart of the County's *argument.*

We strongly disagree with the County's argumentative and inaccurate characterization of the Board's Final Decision and Order. The Final Decision and Order is accurately summarized as follows:

The Final Decision and Order addresses the County's compliance with the GMA. The Board addressed the questions of "whether Whatcom County has adopted measures that apply the GMA requirements about water under the local circumstances here. Further, the question is whether the *Kittitas* decision requires the County to change its other long-range planning (including residential density, LAMIRD designations, and other regulations such as lot coverage governing intensity of allowed usage) commensurate with water availability and water quality."[26]

The Board made a finding that there is "substantial evidence in the record about water availability limits and water pollution in rural

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[24] *See* RAP 10.3(a)(5) (The Statement of the Case should be a "fair statement of the facts and procedure relevant to the issues presented for review, without argument. Reference to the record must be included for each factual statement.")
[25] App. Brief at 6.
[26] AR 1370, FDO at 23 of 51.

Whatcom County,"[27] citing eleven Whatcom County-specific sources.[28] The Board then found that "the link between land development and water resources is well established,"[29] basing this finding on a discussion of the County-specific *2010 WRIA 1 State of the Watershed Report*[30] and taking official notice of two government reports.[31]

Based on "the evidence in the record about the extent and persistence of water pollution and lack of water availability in Whatcom County, and the need to integrate land use and water resource planning," the Board found that "the County has not employed effective land use planning that contains measures to protect water supply and water quality as required by the GMA."[32]

The Board adopted findings for each challenged provision of the Ordinance.[33] Policy 2DD-2.C.6 addresses water availability for subdivision applications. Policy 2DD-2.C.7 "[r]egulate[s] groundwater withdrawals" but applies only to "purveyors of public water systems and

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[27] *Id.*
[28] AR 1370-75, *Id.* at 23-28 of 51.
[29] AR 1377, *Id.* at 30 of 51.
[30] AR 1377-78, *Id.* at 30-31 of 51. WRIA means "Water Resource Inventory Area" geographical areas which were established by Ecology following basin boundaries.
[31] AR 1378-81, *Id.* at 31-34 of 51. In its Statement of the Case, the County challenges the Board's official notice of these two reports, arguing that the Board acted "improperly." App. Brief at 10. We address this argument in Section IV "E", below.
[32] AR 1381-82, FDO at 34-35 of 51.
[33] AR 1383-91, *Id.* at 36-44 of 51.

private water system applicants"[34] and not building permit applicants seeking to rely on exempt wells. Both policies adopt by reference existing Whatcom County Code provisions that allow the approval of subdivisions and building permits relying on the use of exempt wells in closed watersheds. The only exception is "where DOE has determined by rule that water for development does not exist."[35]

The Board found that these provisions demonstrate that the County requires no consideration of the legal availability of water prior to issuing subdivision approvals and building permits for projects that rely on exempt wells, even in closed sub-basins that do not meet instream flows. The Board found that the County's policies do not govern development in a way that protects rural character.[36] This conclusion is supported by the record. Between 1986 and 2011, exempt wells in WRIA 1 increased 270 percent from an estimated 3,294 wells to an estimated 12,195 wells.[37] Approximately 77 percent of the increase was in the parts of WRIA 1, closed to the appropriation of water part or all of the year.[38] From 1986 to 2009, the Nooksack River failed to meet instream flows 72 percent of the

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[34] AR 1387, *Id.* at 40 of 51.
[35] AR 1387, *Id.*, citing Whatcom County Code (WCC) 21.04.090 (in AR 744), WCC 21.05.080 (in AR 745), and WCC 24.11.050 (in AR 748).
[36] AR 1388-89, FDO at 41-42 of 51.
[37] AR 1263, R-153 Northwest Indian Fisheries Commission, *2012 State of Our Watersheds* at 80.
[38] *Id.*

time during the July-September flow period.[39] Not meeting the instream flows results in a loss of habitat connectivity, reduces habitat, strands juvenile salmon, increases instream temperatures, and decreases water quality.[40] Continued well water withdrawals "is in direct conflict with the guidance of the Salmonid Recovery Plan, which recommends reducing out of stream uses in sub-basins impacted by low stream flows."[41]

In addressing Policy 2DD-2.D.7, the Board found that "the record contains a letter provided by Ecology explaining the effect of closed basins and instream flows on rural residential development."[42] Following a discussion of the letter and of GMA provisions, the Board found that, "according to Ecology, the County must deny a new permit for a new building or subdivision unless the applicant can demonstrate factually that a proposed new withdrawal from a groundwater body hydraulically connected to an impaired surface water body will not cause further adverse impact on flows."[43]

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[39] *Id.*
[40] *Id.*
[41] *Id.*
[42] AR 1388, FDO at 41 of 51.
[43] AR 1389, *Id.* at 42 (emphasis added). The County's Statement of the Case incorrectly contends that "**the Board** determined that the County must 'deny a permit for a new building or subdivision unless the applicant can demonstrate factually that a proposed new withdrawal from a groundwater body hydraulically connected to an impaired surface water body will not cause further adverse impact on flows.'" App. Brief at 9, emphasis added). In fact, the Board wrote that it has "no jurisdiction over the issuance of building permits but only over development regulations." AR 1390, FDO at 42 of 51, n. 156.

The Board's findings on water quality issues include determinations that protective policies are limited to specific areas of the County and do not apply throughout the Rural Area[44] and that regulations fail to protect water quality from faulty septic tanks.[45]

The Board remanded the Ordinance to the County to take the necessary action to achieve GMA compliance.[46] As stated in the Order, "the County has many options for adopting measures to reverse water resource degradation in its Rural Area through land use controls."[47]

IV. ARGUMENT

A. Standard of Review

The Administrative Procedure Act (APA) governs judicial review of challenges to decisions by the Board.[48] "Courts apply the standards of the Administrative Procedure Act, chapter 34.05 RCW, and look directly to the record before the board."[49] The party challenging the Board decision (here the County for its issues and the Hirst Petitioners for ours) bears the

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[44] AR 1383, FDO at 36 of 51 (addressing Policy 2DD-2.C.1); AR 1385, *id.* at 38 of 51 (addressing Policy 2DD-2.C.3); AR 1385-86, *id.* at 38-39 of 51 (addressing Policy 2DD-2.C.4); AR 1389-90, *id.* at 42-43 of 51 (addressing policies 2DD-2.C.8 and 2DD-2.C.9).
[45] AR 1383-85, FDO at 36-38 of 51 (addressing Policy 2DD-2.C.2).
[46] AR 1397, *Id.* at 50 of 51.
[47] AR 1390, *Id.* at 43 of 51.
[48] *Quadrant Corp. v. State Growth Mgmt. Hearings Bd.*, 154 Wn.2d 224, 233, 110 P.3d 1132 (2005).
[49] *Kittitas County v. Eastern Washington Growth Mgmt. Hearings Bd.*, 172 Wn.2d 144, 155, 256 P.3d 1193, 1198 (2011) ("*Kittitas*").

burden of proving it is invalid.[50] A court "shall grant relief only if it determines that a person seeking judicial relief has been substantially prejudiced by the action complained of."[51]

While the County's actions are presumed compliant unless and until a petitioner brings forth evidence that persuades a board that the action is clearly erroneous, "deference to counties remains 'bounded ... by the goals and requirements of the GMA.' The deference boards must give 'is neither unlimited nor does it approximate a rubber stamp.'"[52] Furthermore, "when it comes to interpreting the GMA, the same deference to counties does not adhere, and [courts] give substantial weight to a board's interpretation."[53]

Relief from a Board decision may be granted on nine different APA grounds. Although the County's brief states that its appeal is based on seven of these grounds – RCW 34.05.570(3)(a)-(e), (h), and (i)[54] – at least three of these grounds are never addressed. The County never uses the word "constitution" or claims that any Board action is arbitrary and

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[50] *Thurston County v. Cooper Point Ass'n.*, 148 Wn.2d 1, 7 – 8, 57 P.3d 1156, 1159 – 60 (2002) *citing* RCW 34.05.570(1)(a); *Spokane County v. EWGMHB*, 176 Wn. App. 555, 564, 309 P.3d 673, 678 (2013).
[51] RCW 34.05.570(1)(d).
[52] *Kittitas,* 172 Wn.2d at 156, 256 P.3d at 1199 (2011) (internal citations omitted).
[53] *Id.* (emphasis added).
[54] App. Brief at 11 and 11-12, n. 23. Footnote 23 references "RCW 34.05.570(3)(a)-(e), (h), (i)," but does not provides the text of RCW 34.05.570(3)(b).

capricious. The County therefore has waived any claims[55] based on RCW 34.05.570(3)(a)[56] (constitutional violation) or RCW 34.05.570(3)(i) (arbitrary and capricious).[57]

The County cites RCW 34.05.570(3)(b) and RCW 34.05.570(3)(h) during its objection to the Board's official notice of two government documents.[58] The County made no argument under RCW 34.05.570(3)(b), as to the Board's statutory authority or jurisdiction.[59] The County therefore has waived any such argument.

The County's water resource argument states that the Board's decision was "erroneous," indicating an intent to invoke RCW 34.05.570(3)(d). Under the *de novo* review standard for questions of law under RCW 34.05.570(3)(d), "[s]ubstantial weight is accorded to a board's interpretation of the GMA, but the court is not bound by the board's interpretations."[60]

The water resources argument also uses the term "substantial

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[55] When no argument is made in the opening brief, the assignment of error is waived. *Cowiche Canyon Conservancy v. Bosley*, 118 Wn.2d 801, 809, 828 P.2d 549, 553 (1992).
[56] The court would review the record *de novo* to determine whether a constitutional violation has occurred. *Johnson v. Dep't of Fish and Wildlife*, 175 Wn. App. 765, 772, 305 P.3d 1130, 1133 (2013).
[57] A claim under this standard would have to show "'willful and unreasoning action, taken without regard to or consideration of the facts and circumstances surrounding the action.'" *Kendall v. Douglas, Grant, Lincoln & Okanogan Counties Pub. Hosp. Dist. No. 6*, 118 Wn.2d 1, 14, 820 P.2d 497 (1991) (footnote and citation omitted).
[58] App. Brief at 47, referring to RCW 34.05.570(3)(b) and RCW 34.05.570(3)(h). *See infra*, Section IV "E" beginning on page 41, for a response to the County's arguments.
[59] RCW 34.05.570(3)(b).
[60] *Thurston County v. Western Washington Growth Management Hearings Bd.*, 164 Wn.2d 329, 341, 190 P.3d 38, 44 (2008).

evidence," presumably invoking RCW 34.05.570(3)(e). Substantial evidence means "'a sufficient quantity of evidence to persuade a fair-minded person of the truth or correctness of the order.'"[61] The court "view[s] the evidence 'in the light most favorable to ... "the party who prevailed in the highest forum that exercised fact-finding authority"' (in this case, Hirst and Futurewise). Doing so "'necessarily entails accept[ing] the factfinder's views regarding. . . the weight to be given reasonable but competing inferences.'"[62] On mixed questions of law and fact, the court determines the law independently, and then applies it to the facts as found by the Board.[63] The reviewing court does not weigh the evidence or substitute its view of the facts for that of the Board.[64]

B. The County's Failure to Assign Error to Findings of Fact Makes Them Verities on Appeal.

The County did not assign error to any of the Board's findings of fact.[65] Consequently, the Board's findings of fact are verities on appeal.[66]

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[61] *Id.* (internal quotation marks omitted), quoting *City of Redmond v. Central Puget Sound Growth Management Hearings Bd.*, 136 Wn.2d 38, 46, 959 P.2d 1091, 1094 (1998).
[62] *Spokane County v. EWGMHB*, 176 Wn. App. 555, 565, 309 P.3d 673, 678 (2013), *quoting City of Univ. Place v. McGuire*, 144 Wn.2d 640, 652, 30 P.3d 453 (2001).
[63] *Thurston County v. Cooper Point Ass'n*, 148 Wn.2d 1, 8, 57 P.3d 1156, 1160 (2002).
[64] *Callecod v. Wash. State Patrol*, 84 Wn. App. 663, 676, 929 P.2d 510, 516 n.9 (1997) *review denied Callecod v. Wash. State Patrol*, 132 Wn.2d 1004, 939 P.2d 215 (1997).
[65] App. Brief at 4-5.
[66] *Davis v. Dep't of Labor & Indus.*, 94 Wn.2d 119, 123, 615 P.2d 1279, 1282 (1980); *Manke Lumber Co., Inc. v. Central Puget Sound Growth Management Hearings Bd.* 113 Wn. App. 615, 628, 53 P.3d 1011, 1018 (2002), review denied *Manke Lumber Co. v. Central Puget Sound Growth Management Hearings Board*, 148 Wn.2d 1017, 64 P.3d 649 (2003)

C. County's Issue 1: The Board Did Not "Err by Ruling that the GMA Requires the County, When Making Water Determinations, To Adopt a Legal Interpretation of the Controlling Water Resources Regulations That Is Independent Of and Inconsistent With Ecology's Interpretation". No "Ecology Interpretation" Exists, the 1985 Regulations Do Not "Control" the County's GMA Obligation, and the Board's Decision is Supported by Substantial Evidence And Is Not Clearly Erroneous.

1. Substantial Evidence Supports the Board's Decision.

The Board's decision is based on substantial evidence in the record demonstrating that the County's land use planning does not protect water quality and quantity.[67] Because the County did not assign error to any of the Board's factual findings, these facts are verities on appeal. The evidence cited in the Board's order constitutes "'a sufficient quantity of evidence to persuade a fair-minded person of the truth or correctness'"[68] of the Board's conclusions.

The Board relied on facts from Ecology reports showing that year-round or seasonally-closed watersheds account for a large portion of the County[69] and that most water "is already legally spoken for."[70] The 1985 Rule established instream flows, and the Board cited evidence that

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[67] AR 1370-78, FDO at 23-31 of 51.
[68] *Thurston County*, 164 Wn.2d at 341 (internal quotation marks omitted), quoting *City of Redmond*, 136 Wn.2d at 46.
[69] AR 1370, FDO at 23 of 51, citing AR 470-81, Ex. C-683-A.14 *WRIA 1 State of the Watershed Report* (2010).
[70] AR 1370, FDO at 23 of 51, citing AR 421, Ex. C-671-G Ecology, *Focus on Water Availability: Nooksack Watershed, WRIA 1* at 1. As the Board observed, WRIA 1 comprises most of Whatcom County. AR 425, Id. at 5; AR 1371, FDO at 24 of 51, n. 76.

instream flows are not met.[71]

Significantly, the Board found that the County's own studies and decision documents provide substantial evidence that exempt wells adversely affect surface and groundwater flows. In its 1999 Water Resource Plan – the County's most recent plan – "the County reported a proliferation of rural residential exempt wells already created 'difficulties for effective water resource management' by drawing down underlying aquifers and reducing groundwater recharge of streams."[72] The Board found that 1,652 wells have been drilled within closed basins since 1997[73] and that 77% of the increase in exempt wells in WRIA 1 has taken place in basins closed year round or seasonally to water withdrawal.[74]

As the Board observed, the Environment element of the County's own Comprehensive Plan states:

> Surface and groundwater quality problems can be found in many areas of Whatcom County. . . There are significant legal limitations in obtaining water. Management actions between and within jurisdictions are not always well coordinated or consistent. . . .

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[71] AR 1371, FDO at 24 of 51 ("The record indicates average minimum instream flows in the mainstem and middle fork Nooksack River are not met an average of 100 days a year"), citing AR 423, Ex. C-761-G Ecology, *Focus on Water Availability: Nooksack Watershed, WRIA 1* at 3.

[72] AR 1348, FDO at 24 of 51, citing AR 393 Ex. C-671-D, *Whatcom County Water Resource Plan* at 49.

[73] AR 1371, FDO at 24 of 51. *See also* AR 504, Ex. C-685-F Map, AR 502, Ex. C-685-E (the rural well log data supporting these maps, as described in AR 485, Ex. C-685 at 3, fn. 3); AR 464, Ex. C-683 (Stalheim letter, 7/23/12) at 6; AR 484-85, Ex. C-685 (Nossaman, 7/20/12) at 2-3: and AR 1263.

[74] AR 1371, FDO at 24 of 51, citing AR 1263, R-153 Northwest Indian Fisheries Commission, *2012 State of Our Watersheds* at 80.

> These problems and issues have already led to many impacts. . . [including] a lack of adequate water storage and delivery systems to meet the requirements of growth and development; concerns with the availability of water to meet existing agricultural and public water supply demands; potential difficulties and additional costs associated with obtaining building permits and subdivision approvals; and other related increasing financial costs to the community. Long-term resolution of the numerous, complex and changing water issues requires actions in many areas.[75]

County documents also show that the County Council unanimously approved a Resolution to update water system plans, because "[l]and use decisions are made assuming sufficient water resources will be available to serve these land uses. In Whatcom County, water supply is not sufficient to meet all competing needs whether it is because of water rights, water quality or water quantity."[76]

The Board made the important factual finding that "[t]he link between stream flows and groundwater withdrawals in the shallow Whatcom aquifers and stream flows is well documented."[77] As one County document states, "[a] number of studies indicate that shallow aquifers of the County are responsible for approximately 70% of base stream flow."[78]

Water withdrawals in Whatcom County are linked with fish habitat

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[75] AR 1372-73, FDO at 25-26, quoting AR 688-91, AR 692, Whatcom County Comp. Plan, Ch. 11 Environment at 11-14 and 15.
[76] AR 1372, FDO at 25, quoting AR 324, Ex. C-671-B Whatcom Co. Council Agenda, Economic Development Investment Board Request, Sept. 6, 2011 at 1 of *Water Supply Planning for Economic Certainty in Whatcom County* (WRIA 1) (emphasis in FDO).
[77] AR 1371, FDO at 24.
[78] AR 1371, FDO at 24, quoting AR 659-60 Ex. C-788-A15, Whatcom County Draft EIS, 10-Year Urban Growth Area Review (2009), at 4.3-2 - 4.3-3.

and salmonid recovery.[79] Hirst submitted substantial evidence to the Board that water quantity and instream flow problems are contributing to the decline of three Puget Sound salmon species found in WRIA 1– chinook, bull trout, and steelhead– that are listed as "threatened" under the Federal Endangered Species Act.[80] The County did not respond to arguments or evidence about the effects of water quality on fish, as the Board recognized in factual findings.[81] The County now asserts "[t]hat is incorrect," but cites no evidence.[82] In an attempt to sidestep the issue, it asserts (again, with no support) that "arguments regarding fish and wildlife were simply additional support for their basic premise that measures to protect water quality and quantity are important."[83] There was no "premise" that measures to protect water quality and quantity are "important" – protection is a GMA mandate.[84] This undisputed evidence about effects on fish supports the Board's conclusions that the Ordinance does not meet "GMA mandates."[85]

The County's response to its serious water availability problem was merely to adopt Policies 2DD-2.C.6 and 7. These "measures"

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[79] AR 1355, FDO at 8.
[80] AR 262-63, Hirst Prehearing Brief at 18-19; AR 1362, FDO at 17 of 51.
[81] AR 1367, AR 1376, FDO at 20, 29 of 51.
[82] App. Brief at 14, n.34.
[83] *Id.*
[84] RCW 36.70A.070(5)(c)(iv).
[85] AR 1382, FDO at 35.

incorporate by reference three existing code sections,[86] all of which allow the use of exempt wells in closed watersheds and where instream flows have not been met, with no showing that water is legally available.[87]

The Board's determination that these measures violate the GMA was based on substantial evidence that development in the rural areas of the County, including groundwater withdrawals by exempt wells, fails to protect rural character. The County did not refute this substantial evidence of adverse effects on fish, ground and surface water, and it did not provide conflicting evidence. The County simply asserts that its Comprehensive Plan policies cannot be GMA-noncompliant so long as they conform to the County's vision of "Ecology's past interpretation of WRIA 1."[88]

This contention fails to meet the County's burden of showing that the Board's decision was not supported by substantial evidence. It is also based on errors of law, as discussed in the next section.

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[86] WCC 21.04.090 (AR 744), WCC 21.05.080 (AR 745), and WCC 24.11.050 (AR 748).
[87] These findings are summarized above in the Statement of the Case beginning page 5.
[88] App. Brief at 25.

2. The Board's Decision Correctly Interprets and Applies the GMA and Is Not Clearly Erroneous.

a. The County May Not Raise the Issue of a Controlling "Ecology Interpretation" For the First Time On Appeal.

County Issue 1 asserts that the Board's ruling was clearly erroneous[89] because it requires the County to "adopt a legal interpretation of the controlling water resources regulations that is independent of and inconsistent with Ecology's interpretation."[90] The County asserts that "the Board failed to give deference to the County's reasonable reliance on Ecology's interpretations" of the 1985 Rule[91] and even goes so far as to argue that, "[a]t its core, the Board's decision (and the Petitioners' appeal[92]) challenges Ecology's controlling interpretation of its rule."[93]

The County's argument is spun from straw. The alleged existence and content of this crucial "Ecology interpretation," which purportedly controls the Board's GMA determination, was never raised before the Board.[94] RCW 34.05.554(1) provides that"[i]ssues not raised before the

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[89] App. Brief at 4 (Assignment of Error 1).
[90] App. Brief at 21 (emphasis added).
[91] App. Brief at 25.
[92] The County appears to be referring to the Hirst and Futurewise appeal to the Board.
[93] App. Brief at 28-29.
[94] *See* AR 835, AR 841-42, County Response Brief before GMHB at 1, 7-8 (no reference to an Ecology interpretation). See also AR 1365-66 FDO at 18-19 of 51 (summary of the County's argument before the Board with no assertion of a governing "Ecology interpretation.")

agency may not be raised on appeal." The County may not raise this issue for the first time on this appeal.

Ecology's 1985 Rule established minimum instream flows[95] and closed most of the streams, tributaries, and lakes in Whatcom County to further appropriation, either year round or during the dry summer months.[96] Before the Board, the County argued that the 1985 Rule, "by its express terms,"[97] does not affect exempt wells in closed sub-basins.[98]

The Board fully addressed this argument.[99] Its analysis includes a factual finding that the record contains a letter from Ecology to Snohomish County, providing evidence of Ecology's views of "the effect of closed basins and instream flows on rural residential development." ("Ecology Letter").[100] The Ecology Letter agrees that "in a basin which is closed by regulation to new unmitigated withdrawals" the proper approach is not to approve permits that rely on permit exempt wells unless the

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[95] WAC 173-501-030.
[96] WAC 173-501-040. *See also* AR 479, C-683A.14 *WRIA 1 State of the Watershed Report* at 10 Figure 6 (2010).
[97] AR 842, County Response Br. at 8 (emphasis added).
[98] AR 842-43, *Id.* at 8-9.
[99] The Order accurately summarizes the County's argument, concluding that "the County contends Petitioners' argument that numerous exempt wells in closed basins demonstrate noncompliance with the GMA is without merit because the County complies with Ecology's water resource regulations." AR 1365-66, FDO at 18-19 of 51. No "Ecology interpretation" was raised.
[100] AR 1388, FDO at 41 of 51, referencing AR 456, Ex. C-678 Ecology, Maia Bellon letter to Clay White, Snohomish County Planning and Development Services (December 19, 2011) at 7. Ecology had provided the Ecology Letter to Whatcom County, stating that it contained "information that may be of interest and/or helpful to you." AR 809, Ex. R-082 at 4 Kasey Ignac, Ecology, email to Whatcom County PDS.

applicant provides "documentation of an alternative water source such as a connection to a public water system or mitigation for their well." [101]

Now the County asserts that the Board's decision violates some other, conflicting "Ecology interpretation." Had the County argued before the Board that an "Ecology interpretation" is "controlling" of the County's GMA obligations, the Board would have had an opportunity to address this "Ecology interpretation." But the County did not raise this issue.

The County still has not identified an "Ecology interpretation." For an agency interpretation to be entitled to great weight, it must be established that the agency "adopted and applied such interpretation as a matter of agency policy."[102] While such adoption need not be formal, "it must represent a policy decision by the person or persons responsible."[103] An "isolated action" by Ecology does not establish an "interpretation;" the agency must apply an interpretation "uniformly."[104]

On appeal, for the first time, the County asserts that an "Ecology interpretation" is contained in a single Pollution Control Hearings Board decision. [105] This decision, *Steensma v. Dept. of Ecology*, held that "[t]he

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[101] AR 455, Ex. C-678 Ecology, Maia Bellon letter to Clay White, Snohomish County Planning and Development Services (Dec. 19, 2011) at 6.
[102] *Cowiche Canyon Conservancy,* 118 Wn.2d at 815.
[103] *Id.*
[104] *Id.*
[105] App. Brief at 21, citing *Steensma* v. *Ecology,* PCHB No. 1 1-053, Order Granting Summary Judgment to Ecology (Sept. 8, 2011) ("*Steensma*").

letter which the Steensmas appealed, while offering Ecology's views on the applicant's proposal for water supply for the subdivision, does not . . . constitute a decision or adjudication by Ecology on the permit-exempt groundwater use that may occur to supply water for the project. . ."[106] This reference to a non-decision by Ecology falls far short of the standard to establish a uniform "agency interpretation" that "documents Ecology's position that the basin closure does not apply to permit-exempt wells,"[107] as the County claims.[108]

Because Issue 1's purported controlling "Ecology interpretation" was never raised before the Board, it cannot be raised in this judicial review.[109] Even if such an "Ecology interpretation" existed in the record (which it does not), an "interpretation" that conflicts with state law would not be accorded deference.[110] As discussed further below, an "Ecology

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[106] *Steensma* at 7 (emphasis added). *See also id.* at 9 ("The Board concludes that the letter sent by Ecology to Whatcom County was just what it purported to be, a comment letter to Whatcom County Health Department providing information and clarification regarding water resources for the Bertrand Creek Estates Plat.")

[107] App. Brief at 21.

[108] Although undisclosed by the County, *Steensma* does include an important legal conclusion that is germane to this case. *Steensma* held that the Legislature has determined that the County, not Ecology, is "the appropriate entity to make the decision" on the availability of potable water for a subdivision. *Steensma* at 7-9. This holding is consistent with the Ecology Letter, as discussed further in the following section.

[109] None of the exceptions identified in RCW 34.05.554(1) applies to this case: the County knew of facts giving rise to the issue, the agency action is not a rule, the County was notified of the of the Board's proceedings, and there is no change in controlling law. RCW 34.05.554(1)(a)-(d).

[110] *Postema,* 142 Wn.2d at 77.

interpretation" that required the County to violate the GMA by failing to protect water resources would violate state law.

b. The Board Correctly Interpreted the GMA, Including *Kittitas*, in Determining That the Ordinance Did Not Protect Surface and Groundwater Flows.

The Board appropriately addressed the issue before it: the County's compliance with the GMA, not the County's compliance with the 1985 Rule. The question before the Board was "whether Whatcom County has adopted measures that apply the GMA requirements about water under the local circumstances here."[111] To answer that question, the Board considered "whether *Kittitas County* requires the County to change its other long-range planning (including residential density, LAMIRD designations, and other regulations such as lot coverage governing intensity of allowed usage) commensurate with water availability and water quality."[112]

Kittitas addressed the fact that "[t]he GMA includes requirements that counties consider and address water resource issues in land use planning."[113] In addition to meeting rural element requirements, any

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[111] AR 1370, FDO at 23 of 51.
[112] *Id.*
[113] *Kittitas*, 172 Wn.2d at 175 ("*See, e.g.*, RCW 36.70A.020(10) (GMA goal to protect the environment, including "water quality [ ] and the availability of water"), .070(1) (requiring that land use elements "shall provide for protection of the quality and quantity of groundwater used for public water supplies"), (5)(c)(iv) (requiring that rural elements include measures "[p]rotecting ... surface water and groundwater resources")).

amendment or revision to a comprehensive plan must comply with the entire GMA.[114] Development regulations must be consistent with all mandatory elements of the Comprehensive Plan and GMA that protect surface and ground water resources.[115] Accordingly, the Board recognized that the County's Comprehensive Plan and development regulations must be consistent with and implement a Land Use Element that provides for the "protection of the quality and quantity of groundwater used for public water supplies,"[116] and that includes "corrective actions to mitigate or cleanse those discharges that pollute waters of the state, including Puget Sound or waters entering Puget Sound."[117]

Kittitas squarely addressed the issue of whether state water law preempts these GMA requirements, and concludes that it does not. The Court held that state law "preempts the County from separately *appropriating* groundwaters,"[118] but that it "does not prevent the County

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[114] RCW 36.70A.130(1)(d).
[115] AR 1368-69, FDO at 21-22 of 51, citing RCW 36.70A.040(4)(d) ("The county and each city that is located within the county shall adopted a comprehensive plan and development regulations that are consistent with and implement the comprehensive plan...") and RCW 36.70A.130(1)(d). See also *Kittitas*, 172 Wn.2d at 164 "County development regulations must also comply with the requirements of the GMA. See RCW 36.70A.130(1)(a)..."
[116] AR 1368, FDO at 21 of 51, quoting RCW 36.70A.070(1) (emphasis in the FDO).
[117] AR 1368, FDO at 21 of 51, citing RCW 36.70A.070(1) (emphasis in the FDO). This refutes the County's assertion that requirements for the Land Use Element are "inapplicable" to the Rural Element, and that the Board "erred" in citing these requirements. App. Brief at 13 n. 32.
[118] *Kittitas*, 172 Wn.2d at 178 (emphasis in original).

from protecting public groundwaters from detrimental land uses."[119] As long as local land use regulations are consistent with state law preemption of the appropriation of groundwater, the Supreme Court concluded that "[n]othing in the text of chapter 90.44 RCW [the state water code] expressly preempts consistent local regulation."[120]

The Court flatly rejected Kittitas County's argument that the authority to protect groundwater resources rests solely with Ecology,[121] finding that "[i]n fact, several relevant statutes indicate that the County *must* regulate to some extent to assure that land use is not inconsistent with available water resources."[122] Relevant statutes include GMA Rural and Land Use Element provisions[123] and "[a]dditional GMA provisions, codified at RCW 19.27.097 and 58.17.110," which "require counties to assure adequate potable water is available when issuing building permits and approving subdivision applications."[124] The Supreme Court concluded that "the County is not precluded and, in fact, is required to plan for the protection of water resources in its land use planning."[125]

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[119] *Id.*
[120] *Id.*
[121] *Id.*
[122] *Id.* (emphasis in original).
[123] *Id.*, citing RCW 36.70A.070(1) and 36.70A.070 (5)(c)(iv).
[124] *Id.* at 178-79 (emphasis added).
[125] *Id.* at 179.

It is important to emphasize that *Kittitas* refers to GMA requirements, including RCW 19.27.097, 58.17.110, 36.70A.070(1), and RCW 36.70A.070(5)(c)(iv), that govern the issuance of building permits and "land use planning." The Court does not say that the application of GMA water requirements is limited solely to counties' subdivision approvals. Although the County repeatedly contends that *Kittitas* extends no further than its facts, the Supreme Court's references to "land use planning" and "building permits" contradicts this claim. The Board's analysis and decision is entirely consistent with *Kittitas*.

The County refuses to recognize that *Kittitas* requires it to implement GMA water requirements, asserting instead that *Kittitas* does nothing more than establish a "legal framework" requiring the Board to consider a different question: "namely, is Whatcom County's approach of protecting water resources consistent and cooperative with *Ecology's management of water resources*?"[126]

The County – not Ecology – has the legal responsibility under RCW 19.27.097 and 58.17.110 to determine water availability before it issues permits.[127] "[I]n making a land use decision that requires a finding that there is adequate water supply to support the proposed development, it

[126] App. Brief at 28 (emphasis added).
[127] *Kittitas,* 172 Wn.2d at 180; *Steensma* at 7-8; Ecology Letter, AR 452, at 3 of 8.

is the local government – and not Ecology – that is responsible to make the decision on water adequacy as part of its land use decision."[128]

As Ecology has recognized, *Kittitas* means that "counties must ascertain that water is *legally* available, and not just *physically or factually* available, before they can approve applications for subdivisions and building permits."[129] The Board's recognition of this legal fact[130] is not "an erroneous interpretation of the law," as the County contends. [131] The Board correctly notes (and the County does not contest) that the County regulations incorporated by reference into Policies 2DD-2.C6 and 2DD-2.C6 do not require any showing that water is legally available.[132] The Board also observed that:

> In *Postema v. Pollution Control Hearings Board*, the Supreme Court made clear that where Ecology has administratively by adoption of rules closed a surface water body as in much of Whatcom County, and an applicant intends to rely on a new withdrawal from a hydraulically connected groundwater body, new water is no longer

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[128] AR 1370, FDO at 23 of 51, *citing Kittitas,* 172 Wn. 2d at 180.
[129] AR 452, C-678 Ecology Letter at 3 of 8 (emphasis in original).
[130] AR 1366, FDO at 19 of 51.
[131] App. Brief at 19. The County attempts to put words into the Board's mouth, claiming that the Board "essentially" held that the County must "independently reach its own conclusions about legal availability, rather than following Ecology's lead." *Id.* In fact, the Board's statement that "Ecology provides technical assistance and model regulations, but County land use plans and regulations are necessary to assure protection of rural character, including water resource protection" (AR 1370, FDO at 23 of 51) is consistent with *Kittitas*' observation that Ecology "ought to assist counties in their land use planning to adequately protect water resources." *Kittitas*, 172 Wn.2d at 180.
[132] AR 1387-89, FDO at 40-42 of 51. See also AR 001257-60, R-152 Whatcom County Health Dept., *Water Availability Notification to Obtain Building Permit Private – 1 Home Well* (The Whatcom County Health Department's water availability form does not require that water be legally available).

> legally available for appropriation and the application must be denied. Likewise where Ecology has set minimum instream flow by rule, as in Nooksack WRIA 1, subsequent groundwater withdrawals may not contribute to the impairment of the flows. [133]

In the absence of any policy or regulation requiring a determination that water is legally available, the County has no mechanism to ensure that subdivisions or building permits relying on groundwater withdrawals will not impair surface water flows in closed sub-basins or in areas with minimum instream flows. The County asserts that the GMA does not require the County to protect its surface and ground waters through this determination, however, because such a requirement would force the County "to reach a legal conclusion regarding water availability pursuant to permit-exempt withdrawals that is contrary to that of Ecology under Ecology's [1985 Rule.]"[134]

Even if there were an "Ecology interpretation" expressing a "legal conclusion" that the 1985 Rule "was not intended to apply to permit exempt withdrawals," as the County claims,[135] it would not immunize the County from its obligation to protect surface and ground water under the

[133] AR 1387, FDO at 40 of 51, citing *Postema,* 142 Wn.2d at 81, 90, 93, 96.
[134] AR 1370, FDO at 23 of 51.
[135] App. Brief at 22.

GMA. *Kittitas* held that state water law does not preempt GMA requirements to protect groundwater through land use planning.[136]

Furthermore, the Board's decision and reasoning are entirely consistent with state water law. The Supreme Court's 2000 decision in *Postema* establishes that "a minimum flow set by rule is an existing right which may not be impaired by subsequent groundwater withdrawals."[137] There is no question that this determination applies to rules (including the 1985 Rule) that might otherwise arguably allow exempt wells to impair instream flows, because *Postema* addresses this issue. The Supreme Court held that, "even if the WRIA regulations [at issue in the case] could be read as establishing a limited minimum flow right . . . they would be inconsistent with the statutes and invalid."[138] The County's assertion of "Ecology's interpretation" would allow instream flows to be limited by exempt wells. Such an interpretation would be invalid because it would conflict with the underlying statute.

Postema also addresses the County's assertion that the 1985 Rule establishes conditions and limitations on the instream flow right by its very terms, which purportedly allow exempt wells in closed watersheds. Responding to an argument that "it is normal for water rights to contain

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[136] *Kittitas*, 172 Wn.2d at 180.
[137] *Postema*, 142 Wn.2d at 81.
[138] *Id.* at 83.

conditions and limitations," the Court held that, "[w]hile that is the case, it does not support the proposition that minimum flow rights are limited rights subject to impairment."[139]

Postema's holding that "a minimum flow set by rule is an existing right which may not be impaired by subsequent groundwater withdrawals"[140] is subject to only one "narrow exception." According to the Supreme Court, this "narrow exception" is found in RCW 90.54.020(3)(a), which provides that withdrawals of water which would conflict with the base flows 'shall be authorized only in those situations where it is clear that overriding considerations of the public interest will be served.'"[141] In *Postema*, Ecology claimed that this "overriding considerations of the public interest" provision was the legal basis for exempting single family domestic use from the instream flow protections contained in a 1985 rule.[142] Last year, however, the Supreme Court decision in *Swinomish Tribal Community v. Dept. of Ecology*[143] ("*Swinomish*") held that the water code does not contain "any provision

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[139] *Id.* at 90-91.
[140] *Id.* at 81.
[141] *Id.*
[142] "As to Ecology's rule, Ecology says that it has determined that the single family dwelling exempted domestic use is pursuant to RCW 90.54.020(3)(a), which provides that groundwater withdrawals which would conflict with the base flows 'shall be authorized only in those situations where it is clear that overriding considerations of the public interest will be served.'" *Postema*, 142 Wn.2d at 90. The Supreme Court did not rule on this assertion, which was tangential to the issues in that case.
[143] *Swinomish Tribal Community v. Dept. of Ecology*, 178 Wn.2d 571, 311 P.3d 6 (2013).

permitting a 'jump to the head of the line' in priority" for exempt wells.[144] This is the case even where Ecology has made a finding of overriding considerations of the public interest, as it had in adopting the rule at issue in *Swinomish.*[145] With no evidence in the record that Ecology made any finding of overriding considerations for the 1985 Rule, the County's claim that the 1985 Rule protects exempt wells from determinations of water availability lacks any legal justification.

Postema and *Swinomish* thus support the Board's conclusion that the GMA requires the County to avoid impairment of surface waters. Even if the County were correct that Ecology intended the 1985 Rule to allow exempt wells without any inquiry into their effect on instream flows, this original intent must change with changes in science and the law. Ultimately, as the Supreme Court mandated in *Postema*, "Ecology's intent was and is to prevent interference with instream flows."[146]

The County failed to address *Postema,* aside from the inaccurate claim that *Postema* stands solely for the proposition that each water basin's regulations are unique and should be interpreted differently.[147] All interpretations must, however, be consistent with state law, including *Postema, Kittitas,* and the GMA. As the Board stated, "[t]his Board has

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[144] *Swinomish,* 178 Wn. 2d at 598.
[145] *See id.* at 576 and 579.
[146] *Postema*, 142 Wn.2d at 88-89.
[147] App. Brief at 18 and 27-28.

previously held that exemption for private wells does not exempt the County from complying with the GMA's mandate to protect critical aquifers. Similarly, the exemption does not exempt Whatcom County from complying with the GMA rural element requirements. **The GMA** mandates comprehensive plan measures to protect rural character, defined as "patterns of land use and development . . . consistent with the protection of natural surface water flows."[148] The County did not meet its burden to show that this conclusion is a misinterpretation of the GMA.

D. County's Issue 2: The Board Did Not Err By Ruling That the County's Measures to Protect Surface and Ground Water Quality Do Not Comply With the GMA.

1. Substantial Evidence Supports the Board's Decision.

In determining that the Ordinance does not protect water quality as required by the GMA, the Board found that "[t]he proliferation of evidence in the record of continued water quality degradation resulting from land use and development activities underscores the need for protective measures for water resources."[149] Substantial evidence supports the Board's decision.

The Comprehensive Plan policies purportedly adopted to address water quality merely incorporate existing development regulations by

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[148] AR 1388, FDO at 41 of 51, citing *Olympic Envtl. Council v. Jefferson Cnty,* Growth Management Hearings Bd. Case No. 01-2-0015, Final Decision and Order (Jan. 10, 2002) at 14 and RCW 36.70A.030(15)(g) (emphasis added).
[149] AR 1382, FDO at 35 of 51.

reference. The Board found that Policy 2DD-2.C.1 incorporates regulations that only protect critical areas and do not protect the remainder of the Rural area.[150] Policy 2DD-2.C.3 incorporates "water resource overlay" regulations that only protect three watersheds (Lake Whatcom, Lake Samish, and Lake Padden).[151] The policy does not incorporate limits on development to protect the remainder of the rural area.[152] Nor does it limit impervious surfaces. The County claims that its regulations do in fact "limit impervious surfaces,"[153] but any such limits are either non-regulatory (a statement that development shall "minimize" impervious surfaces)[154] or does not cover a substantial portion of the rural area.[155]

Policy 2DD-2.C.4 incorporates stormwater regulations that only protect limited areas as defined in Ecology's NPDES Phase II permit boundaries; that is only urban areas and very limited rural areas near

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[150] AR 1383, *Id.* at 36 of 51, discussing WCC Ch. 16.16 Critical Areas provisions.
[151] AR 1385, *Id.* at 38 of 51, discussing WCC 20.71.021 in AR 733-34.
[152] AR 1385, *Id. See also id.* at n. 143, discussing WCC 20.71.010 found in AR 733.
[153] App. Brief at 37.
[154] App. Brief at fn. 103, citing WCC 20.80.634(l)(c), Appendix at 4 (all development "shall minimize impervious surface").
[155] *Id*, citing WCC 20.71.302, Appendix at 1 ("development in certain rural zoning districts sets restrictions on percentage of lot dedicated to "structures and impervious surfaces") (emphasis added). The County's RR (Rural Residential) development regulations impose no limits on the amount of impervious surface that may cover rural residential lots. AR 720-32, WCC Ch. 20.32. *See especially* WCC 20.32.450, in AR 731, (limits lot coverage, but no limit on impervious surfaces). Nor is there any limit on the amount of impervious surface that can be developed in the "Rural" zone. WCC Ch. 20.36. The portions of WCC Ch. 20.36 amended by Ordinance No. 2012-032 are at AR 89-92. *See especially* WCC 20.36.450, AR 92, (limits lot coverage, but no limit on impervious surfaces).

Ferndale and Bellingham.[156] The Board correctly found that "[o]nly those areas must use the most current and more stringent version of Ecology's stormwater manual."[157] The County's own document states that "The County has not yet adopted the Washington Department of Ecology Stormwater Manual for Western Washington."[158] The County's brief makes much of measures purportedly "required" by Chapter 2 of the County's "Public Works Development Standards" ("Stormwater Development Standards")[159] without disclosing that these "standards" are non-regulatory and therefore do not supersede zoning regulations. WCC 12.08.035(A) states clearly that the "development standards are not intended to establish new land use regulations."[160] Substantial evidence supports the Board's finding that that the County only requires the use of the 2012 Ecology stormwater manual in NPDES II areas of the County.[161]

Overall, the County's lengthy explication of its stormwater regulations merely supports the Board's conclusion: in much of the Rural area, regulations have not been updated to include Ecology's current

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[156] AR 1385-86, FDO at 38-39, discussing WCC 20.80.630.
[157] *Id.*
[158] AR 675, C-788A.20 (Whatcom County, FEIS for 10-Year UGA Update, 2009) at p. 5-4; correction made to Draft EIS (which had previously stated that the County had adopted Ecology's stormwater manual) at p. 4-8 which is At AR 673.
[159] App. Brief at 33-34.
[160] Accessed on May 15, 2014 at: http://www.codepublishing.com/wa/whatcomcounty/
[161] AR 1385-86, FDO at 38-39 of 51.

stormwater manual, and they are not sufficient to protect water resources, as evidenced by continuing and increasing levels of pollution.

With respect to septic tanks, the Board found that Policy 2DD-2.C.2, which incorporates by reference existing WCC Ch. 24.05 allowing onsite septic ("OSS") owners to conduct their own inspections, does not protect water resources. [162] The County's assertion that the Department of Health approved these standards, and that other jurisdictions may use this approach,[163] does not address "[t]he question before the Board," which is "whether Whatcom County has adopted measures that apply the GMA requirements about water under the local circumstances here."[164] Substantial evidence, including evidence that "malfunctioning on-site septic systems [are] a potential cause of water quality failures in three of the County's seven watershed areas,"[165] supports the Board's decision. While the County objects that failing septic tanks are not the largest pollution source affecting the heavily-polluted Sumas-Blaine aquifer,[166] the record establishes that approximately 23,000 area residents currently

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[162] AR 1384-85, *Id.* at 37-38 of 51.
[163] App. Brief at 37-38.
[164] AR 1370, FDO at 23 of 51. Similarly, the County's complaint that the Board found GMA compliance in Stevens County for what the County believes to be "generally worded policies" does not address, and has no relevance to, the evidence that Whatcom County's policies fail to protect water quality in Whatcom County. *See* App. Brief at 31, n. 82.
[165] AR 1384, *Id.* at 37 of 51.
[166] App.Br. at 39.

use on-site septic systems above the aquifer.[167] These systems contribute an estimated load of 207,000 pounds of nitrogen per year to area groundwater.[168] The County has chosen not to adopt septic tank inspection measures that would reduce the pollution from OSS, violating the GMA.[169]

This evidence exemplifies the evidence cited by the Board, connecting water quality problems to the County's failure to adopt measures to limit development to protect water resources. Another example is the County's failure to address "impaired" waterbodies under Section 303(d) of the Clean Water Act. Contrary to the County's assertion, the Board did not make a "general reference" to the "number of waterbodies listed as 'impaired.'"[170] In fact, the Board made a factual finding that standards and policies to limit pollution (Total Maximum Daily Loads, or TMDLs) for impaired water bodies were not addressed, either as measures governing land use in the Rural Element and or in development regulations for affected Rural areas.[171] This failure to address serious pollution problems by incorporating appropriate measures in the

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[167] AR 552, C-685N Ecology, *Nitrate Contamination in the Sumas-Blaine Aquifer,* (March 2011.)
[168] *Id.*
[169] The County additionally appears to claim that the OSS regulations are enforcement issues that should not be addressed under the GMA. App. Brief at 44. In fact, they are regulatory. WCC 24.05.160 B-C, at AR 747, incorporated by reference in Policy 2DD-2.C.2. *See* AR 1383, FDO at 36 of 51.
[170] App. Brief at 42.
[171] AR 1375, FDO at 28 of 51.

Rural Element supports the Board's determination that the County failed to protect water resources under the GMA. [172]

The Board's official notice of two government documents is addressed below, in section IV.E beginning on page 41.

2. The Board's Decision is Not Clearly Erroneous.

The County asserts that the Board's discussion of *Kittitas* is clearly erroneous[173] Again, the County incorrectly describes *Kittitas*, claiming that it limits the Board's GMA authority so that the Board may only determine whether the County had "exercise[d] its land use planning authority in a manner that is consistent with Ecology's regulation of water resources."[174] In fact, as the Board notes, *Kittitas* addressed the fact that "the County *must* regulate to some extent to assure that land use is not inconsistent with available water resources. The GMA directs that the rural and land use elements of a county's plan include measures that protect groundwater resources. RCW 36.70A.070(1), (5)(c)(iv)."[175] Quoting this language, the Board notes that it is "equally applicable to water quality" because "[l]ocal land use plans and regulations must seek to avoid groundwater contamination as well as managing surface water runoff to prevent

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[172] *Id,* citing *Butler v. Lewis County*, West. Wash. Growth Management Hearings Bd. Case No. 99-2-0027c, Final Decision and Order (June 20, 2000) at 56.
[173] App. Brief at 47-48.
[174] *Id.* at 47.
[175] *Kittitas*, 172 Wn.2d at 178-179 (emphasis in original), *quoted in* AR 1369, FDO at 22 of 51.

pollution."[176] The Board's analysis is consistent with *Kittitas*, consistent with the GMA, and not clearly erroneous.

The County further asserts that the Board has erroneously required Whatcom County to "restore" water quality and that the GMA prevents a "restoration" requirement.[177] This argument grossly misconstrues the GMA and relevant precedent.

The County bases its argument on the Supreme Court's decision in *Swinomish Indian Tribal Community v. Western Washington Growth Management Hearings Board*,[178] which addressed a "no harm" ordinance that required agricultural activities "not to cause harm or degradation" to critical areas.[179] The Supreme Court upheld a Board decision finding that this "no harm" ordinance met the GMA requirement to "protect" critical areas.[180] The County has not adopted a "no harm" standard for all of its waterways. It has never made this assertion, and the substantial evidence of pollution in the County's waterbodies would not support it. The challenged policies therefore do not meet the stringent standard of "no harm" that the Supreme Court addressed in *Swinomish v. WWGMHB*.

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[176] AR 1369, FDO at 22 of 51.
[177] App. Brief at 48.
[178] 161 Wn.2d 415, 166 P.3d 1198 (2007) ("*Swinomish v. WWGMHB*").
[179] *Id.* at 427.
[180] *Id.* at 427.

The Supreme Court further contrasted the GMA requirement to "protect" critical areas, at issue in *Swinomish v. WWGMHB*, with GMA Goal 10, which is at issue in this case. Goal 10 requires comprehensive plans and development regulations to "[p]rotect the environment and enhance the state's high quality of life, including . . . water quality, and the availability of water."[181] The Supreme Court discussed the "duty to enhance the quality of water," which it distinguished from the requirement to "protect" fish habitat at issue in that case.[182] The Court concluded that "[w]ithout firm instruction from the legislature to require enhancement of critical areas, we will not impose such a duty."[183]

In this case, the legislature has imposed a duty to "enhance" water quality. Far from undermining the Board's decision in this case, *Swinomish v. WWGMHB* supports the Board's conclusion that the County's action is clearly erroneous in view of the entire and in light of the goals and requirements of the GMA.[184]

The County's argument that the Board's reliance on evidence of "pre-existing conditions"[185] is clearly erroneous would lead to absurd results. All evidence of the failure to protect water quality will involve the

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[181] RCW 36.70A.020(10).
[182] *Swinomish v. WWGMHB*, 161 Wn.2d at 430.
[183] *Id.* (emphasis added).
[184] AR 1391, FDO at 44 of 51.
[185] App. Brief at 48. *See also id.* at 39 (complaining of "evidence of historic problems").

evaluation of "pre-existing conditions," because pollution is a "pre-existing" condition. Furthermore, if the GMA exempted "pre-existing conditions" from its requirement to protect rural character, local governments with the worst water pollution problems would be subject to the fewest planning requirements under the GMA. Such localities could merely assert that they must tolerate their "pre-existing" pollution because the GMA's water protection goals and requirements did not apply to "pre-existing" pollution. Nothing in the GMA supports this result, and the Board's interpretation of the is not clearly erroneous.

E. County's Issue 3: The Board Did Not Err By Taking Official Notice of Two Government Documents.

1. The Board Followed Its Own Procedures.

The Board took official notice of the Puget Sound Partnership's 2012/2013 *Action Agenda for Puget Sound* and Washington State Department of Fish and Wildlife's *Land Use Planning for Salmon, Steelhead and Trout*.[186] Copies of these documents are included in the Appendices.

The Board may take official notice of "facts stated in any publication . . . by any . . . state officer, department, or agency."[187] The

[186] AR 1356, FDO at 9 of 51.
[187] WAC 242-03-640(1)(b).

board "may take official notice of a material fact on its own initiative."[188] "In determining whether to take official notice of material facts, the presiding officer may consult any source of pertinent information, whether or not furnished by any party and whether or not admissible under the rules of evidence."[189]

The Board thus has the authority to take official notice of government documents and to determine when and whether to admit material facts, whether or not they were furnished by the parties. The County claims that the Board was required to notify the parties of materials to be officially noted, but this provision only applies to materials "proposed" to be officially noticed.[190] The two government reports were not "proposed" for official notice; the Board took notice on its own initiative, not because of a "proposal." The Board's authority extends to deciding to take official notice based on consultation with materials not provided by any party.[191] The County has not met its burden of showing that the action was inconsistent with a rule of the Board under RCW 34.05.570(3)(h).[192]

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[188] WAC 242-03-640(2).
[189] WAC 242-03-640(4)(a).
[190] WAC 242-03-640(3).
[191] WAC 242-03-640(4)(a).
[192] The County also may have intended to assert a violation of RCW 34.05.570(3)(c), although it did not cite this provision. If the County's argument is so interpreted, it has not carried its burden of showing that the Board "engaged in unlawful procedure or decision-making process, or has failed to follow a prescribed procedure."

2. The County Was Not Substantially Prejudiced.

The court also should deny the relief requested because the County was not substantially prejudiced by the action complained of.[193]

The Board cited "three authoritative references" to support its finding that "the link between land development and water resources is well-established."[194] The Board first discusses the *2010 WRIA 1 State of the Watershed Report*[195] and then discusses information from the two government reports. The Board concluded that "current science-based studies conclude that most water resource degradation in the Puget Sound region and Whatcom County in particular can be attributed to land use and land development practices."[196]

The Board's finding "the link between land development and water resources is well-established"[197] is amply supported by the *2010 WRIA 1 State of the Watershed Report*,[198] as explained in the Board's lengthy discussion of this report. Furthermore, the County does not even dispute the Board's finding. The first page of the County's opening brief states

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[193] The APA states that "The court shall grant relief only if it determines that a person seeking judicial relief has been substantially prejudiced by the action complained of." RCW 34.05.570(1)(d). *See also* WAC 242-03-530 (authority of the presiding officer to waive any requirement of the rules unless a party shows that it would be prejudiced).
[194] AR 1377-78, FDO at 30-31 of 51.
[195] AR 1377, FDO at 30 of 51, citing AR 474, C-683A.14 *WRIA 1 State of the Watershed Report* at 5 (2010).
[196] AR 1381, FDO at 34 of 51.
[197] AR 1377-78, FDO at 30-31 of 51.
[198] AR 1377, FDO at 30 of 51, citing AR 474, C-683A.14 *WRIA 1 State of the Watershed Report* at 5 (2010).

that "the County does not dispute that rural development can impact water resources."[199] Because the County has not been substantially prejudiced by the Board's official notice, the court should not grant relief.

F. Hirst Issue 1: Was the Board's conclusion that the "Petitioners have not met the standard for a declaration of invalidity" an erroneous interpretation or application of the GMA? (Assignment of Error 1.)

The "GMA requires that the Board adjudicate compliance, including invalidating noncompliant comprehensive plans. RCW 36.70A.280 and RCW 36.70A.302."[200] When the Board finds that a local government's comprehensive plan or development regulation does not comply with the GMA, it may limit its decision to a finding of noncompliance under RCW 36.70A.300(3)(b), or it may also make a finding of invalidity under RCW 36.70A.302. Noncompliance findings result in a remand of the matter to the County. Noncompliant plans and regulations remain valid during the remand period.[201]

Upon a finding of invalidity, in contrast, the noncompliant actions are rendered void.[202] As the Washington State Supreme Court has stated, RCW 36.70A.302(1) sets out the legal standards the Board must apply in

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[199] App. Brief at 1.
[200] *Ferry County v. Concerned Friends of Ferry County*, 121 Wn. App. 850, 855, 90 P.3d 698, 701 (2004).
[201] RCW 36.70A.300(4). See also *King County v. Central Puget Sound Growth Management Hearings Bd.*, 138 Wn.2d 161, 181, 979 P.2d 374, 384 (1999) ("*King County*") (footnote omitted).
[202] *King County v. Central Puget Sound Growth Management Hearings Bd.*, 138 Wn.2d 161, 181, 979 P.2d 374, 384 (1999) (footnote omitted).

deciding whether to make a determination of invalidity. RCW 36.70A.302(1) provides in full that:

> (1) The board may determine that part or all of a comprehensive plan or development regulations are invalid if the board:
>
> (a) Makes a finding of noncompliance and issues an order of remand under RCW 36.70A.300;
>
> (b) Includes in the final order a determination, supported by findings of fact and conclusions of law, that the continued validity of part or parts of the plan or regulation would substantially interfere with the fulfillment of the goals of this chapter; and
>
> (c) Specifies in the final order the particular part or parts of the plan or regulation that are determined to be invalid, and the reasons for their invalidity.

However, instead of applying this standard, the Board applied a very different standard. The Board dispensed with the Hirst Petitioners' request for a determination of invalidity in two sentences, writing:

> This Board has previously held that it will declare invalid only the most egregious noncompliant provisions which threaten the local government's future ability to achieve compliance with the Act.[203] Although the Board finds areas of noncompliance with the GMA, Petitioners have not met the standard for a declaration of invalidity.[204]

The standard for a determination of invalidity is not "the most egregious noncompliant provisions which threaten the local government's

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[203] The Board cited *Abenroth v. Skagit County,* West. Wash. Growth Management Hearings Bd. Case No. 97-2-0060c, Final Decision and Order (July 22, 1998), which applied the "most egregious, most threatening" standard. *Abenroth* at *73.
[204] AR 1397, FDO at 50 of 51.

future ability to achieve compliance with the Act." As this court has stated, under RCW 36.70A.302(1), the Board has the authority to invalidate where the Board (1) makes a finding of determination, (2) remands, (3) "makes a determination supported by findings and conclusions that the continued validity of the plan or regulation will *substantially interfere with the fulfillment of the goals of the GMA*;" and and (4) specifies and explains the invalid portion of the action.[205] Nowhere does RCW 36.70A.302 require a finding that noncompliant provisions are "the most egregious" or that they "threaten the local government's *future* ability" to comply with the GMA. Rather, the Board is to determine whether "the continued validity of the plan or regulation will *substantially* [not "egregiously"] *interfere* with the *fulfillment of the goals of the GMA* [not with "future ability to achieve compliance"] . . . RCW 36.70A.302(1)."[206]

While the Board may interpret the requirements of RCW 36.70A.302(1), the Board may not substitute or add to these requirements.[207] By altering the standards in RCW 36.70A.302(1) the

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[205] *Davidson Serles & Associates v. Central Puget Sound Growth Management Hearings Bd.*, 159 Wn. App. 148, 157, 244 P.3d 1003, 1007 (2010).
[206] RCW 36.70A.302.
[207] *City of Redmond v. Central Puget Sound Growth Management Hearings Bd.*, 116 Wn. App. 48, 56, 65 P.3d 337, 341 (2003) The Board cannot use a test that "has no support in the GMA." *Review denied City of Redmond v. Central Puget Sound Growth Management Hearings Bd.*, 150 Wn.2d 1007, 77 P.3d 651 (2003).

Board has erroneously interpreted and applied the GMA.[208] This court should remand the invalidity determination in this case back to the Board with instructions to apply the correct standard.

G. Hirst Issue 2: Are the findings of fact inherent in the Board's conclusion on invalidity supported by substantial evidence and are they based on a proper interpretation and application the GMA? (Assignment of Error 2.)

The record before the Board shows that all of the requirements for invalidity are met. Hirst and Futurewise argued that the Ordinance substantially interfered with the GMA's environmental protection goal because the rural element, as amended by the Ordinance, fails to protect water quality and the availability of water.[209] The Board's findings demonstrate that the continued validity of the Ordinance will "substantially interfere with the goals of the GMA," the legal standard set forth in RCW 36.70A.302(1).[210] The Board's subsequent dismissal of the invalidity request is not supported by substantial evidence.[211]

The Board found "substantial evidence in the record about water availability limits and water pollution in rural Whatcom County," including evidence that "year-round or seasonally closed watersheds

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[208] RCW 34.05.570(3)(d).
[209] AR 1271, *Hirst et al. v. Whatcom County*, GMHB Case No. 12-2-0013, Petitioners' Prehearing Brief p. 25. The environmental protection goal states: "Protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water." RCW 36.70A.030(10).
[210] *See also Davidson Serles, supra,* 159 Wn. App. at 157, 244 P.3d at 1007.
[211] RCW 34.05.570(3)(e).

account for a large portion of the County."[212] The Board found that "[m]ost water in the Nooksack watershed is already legally spoken for,"[213] that "some of the water sources are closed year round to additional withdrawals and some are closed part of the year" because of instream flows,[214] and that "average minimum instream flows in the mainstem and middle fork Nooksack River are not met an average of 100 days a year."[215]

The Board found that the County's own Water Resource Plan, as long ago as 1999, reported a proliferation of rural residential exempt wells that had already created "difficulties for effective water resource management" by drawing down underlying aquifers and reducing groundwater recharge of streams.[216] Evidence documented the drilling of new wells in closed aquifers[217] and established that "[t]he link between stream flows and groundwater withdrawals in the shallow Whatcom aquifers is well documented."[218]

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[212] AR 479, C-683A.14 *WRIA 1 State of the Watershed Report* at 10 (2010).
[213] AR 421, Ex. C-671G Ecology, *Focus on Water Availability: Nooksack Watershed, WRIA 1* at 1.
[214] AR 479, C-683A.14 *WRIA 1 State of the Watershed Report* at 10 (2010); AR 422-23, Ex. C-671G Ecology, *Focus on Water Availability: Nooksack Watershed, WRIA 1* at 2-3.
[215] AR 423, Ex. C-671G Ecology, *Focus on Water Availability: Nooksack Watershed, WRIA 1* at 3.
[216] AR 393, Ex. C-671-D, Whatcom County Water Resource Plan at 49.
[217] AR 257-58, Petitioners' Prehearing Brief at 13-14 and extensive documentation from well logs and other data at AR 502-06, AR 1334, AR 1257 – 60, and AR 1263.
[218] AR 659-70, Ex. C-788-A.15 Whatcom County Draft EIS, 10-Year Urban Growth Area Review at 4.3-2-4.3-3 (2009).

The Board found nitrate contamination of a rural Whatcom aquifer that is the only readily available drinking water source for roughly 27,000 rural residents of Whatcom County.[219] The Board found that the up to 23,000 residents use on-site sewage systems which contribute an estimated 207,000 pounds of nitrogen per year to area groundwater and that groundwater withdrawals are not prohibited.[220]

This partial list of Board evidence and findings shows substantial interference with the protection of the water quality and quantity. The Board's invalidity determination addressed none of this evidence.

In *Spokane County v. Eastern Washington Growth Management Hearings Board*,[221] the Court of Appeals upheld a Board determination of invalidity for a comprehensive plan amendment and rezone because it would substantially interfere with the GMA's environmental protection goal, RCW 36.70A.020(10). The court found that the Board had appropriately considered evidence of environmental impacts on a critical aquifer recharge area, and had "correctly interpreted and applied the law

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[219] AR 552, Ex. C-685N Ecology, *Nitrate Contamination in the Sumas-Blaine Aquifer, Whatcom County, Washington* (May 2011).
[220] *Id.*; AR 562 & AR 612, Ex. C-685O Ecology, *Sumas-Blaine Aquifer Nitrate Contamination Summary* at 5 & 55 (June 2012).
[221] *Spokane County v. Eastern Washington Growth Management Hearings Bd.*, 176 Wn. App. 555, 581-82, 309 P.3d 673, 685-86 (2013) *review denied Spokane County v. Eastern Washington Growth Management Hearings Bd.*, 179 Wn.2d 1015, 318 P.3d 279 (2014).

upon thorough reasoning with due consideration for the facts."[222]

In contrast, the Board here summarily dismissed Hirst and Futurewise's invalidity argument. It did not consider its own conclusions regarding the significance of the evidence, as partially summarized above. The Board's decision not to make a determination of invalidity both misinterpreted and misapplied the GMA and was not supported by substantial evidence.

V. CONCLUSION

Respondents respectfully request that the Court of Appeals uphold the decision of the Growth Management Hearings Board as to Whatcom County's issues. Appellants ask this Court to reverse the Board on its invalidity determination and remand the invalidity question back to the Board to apply the correct legal standard to Hirst and Futurewise's request.

Respectfully submitted on this 16th day of May, 2014.

NOSSMAN LLP	FUTUREWISE
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[222] *Spokane County*, at 176 Wn. App. 581 – 82, 309 P.3d at 686.

DECLARATION OF SERVICE

I, Tim Trohimovich, certify that I am a resident of the State of Washington, residing or employed in Seattle. I am over 18 years of age, and not a party to the above entitled action. I declare that on May 16, 2014, I caused the following documents to be served on the following parties in the manner indicated: Appellants' Brief & Brief of Respondents Hirst, *et al.* and Futurewise in Case No. 70796-5-I. The appendices are included with the paper copies.

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Signed and certified on this 16th day of May, 2014,

Tim Trohimovich

APPENDICES

Board Supplemental Exhibit 1:

Puget Sound Partnership's *201212013 Action Agenda for Puget Sound* (August 28, 2012)

The 2012/2013 Action Agenda for Puget Sound

The Puget Sound Action Agenda is the plan for cleaning up, restoring, and protecting Puget Sound by 2020

August 28, 2012

PugetSoundPartnership

LEADING PUGET SOUND RECOVERY

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Executive Summary

The Puget Sound Action Agenda lays out the work needed to protect and restore Puget Sound into the future. It is intended to drive investment and action. The 2012 Action Agenda is the result of over a year of work with state and federal agencies, tribal governments, local governments, representatives of the business and environmental caucuses, and other interested partners. It builds on the first Action Agenda, created in 2008, and progress since then.

Why is Action Needed

Puget Sound is a national treasure and the lifeblood of people who live here. It has been so from time immemorial. And now, on our watch, Puget Sound is in trouble.

Swimming beaches and shellfish beds are closed because of contamination. Dead zones are appearing in South Sound and Hood Canal where the lack of oxygen is killing fish and marine life. Populations of salmon once numbered in the millions have been reduced to the status of threatened or endangered. The iconic species of Puget Sound—the southern resident killer whale—carries some of the world's highest levels of PCBs and other bioaccumulative chemicals. They, along with the wild Chinook salmon they eat are now in danger of disappearing from our waters forever. Tribal nations that depend on Puget Sound resources to sustain their culture, traditions and ways of life find these uses, many of which are guaranteed by treaties, increasingly imperiled.

Threats to Puget Sound health have the potential to grow at the same rate as our burgeoning human population—but they don't have to. Our challenge is to accommodate the more than 1.5 million new people expected to live here by 2025, and adapt to a changing climate, without increasing pressures on Puget Sound from habitat and land use, stormwater, toxic pollution, and transportation.

A healthy Puget Sound will support our well-being and quality of life, the health of our communities, and a thriving economy in the Northwest, both now and in the future. While we don't expect Puget Sound to return to conditions before European settlers first arrived, we do want to derive many of the same benefits offered them, from a healthy, vibrant Puget Sound in the 21st century and beyond.

A Healthy Sound Supports a Healthy Economy

The dangers to Puget Sound's health are not merely aesthetic. In addition to being beautiful, the Sound works for us. The forests filter rain water of pollutants and bacteria, marshes and wetlands absorb high waters in storms and buffer our homes and businesses from damage. We experience these benefits from Puget Sound every day and most of us will not really notice these benefits until they are gone.

Today's investment in Puget Sound will directly influence the health of Washington State's economy tomorrow. Together the ports of Seattle and Tacoma make the Sound the second largest US harbor for container traffic, including $28 billion in state-originated exports and 34,000 jobs. There are 68 state parks and 3 national parks, as well as wildlife refuges, forests and other public lands that border Puget Sound. These assets help drive approximately $9.5 billion in travel spending, including 88,000 tourist-related jobs that bring $3 billion in income to the region.

"[It is our task] to ensure that the Puget Sound forever will be a thriving natural system, with clean marine and freshwaters, healthy and abundant native species, natural shorelines and places for public enjoyment, and a vibrant economy that prospers in productive harmony with a healthy Sound."

—Governor Christine Gregoire

The average annual commercial value for Puget Sound crab, shrimp, mussel, oyster, geoduck and other clams is $44 million, and recreational shellfishing is valued conservatively at $42 million per year. Recreational fishing in Puget Sound is valued conservatively at $57 million a year and commercial fishing is valued at $4 million a year.

Nearly 71% of all jobs and 77% of total income in Washington State are found in the Puget Sound Basin. Puget Sound is a place where employees want to live, work and build a family.
By investing in Puget Sound restoration we will create long-term jobs and economic benefits that go beyond the jobs associated with individual project implementation. Restoring salmon populations, for example, increases recreational, commercial, and tribal jobs, as well as wholesale and retail jobs. Restoration projects in estuaries and riparian areas create almost twice as many jobs per $1 million spent than infrastructure projects such as roadwork.

We already are seeing our investments in Puget Sound help to strengthen our economy and create jobs. In 2010 the investment in Puget Sound protection and restoration was in excess of $239,667,446 in funding, which created 6494 jobs across 434 projects. We can and must build on these successes in the years to come. There is still time to turn the tide towards protection and restoration of Puget Sound. Now is the time to act.

ALREADY MAKING A DIFFERENCE

The task is daunting; but we know that we can—and are—making a difference.

- At the tip of the Key Peninsula, the 94 acres and 1 mile of undeveloped shoreline of Devils Head has been, despite development pressure, permanently protected.
- In Henderson Inlet, in the South Sound, 240 acres of shellfish-growing tidelands were re-opened for harvest without weather restrictions.
- The City of Tacoma has reduced the pollution in stormwater runoff by controlling sources and removing the legacy of contaminated sediment from stormwater pipes and holding vaults.
- Puget Sound is a national leader in low impact development—Seattle Public Utilities' Natural Drainage Systems Program has won national recognition in this area.
- In Kitsap County, two new high-efficiency street sweepers remove more than 2,000 tons of road dirt and debris every year—removing pollution near its source.
- In Puget Sound's most highly urbanized bay, clean up and source control efforts are improving sediment quality. Levels of toxic metals like mercury and leads in Elliott Bay sediments are lower than they were ten years ago, and levels of PCBs and PAHs are lower too.

What is the Action Agenda

The Action Agenda is a complete picture of Puget Sound recovery including strategies and sub-strategies, ongoing activities and near-term actions. The strategies and sub-strategies are intended to be durable, but will be adapted as needed. It is made up of strategies, sub-strategies, ongoing program activities, and near-term actions and organized primarily into four broad categories.

A. **Freshwater and Terrestrial Protection and Restoration**, which includes strategies and actions related to land development and restoration, stewardship of working forest and agriculture lands, floodplains, salmon recovery, , and fresh water flows;
B. **Marine and Nearshore Protection and Restoration**, which includes strategies and actions related to shoreline protection. alteration, and restoration, marine area protection and restoration, working waterfronts and public access, and biodiversity and invasive species;
C. **Pollution Prevention and Cleanup**, which includes strategies related to reducing toxic threats, polluted runoff from urban and rural lands, wastewater management; shellfish bed restoration, oil spill preparedness, and, clean up.
D. **Strategic Leadership and Collaboration**, which includes much of the core work of the Puget Sound Partnership agency, as well as some partners, including strategies related to setting priorities, performance management, science and ecosystem monitoring, and promoting stewardship.

E. **Funding Strategy**, which describes how increased financial capacity to implement priority ongoing and new actions in the Action Agenda can be achieved through new sources of funding, using existing funding more strategically and efficiently, and through the development of innovative, market-based programs.

In each category, strategies and sub-strategies describe the overall, long-term directions and approaches that are needed for Puget Sound protection and recovery. Strategies identified by local areas, where available, are included at the strategy or sub-strategy level. Cross-cutting issues such as salmon recovery and climate adaptation are discussed throughout. Emerging opportunities and future considerations are also listed for strategies or sub-strategies as appropriate.

Ongoing program activities and near-term actions are nested under strategies and sub-strategies. **Ongoing activities** provide the foundation for recovery efforts and create the regulatory, policy, and incentive-based framework upon which the near-term actions are built. Funding should not be reallocated away from those programs at this time. **Near-term actions** are considered the "change agenda." These are important new initiatives, critical next steps in ongoing work, and targeted efforts to improve implementation of ongoing programs or ensure these programs have adequate resources to deliver on their objectives.

Target views throughout the Action Agenda describe each recovery target, the current status of the ecosystem relative to each target, and show the logic behind how we think the strategies and actions in the Action Agenda will lead to achievement of the targets. The target views cut across relationships in the ecosystem to show how strategies and actions map to the recovery targets, and which strategies and actions are most important to achieving progress toward targets.

Two **companion documents** accompany the 2012/2013 Action Agenda. Highlights from the 2012/2013 Action Agenda, including the Strategic Initiatives, can be found in *The Action Agenda for Puget Sound: Highlights of the 2012 Action Agenda.*. Priority science actions are described in the Action Agenda's companion document, *Priority Science for Restoring and Protecting Puget Sound: A Biennial Science Work Plan for 2011-2013*.

Strategic Initiatives for 2012/2013

The role of the Action Agenda is not just to lay out all of the work that must be done. It also has to prioritize those critical areas where we know we have the opportunity, and the need, to act now to make meaningful progress. Cutting across the entire Action Agenda, three strategic initiatives meet this need. They are focused strategic sets of related actions where we can address the most significant problems, with viable solutions, in a way that will create meaningful improvements for Puget Sound.

Strategic initiatives are meant to deliver progress at a substantial level on the priority actions -- now. They will be the focus of Partnership spending and resources, and of our efforts to increase funding, seek changes in policy, report success and challenges, and educate and engage the Puget Sound community in the recovery effort.

The three strategic initiatives are:

- **Prevention of pollution from urban stormwater runoff** – we have many of the tools we need to do this but need the capacity to ramp up efforts, we must stop contaminating Puget Sound;
- **Protection and restoration of habitat** – we must save the best of the habitat that we have left;
- **Recovery of shellfish beds** – shellfish health begins on land through reduction of pollution from rural and agricultural lands and maintenance and repair of failing septic tanks.

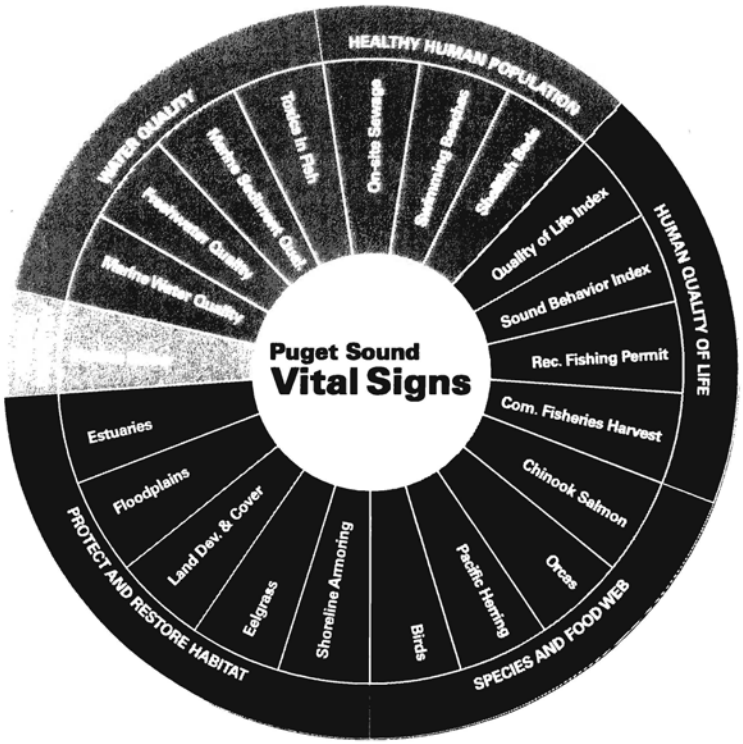
The specific actions to include within each strategic initiative will be drawn from the strategies and actions developed during the Action Agenda update process, and informed by high-level policy discussions such as the Governor's Shellfish Initiative, the ECB policy statement on stormwater, and the process to address shortcomings in the implementation of salmon recovery efforts indentified by tribes and NOAA in 2011. They are under development with partners and will be added to the final Action Agenda.

Improvements from the 2008 Action Agenda

The 2012 update to the Action Agenda contains important, strategic advances.

Recovery targets set: When establishing the Partnership, the Legislature established six recovery goals for Puget Sound. In 2010, the Leadership Council adopted 20 indicators covering these six goals. In 2011, the Leadership Council adopted science-based recovery targets for 18 of the indicators. These targets articulate the conditions we expect to achieve by 2020. They provide more precision to the Legislature's recovery goals for a healthy Puget Sound so we can evaluate whether we're on our desired trajectory.

REPORTING ON TARGET STATUS AND PROGRESS



The indicators and targets have been incorporated into a Vital Signs Dashboard to help track and communicate efforts toward recovery goals: http://www.psp.wa.gov/vitalsigns/index.php).

There are a number of additional improvements in this Action Agenda.

- **Strategies and actions logically aligned with goals and targets**. Regional strategies and actions focus on goals and recovery targets and are refined to incorporate progress, new information, and lessons learned since 2009. The scientific and logic basis for actions needed to recover Puget Sound are more thoroughly illustrated.
- **Cross-cutting issues for salmon recovery and climate change adaption integrated.** The integration of the salmon recovery plan is called out and initial climate change adaptation needs are identified.
- **Local partners engaged.** Local partners organized to provide considerable input on both regional and local priorities.
- **Ongoing programs called out**. Ongoing programs are recognized as a critical foundation for recovery and many examples are given of important on-going work. New efforts are distinguished separately.
- **Near term actions with performance measures clearly identified**. All near-term actions have one assigned owner, a completion date and performance milestones that are outcome based, or output based wherever possible. The intent of the measures is to ensure that performance measurement is meaningful for regional decision-making.
- **Action Agenda document simplified.** The Action Agenda has a simpler structure that better aligns with other large ecosystem restoration programs. It will transition to an on-line format.

Locally Developed Information in the Action Agenda

City and county governments will be the primary implementers of many of the priorities, strategies, and actions identified in the Action Agenda. The Partnership has supported local areas to form local integrating organizations (LIOs) and 8 out 10 LIOs are now recognized by the Leadership Council. These LIOs, and representatives of the LIOs still in formation, have helped to update the Action Agenda by more clearly articulating local information, priorities, and actions.

Local priorities are reflected throughout the Action Agenda. Each LIO or forming LIO has a profile that describes work to-date to identify local ecosystem threats and strategies and actions for addressing those threats. Local strategies that have been agreed upon or are in consideration are presented with the related soundwide strategies or sub-strategies. Many local areas were not able to identify Near Term Actions at this time. This does not mean that actions and strategies are not important in these areas; instead it reflects the differences between the local area processes.

The following table summarizes the local priorities described in the profiles.

LIO	PRIORITIES IDENTIFIED
San Juan Islands: San Juan Action Agenda Oversight Group *Priority Pressures Identified* • *Major oil spills* • *Runoff from the built environment (including septic systems)* • *Shoreline development (including armoring)*	*Tier 1 Strategies* • *Work with the Puget Sound Partnership on oil spill prevention and readiness programs within Puget Sound and with Canada.* • *Maintain local oil spill readiness and response programs in alignment with a regional readiness and* response *program.* • *Create effective compliance mechanisms for stormwater* • *Implement best management practices to reduce pollution of source wastes by residential runoff and non-point sources.* • *Provide information and work with landowners regarding the importance of retaining and restoring native vegetation, trees and ground cover and geologic processes.* • *Improve on compliance and enforcement capacity* • *Identify and implement shoreline protection tools including land preservation via acquisition and conservation easements, restoration, and protection of marine areas consistent with treaty rights.*
Strait of Juan de Fuca: Strait Ecosystem Recovery Network *Priority Pressures* • *19 identified*	*Highest Strategic Priorities* 1. **Elwha River Ecosystem Recovery** – Implement Elwha River Ecosystem Recovery Efforts and associated projects. 2. **Salmon Recovery Plans** (Puget Sound Salmon Recovery Plan, Hood Canal/ Eastern Strait of Juan de Fuca Summer Chum Recovery Plan, Puget Sound Steelhead Recovery Plan – in development) – Implement N. Olympic Peninsula Lead Entity (NOPLE) for Salmon and Hood Canal Coordinating Councils Lead Entity (HCCC-LE) 3-year Work Plans. 3. **Oil Spill Prevention, Preparedness, and Response** – Implement and promote improvements in oil spill prevention, preparedness, and response programs, policies, or capabilities for the benefit of the Strait of Juan de Fuca and adjacent waters. 4. **Shoreline Master Program Updates, Implementation, and Intergovernmental Coordination** (Jefferson County, Clallam County and cities of Port Townsend, Sequim, and Port Angeles). 5. **Stormwater Management Program Updates and Implementation** (Clallam, Jefferson, Port Angeles, Sequim, and Port Townsend). 6. **Instream Flow Rules** – Adopt and/or implement Instream Flow Rules for Water Resource Inventory Areas (WRIAs) 17, 18 East, 18 West, and 19.
South Central LIO: South Central Action Area Caucus Group *Priority Pressures* Sound wide Level • *Land development* • Shoreline alteration	*10 Priority Strategies* A. Acquire and/or Protect high-value habitat and land at immediate risk of conversion. B. Change Shoreline Management Act (SMA) statutes and regulations to limit residential shoreline armoring and overwater coverage, and promote "green" shoreline replacements. C. Develop a strategic funding proposal for habitat restoration and protection priorities. D. Fund and implement stormwater retrofits, improvements to operations/maintenance of existing stormwater infrastructure, and additional source control measures.

LIO	PRIORITIES IDENTIFIED
• Stormwater • Loss of floodplain function South Central • Habitat conversion • Climate change • Dams, levees, and tidegates • Legacy toxic contaminants • Current use and release of excess toxics and nutrients	E. Implement salmon recovery habitat protection and restoration recommendations. F. Incorporate low impact development (LID) requirements into stormwater codes and develop and implement LID incentives. G. Keep toxics and excess nutrients out of stormwater runoff and wastewater. H. Restore floodplains to recreate ecosystem function. I. Restore and protect Local Toxics Control Account funding under the Model Toxics Control Account (MTCA) for local toxics cleanup activities. J. Work with local governments to develop and implement policies and regulations that advance Action Agenda implementation.
South Sound LIO: Alliance for Healthy South Sound *Priority pressures*: A detailed is in place and being refined	**Interim, unranked ecosystem restoration priority actions** *Strategic Initiative: Habitat Acquisition and Protection* • *Secure perpetual public ownership of McNeil Island* • *Implement Conservation Plans for McLane Creek, Goldsborough Creek, Skookum Creek, Nisqually Protection (and Restoration) Plan* • *Bayshore Acquisition at Oakland Bay* • *Protect existing, functioning drift cells in South Sound* *Strategic Initiative: Urban Stormwater/Runoff* • *Complete upgrade at Wastewater Treatment Plants in South Sound (LOTT, Shelton, Solo Point, Chambers)* • *Urban Total Maximum Daily Loads (TMDLs): Complete and Implement Deschutes TMDL and Implement Oakland Bay TMDL* • *Achieve a balance of local, state and federal funding for full implementation of NPDES municipal stormwater permits, retrofitting and stormwater management on a watershed basis.* • *Work with Eatonville to manage their stormwater and domestic water consistent with salmon recovery objectives.* • *Oil spill response preparation and training* *Strategic Initiative: Rural/Agricultural Runoff* • *Implement South Puget Sound Dissolved Oxygen Study* • *Totten/Skookum TMDL* • *Re-open Shellfish Beds (Henderson, Burley Lagoon, Minter, Oakland Bay, North Bay)* • *Improve Operations and Management of septic systems in all 4 counties (e.g. Henderson inlet program)* *Strategic Initiative: Salmon Recovery/Habitat Restoration*

LIO	PRIORITIES IDENTIFIED
	• *Implement 3- year work plans (top tier/high priority projects)* • *Restore Chambers Creek, Sequalitchew Creek Estuaries, and Deschutes Estuary* • *Fully implement the 2011 Nisqually Fall Chinook Stock Management Plan* • *Clean up Budd Inlet Industrial Pollution* • *Implement all South Sound nearshore projects described by the PSNERP process* • *Restore function to drift cells in South Sound with a focus on BNR ownership* • *Reconfigure I-5 through the Nisqually lowlands to reconnect the flood plain throughout the valley*
Hood Canal LIO: Hood Canal Coordinating Council *Very High Pressures/Threats* • *Residential / Commercial Development)* • *Transportation / Service Corridors* • *Climate Change / Severe Weather* *High Pressures/Threats* • *Shoreline Infrastructure (Marine and Freshwater)* • *Shoreline Levees (Marine and Freshwater)* • *Water Withdrawal / Diversions* • *Invasive Species* • *Wastewater* • *Stormwater* • *Timber Production* • *Oil / Hazardous Spills*	*Top Priority Actions* • Complete Integrated Watershed Management Plan • Complete the In Lieu Fee (ILF) Mitigation Program • Phase I of a regional Hood Canal Pollution Identification and Correction to determine the needs for a comprehensive regional program. • Continue pursuing a stormwater retrofit program to identify and prioritize stormwater retrofit opportunities throughout the Hood Canal watershed. • Convene a climate change symposium to identify unique vulnerabilities and potential adaptation strategies for the Hood Canal Action Area. • Target funding to highest Tier I salmon recovery projects between 2012-2014, as listed in the Hood Canal Three Year Work Plan.
West Sound (North Central Action Area): LIO in formation. (Work groups and West Sound Watersheds Council assisting with profile) Priority pressures being refined. These include: land development, shoreline alteration, stormwater, and wastewater	*46 priority strategies have been identified to date to address the pressures. Actions that align to the 2012 Strategic Initiatives:* *Protection of habitat in support of salmon recovery* • *Ensure that restoration plans for every SMP include alternatives to traditional shoreline armoring, and incentives for the removal of existing armoring.* • *Develop and implement periodic surveys of eelgrass and forage fish spawning habitat* • *Develop a funding strategy for replacing the SR3 culvert with a bridge on Chico Creek.* • *Develop a local chapter of a Steelhead Recovery Plan.*

LIO	PRIORITIES IDENTIFIED
	• *Develop a detailed protection and restoration plan for the upper Chico Creek watershed.* *Prevention of water pollution from urban stormwater runoff* • *Provide training for 80% of LID professionals in Kitsap County,* • *Design and construct high priority retrofit projects treating 10 acres of pollution generating impervious surfaces* *Protection of water quality and nearshore habitat from rural and agricultural runoff* • *Repair failed OSS using funds from the Craft3 septic loan program* • *Conduct sewer infrastructure feasibility study for sewers in areas such as Ostrich and Phinney Bay* • *Report on the number of failing septic systems identified using PIC methodology, the number repaired and associated improvements in water quality by December 2013* • *Identify potential pump out stations and develop needs assessment to address marine vessel sewage* • *Expand a pilot shoreline owner shellfish gardening program. Concurrently, report on the results and actions from PIC shoreline monitoring affecting shellfish growing areas.*
Whatcom LIO: WRIA 1 Policy Boards *Priority Pressures*: Work in progress to refine key pressures by watershed	A significant amount of work is underway across WRIA 1 to advance habitat protection, habitat restoration, reduction of pollution, resolution of instream flow and out of stream water use, infrastructure development and maintenance, and port development. A detailed list of strategies in the profile reflects the work that is underway. The next step in the LIO process will be to sequence, establish relative priorities, identify near term actions, resource needs, and timelines.
Island County/Watershed: Island County/Watershed (WRIA 6) *Priority Pressures*: Work started to identify and prioritize pressures	Over 60 draft strategies have been identified and will be refined. Actions will be developed from the refined work. See the profile for the strategy information.
Stilly Snohomish Watershed (Whidbey Basin Action Area) *Priority Pressures:* Work started to identify and prioritize pressures	The LIO was recently formed. During 2011, an ad hoc group identified over 100 draft potential strategies. Over the next year, the strategies and actions will be further developed.
Skagit Watershed (Whidbey Basin Action Area): LIO in formation Initial work started to identify and prioritize pressures	The Skagit LIO is in formation. Potential strategies and their importance are under discussion. See the profile for the complete list.

Science in the Action Agenda

After completion of the first Action Agenda in 2008, the Partnership, including the Science Panel, embarked on identifying and building more rigorous and systematic approach to future iterations of the Action Agenda. The Partnership adopted the Open Standards for the Practice of Conservation (The Conservation Measures Partnership, 2007) as the adaptive framework to use moving forward (Partnership's Strategic Science Plan (2010)).

The Open Standards process provides a common means of understanding and supporting the critical role of science, and each step in the Open Standards process has scientific, performance and policy inputs. Multiple other scientific inputs to the Action Agenda content and process are summarized in Appendix D.

Climate Change in the Action Agenda

Adapting to our changing climate means understanding how climate change may affect priority recovery issues using that knowledge to take steps that will reduce or avoid the negative impacts of climate change, as well as seize opportunities that exist now. Adaptation is part of long-term risk management, not a one-time effort.

Climate change pressures in Puget Sound include changes in streamflow timing and volume, temperature, loss of snowpack and glacial retreat, sea level rise, and ocean acidification. In 2012 and 2013, the Puget Sound Partnership and the Puget Sound Institute are working with UW Climate Impacts group to synthesize and update a growing body of climate change science.

The recently released, *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy* (April 2012), summarizes risks and impacts across the state, including human-health consequences from increased injuries and disease due to higher temperatures, heat waves and more frequent extreme storms, increased storm event damage costs and disruptions, reduced water supply, loss of fish, wildlife, and natural systems, and losses to agriculture and forest industries. Specific impacts to natural resources and Puget Sound communities will vary.

The state climate response strategies and actions are integrated into the 2012 Action Agenda as much as possible. Each strategy or sub-strategy of the Action Agenda contains a description of climate change impacts and related state strategies. Where possible now, a climate change adaptation step was included in near-term actions. Climate change next steps are included in the future opportunities and emerging issues for each strategy section.

Many adaptation strategies are considered "no regrets" or "win win" strategies because they address existing stresses on communities, economy, and environment while also helping reduce climate-related risks. All of the Action Agenda strategies, sub-strategies, ongoing programs and near-term actions are "win-win" that both help reduce existing stresses while reducing climate risks. They are similar to the strategies and actions outlined in state climate response, and help implement the state high-priority, overarching response strategies.

Fully integrating climate change into the Action Agenda will require looking at the implications of a changing climate beyond 2020. Definitions of a "healthy Puget Sound", how we measure and evaluate progress, value terms like "priority", "ecologically important", "sensitive" and "high value" may all need to be adjusted, as well as existing policies, plans and tools that may not include climate change considerations.

Using the Action Agenda to Drive Investment and Progress

The Action Agenda was created to drive investment and action. All of the work it describes is important and needed to protect and recover Puget Sound. At the same time, the Partnership recognizes the need to think practically about how work might be sequenced, both for maximum efficiency and because resources are scarce and declining. The Action Agenda should be used to guide decision making related to allocation of funding or other resources in the following way.

Focus on the Strategic Initiatives: Strategic initiatives are the highest priorities for 2012 and 2013. First consider whether the new or discretionary funding source can support an unfunded or partially funded priority regional or related local action in one or more of the strategic initiatives. Strategic initiatives are the top priority for funding and the allocation of other resources. Strategic initiatives also should guide the development of policy agendas.

RANKING SUB-STRATEGIES

In 2012 the Partnership working with the Ecosystem Coordination Board and the Science Panel undertook an unprecedented effort to create a science-based assessment of the expected ecological impact of each sub-strategy in the Action Agenda, and to gather associated information on implementation issues including potential contribution to human well-being and economic vitality. The result of this initial effort is a preliminary ranked list of sub-strategies based on expected ecological impacts. The science community and the Partnership are committed to working to improve the ecological ranking process, and have committed to creating a final ranked list of sub-strategies in summer 2012.

Maintain Effective Ongoing Programs: The Action Agenda builds on the ongoing work of partners to protect and restore Puget Sound. Funding should not be reallocated away from those programs at this time. Following this Action Agenda Update, the Partnership will conduct an evaluation of ongoing programs in accordance with RCW 90.71.370, which may result in ongoing program funding recommendations.

Prioritize the Science Needed to Better Understand a Complex System: Ensure that the science needed to successfully implement priority actions is funded and implemented. First fund and implement the biennial science work plan.

Use the Lists of Sub-strategies Ranked Based On Ecological Criteria (when available) and Local Priorities as One Piece of Information for Decision Making: If the funding source or other resource cannot be used to support implementation of a strategic initiative, refer to the ranked list of sub-strategies and related implementation information. Extract the sub-strategies eligible for funding by the

source in question and generally fund near term actions or local actions related to the highest ranked sub-strategies first except where implementation information or local priorities may be used to justify funding actions related to lower-ranked sub-strategies. A final list of sub-strategies ranked based on ecological criteria will be available in summer 2012.

The Need for Funding

Increased financial capacity to implement ongoing and new actions in the Action Agenda and the Biennial Science Work Plan is required to achieve recovery goals. This demands that we develop and secure stable, diverse funding sources. Increased capacity can be achieved through new sources of funding, using existing funding more strategically and efficiently, and through the development of innovative, market-based programs. It is particularly important to support and adequately fund the ongoing programs that support Puget Sound recovery. These efforts form the backbone of the recovery effort. Most of the Soundwide and local near-term actions also need funding. Owners of these actions are cautious about committing to them without an explicit understanding that funding is a requirement for successful implementation.

The Action Agenda includes a funding strategy and specific funding actions to address this need.

The Future of the Action Agenda

The Action Agenda is a living document. Future updates will build on lessons learned and strengthen our shared responsibility to protect and recover Puget Sound. Our ongoing work to strengthen the Action Agenda and the Partnership includes improving the science basis, continued climate change integration, improving the prioritization process, increasing specificity on local priorities and actions, understanding program and action effectiveness, setting interim target milestones, continued refinement of near-term actions and measures of progress, and cultivation of business and private sector interests, including market-based solutions and diversified funding.

INTRODUCTION

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Introduction

The 2012 Action Agenda is the result of over a year of work with state and federal agencies, tribal governments, local governments, representatives of the business and environmental caucuses, and other interested partners. It builds on the 2008 Action Agenda, and progress since then, to create a complete picture of the work needed to protect and recover Puget Sound. The Action Agenda is not a regulatory document; it does not establish regulatory requirements. It is a leadership and coordinating document, meant to focus the region around a shared agenda for Puget Sound recovery.

The Action Agenda is organized into five Sections.

Section 1 is the Context for Recovery. It describes the 2020 recovery targets, the current state of Puget Sound relative to each target, and climate change projections.

Section 2 describes the 2012/2013 priorities for the Action Agenda, the three Strategic Initiatives, which are:

- **Prevention of pollution from urban stormwater runoff** – we have many of the tools we need to do this but need the capacity to ramp up efforts; we must stop contaminating Puget Sound;
- **Protection and restoration of habitat** – we must save the best of the habitat that we have left;
- **Recovery of shellfish beds** – shellfish health begins on land through reduction of pollution from rural and agricultural lands and maintenance and repair of failing septic tanks.

Section 3 is the heart of the Action Agenda. It describes the strategies, sub-strategies, ongoing program activities, and near-term actions needed to protect and recover Puget Sound, as well as future opportunities. This section includes an overview of how the strategies and actions were developed, discussions of the roles of science and climate change, and a description of the ongoing process to develop a ranked list of Action Agenda sub-strategies. Strategies and Actions are divided into five categories:

A. **Freshwater and Terrestrial Protection and Restoration**, which includes strategies and actions related to land development and restoration, stewardship of working forest and agriculture lands, floodplains, salmon recovery, and freshwater flows;
B. **Marine and Nearshore Protection and Restoration**, which includes strategies and actions related to shoreline protection, alteration, and restoration; marine area protection and restoration; working waterfronts and public access; and biodiversity and invasive species;
C. **Pollution Prevention and Cleanup**, which includes strategies related to reducing toxic threats, polluted runoff from urban and rural lands, wastewater management, shellfish bed restoration, oil spill preparedness, and clean up;
D. **Strategic Leadership and Collaboration**, which includes much of the core work of the Puget Sound Partnership agency, as well as some partners, including strategies related to setting priorities, performance management, science and ecosystem monitoring, and promoting stewardship;

E. **Funding Strategy**, which describes how increased financial capacity to implement priority ongoing and new actions in the Action Agenda can be achieved through identifying new sources of funding, using existing funding more strategically and efficiently, and developing innovative, market-based programs.

Section 4 contains local profiles and local strategies and actions. Local strategies and actions also are incorporated throughout Section 3, nested within the relevant Puget Sound-wide sub-strategies.

Section 5 contains five appendices. Appendix A provides logic models or "results chains" of each of the strategies included in the A-C sections; Appendix B provides an overview of the Puget Sound National Estuary Program Management Conference; Appendix C provides a table of all Near-Term Actions in the Action Agenda; Appendix D provides an overview of the science basis of the Action Agenda; Appendix E provides a glossary of acronyms, terms, and definitions; Appendix F provides a Federal Response – Habitat Matrix; and Appendix G provides the Action Agenda Sub-Strategy Rankings.

Finally, there are two companion documents to the 2012/2013 Action Agenda. Highlights from the 2012/2013 Action Agenda, including the Strategic Initiatives, can be found in ***The Action Agenda for Puget Sound: Highlights of the 2012/2013 Action Agenda.*** Priority science actions are described in the Action Agenda's companion document, ***Priority Science for Restoring and Protecting Puget Sound: A Biennial Science Work Plan for 2011-2013***. It provides a strategic focus on the science needed to recover and protect Puget Sound.

SECTION 1:

RECOVERY CONTEXT

THE CURRENT STATUS OF PUGET SOUND AND CLIMATE CHANGE PROJECTIONS

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Recovery Context: The Current Status of Puget Sound and Climate Change Projections

"Healthy" ecosystems are both functioning and resilient. A functioning ecosystem serves the needs of fish and wildlife and of human populations. When ecosystem conditions are stressed, such as through pollution or resource depletion, it can become more difficult to meet all of these needs. Resilient means that the ecosystem is flexible or adaptable to changes over time that may be caused by humans or natural circumstances. Having some redundancy of species and habitats in the ecosystem (e.g., species live in multiple locations), as well as a representative sample of the species and habitats that were historically present in the ecosystem, can improve the resiliency of the ecosystem.

So what does this mean for Puget Sound? Based on the statutory goals, a healthy Puget Sound supports our well-being and quality of life, the health of our communities, and a thriving economy in the Northwest, both now and in the future. In a healthy Puget Sound, native species are abundant and diverse, and have the habitat they need to thrive. Moreover, Puget Sound waters are also clean and plentiful enough to fully support drinking water and recreational uses, fish and shellfish harvest, and other activities, without causing health concerns or posing environmental risks for fish or wildlife. While we don't expect Puget Sound to return to conditions before European settlers first arrived, we do want to derive many of the same benefits offered them, from a healthy, vibrant Puget Sound in the 21st century and beyond.

PRESSURES ON PUGET SOUND

Recovery targets consider both indicators of the statutorily-established Puget Sound goals and the pressures on the Puget Sound ecosystem that may make recovery difficult. Ecosystem pressures identify human activities that may impact the physical, structural, and ecological processes and functions in the ecosystem. Many of these human activities also may provide direct and indirect benefits to the ecosystem and/or may be relatively neutral to the ecosystem but provide benefits in terms of human quality of life. The goal is not to eliminate human pressures on Puget Sound, but to understand and manage them towards ecosystem protection and recovery.

Current Status of the Ecosystem

The Partnership has adopted indicators for the statutorily-established goals and recovery targets for 18 of the chosen indicators. These indicators and targets are presented on the Puget Sound Vital Signs.

The Vital Signs are updated annually. The State of the Sound, a performance report reviewing the ecological health of the Sound, the funding for the Sound, and the status of the Action Agenda implementation, is updated every two years. The next update is set for November 2012. The Vital Signs are next scheduled for updating in September 2012 as part of the State of the Sound process.

The table below presents the indicators, recovery targets and current status as reported on the current Vital Signs (unless otherwise noted). The current status information is helpful in developing the strategies and actions needed to reach 2020 targets and recovery goals.

GOAL	INDICATOR	2020 RECOVERY TARGET	CURRENT STATUS
1. Healthy human population	On-site sewage	There are two targets for managing on-site sewage systems: • Inventory and fix all on-site sewage systems in marine recovery areas and other designated sensitive areas and be current with inspections at 95 percent. • Extend this work to cover 90 percent of Puget Sound's unsewered marine shorelines.	Local health jurisdictions and the Department of Health are gathering and mapping data for on-site sewage system inspections. Initial results will be available in 2012 and semi-annually thereafter.
	Swimming beaches	All monitored beaches – currently about 70 locations – meet health standards for what is called enterococcus, a type of fecal bacteria.	Almost half of routinely monitored beaches (about 70 locations) consistently met the standards between 2004 and 2010; another third met the standard except for one or two years. However, in any given year from 2004 - 2010, 7 to 15 beaches failed to meet standards, resulting in the issuance of health advisories to the public.
	Shellfish beds reopened	The target for shellfish beds is to have a net increase of 10,800 acres of harvestable shellfish beds, of which 7,000 acres must be from beds presently classified as prohibited.	Around Puget Sound, there are an estimated 190,000 acres of classified commercial and recreational shellfish beds. According to the State Department of Health, about 36,000 acres – approximately 19 percent – are closed due to pollution sources (primarily fecal bacteria from humans, livestock and pets).
2. Human quality of life	Puget Sound quality of life index	The index and targets are being developed with anticipated adoption in 2012-2013. The quality of life index will address aesthetics, recreation, culture, and the economy.	Indicator in development.
	Puget Sound behavior index	The Sound Behavior Index will be a measure of two elements: the public's changing behavior to reduce human impacts on Puget Sound, and social capital. Social capital represents the bonds that bring groups of people and organizations together; it can be measured, and correlates to a variety of social indicators including health, civic participation, and educational achievement. The index is under development.	Data will be available in 2012.
	Recreational fishing permit sales	The Leadership Council chose not to set a target for recreational fishing licenses at this time. Desired future conditions will be reflected in the quality of life index.	This indicator is the number of recreational angling and crabbing license holders.
	Commercial fisheries harvest	The Leadership Council chose not to set a target for commercial fisheries harvest at this time. Desired future conditions will be reflected in the quality of life index.	This indicator is pounds of all salmon caught in commercial harvest.
3. Species and food web	Chinook salmon	Stop the overall decline and start seeing improvements in wild Chinook abundance in two to four populations in each biogeographic region.	Data to be available in 2012.
	Orcas	Achieve an end-of-year census of southern resident killer whales of 95 individuals, which would represent a 1 percent annual average growth rate from 2010 to 2020.	The historic population of Southern Resident Orcas may have numbered around 200 individuals, but by mid-2011, the population totaled fewer than 90 whales. There are currently 17 female orcas capable of bearing young, and orcas generally wait three to five years between pregnancies. Also, about three orcas disappear from the population every year; generally their fates are unknown.

GOAL	INDICATOR	2020 RECOVERY TARGET	CURRENT STATUS
	Pacific herring	• Achieve increased spawning biomass for each genetic grouping to a minimum of: • 5,000 tons for Cherry Point stock • 880 tons for Squaxin Pass stock • 13,500 tons for all other stocks combine	Overall, the number of herring in Central and Southern Puget Sound has been relatively stable for the past 40 years. However, the population of one large and important stock of Pacific herring, the Cherry Point stock in North Puget Sound, has declined by 90 percent since 1973.
	Birds	The Leadership Council has not yet set a target for this indicator.	
4. Protect and restore habitat	Shoreline armoring	The target has three parts: • The amount of armoring removed is greater than the amount of new armoring added, for a net decrease in total armored shoreline. • Efforts should be focused on feeder bluffs (highly erodible bluffs that supply sediment to beaches). • Jurisdictions should require the use of "soft shore" techniques for all new and replacement armoring wherever feasible.	Currently, more than a quarter of all the shoreline around the Sound is armored with bulkheads and seawalls affecting important shoreline processes such as sediment supply and transport. To reduce the total amount of armoring, it will be necessary to minimize the need for new armoring by properly locating new structures and strategically remove existing armoring in key locations. Additionally, using "soft shore" designs for new and replacement armoring will reduce some of the impacts associated with traditional hard armoring.
	Eelgrass	Increase the acres of eelgrass in Puget Sound by 20 percent from the 2000 to 2008 baseline period - an increase from about 53,100 acres to about 63,700.	Though some larger Puget Sound eelgrass beds are stable or possibly increasing in size, many of the smaller more widely dispersed beds are in decline.
	Land development and cover	The target has three parts: • The proportion of basin-wide growth occurring within Urban Growth Areas is at least 86.5% (equivalent to all counties exceeding goal by 3%) and all counties show an increase over their 2000-2010 percentage. • Average annual loss of forested land cover to developed land-cover in non-federal lands does not exceed 1,000 acres per year and 268 miles of riparian vegetation are restored or restoration projects are underway • Basin-wide, loss of vegetation cover on indicator land base over a 5-year period does not exceed 0.15% of the 2011 baseline land area.	The rate of forest conversion to developed land-cover from 2001-2006 was 2,176 acres/year. For the riparian corridor aspect, the footnotes under the target options note that 13,000 riparian acres (equivalent to 268 stream miles) are currently in medium or high density development and 2,100 acres (equivalent to 43.3 stream miles) were converted from vegetated to developed from 1996 to 2006. The 2001-2006 rate of change from vegetative to developed land was 0.26% of the indicator base lands for a six county area (named in the footnote on p. 15); 83 percent of the basin-wide new growth from 2000-2010 occurred within Urban Growth Areas.
	Floodplains	There are two targets for floodplains: • Restore, or have projects underway to restore, 15 percent of Puget Sound floodplain areas. • Have no net loss of floodplain function, in any watershed (for example, due to conversion for development).	Data will be available in 2012. Based on other studies, the National Oceanic and Atmospheric Administration (NOAA) estimates that almost three quarters of wetlands have been lost in Puget Sound, the vast majority of which occurred in floodplains. Floodplains have been lost through a combination of shoreline armoring, levees, and residential, commercial, industrial, and agricultural development.

GOAL	INDICATOR	2020 RECOVERY TARGET	CURRENT STATUS
	Estuaries	There are two targets for restoring large river estuaries and the salmon that depend on them: • Meet the 10-year salmon habitat recovery goals in the Nisqually, Skagit, Stillaguamish, Skokomish and Elwha river deltas. More information about those goals can be found at the Washington State Salmon Recovery homepage. • Restore 7,380 acres of river delta marsh and swamp throughout Puget Sound, about 20 percent of the total restoration need.	A number of efforts are now under way to restore estuarine habitat because it is believed to be a bottleneck to the recovery and success of wild salmon and other species. Local groups working with the support of state and federal partners are working hard, watershed by watershed to set local acreage targets, find willing landowners, work through intense local politics, and restore habitat as part of their salmon recovery planning process (see the Habitat Work Schedule). These efforts are technically complex, and require public-private partnerships in a complex landscape. Strong local and state organization is necessary to lay the groundwork to leverage and maintain federal investment.
5. Water quantity	Summer stream flows	This indicator has the following river-specific targets: • Maintain stable or increasing flows in highly regulated rivers: Nisqually, Cedar, Skokomish, Skagit, Green. • Monitor low flow in the Elwha River after dam removal. • Maintain stable flows in unregulated rivers that currently are stable: Puyallup, Dungeness, Nooksack. • Restore low flows to bring the Snohomish River from a weakly decreasing trend to no trend. • Restore low flows to bring the Deschutes River, North Fork Stillaguamish River, and Issaquah Creek from a strongly decreasing trend to a weakly decreasing trend.	Low stream flows affect salmon runs, wildlife, and our water supply. Summers in the Puget Sound region are often glorious, with comfortable temperatures and little rain. One result of this great weather is that the flow of water from rivers and streams around the Sound also declines, affecting salmon runs, wildlife, and our water supply. There are other man-made reasons for lower summer stream flows, such as new wells that tap ground water and new buildings and development that cover up the ground and decrease seepage – reducing the amount of water that would reach the stream in summer.
6. Water quality	Marine water quality	The Leadership Council adopted the Marine Water Condition Index as an indicator to determine if the overall water quality of Puget Sound is getting better or worse over time. However, they only set a target for one of the 12 components of the index: dissolved oxygen levels, specifically related to how much humans are contributing to dissolved oxygen problems. The target for improved water quality in the Sound is to keep dissolved oxygen levels from declining more than 0.2 milligrams per liter in any part of Puget Sound *as a result of human inputs.*	Because dissolved oxygen concentrations are a result of many natural and human influences, we cannot simply measure dissolved oxygen and understand how much humans contribute directly. This target requires a combination of monitoring data, studies on the sources of nitrogen and sophisticated mathematical models to determine whether human inputs are contributing to a decline in dissolved oxygen. The Washington Department of Ecology and others are currently working on such studies. Initial results will be available sometime in late 2012. At that time we will understand whether humans contribute to low levels of dissolved oxygen and what management actions may be necessary to address them. In the future we will update these results using better models and more recent estimates of nitrogen loads coming into Puget Sound.

GOAL	INDICATOR	2020 RECOVERY TARGET	CURRENT STATUS
	Freshwater quality	To improve the quality of freshwater that flows into Puget Sound, the Leadership Council established three major targets: • At least half of all monitored streams should score 80 or above on the fresh water quality index. • Reduce the number of "impaired" waters. • Protect (i.e. allow no degradation of) any small streams that are currently ranked "excellent" for biological condition, and improve water quality in streams ranked "fair" so their average scores become "good".	**Fresh Water Quality Index:** A score of 80 or higher (out of 100) indicates that water quality is generally meeting our goals for sediments, nutrients, temperature, dissolved oxygen, fecal coliform bacteria, and other conventional pollutants (the index does not address toxic contaminants for a number of technical reasons). In general, fresh water quality index scores for the major rivers in Puget Sound have slowly improved since the index was first established in 1995 and now average in the mid-70's range. Scores in small urban streams are lower. **Impaired Waters:** Washington's most recent complete list of impaired waters (2008) shows 1,272 "listings" on 501 different rivers and streams in Puget Sound (an individual stream may be listed as impaired for more than one pollutant or impaired in more than one location). Since 2008, 54 listings (about 4.2 percent) have been addressed by formal Clean-Up Plans. An additional five listings were removed for other reasons. Since about 1998, a total of 570 listings in Puget Sound have been addressed (about 31 percent) by formal Clean-Up Plans. **Biological Condition:** Scientists studying small streams have developed a way to summarize the overall condition of the aquatic biological community using a measure called the Benthic Index of Biological Integrity, or "B-IBI" for short. Data for this measure are more sparse than for conventional water pollutants, but King County recently reported that, for small wadeable lowland streams, 37 percent of sites ranked "good" or "excellent" and 63 percent ranked "fair or poor."
	Marine sediment quality	The Puget Sound Partnership has defined a "functioning, resilient ecosystem to include sediment quality that supports functioning, healthy communities of sediment dwelling invertebrates." This is a clear goal, but determining specific numerical targets is very complex. Accordingly, the Leadership Council adopted several different measures based on accepted scientific methods for assessing marine sediment quality. All Puget Sound regions and bays should: • Have sediment chemistry measures reflecting "minimum exposure", as defined by having a Sediment Chemistry Index (SCI) score of >93.3. • Have combined measures of sediment chemistry, toxicity, and the health of bottom-dwelling marine life reflecting "unimpacted" conditions, as defined by having a Sediment Quality Triad Index (SQTI) score of >83.	This status report focuses only on the second target - the Sediment Quality Triad index (SQTI), as an overall summary of sediment quality in Puget Sound. Eight regions were sampled between 1997 and 2003 in Puget Sound (Hood Canal, Strait of Georgia, Whidbey Basin, Central Sound, South Sound, San Juan Islands, Strait of Juan de Fuca, and Admiralty Inlet). Four of the eight regions met or exceeded the target value for sediment quality. Of the three regions re-sampled between 2004 and 2012, two (Hood Canal and Strait of Georgia) showed declining SQTI scores due to poor biological community values; the other, Whidbey Basin,

GOAL	INDICATOR	2020 RECOVERY TARGET	CURRENT STATUS
		• Have no chemistry measurements exceeding the Sediment Quality Standards set in Washington State	showed an improvement. Results are not yet available for the remaining regions either because they are being analyzed or will be sampled.
	Toxics in fish	The Leadership Council (LC) adopted several different sets of targets related to reducing toxic contaminants in fish. They include: • Reducing levels of PCBs and related compounds in salmon, herring, and English sole (a bottom-dwelling flatfish) below: • a threshold related to fish health, and • a threshold related to human health. • Reducing concentrations of two other classes of toxic contaminants (abbreviated as PAHs and EDCs), in herring and English sole below several different thresholds for harmful effects in fish. The Vital Signs report focuses only on one chemical in the first target (PCBs) as it relates to the fish health threshold. *As data become available for the other targets, those results will be added to the report.*	Results are mixed. In recent years, four of the five species of salmon were almost always below the threshold. But 15% of adult Chinook salmon that were sampled, and 100% of juvenile Chinook exceeded the threshold. This is most likely because Puget Sound Chinook salmon spend more time in Puget Sound close to PCB sources and are more likely to eat contaminated prey (e.g. herring). The other four species of salmon tend to spend more of their life in the Pacific Ocean where PCB levels are lower. For Pacific herring, from 30-82% of sampled fish exceeded the threshold levels for contamination, with herring from Puget Sound's most urbanized basin showing the highest levels. Nearly all (95%) of English sole from urban bays exceeded the threshold, compared to only 30% which exceeded the threshold in rural bays (still above the target).

Climate Change Projections in Puget Sound

Climate change is key part of Puget Sound recovery context. The climate is already changing, and we will increasingly experience the effects of climate change. In 2012 and 2013, the Puget Sound Partnership and the Puget Sound Institute are working with UW Climate Impacts group to synthesize and update the growing body of climate change science that has emerged since publication of *Uncertain Future: Climate Change and Its Effects on Puget Sound* in 2005[1]. This new information will become part of the *Puget Sound Science Update.* The climate change pressures summary below is drawn from the 2010 *Puget Sound Science Update* (Chapter 3), with additional review by the Climate Impacts Group.

Climate change pressures in Puget Sound include:

- **Changes in streamflow timing and volume**. Watersheds with streamflow based mostly or partially on snowmelt are projected to have the greatest hydrological shifts associated with climate change. Impacts to streamflow include earlier peak streamflows, decreasing runoff in late spring and summer, and increasing runoff in fall and winter.

- **Temperature changes.** Over the last century (1900-2000), average air temperature in the Puget Sound region increased 2.3°F[2]. Average annual and seasonal temperature is expected to increase over the coming century, although natural climate variations will continue to cause substantial variability between years and decades. Relative to 1970-1999, average annual temperature in the Pacific Northwest is projected to increase about 2°F by the 2020s (range: 1.1°F to 3.4°F), 3.2°F by the 2040s (range: 1.6°F to 5.2°F), and 5.3°F (range: +2.8°F to +9.7°F) by the 2080s[3]. Most models project an enhanced seasonal precipitation cycle with wetter winters and drier summers, although the region's large natural variations in precipitation will make it difficult to distinguish the influence of climate change on Northwest precipitation in the next few decades[4].

- **Loss of snowpack and glacial retreat.** The loss of snowpack and glacial retreat are one of the most far-reaching impacts of rising temperature, affecting water availability for both people and wildlife. Under a moderate warming scenario (the A1B greenhouse emissions scenario), average spring snowpack in Washington State is projected to decrease 29% by the 2020s, 44% by the 2040s, and 65% by the 2080s, relative to the average for 1916-2006[5].

  This decline in snowpack contributes to lower spring runoff in snow-fed rivers and streams and lower summer streamflows. Warmer spring temperatures also reduce late spring and summer streamflows by shifting the timing of peak snowmelt runoff earlier into the spring season.

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[1] Snover, A.K., P.W. Mote, L.C. Whitely Binder, A.F. Hamlet, and N.J. Mantua. 2005. *Uncertain Future: Climate Change and Its Effects on Puget Sound.* Climate Impacts Group, Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington. Available at: http://cses.washington.edu/db/pdf/snoveretalosat461.pdf

[2] Source: Snover, A.K., P.W. Mote, L.C. Whitely Binder, A.F. Hamlet, and N.J. Mantua. 2005. *Uncertain Future: Climate Change and Its Effects on Puget Sound.* Climate Impacts Group, Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington.

[3] Mote, P.W., and E.P. Salathé. 2010. Future climate in the Pacific Northwest. *Climatic Change* 102(1-2): 29-50, doi: 10.1007/s10584-010-9848-z.

[4] Mote and Salathé 2010 (see previous)

[5] Elsner, M.M., L. Cuo, N. Voisin, J. Deems, A.F. Hamlet, J.A. Vano, K.E.B. Mickelson, S.Y. Lee, and D.P. Lettenmaier. 2010. Implications of 21st century climate change for the hydrology of Washington State. *Climatic Change* 102(1-2): 225-260, doi: 10.1007/s10584-010-9855-0.

- **Sea Level Rise.** Global sea level is rising due to ocean thermal expansion and melting of land-based ice sheets. A medium estimate of sea level rise in the Puget Sound region is +6 inches (range of 3 to 22 inches) by 2050 and +13 inches (range of 6 to 50 inches) by 2100[6]. Changes at specific locations within Puget Sound will vary from these regional projections depending on local factors, including uplift or subsidence rates. Major impacts associated with sea level rise are likely to be inundation of low-lying areas, flooding, erosion and infrastructure damage, with the largest impacts occurring when storm and/or river flooding events converge with high tides. Shifts in or loss of coastal habitat types is another major concern associated with sea level rise.

- **Ocean Acidification.** As the global ocean absorbs atmospheric carbon dioxide, these increasing concentrations are reducing ocean pH and carbonate ion concentrations, resulting in ocean acidification. Impacts of ocean acidification include altered marine food web, loss of shellfish production, and impacts to the growing environment for sea grasses like eelgrass.

Climate change scenarios are modeled estimates of how climate change and related impacts may unfold in the Pacific Northwest in the coming decades. As such, climate change scenarios they are *projections*, not specific predictions. While scientists expect that the direction of trends (e.g., increasing or decreasing) in temperature, snowpack, sea level rise, and other important variables will remain consistent over the 21st century or longer, the specific values (e.g., specific temperature changes) will change over time as: modeling capabilities increase, greenhouse gas emissions change, and our understanding of global and regional sensitivity to climate change increases.

Puget Sound climate is also affected by large-scale patterns of natural variability, particularly the El Niño/Southern Oscillation (ENSO) and Pacific Decadal Oscillation (PDO). While it is not clear at this time how climate change will affect the frequency or intensity of ENSO or PDO, we should expect continued year-to-year and decade-to-decade variability in regional conditions even as the long-term mean around which we vary is affected by climate change.

Climate Change Impacts and Risks in Puget Sound

In the recently released, *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy* (April 2012), risks and impacts across the state are summarized as presented below. Specific impacts to natural resources and Puget Sound communities will vary. Where local information is available, it is presented in the subject-specific parts of the Action Agenda or in the local profiles. Part of the work underway with the UW Climate Impacts Group will be to update and call out geographically-specific changes and risks.

[6] Mote, P.W., A. Petersen, S. Reeder, H. Shipman, and L.C. Whitely Binder. 2008. *Sea Level Rise in the Coastal Waters of Washington State*. Report prepared by the Climate Impacts Group, Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington, Seattle, Washington and the Washington Department of Ecology, Lacey, Washington.

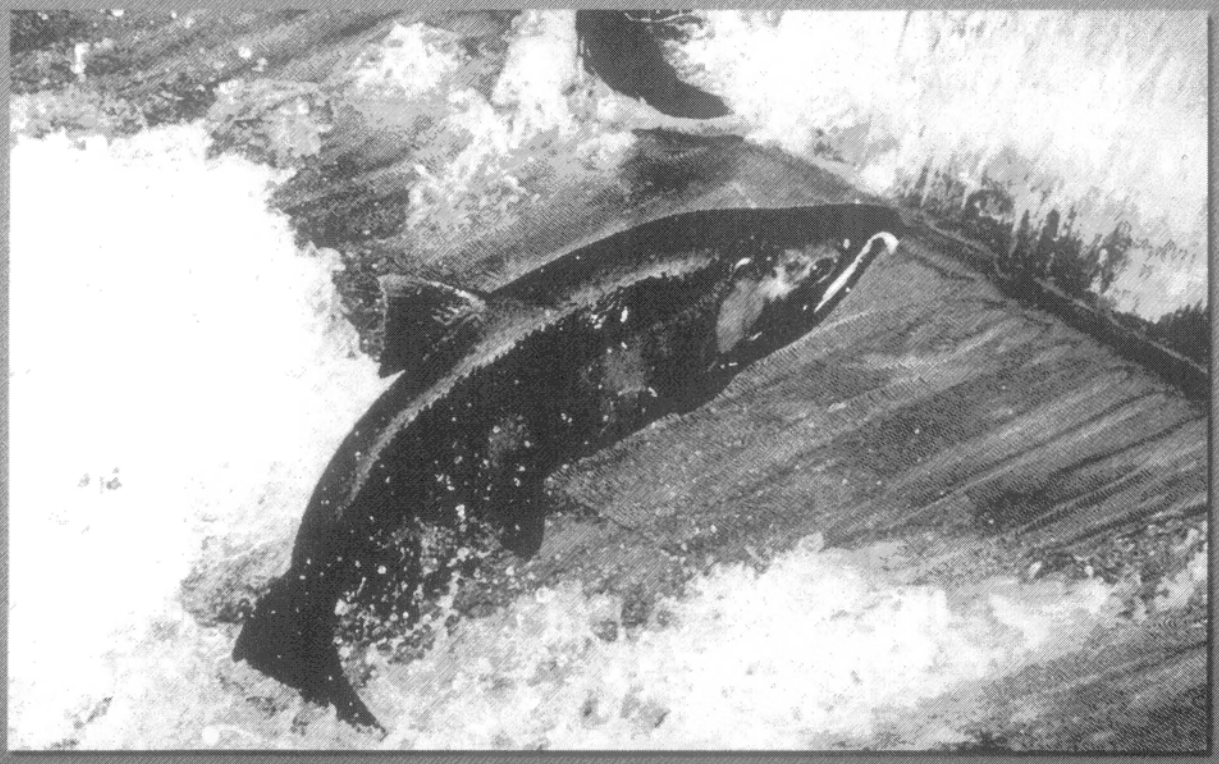
- **Severe consequences to human health** from increased injuries and disease due to higher temperatures, heat waves, declining urban air quality, and smoke from more frequent wildfires. More frequent extreme storms are likely to cause river and coastal flooding that could lead to increased injuries and loss of life.

- **Increased damage costs and disruptions** to communities, transportation systems, and other infrastructure. Damage to roads, bridges, ports, rail, power and communication transmission systems, and communities due to extreme storms, flooding, erosion, landslides, sea level rise, and storm surges could occur. In Puget Sound counties, structures valued at $29 billion are located in flood hazard areas. Ports, rail, highways, wastewater treatment plans, and other infrastructure could require retrofits or relocation to accommodate rising sea levels and stronger coastal storms.

- **Reduced summer water supply**. Increasing temperatures will significantly reduce snowpack in the Cascade and Olympic Mountains. This will lead to reduced summer streamflows, reduced soil moisture, higher summer stream temperatures, and an increased risk of drought for Washington's water users, including agriculture, municipalities, and fish and wildlife. Increased water demand could increase the potential for conflict among users.

- **Loss of fish, wildlife, and natural systems**. Species will be forced to move northward or higher in elevation, and some will perish. Higher summer stream temperatures and reduced flows are projected to increase lethal stream conditions for salmon and other coldwater species. Increased forest fires will destroy habitat, leading to erosion and degraded water quality. Sea level rise is projected to eliminate valuable habitat, and increasing ocean acidity and upland runoff threatens shellfish aquaculture.

- **Losses to agriculture and forest industries.** Increased disease, pests, weeds, and fire, along with reduced summer water supplies, are already affecting Washington's farms and forests. Crops and yields are also likely to be impacted.



SECTION 2:
THE 2012/2013 STRATEGIC INITIATIVES

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The 2012/2013 Strategic Initiatives

The role of the Action Agenda is not just to lay out all of the work that must be done. It also has to prioritize those critical areas where we know we have the opportunity, and the need, to act now to make meaningful progress. Cutting across the entire Action Agenda, three strategic initiatives meet this need. They are focused strategic sets of related actions where we can address the most significant problems, with viable solutions, in a way that will create meaningful improvements for Puget Sound.

Strategic initiatives are meant to deliver progress at a substantial level on the priority actions – now. They will be the focus of Partnership spending and resources, and of our efforts to increase funding, seek changes in policy, report success and challenges, and educate and engage citizens in the recovery effort.

The three strategic initiatives are:

- **Prevention of pollution from urban stormwater runoff** – this is an immense challenge, and although we have many of the tools and technologies for stormwater, we need to make much fuller use of them if we are to stop contamination from flowing into the Sound;
- **Protection and restoration of habitat** – we must stop destroying habitat, protect what we have left and substantially restore the critical habitats that we have lost;
- **Recovery of shellfish beds** – Shellfish harvesting is both a treaty right for tribes and a vital industry in our region. It is also a treasured tradition for countless northwest families. Shellfish health begins on land, through reduction of pollution from rural and agricultural lands and maintenance and repair of failing septic tanks.

The specific actions to include within each strategic initiative were drawn from the strategies and actions developed during the Action Agenda update process and informed by high-level policy discussions such as the Governor's Shellfish Initiative, the ECB policy statement on stormwater, and the process to address shortcomings in the implementation of salmon recovery efforts identified by tribes and NOAA in 2011. They were developed by Subcommittees of the Ecosystem Coordination Board and reviewed and adopted by the Leadership Council.

The Strategic Initiatives are described in detail in the Action Agenda Highlights document. For ease of reference the content is summarized here in Tables 1-3 In addition, throughout the Action Agenda symbols illustrate the sub-strategies and actions that are part of each Strategic Initiative.

Prevention of pollution from urban stormwater runoff

Protection and restoration of habitat

Recovery of shellfish beds

Table 1: Prevention of Pollution from Urban Stormwater Runoff - Strategies and Actions

STRATEGY	#	SUB-STRATEGY	NTA #	NTA
C	1.1	Implement and strengthen authorities and programs to prevent toxic chemicals from entering the Puget Sound environment.	3	Fish Consumption Rates. Ecology will, as soon as possible, establish accurate default fish consumption rates that are reflective of actual consumption rates of vulnerable populations who consume fish and shellfish from the Sound at a subsistence level and children who, by virtue of lower body mass may be disproportionately affected by toxins in their food supply. Ecology will complete the rulemaking processes for Sediment Management Standards, incorporating the revised and accurate fish consumption rate, no later than the end of 2013; the water quality rule shall be guided by Ecology's September 2011 draft Fish Consumption Rates – Technical Support Document and other appropriate relevant information as it becomes available. Ecology will report to the Leadership Council at least quarterly, beginning in October 2012, on the plan and progress towards adoption of a fish consumption rate.
C	2.1	Manage urban runoff at the basin and watershed scale.	1	Watershed Based Stormwater Management. To ensure all funds (existing and new) are used efficiently and effectively, Puget Sound Partnership (PSP) will work with the ECB to commission an evaluation of the feasibility, cost, and effectiveness of transitioning the existing municipal stormwater jurisdiction by jurisdiction permit approach using "general permits," to watershed-based municipal stormwater management. PSP will work with interested parties, particularly Ecology and local governments, to ensure their perspectives and concerns are addressed and accounted for when developing the scope of work for their evaluation.
C	2.2	Prevent problems from new development at the site and subdivision scale.	1	NPDES Municipal Permits. Ecology will issue municipal permits for western Washington and provide financial assistance to permittees for implementation, particularly for code changes, stormwater system mapping, operations and maintenance, inspections and enforcement. This will require additional resources to Ecology for permit oversight, technical assistance, and enforcement. Ecology will provide incentives to NPDES permittees who, by interlocal agreement, lead or carry out regional or watershed scale NPDES implementation.
C	2.2	Prevent problems from new development at the site and subdivision scale.	3	Stormwater Management Outside Permitted Areas. Ecology, in coordination with the state Department of Health, will identify two high priority shellfish growing areas degraded by urban stormwater discharges and work with local governments and other key parties to reduce these impacts to the areas.
C	2.3	Fix problems caused by existing development.	1	Stormwater Retrofit Projects. Ecology will lead a process to identify high priority retrofit projects that will contribute to the recovery of Puget Sound and complete conceptual design to a stage sufficient to seek project implementation funding. The work will build on retrofit prioritization work by WSDOT, King County and others, and will be replicable in other urban and suburban areas around the Sound.
C	2.4	Control sources of pollutants.	1	Compliance Assurance Program. Ecology and local governments will increase inspection, technical assistance, and enforcement programs for high-priority businesses and at construction sites.
C	2.5	Provide focused stormwater-related education, training, and assistance.	1	LID Training and Certification. Ecology will provide focused training for local government staff on LID project review, and inspections and approvals, as well as to local government staff and private sector on maintenance. Develop new professional certification for stormwater maintenance specialists. Provide business staff and contractors with training on source control, spill recognition, spill response, and erosion control.
C	2.5	Provide focused stormwater-related education, training, and assistance.	2	Education for the Next Generation of Stormwater Professionals. The Tulalip Tribes will develop a near-term plan to provide sustainable water resource management academic curriculum in all Puget Sound counties for future stormwater professionals that is inclusive of tribal treaty rights, history, civics, and emphasizes continuing improvements in stormwater management in the context of the larger issues of sustainable water resource management and climate change.

STRATEGY	#	SUB-STRATEGY	NTA #	NTA
D	6.1	Implement a long-term, highly visible, coordinated public-awareness effort using the Puget Sound Starts Here brand to increase public understanding of Puget Sound's health, status, and threats. Conduct regionally-scaled communications to provide a foundation for local communications efforts. Conduct locally-scaled communications to engage residents in local issues and recovery efforts.	1	Phase 2 of Puget Sound Starts Here. PSP and partners implement Phase 2 of *Puget Sound Starts Here* campaign. PSP, STORM and Ecology ensure that messages reflect the demography, regional identity and issues facing the Puget Sound.

Table 2: Protection and Restoration of Habitat - Strategies and Actions

STRATEGY	#	SUB-STRATEGY	NTA #	NTA
A	1.2	Support local governments to adopt and implement plans, regulations, and policies consistent with protection and recovery targets, and incorporate climate change forecasts.	1	Land Use Planning Barriers, BMPs and Example Polices. By December 2012, Ecology and Commerce, working with local governments, will identify the primary barriers to incorporating policies consistent with implementation of the Action Agenda into local land use planning and decisions and identify best practices and assistance needed to overcome these barriers. This will address implementation of protection strategies, encouraging compact growth patterns, increased density, water quality standards, redevelopment, and rural lands protection. By December 2013, Ecology and Commerce will distribute example growth policies that include best practices that are consistent with protection and recovery targets and the Growth Management and Shoreline Management Acts.
A	1.3	Improve, strengthen, and streamline implementation and enforcement of laws, plans, regulations, and permits consistent with protection and recovery targets.	1	ECB Address Regulatory Exemptions. The ECB will address regulatory exemptions to provide effective oversight and mitigation sequencing for activities that impact the ecosystem.
A	4.2	Provide infrastructure and incentives to accommodate new and re-development within urban growth areas.		*All of sub-strategy A4.2 is a priority for the habitat protection and restoration strategic initiative.*
A	5.1	Improve data and information to accelerate floodplain protection, restoration, and flood hazard management.	1	Floodplain Protection and Policy Team Actions. PSP will advance floodplain protection and restoration by facilitating actions, policy changes, and program changes necessary to reduce critical barriers to habitat protection and restoration. Funding will be focused on the places that have the greatest potential to recover floodplain functions.
A	5.3	Protect and maintain intact and functional floodplains.	4	Levee Vegetation. PSP will continue to work with the Army Corps of Engineers to craft a regional variance to their vegetation on levees policy.
A	6.1	Implement high priority projects identified in each salmon recovery watershed's three-year work plan.		*All of sub-strategy A6.1 is a priority for the habitat protection and restoration strategic initiative.*
A	7.1	Update Puget Sound instream flow rules to encourage conservation		*All of sub-strategy A7.1 is a priority for the habitat protection and restoration strategic initiative.*
B	1.2	Support local governments to adopt and implement plans, regulations, and policies that protect the marine nearshore and estuaries, and incorporate climate change forecasts.	1	Update Local Shoreline Master Programs. Ecology will provide funding and, with WDFW, technical assistance to local jurisdictions to update local shoreline master programs by current deadlines, with all updates complete by 2014. A key deliverable for Ecology and local governments is to implement SMPs in a manner that validates achievement of no net loss of ecological function and guides Puget Sound toward shoreline armoring target.
B	1.3	Improve, strengthen, and streamline implementation and enforcement of laws, regulations, and permits that protect the marine and nearshore ecosystems and estuaries.	2	Hydraulic Code Rules Revision. By December 2014, WDFW will use best available science to revise Hydraulic Code Rules (chapter 220-110 WAC) and clarify conditions under which hydraulic projects must be conducted to prevent or mitigate the impacts to fish life and habitat.

STRATEGY	#	SUB-STRATEGY	NTA #	NTA
B	2.1	Permanently protect priority nearshore physical and ecological processes and habitat, including shorelines, migratory corridors, and vegetation particularly in sensitive areas such as eelgrass beds and bluff backed beaches.	1	Protect 10% of Bluff-Backed Beaches. PSP will promote acquisitions, easements, or other protective covenants to permanently protect at least 10% of bluff-backed beaches with high sediment supply or other priority nearshore habitats facing potential shoreline development pressure by June 2014.
B	2.2	Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands.	1	Implementation of Projects Identified by PSNERP. By December 2014, DFW and the Corps will advance implementation of projects identified by Puget Sound Nearshore Ecosystem Restoration Project (PSNERP), including those described in the Strategic Restoration Conceptual Engineering Final Design Report. Implementation will occur both through Corps programs as anticipated through the General Investigation process, and through other non-Corps federal, state, tribal and local programs by 2013.
B	2.3	Remove armoring, and use soft armoring replacement or landward setbacks when armoring fails, needs repair, is non protective, and during redevelopment.	1	Homeowner Incentives for Landward Setbacks. Building on work done to date, PSP will convene a process with partners to develop and recommend incentives that help homeowners permanently remove armoring and encourage setback of houses by June 2014. Incentives could include, but would not be limited to financial, regulatory, low interest loans or grants. This work will help restore nearshore processes, promote landward retreat of homes facing sea level rise, and promote progress toward shoreline armoring target.
B	5.3	Prevent and rapidly respond to the introduction and spread of terrestrial and aquatic invasive species.	2	Invasive Species Early Detection and Monitoring. By June 2014, the Invasive Species Council, in consultation with WSDA, will develop an early detection and monitoring program plan for priority invasive species in Puget Sound. The Council will coordinate the plan and implementation efforts with the Puget Sound Coordinated Ecosystem Monitoring Program.
C	8.1	Prevent and reduce the risk of oil spills.	2	Evaluate Risk Assessments for Update Needs. Ecology will evaluate existing Puget Sound marine transportation oil spill risk assessments, identify any gaps in marine safety and work with experts to develop and apply appropriate risk reduction measures.

Table 3: Recovery of Shellfish Beds - Strategies and Actions

STRATEGY	#	SUB-STRATEGY	NTA #	NTA
B	3.1	Protect intact marine ecosystems particularly in sensitive areas and for sensitive species.	2	Outfall Strategy on State-Owned Aquatic Lands. DNR, in collaboration with Tribal Governments, Ecology, DFW, and DOH, will develop and implement a strategy to reduce impacts from outfalls on state-owned aquatic lands in Puget Sound.
C	1.5	Control wastewater and other sources of pollution such as oil and toxics from boats and vessels.	1	No Discharge Zone Evaluation and Petition. Ecology, in collaboration with State Parks and EPA, will administer grants to fund the development of a petition to EPA to establish a No Discharge Zone to prohibit recreational and commercial vessels from discharging sewage in all or parts of Puget Sound.
C	1.6	Implement and strengthen authorities and programs to prevent toxic chemicals from entering the Puget Sound environment.	3	Water Quality Enforcement. Ecology, working with DOH, will increase the capacity for enforcement, and enforce all regulations pertaining to pathogens and contaminants that pollute the waters of the state to ensure achievement of approved shellfish growing water certification.
C	3.2	Ensure compliance with regulatory programs designed to reduce, control, or eliminate pollution from working farms.	1	Priority Areas for Voluntary Incentive and Regulatory Programs. The State Conservation Commission and the Washington State Departments of Agriculture, Ecology, and Health will identify priority areas to better target and coordinate implementation of voluntary incentive and regulatory programs for rural landowners, small-acreage landowners, and working farms.

STRATEGY	#	SUB-STRATEGY	NTA #	NTA
C	5.3	Improve and expand funding for on-site sewage systems and local OSS programs.	1	Regional OSS Homeowner Loan Program. DOH, Ecology, and PSP will help evaluate options and support proposals to fund a unified, self-sustaining, low-interest loan program in the Puget Sound region to help OSS owners repair and replace their systems by June 2014.
C	5.3	Improve and expand funding for on-site sewage systems and local OSS programs.	2	Regional OSS Program Funding Source. DOH will evaluate approaches and mechanisms (e.g., a regional flush tax or sewer surcharge) to generate and distribute funds to Puget Sound counties to implement their OSS management plans and programs by June 2014.
C	7.1	Improve water quality to prevent downgrade and achieve upgrades of important current tribal, commercial and recreational shellfish harvesting areas.	3	Pollution Control Action Team. Ecology, working with DOH, WSDA, EPA and the Tribes will form a Pollution Control Action Team (PCAT) to respond quickly when areas are identified where water quality problems threaten shellfish areas. They will initiate community outreach and education, pollution identification, inspection, technical assistance to local agencies and landowners and finally, enforcement. The team will focus its work in priority areas and support PIC programs where they are established. The first effort will be in Drayton Harbor and Portage Bay.
C	7.3	Ensure environmentally responsible shellfish aquaculture based on sound science.	3	Shellfish Model Permitting Program. The Department of Ecology will work with the Governor's Office of Regulatory Assistance (ORA) to lead and facilitate a state team to develop and implement a Model Permitting Program that ensures early and continued coordination among state and federal agencies, tribes and local governments for permitting and licensing of shellfish aquaculture.
C	9.4	Develop and implement local and tribal pollution identification and correction programs.	1	Pollution Identification and Correction Programs. DOH and Ecology will administer EPA grants to help counties and tribes set up sustainable programs to identify and correct nonpoint pollution sources to improve and protect water quality in shellfish growing areas and at marine swimming beaches. These sustainable programs will have ongoing monitoring to identify pollution sources and assess effectiveness of efforts, a local sustainable funding source, and a compliance assurance component.

SECTION 3:

STRATEGIES AND ACTIONS TO RECOVER PUGET SOUND TO HEALTH

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Strategies and Actions to Recover Puget Sound to Health

This section presents a complete picture of Puget Sound recovery including strategies and sub-strategies, ongoing activities, and near-term actions. The strategies and sub-strategies are intended to be durable, and will be adapted as needed.

How are the Strategies and Actions Organized?

The Action Agenda is made up of strategies, sub-strategies, ongoing program activities, and near-term actions.

Strategies and actions are organized into five broad categories:

A. **Freshwater and Terrestrial Protection and Restoration**, which includes strategies and actions related to land development and restoration, stewardship of working forest and agriculture lands, floodplains, salmon recovery, and freshwater flows;
B. **Marine and Nearshore Protection and Restoration**, which includes strategies and actions related to shoreline protection, alteration, and restoration; marine area protection and restoration; working waterfronts and public access; and biodiversity and invasive species;
C. **Pollution Prevention and Cleanup**, which includes strategies related to reducing toxic threats, polluted runoff from urban and rural lands, wastewater management, shellfish bed restoration, oil spill preparedness, and clean up;
D. **Strategic Leadership and Collaboration**, which includes much of the core work of the Puget Sound Partnership agency, as well as some partners, including strategies related to setting priorities, performance management, science and ecosystem monitoring, and promoting stewardship;
E. **Funding Strategy**, which describes how increased financial capacity to implement priority ongoing and new actions in the Action Agenda can be achieved through identifying new sources of funding, using existing funding more strategically and efficiently, and developing innovative, market-based programs.

In each category, strategies and sub-strategies describe the overall, long-term directions and approaches that are needed for Puget Sound protection and recovery. Strategies and actions identified by local areas are included where available. Cross-cutting issues such as salmon recovery and climate adaptation are discussed throughout. Emerging opportunities and future considerations are also listed for strategies or sub-strategies as appropriate.

Ongoing program activities and near-term actions are nested under strategies and sub-strategies.

- **Ongoing activities** have been and continue to be the foundation for recovery efforts. All ongoing work that is related to Puget Sound recovery fits within the framework of the Action

Agenda. The ongoing programs listed in the 2012 Action Agenda are mainly state agency programs. They are examples and are not intended to be a complete inventory. Ongoing work must continue to be funded in order to achieve recovery goals. The Partnership will begin an evaluation of ongoing programs after the Action Agenda is adopted.

- **Near-term actions** are considered the "change agenda." These are important new initiatives, critical next steps in ongoing work, and targeted efforts to improve implementation of ongoing programs or ensure these programs have adequate resources to deliver on their objectives.

Finally, **recovery target views** throughout this section describe each recovery target, the current status of the ecosystem relative to each target, and show the logic behind how we think the strategies and actions in the Action Agenda will lead to achievement of the targets. The target views are presented as graphical depictions of this thinking in the form of "results chains." The results chains illustrate relationships between strategies and actions, pressures on the ecosystem, and ecosystem conditions. The Partnership has received feedback that the results are difficult to read and could be improved as a communication tool. Each target view includes a detailed explanation of how to read the diagrams. These diagrams can be improved in the future.

How Were the 2012 Strategies and Actions Developed?

As the recovery targets were emerging, work began to ensure the strategies and actions in the Action Agenda would make meaningful progress towards achieving recovery. Five interdisciplinary teams were formed to focus on developing and refining strategies and actions related to achieving the recovery targets for the focus pressures of: 1) land development, 2) loss of floodplain function, 3) shoreline alteration, 4) urban stormwater runoff, and 5) wastewater. These teams included representatives of the business, environmental, academic, and public interest communities; state and federal agencies; and Tribal governments. They met through the summer and fall of 2011 and used a process based on the Open Standards for the Practice of Conservation (http://www.conservationmeasures.org/) to develop strategies and actions, building from the 2008 Action Agenda and considering the guiding principles for ecosystem management in Puget Sound. Other strategy areas, such as oil spill preparedness and response, toxic cleanup, and invasive species, were assigned to staff leads who worked with standing or ad hoc groups to refine and update the existing strategies if and as needed. Well over 100 people participated in this process, which included upwards of 50 intensive meetings and discussions.

At the same time, updates to the local area strategies and actions were underway. This work both informed the Soundwide strategies and actions, and defined local priorities for and contributions to Puget Sound recovery. Over 30 meetings were held in local areas from June through September 2011.

GUIDING PRINCIPLES FOR ECOSYSTEM MANAGEMENT IN PUGET SOUND

Input from the topic forums and action area meetings in 2008 led to the development of the following principles for ecosystem management. The principles, refined by the Leadership Council, Science Panel, and Ecosystem Coordination Board, were used to develop the strategic priorities and actions. They were reviewed by the Science Panel in 2011 and reflect only modest addition related to human communities.

A. Address threats and choose opportunities with the highest potential magnitude of impact.

B. Address threats with the highest level of urgency. (How imminent is the threat; will it result in an irreversible loss; how resilient are the resources that are affected?)

C. Use strategies that have a reasonable certainty of effectiveness and reflect a balanced precautionary and adaptive approach.

- Actions should have a realistic expectation that they will be effective in addressing the identified threat.
- Actions and decisions about the use of resources should err on the side of caution to avoid irreversible ecological consequences.
- Actions should be designed so they can be measured, monitored, and adapted.

D. Use scientific input – about the importance, urgency, and reversibility of threats; opportunities for management impact; effectiveness of actions; and monitoring and adaptation – in designing, implementing, and evaluating strategies.

E. Use strategies that are cost effective in making efficient use of funding, personnel, and resources with realistic expectations of achieving results.

F. Address the processes that form and sustain ecosystems and increase ecosystem resiliency rather than focus narrowly on fixing individual sites. Consider the Salish Sea ecosystem perspective.

G. Attempt to address threats at their origin instead of reacting after the damage has been done. Anticipate and prevent problems before they occur, and plan for extreme events. (With more people coming to the region and a changing climate, a proactive strategy is increasingly important.)

H. Consider the linkages and interactions among strategies.

- Address multiple threats and their interactions with strategies that work together. We cannot afford to look at problems or develop solutions in isolation.
- Watch out for unintended consequences. Evaluate strategies so actions to address one problem do not cause harm to other ecosystem processes, functions, and structure, as well as social and economic considerations.
- Integrate salmon recovery actions with ecosystem management actions.

I. Account for the variations in ecosystem conditions and processes in different geographic areas of Puget Sound. Some parts of Puget Sound are fairly intact while others are severely degraded, and rebuilding strategies need flexibility to encompass regional differences. Ensure that no region or economic sector bears the entire brunt of the responsibility for implementing solutions.

J. Account for human communities and values as fundamental, central elements of the Puget Sound ecosystem (i.e., the Puget Sound social-ecological system).

Public Review of the Draft Action Agenda

Subject-focused workshops on draft Action Agenda content were held in September 2011, attended by approximately 100 subject experts from a wide range of interests. Six public open houses were held around the Sound around the same time. The Ecosystem Coordination Board and Leadership Council were briefed on draft Action Agenda content in September, October, and November 2011 and the Draft Action Agenda Update was released for public review and comment on December 8, 2011.

Ninety comment letters were received during the public comment period that closed on February 3, 2012, and over 1,000 comments were received by email or post-card.

High-level concerns raised by commenters included:

- While the Partnership needed to "show their work" and logic behind the Action Agenda, the document was too long and should be simplified, shortened, and focused on clear priorities;
- The prioritization process described in the draft Action Agenda would mix ecological with other criteria and would not produce clear information for decision makers to use;
- Salmon recovery and salmon recovery actions should be more prominent;
- Links between strategies and actions and achievement of the 2020 recovery targets are not clear enough, and interim milestones to track progress towards recovery are needed;
- More integration of the Soundwide and local work is needed;
- Actions needed to be specific and include performance measures.

In addition, commenters offered numerous comments on specific sections and wording and on specific strategies, sub-strategies, near-term actions, and performance measures. A summary of responses to comments is available online (http://www.psp.wa.gov/action_agenda_2011_update_home.php).

The Partnership addressed the high-level concerns by creating the strategic initiatives and an Action Agenda Highlights document. Salmon recovery is prominently featured through the strategic initiatives and iconography throughout the Action Agenda. The work of the local integrating organizations advanced between the draft and final Action Agenda. Local strategies and actions, to the extent available and relevant, are woven throughout the strategies and sub-strategies. Local near-term actions with measures are included where available. The Partnership has added an action to develop interim milestones to track progress towards recovery targets.

As part of the Partnership's performance management responsibilities, near-term actions will be tracked for implementation progress. The will help identify where additional regional support and resources are needed. It is not intended to grade implementers on their work. All near-term actions have one assigned owner, a completion date and performance measures. The Partnership is continuing to work with partners to identify measures that are strongly linked to progress in reaching the 2020 ecosystem targets. The monitoring of progress and performance management will continue to improve, yet we have made substantial strides in this document from the 2008 Action Agenda.

After the initial public comment on the Action Agenda, the Partnership made the revised draft Action Agenda available for additional public review in May and June 2012. This review was focused on identifying any refinements to near term actions (or additional actions) that might be needed. At the same time, subcommittees of the Ecosystem Coordination Board were working to identify the content

of the three Strategic Initiatives. When this work was complete the Partnership made the final draft Action Agenda package, including the Strategic Initiatives, available for public comment in early July, 2012. Thirty-three sets of comments were received during the July review period. These comments were considered by the Ecosystem Coordination Board and final changes were considered and adopted by the Leadership Council in August.

SCIENCE IN THE ACTION AGENDA

After completion of the first Action Agenda in 2008, the Partnership, including the Science Panel, embarked on identifying and building more rigorous and systematic approach to future iterations of the Action Agenda. The Partnership adopted the Open Standards for the Practice of Conservation (The Conservation Measures Partnership, 2007) as the adaptive framework to use moving forward (Partnership's Strategic Science Plan (2010)).

The Open Standards process provides a common means of understanding and supporting the critical role of science, and a means to identify where in the project management cycle science is relevant and needed. Each step in the Open Standards process has scientific, performance and policy inputs. The choice of what actions to take and their priority and sequencing are ultimately policy choices. These choices are grounded in scientific information so that decision-makers can make the most informed decisions possible, and understand the certainty and uncertainties in their choices.

There are multiple other scientific inputs to the Action Agenda content and process, summarized in Appendix D.

In the 2008 Action Agenda, the Partnership recognized that climate change would need to be incorporated into future versions of the Action Agenda. For this update, the Partnership is working with the University of Washington Climate Impacts Group to set the Puget Sound region and the Action Agenda on a path for adapting our work in the face of a changing climate.

How is Climate Change Adaptation Incorporated into the Strategies and Actions?

Adapting to our changing climate means understanding how climate change may affect priority issues for the Partnership and using that knowledge to take steps that will reduce or avoid the negative impacts of climate change, as well as seize opportunities that exist now. Adaptation is part of long-term risk management, not a one-time effort.

The Department of Ecology recently released *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy* (April 2012). Adaptation steps reduce the vulnerability of human and natural systems, increase the capacity to withstand or cope with changes in climate, and transform the system to be compatible with likely future conditions. Many adaptation strategies are considered

"no regrets" or "win-win" strategies because they address existing stresses on communities, economy, and environment while also helping reduce climate-related risks. In addition to the state strategy, there are local adaptation strategies that should be considered where relevant.

All of the Action Agenda strategies, sub-strategies, ongoing programs, and near-term actions are the "win-win" strategies and actions that help reduce existing stresses while reducing climate risks. They are similar to the strategies and actions outlined in state climate response. The state climate response strategies and actions are integrated into the 2012 Action Agenda as much as possible. Each strategy or sub-strategy of the Action Agenda contains a description of climate change impacts and related state strategies. Where possible now, a climate change adaptation step was included in near-term actions. Climate change next steps are included in the future opportunities and emerging issues for each strategy section. In the 2012 Action Agenda, a few near-term actions are specifically targeted at incorporating an adaptation need. For example, B2.3 NTA 1 Landowner Incentives for Landward Setbacks is designed to address both current shoreline armoring, as well as sea level rise. Action A5.1 NTA 4 Prioritization of State Highways with Floodplain Impacts specifically includes incorporating the Washington Department of Transportation *2011 Climate Impacts Vulnerability Assessment Report.*

Fully integrating climate change into the Action Agenda will require looking at the implications of a changing climate beyond 2020 for the long-term (e.g., 2050 and later), medium-term (2020) and near-term (2-3 years) goals and trajectories. For example, how will the definition of a "healthy Puget Sound" change in a changing climate? How will climate change alter how we measure and evaluate progress? We may need to refine value terms like "priority," "ecologically important," "sensitive," and "high value," as well as re-evaluate strategies that are based on existing policies, plans, and tools that may not include climate change considerations. In a region with high natural climate variability, we will need to recognize the impacts of climate fluctuations as well as change, to ensure appropriate approaches and metrics for planning and evaluation.

In *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy* (April 2012), seven overarching high-priority climate change response strategies are identified.

1. **Protect people and communities from climate change impacts**. This includes enhancing core public health capacity and enhancing emergency response capacity to address increasingly extreme floods and fires.

2. **Reduce risk of damage to buildings, transportation systems, and other infrastructure**. This includes reducing flood damage by restoring floodplains and capturing more water, supporting local efforts to prepare for coastal flooding and storm surges, considering climate change impacts when siting new development and infrastructure, and planning for relocation if structures are damaged by floods or other impacts.

3. **Reduce forest and agriculture vulnerability to climate change impacts**. This includes enhancing surveillance and eradication of pests and disease, promoting identification of and transition to plant species that are resilient to new climate conditions, conserving productive and adaptive farmland and forests, and reducing forest and wildland fire risk in highly vulnerable areas.

4. **Improve water management to address climate-related supply reductions.** This includes promoting integrated water management in vulnerable basins, implementing enhanced water

conservation and efficiency programs, ensuring sufficient cold water in salmon-bearing streams during critical seasons, and incorporating climate change realities into agency decision-making.

5. **Safeguard fish and wildlife and protect critical ecosystem services that support human and natural systems.** This includes protecting and restoring habitat and improving the ability of species to migrate to more suitable habitat as the climate shifts, protecting sensitive and vulnerable species and their habitats, and reducing existing stresses on fish, wildlife, plants, and ecosystems.

6. **Reduce the vulnerability of coastal communities, habitat, and species**. This includes preventing coastal habitat degradation and destruction and seeking opportunities for upland habitat creation as sea levels rise, and reducing shellfish vulnerability to ocean acidification by reducing land-based contributions of carbon and polluted runoff to the marine environment.

7. **Support the efforts of local communities and strengthen capacity to respond and engage the public.** This includes identifying existing and new funding mechanisms to support adaptation work at the local level, developing an institutional structure to improve coordination and support an integrated approach, supporting information gathering on climate impacts and ensuring scientific information is easily accessible, and engaging the public in determining appropriate responses to climate change.

Locally Developed Information in the Action Agenda

City and county governments will be the primary implementers of many of the priorities, strategies, and actions identified in the Action Agenda. Since 2008 with the development of the first Action Agenda, local areas have been working toward both a structure and an approach to implement, as well as integrate, local community efforts to advance the Action Agenda. The Partnership has supported local areas to form what are called, "local integrating organizations" (LIOs) and have had these LIOs recognized by the Leadership Council. These LIOs have helped to update the Action Agenda by more clearly articulating local information, priorities, and actions. By April 2012, LIOs have been established in 8 out of 10 local areas in Puget Sound.

Throughout 2011 and early 2012, Partnership staff worked closely with each local area to develop an approach for identifying and prioritizing local strategies and actions that help to restore Puget Sound to health. The result of this work is portrayed in the 2012 Action Agenda in the following ways:

- An updated profile for each local area is included in the 'How Local Areas Are Working to Protect and Recover Puget Sound?' section of the Action Agenda. These profiles contain information on each area's work to date to identify local

Locally Developed Information in the Action Agenda

ecosystem pressures and strategies and actions for addressing those threats.

- Information from the local areas was used by strategy conveners to help develop the Soundwide strategies in the 2012 Action Agenda. Local strategies that have been agreed upon or are in consideration are presented with the related Soundwide strategies or sub-strategies.
- For those LIOs that identified and prioritized near-term actions, these are listed with related Soundwide actions. Many local areas were not able to identify near-term actions at this time. This does not mean that actions and strategies are not important in these areas; instead it reflects the differences between the local area processes. Local near-term actions are indicated with a label that delineates the area, for example "HC" delineates Hood Canal.
- Most local areas identified scientific needs. These are included in the 2012 Biennial Science Work Plan (BSWP).

It is important to note that work is ongoing in all local areas. Each area is at a unique point in the process of identifying their priorities and contributing to the Action Agenda. Some areas have prioritized strategies and actions with performance measures, others are working to further refine content and add specificity around actions, while others are beginning to establish their LIO and define and prioritize strategies and actions. The table below provides an overview of the current status of each area as it relates to Action Agenda engagement.

LOCAL AREA	STATUS	LOCAL AREA	STATUS
Hood Canal	LIO developed; strategies and actions identified; undergoing prioritization and further refinement	**South Central**	LIO developed; strategies and actions identified and prioritized; undergoing further refinement
Island	LIO developed; starting to identify strategies and actions and discuss prioritization	**South Sound**	LIO developed; strategic initiatives identified; refining and prioritizing strategies and actions
West Sound (North Central)	LIO in formation; strategies and actions identified; undergoing prioritization and further refinement	**Stillaguamish/ Snohomish**	LIO developed; starting to identify strategies and actions

Locally Developed Information in the Action Agenda

San Juan Islands	LIO developed; strategies and actions identified and prioritized; actions to be further defined	**Strait of Juan de Fuca**	LIO developed; strategies and actions identified and prioritized
Skagit	LIO in formation; starting to identify strategies and actions	**Whatcom**	LIO developed; refining strategies and actions

In the next two years, each local area will continue to move forward in defining priorities, implementing actions, and contributing to a cleaner, more vibrant, and community-oriented Puget Sound.

What Are the Priorities For Action?

RCW 90.71 requires PSP to prioritize actions necessary to recover Puget Sound. Clear priorities also are needed to direct allocation of increasingly scarce federal, state, and local resources. Based on feedback from the ECB and others in April, the prioritization process will be further refined and completed by July. However, broad support was expressed for three strategic initiatives which are listed below. The content of these initiatives will be developed along with the finalization of the prioritization process.

The three Strategic Initiatives are:

- **Prevention of pollution from urban stormwater runoff** – this is an immense challenge, and although we have many of the tools and technologies for stormwater, we need to make much fuller use of them if we are to stop contamination from flowing into the Sound;
- **Protection and restoration of habitat** – We must stop destroying habitat, protect what we have left and substantially restore the critical habitats that we have lost;
- **Recovery of shellfish beds** – shellfish harvesting is both a treaty right for tribes and a vital industry in our region. It is also a treasured tradition for countless northwest families. Shellfish health begins on land, through reduction of pollution from rural and agricultural lands and maintenance and repair of failing septic tanks.

Setting priorities involves balancing ecological, economic, and human-well being factors so that we are focused on actions that will make the greatest progress toward recovery for the time and resources spent. The three strategic initiatives encompass priority actions that address the most serious threats to Puget Sound health, and will improve human well-being and support economic development and job creation. The specific actions included within each strategic initiative were drawn from the strategies and actions developed during the Action Agenda update process and informed by high-level policy

discussions such as the Governor's Shellfish Initiative, the ECB policy statement on stormwater, and the process to address shortcomings in the implementation of salmon recovery efforts identified by tribes and NOAA in 2011. They were developed by Subcommittees of the Ecosystem Coordination Board and reviewed and adopted by the Leadership Council.

The strategic initiatives are described in detail in the Action Agenda highlights document. Their content also is summarized in Section 2 of the Action Agenda. Finally symbols throughout the Action Agenda illustrate the sub-strategies and actions that are part of each strategic initiative.

Future Prioritization Efforts

In addition to establishing the 2012/2013 Strategic Initiatives, as part of this Action Agenda update, the Partnership has begun an effort to create a more systematic and replicable approach to prioritization, including creating a transparent, durable framework for the prioritization process – something that can be refined and used year after year if desired – and reaching out to technical experts to gather specific information on each near-term action to inform priority setting. The ambition of this priority setting process is that it will be explicitly information based, transparent, and replicable, and that it will help illustrate where gaps in knowledge or uncertainty are particularly relevant to our understanding of what various actions might achieve.

Following direction from the ECB, the Science Panel and staff developed a tool that would produce a ranking of Action Agenda sub-strategies based on their expected ecological impact. In February and early March 2012, the ECB agreed that two other kinds of criteria were important for prioritization but would not be included in calculating ranks of sub-strategies. These were protection of tribal treaty rights and implementation issues (e.g., availability of funding, infrastructure considerations, job creation, human well-being).

This process followed five well-established steps for decision support:

1. *Meet with decision makers to identify what is important in their decisions* – In February, Science Panel and staff scientists met twice with the ECB in facilitated meetings to identify key criteria for evaluating sub-strategies.

2. *Choose an analytical approach* – The Science Panel chose a well-established, simple but robust method that has been used many times to support environmental decisions in a variety of different settings.

3. *Determine how much different key criteria should influence decisions* – Agreeing on weights is an important step for decision makers. Because the ECB identified a suite of ecological outcomes (e.g., protection, restoration, reducing pressures, effects on multiple parts of the ecosystem) as important, they asked the Science Panel to develop preliminary weightings for these. The Science Panel developed weightings for these and for strategic outcome criteria for ECB consideration.

4. *Collect information on the choices based on the key criteria* – The Partnership engaged 40 scientists nominated by the membership of the ECB in evaluating the 73 sub-strategies of the

Action Agenda using the criteria developed by the ECB, Science Panel, and staff. Staff met with the scientists after receiving their survey data to discuss difficulties they encountered and to identify ways to resolve any data problems.

5. *Apply an analytic method to the information to develop rankings* – Data from the survey were incorporated in the analytical method to develop a score for each sub-strategy. Rankings of sub-strategies were based on this score.

Expected ecological impact, of course, is not the only factor that should be considered in setting priorities. The ECB emphasized in their discussions that information on the funding status and potential economic costs (or economic benefits), human well-being impacts, and implementability would also be needed for each sub-strategy to set responsible priorities. This information was gathered by a broadly distributed survey sent to the Ecosystem Coordination Board, State Caucus, Salmon Recovery Council, Business Caucus, Environmental Caucus, and tribes; forty-two people provided information in response to this survey and their responses were compiled.

The result of this effort was a preliminary ranked list of sub-strategies based on their expected ecological impacts, and accompanying information on economic, human well-being, and implementation issues. The ECB considered the preliminary list of ranked sub-strategies at their April 6 meeting. There was broad-based support for the effort to date and the goal of establishing a ranked list; however, participants were concerned that the scoring process had not left enough time for the science community to develop a common understanding of what each sub-strategy is intended to accomplish, and they noted some other more technical concerns. There was particular concern about creating a list that ranked sub-strategies across issue areas – that is, land development related sub-strategies with marine and nearshore strategies, with species recovery strategies, with stormwater and other pollution abatement and control strategies.

Despite these concerns, participants expressed strong support for continuing to work on the ranking effort to improve the quality of a final ranked list. In response to this interest, the Partnership worked with the experts who had participated in the initial ranking effort to make some initial revisions to the ranking tool to address concerns. Adjustments were made to the ratings for ecosystem pressures, discussions were held to ensure that those participating in the ranking had a consistent understanding of the sub-strategies and what implementation of sub-strategies would mean, and the instructions for ranking were refined. After this effort, parts of the ranking effort were re-done. The results of this second ranking effort are included in the Action Agenda in Appendix G.

The Partnership will continue to work with the science community on the ranking process and will publish three lists of sub-strategies ranked based on expected ecological impact in this Action Agenda update. The information on economic, human well-being, and implementation issues gathered as part of this initial process will be compiled with the final ecological impact rankings so decision makers have all of the information in one place.

Using the Action Agenda to Drive Investment and Progress

The Action Agenda was created to drive investment and action. All of the work described is important and needed to protect and recover Puget Sound. At the same time, the Partnership recognizes the need to think practically about how work might be sequenced, both for maximum efficiency and because resources are scarce and declining. The Action Agenda should be used to guide decision making related to allocation of funding or other resources in the following way.

Focus on the Strategic Initiatives: Strategic initiatives are the highest priorities for 2012 and 2013. First consider whether the new or discretionary funding source can support an unfunded or partially funded priority regional or related local action in one or more of the strategic initiatives. Strategic initiatives are the top priority for funding and the allocation of other resources. Strategic initiatives should also guide the development of policy agendas.

Maintain Effective Ongoing Programs: The Action Agenda builds on the ongoing work of partners to protect and restore Puget Sound. Funding should not be reallocated away from those programs at this time. Following this Action Agenda Update, the Partnership will conduct an evaluation of ongoing programs in accordance with RCW 90.71.370, which may result in ongoing program funding recommendations.

Prioritize the Science Needed to Better Understand a Complex System: Ensure that the science needed to successfully implement priority actions is funded and implemented. First fund and implement the Biennial Science Work Plan.

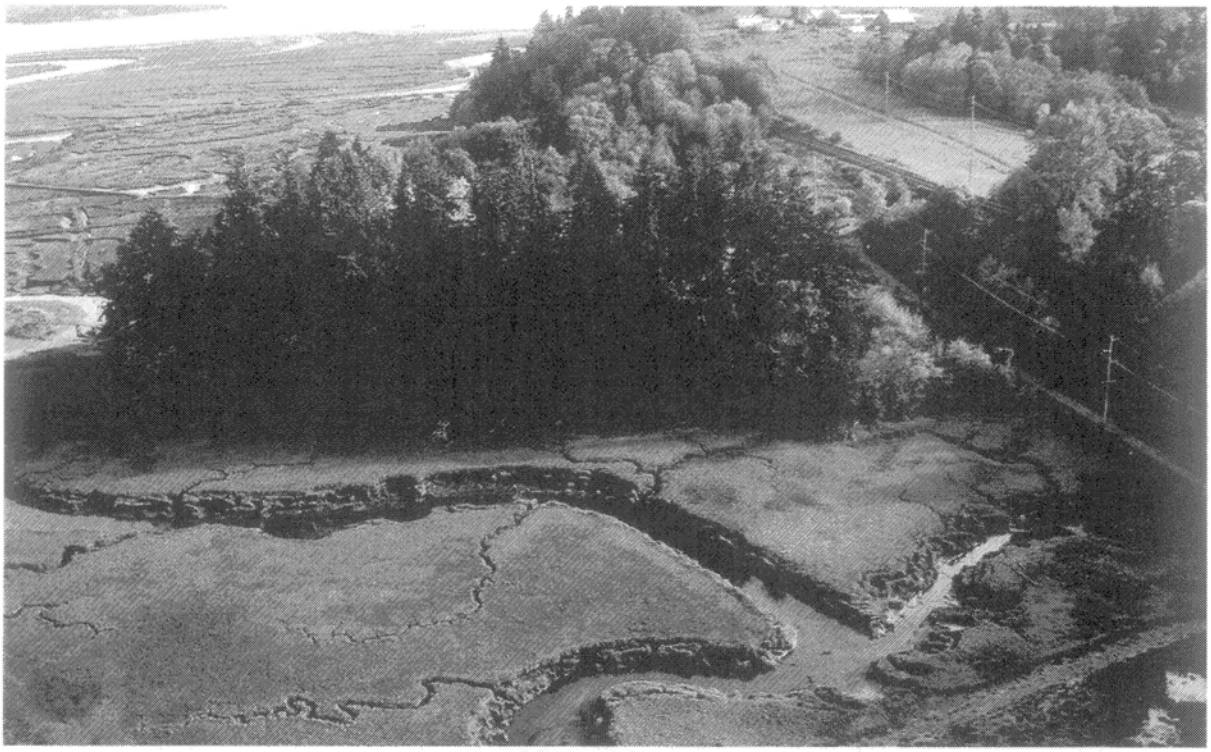
Use the Lists of Sub-strategies Ranked Based on Ecological Criteria and Local Priorities as One Piece of Information for Decision Making: If the funding source or other resource cannot be used to support implementation of a strategic initiative, refer to the ranked list of sub-strategies and related implementation information that will be completed in summer 2012. (The list is not available now.) Extract the sub-strategies eligible for funding by the source in question and generally fund near-term actions or local actions related to the highest ranked sub-strategies first except where implementation information or local priorities may be used to justify funding actions related to lower-ranked sub-strategies.

How Will the Action Agenda be improved in the Future?

The Action Agenda is a living document. Future updates will build on lessons learned and strengthen our shared responsibility to protect and recover Puget Sound. Our ongoing work to strengthen the Action Agenda and the Partnership includes:

- Science basis
    - Complete a risk analysis for Puget Sound that identifies the highest risks in geographic areas.
    - Establish quantitative links between actions and recovery targets, including a better understanding of the strengths of the relationships between individual actions, predicted results, and anticipated changes in the ecosystem.
    - Continue integration and increase emphasis on climate change adaptations, since taking action now reduces the costs of current and future climate impacts.
- Priority setting

    - Refine the ecological ranking process and develop a process to integrate ecological, community, and economic criteria into a prioritization method.
    - Continue and increase specificity on local priorities and actions.
- Program and action effectiveness
    - Complete a more rigorous evaluation of strategy effectiveness, ongoing programs, new actions. This work eventually will include the ability to discuss investment priorities that span ongoing programs and new work and better identify interim milestones towards achievement of targets.
- Performance management
    - Set interim target milestones. This work will begin in 2012.
    - Continue refinement of near-term action definitions and measures of progress to be outcome based.
- Engagement of business and private-sector interests
    - Continue innovation in developing market-based solutions and funding beyond government sources.
    - Cultivate business and philanthropic partnerships.
    - Further engage farmers and other key stakeholders.



STRATEGIES AND ACTIONS TO RECOVER PUGET SOUND TO HEALTH

A: UPLAND AND TERRESTRIAL

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Upland and Terrestrial

The protection and restoration of upland and terrestrial systems is fundamental to the health of Puget Sound, yet land development and associated human land use activities have damaged many of the underlying processes that support these systems. The elements of a successful approach to upland and terrestrial systems must ensure that land use and land development practices are carried out in a sustainable fashion; flood hazards do not harm people, residences, and transportation; freshwater quality and quantity supports freshwater and terrestrial food webs and human uses; groundwater levels as well as river and streamflow levels are sufficient to sustain people, fish, and wildlife; salmon are abundant and populations are significantly increasing throughout Puget Sound; species are protected and biodiversity is enhanced; and non-native species do not impair the complex functions of the Puget Sound ecosystem.

This chapter describes seven overarching strategies that are essential to the protection and restoration of upland and terrestrial systems:

- **A1** – Focus land development away from ecologically important and sensitive areas;
- **A2** – Protect and restore upland, freshwater, and riparian ecosystems;
- **A3** – Protect and steward ecologically sensitive rural and resource lands;
- **A4** – Encourage compact regional growth patterns and create dense, attractive, and mixed-use and transit oriented communities;
- **A5** – Protect and restore floodplain function;
- **A6** – Protect and recover salmon;
- **A7** – Protect and conserve freshwater resources to increase and sustain water availability for instream flows.

The 2020 ecosystem recovery targets most related to the protection and restoration of upland and terrestrial ecosystems are:

- Land development;
- Land cover – forestland and riparian;
- Floodplains;
- Summer stream flows;
- Wild Chinook salmon.

Reduce Pressures on Puget Sound from Land Development

The Challenge

Land cover and land development are essential contributors to the health of both terrestrial and aquatic ecosystem processes and habitats. Due to land conversion from growth and development pressures, many Puget Sound habitats have been reduced in size, diminished in quality, and fragmented, and the ecosystem processes (e.g., water quality, flow, and retention) that form and sustain these habitats have been degraded and disrupted. During the past 50 years, Puget Sound has lost at least two-thirds of its remaining old growth forest, more than 90 percent of its native prairies, and 80 percent of its saltwater and freshwater marshes (PSP Topic Forum Discussion Paper, Habitat and Land Use, 2008).

Essential to our ability to protect the resources that remain will be encouraging density in urban areas, protecting rural working lands, and avoiding sprawl. Population growth and residential and commercial development are elements of a healthy economy and are not per se what threatens Puget Sound health and recovery; rather, it is *where* and *how* the growth and development occur that can result in adverse pressures on ecosystem functions.

Tools to protect key ecosystem processes include regulatory programs, acquisition programs, partial acquisition of development rights or conservation easements, and conservation leasing. Special designations such as Wilderness, Wild and Scenic Rivers, and Outstanding Water Resources can be used to ensure long-term protection. Acquiring development rights from highly productive working resource lands, such as farms and forests, is an effective way to protect ecosystem processes/structures while ensuring long-term productivity of working landscapes and rural communities.

There are a number of sub-strategies in this section for which the National Estuary Program Watershed Grant has identified pilot projects to fund. Ecology and Commerce, the lead agencies for that grant, will continue to fund and provide technical support for pilot projects at the local level aimed at implementation of these sub-strategies.

Climate Change

Many of the impacts of climate change have links to land cover and land development. In particular this includes risks to fish, wildlife, and natural systems from habitat degradation and loss, as well as risks to the agriculture and forestry industries. *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy* (April 2012) identifies several high-priority, overarching strategies with a connection to reducing pressures from land development. These include:

- Reducing forest and agricultural vulnerability to climate change impacts. This strategy includes conserving productive and adaptive farmland and forests.
- Safeguarding fish and wildlife and protecting critical ecosystem services that support human and natural systems. This strategy includes protecting and restoring habitat.

The strategies, sub-strategies, ongoing programs, and near-term actions in Sections A1-4 directly implement the state climate response strategy. More detail on the agricultural and forestry strategies is included in Section A3. Additional climate adaptation work will continue to be needed in the future.

Relationship to Recovery Targets

In October 2011, the Partnership's Leadership Council adopted land cover and land development recovery targets. Broadly speaking, the indicators and targets measure the where, how, and extent of land development and conversion. Strategies for reducing pressures from land development include efforts to identify and focus land development away from ecologically important and sensitive areas; protect and steward ecologically sensitive rural and resource lands; and encourage compact regional growth patterns and create dense and attractive communities.

The land cover and land development targets are:

- Land cover dashboard target: By 2020, average annual loss of forested land cover to developed land cover in non-federal lands does not exceed 1,000 acres per year and 268 miles of riparian vegetation are restored or restoration projects are underway.
- Land development pressure reduction target 1: Basin-wide, by 2020, loss of vegetation cover on indicator land base over a 5-year period does not exceed 0.15 percent of the 2011 baseline land area.
- Land development pressure reduction target 2: By 2020, the proportion of basin-wide growth occurring within Urban Growth Areas is at least 86.5 percent (equivalent to all counties exceeding goal by 3 percent) and all counties show an increase over their 2000–2010 percentage.

Local Priorities

Some local areas have prioritized land development strategies.

Local Integrating Organization	Priorities
South Central	*Theme* • To effectively deal with pressures and threats, desired outcome and actions will have to be tailored to land uses and development patterns while working toward a Soundwide target.

Local Integrating Organization	Priorities
West Sound	*From working strategy list* • Methodically monitor and report key metrics related to population growth and development for adaptive management and to minimize urban sprawl • Develop framework for identifying and prioritizing areas for conservation; identify areas at risk and strategies to protect/prevent their development
Hood Canal	*High Priority* In coordination with the US Navy and other partners, HCCC will complete the In Lieu Fee (ILF) Mitigation Program by June 30, 2012.
Whatcom, Hood Canal, Stillaguamish-Snohomish, Island, and Skagit	These areas have all identified general strategies to focus land development away from ecologically important and sensitive areas.

A1. Focus land development away from ecologically important and sensitive areas

Protecting high quality ecological areas is less expensive and more effective than trying to repair or restore damaged areas. In an effort to maintain a balance of development and protection, the sub-strategies recognize that population growth is an integral part of the regional economy, but aim to focus land development away from areas in the Puget Sound that are ecologically vulnerable and important to maintain. In the near term, the sub-strategies focus on identifying what lands are ecologically important and where they are located in Puget Sound, making this information available to local jurisdictions, and equipping them with information they need to make decisions consistent with the overall strategy of focusing development away from ecologically sensitive areas.

A1.1 Identify and prioritize areas for protection, restoration, and best suitable for (low impact) development.

Ongoing Programs

The Puget Sound Watershed Characterization's (PSWC) assessment of Water Flow, Water Quality and Biodiversity importance of Puget Sound Basin lands and waters is an important tool used to identify ecologically sensitive areas. This assessment, when used in conjunction with other watershed information and data can help identify which areas should be protected from new development and those areas appropriate for low impact development. Applying the information in the Characterization should direct land development away from ecologically important areas and the results are used in several of the strategies in A1, A2, A3, and A4. The Characterization incorporates many of the same data sets used in related regional analyses conducted by Department of Natural Resources (DNR) (Aquatic Landscape Prioritization), The Nature Conservancy, Washington Department of Fish and Wildlife (WDFW), Washington Biodiversity Council, and Washington Habitat Connectivity Working Group and is therefore an important and appropriate tool for identifying ecologically important lands for the purposes of this effort. In addition to the Watershed Characterization tool, use of the strategy

assessment of the Puget Sound Nearshore Ecosystem Restoration Project, maps produced by the Washington Wildlife Habitat Connectivity Working Group, and the Puget Sound Salmon Recovery Plan, with each of its 14 watershed chapters, should help to tailor information to each watershed and support decisions for what areas to protect.

The Puget Sound Watershed Characterization is a set of spatially explicit water and habitat assessments that provide information for regional, county, and watershed-based planning. It is a coarse-scale decision-support tool that will enable better land use decisions and more effective protection, restoration, and conservation of our region's ecologically sensitive areas. The assessments cover the entire contributing drainage area of Puget Sound and represent the physical, chemical, hydrologic, wildlife, freshwater and nearshore habitat, and human attributes of this landscape that support and interact with the structure and function of ecosystems in Puget Sound. Although based on generalized data, they provide a regional-scale perspective on the spatial distribution of these attributes and impacts that is not generally provided by other available tools. The intended audience is local planners and watershed managers, tribes, the Partnership and other state agencies, city and county governments, and other resource managers including NGOs.

The PSWC, which was a high-priority action in the 2008 Action Agenda, is a decision-support tool, not a decision-making tool. It is structured to provide an overview of likely conditions, problems, and opportunities based on GIS information, organized and analyzed in accord with well-established scientific principles. These analyses can be refined to help support a variety of actions, such as final decisions on priority efforts, designations of changed Urban Growth Areas, or specific on-the-ground actions, typically requiring further levels of local data and information and expertise not provided by the regional-scale maps or tables. The Watershed Characterization Technical Assistance Team (WTAT) is funded in 2012 to develop solution templates and integrate these templates within a decision support framework for water flow, water quality and habitat data and assessments e.g., from Watershed Characterization Project and PSNERP, and other watershed data. To leverage local expertise, the WTAT will work with the Partnership's "User Group" consisting of local government planners previously established to review and comment on the effectiveness and usefulness of Puget Sound Characterization products. The templates and decision support framework is designed to address specific solutions to known environmental problems, using refined knowledge of ecosystem processes, and initial field testing and monitoring to apply and adaptively manage proposed solutions. The goal is to achieve meaningful changes in the local regulations affecting development practices throughout Puget Sound, in concert with upcoming local government Growth Management Act (GMA) review and update processes.

Stream typing maps, also part of the 2008 Action Agenda, were developed and are maintained by DNR for purposes of implementing the Forest Practices Act and Rules. The maps classify streams and other water bodies in terms of whether or not they are used by fish, and perennial or seasonal flow. They are provided as a starting point to help forest landowners identify and type streams on their property. Forest landowners are required to determine, in the field, the water types within their harvest area and include them on their forest practice application. While some local government entities (LGE) also use these maps for land use regulation, DNR does not require their use nor do they maintain the maps specifically for LGEs.

The stream typing maps are updated through a concurrence process managed by DNR. Water types can be updated by following a specified protocol and the priority for water type updates is streams and other water bodies on forestland subject to the Forest Practices Act and Rules.

The Washington Department of Fish and Wildlife (WDFW) maintains a number of GIS databases that contain information on the known location of Priority Habitats and Species (PHS) in Washington State. PHS is a source of best available science that can inform local planning activities, development projects, conservation strategies, incentive programs, and numerous other land use applications. This data has also been used in several landscape assessments including The Nature Conservancy's eco-regional assessments, the Biodiversity Conservation Opportunity Framework Maps and the Puget Sound Basin Characterization. This database is available online in an interactive map and management recommendations to guide how to protect priority habitats and species is also available on-line. Please visit http://wdfw.wa.gov/conservation/phs/.

DNR's Natural Heritage Program collects and manages statewide ecosystem data. The Natural Heritage database has spatial information about important native, intact, and rare ecosystems. The program has published a draft field guide to Washington ecological systems, available through the DNR website, and has key expertise in the state's ecosystems, including Puget Sound.

Many local communities at the watershed, city or county level, have detailed data and maps that help inform local planning. Much of this data is a finer scale that the Soundwide work.

Key Ongoing Program Activities

- Ecology and WDFW complete the Puget Sound Basin Characterization by 2012.
- DNR, in consultation with Ecology, WDFW, and tribes, will continue to process stream typing updates for streams in the Puget Sound basin through 2013.
- DNR, working with key partners, shall seek to secure adequate and sustainable long-term funding for the Natural Heritage Program.

SALMON RECOVERY

Protection of Habitat – A Salmon Recovery Plan Priority: Protecting our existing habitat that supports salmon recovery efforts is a key priority for the Recovery Plan. The habitat restoration components of the Plan are based on an assumption that the existing habitat, as of 2005, would be preserved. The Plan also identified more assessment needed to understand how and whether the existing habitat protection infrastructure (regulations, incentives, technical assistance, and education/outreach) is being successful. Two papers released in 2011 illustrated the need to do a better job in protecting and restoring critical salmon habitat in Puget Sound. The first was a report released by the National Marine Fisheries Service that assessed Puget Sound Chinook Salmon Recovery Plan implementation progress since it was federally approved in 2007. Closely following the NMFS report, the Treaty Tribes of Puget Sound and the Coast released a paper titled "Treaty Rights at Risk – Ongoing habitat loss, the decline of the salmon resource, and recommendations for change."

How are these priorities integrated: These two papers sparked a new intensive effort to respond to declining salmon runs. The federal agencies that have trust responsibilities to the tribes have been developing a new action plan to address the need to do a better job, and as that plan is developed, the Partnership's strategic priority to protect habitat may be expanded to incorporate the resulting actions.

Near-Term Actions

A1.1 NTA 1: **Apply Watershed Characterization Results. By 2012, Ecology, in collaboration with Commerce, will support local and regional entities' use of the PSBC results by creating easy web access to the information and an interagency Watershed Technical Assistance Team and by 2013, The Watershed Technical Assistance Team, managed by Ecology, will develop draft solution templates and a decision-support framework which will guide watershed planning and land use decisions by local governments. Development will occur in coordination with Commerce, WDFW, DNR, and local government representatives.**

Performance measure: By 2012 PSBC data is available to all local governments and team established. By 2013, status of standard development and status of decision making framework.

A1.1 NTA 2: **Web-Based Data Tool to Support Land Use Decisions. By December 2012, the Puget Sound Institute will work with the Puget Sound Partnership and other state, federal, Tribes, local, and academic partners to develop a web-based tool to improve and support spatial landscape data collection, sharing, and analysis to improve the ability of agencies to make land use decisions based on watershed assessments and other local characterizations.**

Performance measure: Web-based tool completed by Dec 2012.

A1.1 WS 1: West Sound Inventory of Transportation Infrastructure Projects. By January 2013, the West Sound Watersheds Council and West Sound LIO will develop a process for the review of transportation infrastructure projects that addresses environmental impacts and key fish passage barriers.

Performance measure: Identify process for the review of transportation infrastructure projects that addresses environmental impacts and key fish passage barriers by January 2013.

A1.2 Support local governments to adopt and implement plans, regulations, and policies consistent with protection and recovery targets, and incorporate climate change forecasts.

Land use planning typically occurs on a jurisdiction-by-jurisdiction basis, with some coordination across cities and counties through countywide planning policies and occasionally on a multi-county scale through broader regional initiatives. Typically, a number of jurisdictions are involved in making land use and development decisions that affect a single ecosystem or watershed. Through this strategy and the corresponding sub-strategies, the Action Agenda is working to encourage local plans, regulations, and policies to be defined within a holistic watershed-based planning framework. This sub-strategy has the explicit purpose of incorporating relevant ecological, water quality, sediment quality, planning, and land development information into local decision-making processes.

Ongoing Programs

There are three main legislative acts that govern planning and land developing in the Puget Sound region – the Growth Management Act (GMA), the State Environmental Policy Act (SEPA), and the Shoreline Management Act (SMA). This Action Agenda builds off of these programs and identifies actions intended to accelerate, focus, and/or address gaps.

Currently, the Departments of Ecology, WDFW, and Commerce provide ongoing technical assistance to local jurisdictions to develop and adopt planning goals and policies that incorporate ecosystem characterization information and protection strategies. Ecology and Commerce are also co-leads on the Watershed Protection and Restoration Grant, providing pass-through money to local jurisdictions to implement the PSWC. These goals and policies encourage compact urban growth patterns, increased density, strategic redevelopment, and resource and rural lands protection. Ecology and Commerce are also collecting permitting and planning data from local governments to compare planned growth with watershed characterization information. Over time, it may be appropriate for state and federal grant programs to expressly prioritize projects consistent with Puget Sound ecosystem recovery goals, including establishing priorities for projects that encourage compact growth patterns, density and redevelopment, and rural lands protection.

Regional-scale planning and coordination is facilitated by the Puget Sound Regional Council (PSRC). The PSRC provides the central Puget Sound counties (King, Pierce, Snohomish, and Kitsap), cities and towns, ports, tribes, transit agencies, and the state an opportunity to build a common vision for the region's future – which includes the well-being of people and communities, economic prosperity, and a healthy environment.

This sub-strategy is aimed at helping local governments act in ways that are consistent with Puget Sound recovery and at identifying and providing incentives to local jurisdictions for implementing, monitoring, and enforcing regulations and permits that are consistent with the broader recovery targets for Puget Sound. Material to be used for identifying and providing these incentives includes, but is not limited to, the San Juan Initiative recommendations, programs being implemented through the salmon recovery plan, and material developed as part of the discussions around habitat protection at the federal, state, tribal, and local levels through the Recovery Council.

Local governments operate in a highly dynamic environment with various levels of laws and regulations governing planning for land development. They must balance economic and ecological pressures along with adherence to local, regional, and state laws and regulations. Further, local conditions, demographics, and preferences factor into local land use decisions. In our resource-constrained environment, the ability of local governments to implement and support the land cover and land development strategies is both the single most important success factor and also the most challenging. State funding for GMA implementation, education, and training has been, as of 2012, nearly eliminated during state budget reductions. Near-term action two under this sub-strategy will convene all partners for a broad-based discussion of state and local funding needs and responsibilities, and specific strategies for providing funding for local planning efforts that can be adopted during the 2013 legislative session.

Near-Term Actions

A1.2 NTA 1: Land Use Planning Barriers, BMPs, and Example Polices. By December 2012, Ecology and Commerce, working with local governments, will identify the primary barriers to incorporating policies consistent with implementation of the Action Agenda into local land use planning and decisions and identify best practices and assistance needed to overcome these barriers. This will address implementation of protection strategies, encouraging compact growth patterns, increased density, water quality standards, redevelopment, and rural lands protection. By December2013, Ecology and Commerce will distribute example growth policies that include best practices that are consistent with protection and recovery targets and the Growth Management and Shoreline Management Acts.

Performance measure: Example growth policies distributed or not; extent to which local land use planning and decision making become more consistent with the Action Agenda over time.

A1.2 NTA 2: Financial Support for GMA Updates. Commerce will coordinate broad partner discussion of ways to promote state financial support for local governments for GMA comprehensive plan updates, implementation, training, and education. A proposal for financial support will be developed by December 2012 for discussion by the 2013 legislature.

Performance measure: A proposal for financial support for local governments for plan and regulatory updates, implementation, training, and education will be completed by December 2012 with a goal of adoption by June 2013.

A1.3 Improve, strengthen, and streamline implementation and enforcement of laws, plans, regulations, and permits consistent with protection and recovery targets.

Local, state, and federal permitting programs all affect the type and kind of impact land development can have on the Puget Sound region. Identifying ways to strengthen and streamline elements of these permitting processes by making permitting decisions more predictable and efficient, and by making sure that information on where ecologically sensitive lands are located is considered, could help direct development to areas that are more ecologically resilient and encourage dense, compact growth patterns. Streamlining, in this case, is not intended to advocate the elimination of regulations, but rather efforts to help regulations be implemented more predictably and efficiently.

Near-Term Actions

A1.3 NTA 1: ECB Address Regulatory Exemptions. The ECB will address regulatory exemptions to provide effective oversight and mitigation sequencing for activities that impact the ecosystem .

Performance measure: By September 9, 2012 identify any regulatory processes that are currently moving forward and require immediate attention (e.g., the HPA rulemaking, SMP updates, NRCS practice standards for nutrient management and ripairan buffers, and others), By December 2012 identify the statutes, regulations, policies that need to be changed, by June 30, 2013 develop the approach necessary to make the changes identified.

A1.4 Ensure full, effective compensatory mitigation for impacts that cannot be avoided.

When impacts cannot be avoided, it is critical to achieve and maintain full compensatory mitigation. Historically, this has been very difficult to achieve; estimates vary but local, regional, and national studies show that most mitigation projects fail to fully achieve their intended goals and are not effectively replacing lost or damaged resources, habitats, and functions. To address this concern, Ecology initiated the Mitigation that Works effort which included a stakeholder process to develop a shared vision for successful mitigation and development of a number of short- and long-term recommendations related to improving the mitigation process and mitigation success.

Work under this sub-strategy will focus on ongoing implementation of Ecology's Mitigation That Works initiative, which includes efforts to establish and implement a watershed-based approach to mitigation; support development and piloting of innovative compensatory mitigation tools including market-based techniques and other approaches; and improve effectiveness monitoring programs for mitigation sites.

Near-Term Actions

A1.4 HC 2: HCCC In Lieu Fee Mitigation. Hood Canal Coordinating Council (HCCC), in coordination with the US Navy and other partners, will implement the In Lieu Fee (ILF) Mitigation Program. HCCC, working with its partners in this process, will be in position to implement high priority actions from the ILF for 2013 and beyond.

Performance measure: Complete ILF Mitigation Program by June 2012. HCCC, working with its partners in this process will be in position to implement high priority actions from the ILF for 2013 and beyond.

Emerging Issues and Future Opportunities

- Further incorporation of climate change considerations could include, but would not be limited to addressing habitat connectivity to preserve migration corridors, adding refugia considerations into land development planning, evaluating whether modifications to GMA, SMA, SEPA and other state programs are warranted, and integrating adaptation work into local plans.
- Continued improvements in the stream typing maps and uses.
- Evaluating the effectiveness of regulations.
- Identify when and how to provide direction to local governments when local planning is inconsistent with recovery needs.

A2. Protect and restore upland, freshwater, and riparian ecosystems

One of the primary strategies for the Action Agenda is protection of ecologically sensitive or vulnerable lands in the Puget Sound region. This series of sub-strategies is aimed at different facets of ecological protection. Protection in this context means identifying pieces of land that are of high ecological value and protecting them from development or further development. To assist in meeting these goals the Puget Sound Characteristics and Puget Sound Nearshore Ecosystem Restoration Project (PSNERP), as well as the help of the Puget Sound Watershed Technical Assistance Team, will be enlisted.

Local Priorities

Local Integrating Organization	Priorities
South Central	*Theme*: Local land use and environmental standards are essential for habitat protection and there is a need for better alignment between state standards and the targets being set for Puget Sound recovery; *Top Priority Strategies* • Acquire and/or protect high-value habitat and land at immediate risk of conversion. • Develop a strategic funding proposal for habitat restoration and protection priorities. • Work with local governments to develop and implement policies and regulations that advance Action Agenda implementation
San Juan Islands	*Tier Two* • Restore native vegetation, trees, and ground cover.

Local Integrating Organization	Priorities
West Puget Sound	*From working priority list* • Participate in and support an effort led by Forterra to conserve 7,000 acres of forest and 1.8 miles of shoreline on Port Gamble Bay, through the Kitsap Forest and Bay Project.
Hood Canal	*From General Priorities* • Permanently protect larger tracts of forests – Participate in and support an effort led by Forterra to conserve 7,000 acres of forest and 1.8 miles of shoreline on Port Gamble Bay, through the Kitsap Forest and Bay Project. This spans two action areas. – Dabob Bay, Stavis • Implement and enforce existing regulatory programs of the counties (SMP, CAO, County Comprehensive Plan) and state • Improve financial and technical assistance programs aimed at fostering voluntary stewardship and improving re/development standards
Whatcom	*From working priority list* • Continue updating and implementing local CAO, GMA – Continue implementing, enforcing, and monitoring land use measures adopted for watersheds with designated overlay zones. – Continue implementing, enforcing, and monitoring land use measures adopted for watersheds with designated overlay zones. – Implement habitat restoration projects.

A2.1 Protect and conserve ecologically important lands at risk of conversion.

There are a significant number of private and public land protection programs and mechanisms. Local, state, federal, and private acquisition grant programs, land banks, and land conservancies use land protection mechanisms such as fee simple acquisitions, conservation easements, and leases. The preservation of intact, well-functioning land is a key strategy. The main challenges within the sub-strategy of protection through acquisition of property interests are ensuring sufficient land protection resources and implementing funding strategies that prioritize ecologically important lands. Especially as local jurisdictions continue to face revenue losses and local services are reduced, offsetting funding in the future may be required.

Ongoing Programs

In 2007, the Washington State Legislature created the Habitat and Recreation Lands Coordinating Group (lands group) to improve the visibility and coordination of state habitat and recreation land purchases and disposals. The lands group is comprised of representatives from state natural resource agencies, non-profit organizations, local governments, legislators, private interests, and others. This group uses an established process for making state habitat and recreation land purchases and disposals more visible and coordinated. The process has three components:

1. The Annual State Land Acquisition Coordinating Forum brings together state agencies, local governments, non-government organizations, landowners, tribes, and citizens to learn about and share ideas on proposals for state habitat and recreation land purchases and disposals.
2. The Biennial State Land Acquisition Forecast Report gives information about the state land purchases and disposals that are being planned around the state.
3. The Biennial State Land Acquisition Monitoring Report shows whether state agencies achieved their initial acquisition project objectives.

The Washington State Recreation and Conservation Office (RCO) provides staff support to the lands group and also supports several grant programs that support the protection of habitat and recreation lands. In 2009, using the authority of the Partnership's fiscal accountability legislation (RCW 90.71.340), the RCO, PSP staff, stakeholders, and the two RCO funding boards (Recreation and Conservation Funding Board and Salmon Recovery Funding Board) identified policies to align the grant processes with the 2008 Action Agenda. This work resulted in the following changes to three of the largest RCO grant programs (Aquatic Lands Enhancement Account (ALEA), Salmon Recovery Funding Board (SFRB), Washington Wildlife and Recreation Program (WWRP) Habitat Conservation Account):

- Prohibit funding for any project designed to address the restoration of Puget Sound if that project is in conflict with the Action Agenda (effective January 1, 2010); and,
- Consider whether projects are referenced in the Action Agenda.

The U.S. Fish and Wildlife Service (USFWS) works cooperatively with landowners, communities, and tribes to foster voluntary stewardship efforts on private lands to help conserve species. A variety of tools are available under the Endangered Species Act (ESA) to help states and landowners plan and implement projects to conserve species. One tool is the Cooperative Endangered Species Conservation Fund (section 6 of the ESA), which provides grants to states and territories to participate in a wide array of voluntary conservation projects for candidate, proposed, and listed species. The program provides funding to states and territories for species and habitat conservation actions on non-federal lands. Washington Department of Fish and Wildlife (WDFW) has four grant programs available through the CESCF, including the Habitat Conservation Plan Land Acquisition, Habitat Conservation Planning Assistance, and Recovery Land Acquisition Grants.

In addition, using special designations to protect high priority lands is an important tool for Puget Sound recovery. Numerous special designation programs can be used to protect intact priority areas. These include the federal Wilderness Act, Wild and Scenic Rivers Act, Outstanding Water Resources, Department of Natural Resources (DNR) Natural Heritage Sites, Marine Protected Areas, Marine Conservation Areas, Shellfish Protection Districts, and WDFW Priority Habitat Species areas, and many others.

The 2008 Action Agenda included an action to advocate for proposed Wilderness designations, specifically, supporting the Alpine Lakes Wilderness addition and the Pratt River Wild and Scenic designation; this is an ongoing effort. In addition, special designations have been suggested for other areas including, Wild and Scenic designation of the Middle Fork Snoqualmie River, Wild and Scenic designation of Illabot Creek in the Skagit basin, and Wilderness and Wild and Scenic designations for rivers and lands on the Olympia Peninsula and the Nooksack River basin. These ongoing protection efforts are critical and need additional and ongoing support.

Near-Term Actions

A2.1 NTA 1: Community Forestry Conservation Act. DNR will work with Congress to encourage passage of the Community Forestry Conservation Act (HR 1982 and S 1105 of the 112th Congress), which would enable non-profit conservation organizations to use bonds to purchase private working forests for long-term environmental and economic sustainable management by 2013.

Performance measure: DNR seeks passage by December 2013.

A2.1 NTA 2: Updated Avoidance and Minimization Guidance. Ecology will reinforce the importance of avoiding and minimizing impacts to wetlands, particularly those with high ecological value and that are difficult to replace, by developing and implementing updated avoidance and minimization guidance.

Performance measure: Guidance complete or not.

A2.1 NTA 3: Port Gamble Land Conservation. Forterra, working in collaboration with Kitsap County, the Port Gamble S'Klallam Tribe, and the Suquamish Tribe, will coordinate funding and participation to secure the conservation of ~7,000 acres of land near Port Gamble, including ~2 miles of shoreline by March 2013.

Performance measure: By August 2012, apply for state and federal funding. By March 2013, exercise option agreement.

A2.1 NTA 4: Funding Mechanism for Properties at Imminent Risk of Conversion. PSP will work with the ECB funding committee to consider the development of a funding mechanism to rapidly acquire properties with high ecological value and imminent risk of conversion by 2013.

Performance measure: Discuss the issue with the ECB funding subcommittee by December 2012 and determine if a proposal should be developed. If a proposal is to be developed, new measures would be developed by February 2014.

A2.2 Implement and maintain priority freshwater and terrestrial restoration projects.

Numerous upland and riparian restoration efforts are underway in the region. While it is important to focus on those that give the Puget Sound a big lift for recovery, it also is critical to recognize the potential for local stream-based restoration efforts to both make marked improvements to ecosystem health, contribute to salmon recovery, as well as further regional awareness of the benefits a healthy Puget Sound creates for people and improve individual understanding and commitment to actions that will protect and restore Puget Sound. There is nothing like healthy salmon returning to the stream in your neighborhood to bring home the way we all are connected to Puget Sound.

Once installed, restoration projects need to be maintained and monitored over time to ensure that they are functioning as intended, and adapted where needed. Innovative maintenance methods such as partnerships with conservation organizations and citizen volunteers should be considered.
Freshwater restoration projects cover rivers, streams, lakes, and wetlands; within that body of work, a major focus of the Action Agenda is the riparian restoration needed to reach the recovery target. These gains will come from implementation of existing high priority projects in the salmon recovery three-year work plans that are part of the NOAA-approved Chinook Recovery Plan, other adopted species recovery plans, flood hazard management plans, road decommissioning plans, Shoreline Master Programs, Growth Management Act programs, and local watershed assessments.

Local Implementing Organizations will need to look across these existing local plans to identify the highest priority projects in each area. When prioritizing river and stream projects for implementation local organizations should consider the hierarchical restoration strategy of Roni et al., (2002), including (1) habitat reconnection (e.g., culvert improvements, off-channel connections), where prior disconnection is among the problems; (2) road work (e.g., removal, improvement); (3) riparian vegetation restoration; (4) in-stream habitat restoration (e.g., wood and boulder placement); (5) nutrient enhancement; and (6) habitat creation (e.g., in-stream with wood and boulders, off-channel).

Private landowners should continue to be encouraged to undertake restoration projects. Existing programs need to continue, expand, and be coordinated to further and effectively encourage private landowners to undertake and maintain restoration projects. Incentives for industrial and commercial landowners may also be needed. There are numerous landowner programs that include incentives and technical assistance. The Conservation Commission, Conservation Districts, DNR, Washington State University Extension, Washington Sea Grant, local governments, and non-governmental organizations offer programs. Examples include direct financial incentives (e.g., grants, subsidized loans, cost-shares); indirect financial incentives (property tax relief); technical assistance (referrals, trainings, design assistance), recognition/certification for products or operations, and conservation leasing.

SALMON RECOVERY

Habitat Restoration – A Salmon Recovery Priority: Habitat restoration is an important part of recovery and needs to be done in a way that targets priority areas for ecosystem functions. Restoration priorities for each watershed are called out in Volume II of the Salmon Recovery Plan and then further developed out in each of the annual three-year work plans.

How are these priorities integrated: This strategy of the Action Agenda includes restoration of riparian habitat not covered by the floodplain strategy, fish passage, and other upland actions. Habitat restoration related to estuaries and the nearshore are in Section B. The Action Agenda incorporates the three-year work plans as part of what is needed to recover the Puget Sound in Section A6.1. Additionally, specific restoration projects are part of priorities of the Local Integrating Organizations.

Ongoing Programs

Ongoing programs related to this strategy include programs that implement species recovery plans (including salmon recovery three-year work plans implemented by the 15 Lead Entities), flood hazard management plans, road decommissioning plans, fish passage barrier removal via the Forest and Fish Agreement and other requirements, Shoreline Master Programs, Growth Management Act programs, DNR Aquatic Landscape Prioritization, and watershed assessments.

The Nooksack Tribe has been engaged in a wide variety of elk enhancement projects, and has successfully worked with partners to develop and implement continuing elk habitat enhancement and protection projects. The tribal priority is protection and restoration of terrestrial ecosystems of elk.

Major funding sources include Pacific Salmon Recovery Funding through the National Oceanic and Atmospheric Administration (NOAA), which provides funding for elements necessary to achieve overall salmon recovery, including habitat projects and other activities that result in sustainable and measurable benefits for salmon and other fish species; and Puget Sound Acquisition and Restoration (PSAR), a state capital program, which implements many of the Action Agenda and Salmon Recovery Plan's habitat restoration priorities. Other significant funding sources include the Estuary and Salmon Restoration Program (ESRP) and Family Forest Fish Passage Program. A number of commenters noted that more work is needed to strengthen stewardship incentive programs to increase the ability of private landowners to undertake and maintain restoration projects. This is an issue for discussion in future Action Agenda updates.

Near-Term Actions

A2.2 NTA 1: Prairie and Oak Woodland Restoration. WDFW in consultation with DNR, USFWS, and Joint Base Lewis McCord, will implement priority prairie and oak woodlands restoration projects.

Performance measure: Number of priority projects implemented; Milestones: Maintain a prioritized list of restoration activities. Work with South Sound partners to fund the restoration activities. Update list with completed action items.

A2.2 WS 12: West Sound Priority Watersheds for Protection and Restoration. By February 2013, the Suquamish Tribe will develop a detailed protection and restoration plan for the upper Chico Creek watershed. By December 2013, the tribe will seek funding to undertake similar work for the high priority, refugia Curley and Blackjack Creek watersheds.

Performance measure: By February 2013, protection and restoration plan for the Upper Chico Creek watershed; By December 2013, funding in place for plans for Curley and Blackjack Creek watersheds.

A2.3 Implement restoration projects in urban and developed areas while accommodating growth, density, and infill development.

Restoration in urban areas also is needed. Examples of work include replanting native vegetation, removing non-native invasive species, tree planting and maintenance, removal of bulkheads and bank regrading, setting aside portions of private lots for open space, day-lighting of creeks, and other stream restoration efforts. Many of these activities are supported by local conservation and volunteer groups and neighborhood groups. Actions associated with retrofitting stormwater infrastructure also contribute to freshwater restoration and to improvement and maintenance of water quality. Restoration actions in urban areas need to be considered in concert with the needs of these areas to accommodate anticipated growth.

Ongoing Programs

Many cities, counties, and organizations in urban and suburban areas have programs to encourage planting native vegetation and restoring creeks and streams. Protection of ecologically sensitive and important areas are also designated in critical area ordinances and shoreline management programs.

Near-Term Actions

None; work in the near term will focus on implementation of ongoing programs.

Emerging Issues and Future Opportunities

- Further incorporation of climate change considerations could include, but would not be limited to, planning restoration projects in freshwater and terrestrial ecosystems. For example, projected changes to hydrological regimes from climate change.

A3. Protect and Steward Ecologically Sensitive Rural and Resource Lands

Private forest and agricultural lands provide critical fish and wildlife habitat and other ecosystem functions, especially in highly productive lower elevation riparian areas. These lands, however, are at significant risk of conversion to non-farm and non-forest uses, particularly residential and commercial development.

Maintaining the vibrancy of agriculture is crucial to recovering Puget Sound and instrumental in providing a high quality of life in the region. However, farming in the Puget Sound basin faces an uncertain future. Global competition for agricultural commodities has reduced prices for Puget Sound farm products while costs of land and raw materials continue to rise. Low profit margins have forced many farmers out of business and farmland is being converted to other uses at an alarming rate. Rural areas have a low density of impervious surfaces and farmland provides greater flood plain function than developed areas. The continued loss of farms in the region and conversion to non-farm uses is not only detrimental to individual farmers and to the regional farm economy; but is detrimental to the recovery of Puget Sound.

Climate Change

As identified in *Preparing for Climate Change: Washington State's Integrated Climate Response Strategy* (April 2012), climate change impacts on forest lands include larger and more frequent fires, mountain pine beetle outbreaks, and changes in geographic range, growth, and productivity. Key impacts on agriculture include changes in crop productivity, decreases in water availability, increased stress from extreme events, reduced livestock productivity, increased stress from invasive weeds, diseases, and pests, and global economic impacts related to food production, processing, and transportation.

A high priority overarching state response strategy is to conserve productive and adaptive farmland and forests.

Forest-related adaptation strategies include:

- Conservation and restoration of healthy, resilient forests across ownership boundaries and large geographic ranges;
- Maintaining and protecting forest species and genetic diversity;
- Protecting, expanding and managing urban forests;
- Building capacity and support for maintaining, enhancing, and restoring resilient and healthy forests.

Agriculture-related adaptation strategies include:

- Protection of productive agricultural land;
- Reduction of impacts of severe droughts and floods;
- Prevention and control of invasive species;
- Engagement of agricultural communities in adaptation efforts.

The Action Agenda strategies for forest and agricultural land conversation help to implement the state strategy.

Forest Lands

According to the Washington State Forestland Database, developed by the University of Washington Rural Technology Initiative (RTI), about 972,000 acres of private forestland in western Washington are threatened with conversion. Population pressures, changing forest ownership patterns, and the desire for rural housing sites are fragmenting once continuous forests into smaller tracts that are economically and environmentally unsustainable. The potential risk of private forestland conversion is highest in the Puget Sound region. Forest conversion also eliminates major opportunities to leverage forest carbon sequestration to address climate change and also negatively affect biodiversity, fisheries resources, and open space. [7]

[7] *Retention of High-Valued Forest Lands at Risk of Conversion to Non-Forest Uses in Washington State, Final Report,* Prepared for the Washington State Legislature and Washington DNR by the College of Forest Resources, University of Washington, March 25, 2009

Agricultural Lands

In 1950, there were about 1.4 million acres of farmland in the region. Today, less than 600,000 acres remain – a 58 percent loss. If this rate of loss continues, we will lose the last acre of farmland in seven of the Puget Sound counties by 2050 and the last acre in 2065. In the fifteen-year period from 1982 to 1997, the Puget Sound region lost nearly 20% of its farmland and half of its dairy farms.[8]

Analyses indicate that an acre converted from agricultural to urban development produces ten to fifteen times the runoff and runoff-borne pollutants, including far higher concentrations of heavy metals, petroleum and other key pollutants. Farmland also promotes aquifer recharge and uses far less water than an equivalent area of urban development. At the same time, many salmon-bearing rivers and streams traverse farmland, which often results in degraded or removed habitat or changes to habitat. This creates a challenging dynamic between protecting farmland from urban development while also recognizing that some farmland is located in prime salmon habitat.[9]

Development in rural areas presents a particularly concerning pressure on the ecosystem because it is in those rural areas (including both forested and agricultural lands) where high-quality habitat and significant ecological processes remain partially or largely intact. Rural area forest cover and agricultural land is being converted to housing and other uses in five-acre and smaller patchwork patterns. The network of infrastructure (primarily roads, but also other utilities) constructed to serve such development further fragments the landscape, and interrupts or modifies the delivery, movement, and storage of water, sediment, woody debris, and nutrients, and impairs functions of fish and wildlife habitats for feeding, breeding, rearing, and migrating for numerous species. In addition, sea level rise projections pose a threat to potential future loss of agricultural lands, particularly in the Skagit, Snohomish, Stillaguamish, and Nooksack deltas.

SALMON RECOVERY

Protection of Working Lands – A Salmon Recovery Plan Priority: The Recovery Plan calls for the protection of working lands within the context of how these working lands contribute to salmon recovery. Many of the watershed plans in Volume II specifically call out this need and also speak to the fact that some working lands are located in areas critical to salmon – for example, some estuarine habitat is currently being farmed – and that it is important to find solutions to both sustain working lands and recover salmon. Watershed chapters such as the Whatcom, Skagit, Stillaguamish and Snohomish are areas where this is called out.

How are these priorities integrated: The restoration of habitat needed for salmon recovery is generally reflected in the strategies and actions associated with the protection of working lands as well as the restoration of habitat. However, more discussion and agreement about these slightly different areas of focus is needed. Where working lands are the same as the lands needed for habitat restoration, more flexibility and creativity in conservation tools may be needed to achieve both restoration and farmland protection.

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[8] WSDA personal communication.

[9] Dennis Canty, Pacific Northwest Director, American Farmland Trust, Comment Letter to PSP, August 2011

Local Priorities

Several local integrating organizations prioritized forest and agricultural land conversation efforts.

Local Integrating Organization	Priorities
Whatcom	*From working priority list* • Limit forest and farm conversions to other uses such as residential, commercial, and/or industrial uses
Hood Canal	*From General priorities* • Protect, foster, and incentivize sustainable, working forests and farms (e.g., extinguishing development rights and other programs): Dosewallips, East Jefferson and Tahuya forest protection efforts • Form a Hood Canal forests and forestry focal group to develop and implement balanced approaches to conserving forests and forestry • Form a Hood Canal agriculture focal group (or three affiliated sub-regional groups) to develop and implement balanced approaches to conserving agricultural lands
Stillaguamish – Snohomish watersheds, Skagit Watershed	Conservation of forest and agricultural land is important in these areas and related strategies are under discussion.

A3.1 Use integrated market-based programs, incentives, and ecosystem markets to steward and conserve private forest and agricultural lands.

There are numerous incentive programs available for landowners to encourage stewardship and conservation. However, they are not well coordinated, lack adequate funding, tend to be opportunistic rather than strategic, and are not being fully utilized or targeted at most important lands. In addition, the eligibility requirements may not address the resource impacts, The strategies contained in this Action Agenda support the prioritization of incentive programs toward the highest-priority ecologically sensitive and important lands.

Ongoing Programs

Programs include the Designated Forest Land and Open Space Tax Program as well as the Forest Riparian Easement Program, Riparian Open Space Program, the Family Forest Fish Passage Program and the newly established voluntary stewardship program established by HB 1886 in the 2011 legislative session, among others. There are also numerous federal incentive programs offered through Natural Resources Conservation Service (NRCS) and other federal programs.

Department of Natural Resources (DNR) offers and administers a variety of landowner assistance programs targeted primarily at private forest landowners. The Forest Stewardship Program is a nationwide program which provides advice and assistance to help family forest owners manage their lands. The program is cooperatively funded by the United Stated Department of Agriculture (USDA) Forest Services and state forestry agencies and offers stewardship assistance, technical assistance,

educational materials, and financial/cost-share assistance. At DNR, the Forest Stewardship Program is administered by the Small Forest Landowner Office (SFLO).

The Voluntary Stewardship Program at the Washington State Conservation Commission (WSCC), created in 2011, requires counties across the state to either opt into the program or resume the process of updating their critical areas on agricultural lands under existing Growth Management Act (GMA) processes. Counties who opt in must designate their priority watershed, then designate a lead agency to coordinate other local entities toward developing a work plan, which identifies critical areas on agricultural lands as well as an outreach plan to offer landowners incentives to protect critical areas. These coordinated efforts will enable resources to be targeted toward the most ecologically important areas, improving the efficient application of these incentives.

The USDA offers programs to support the conservation of private forest and agricultural lands through economic incentives and market-based programs. The Conservation Reserve Enhancement Program (CREP), administered by the Farm Services Agency and the WSCC, is a voluntary land retirement program that helps agricultural producers protect environmentally sensitive land, decrease erosion, restore wildlife habitat, and safeguard ground and surface water. The Environmental Quality Incentives Program (EQUIP) is a voluntary program that provides financial and technical assistance to agricultural producers through contracts up to a maximum term of ten years. EQUIP provides financial assistance to help plan and implement conservation practices that address natural resource concerns and for improvements to soil, water, plant, animal, air, and related resources on agricultural land and non-industrial private forestland.

There are also a wide variety of financial incentive-based programs for private forest and agricultural landowners in Washington administered through other state agencies. For example, the Conservation Reserve Enhancement Program offered by the Farm Service Agency focuses on improving the water quality of streams that provide habitat for endangered salmon by planting trees along riparian buffers. Natural Resources Conservation Service's EQUIP provides technical assistance and funding for conservation practices on private, non-industrial forests or agricultural land anywhere in the state.[10] The Washington Department of Fish and Wildlife (WDFW) also administers a financial incentive program for private landowners called the Landowner Incentive Program (LIP). LIP is a competitive grant program to provide financial assistance to private landowners for the protection and restoration of habitat to benefit species-at-risk on privately owned lands. Funds are a direct appropriation from Congress passed through the U.S. Fish and Wildlife Service (USFWS) to state fish and wildlife agencies in a nationally competitive process. Currently, there are no funds for LIP.

Market-based approaches will help achieve this sub-strategy. A common theme among five reports[11] addressing the preservation, conservation, and stewardship of important resource and habitat lands is consideration of ecosystem markets for farm and forest land services as a mechanism for conserving and stewarding these valuable lands at high-risk of conversion by keeping them economically viable. The Washington Conservation Markets Study, issued by the Washington Conservation Commission in response to SSB 6805 (2008), specifically evaluated the feasibility of conservation markets in Washington to pay farmers and foresters for environmental benefits from conservation projects on their

[10] http://www.cfr.washington.edu/nwef/documents/ForestIncentivePrograms.pdf

[11] The Washington Conservation Markets Study (2009), issued by the Washington Conservation Commission; Washington Biodiversity Conservation Strategy, Sustaining our Natural Heritage for Future Generations, Washington Biodiversity Council, (December 2007); and Retention of High-Valued Forest Lands at Risk of Conversion to Non-Forest Uses in Washington State, College of Forest Resources, UW (March 2009); The Cascade Land Conservancy's Cascade Agenda (2005) and the Olympic Agenda (2011).

land and concluded, "Private farms and forests could supply substantial conservation gains in Washington," and that, "conservation actions on private farms and forests can be a viable, sustainable and cost-effective way to achieve a wide variety of environmental goals."

Various ecosystem markets or "conservation banking" services, that are either topical or geographically limiting, are beginning to emerge in Washington, including markets for wetlands, carbon credits, biodiversity conservation, and development rights. Currently, however, these markets are uncoordinated and operate with different procedures and by various organizations – at least eight state agencies have conservation markets within their purview – and some centralized organization and management of these markets may be beneficial.

Key Ongoing Program Activities

- DNR and the Conservation Commission will continue to direct stewardship funding, consistent with current statutory and regulatory requirements, to ecologically important areas as defined by the Puget Sound Basin Ecosystem Characterization and other assessment and characterization information.
- The Conservation Commission will continue assessing existing stewardship incentive programs to identify changes to better include underserved landowners, including small farmers and owners of non-working rural lands.
- The Conservation Commission will continue working with other entities including Washington State University (WSU) Extension, Conservation Districts, and counties to improve and expand public recognition for voluntary private sector stewardship of lands.

Near-Term Actions

A3.1 NTA 1: Use of Agriculture Conservation Program Funds. By December 2013, the Conservation Commission will enhance use of conservation and habitat restoration program funding from a variety of sources, (i.e., CREP and EQUIP) that are currently underused by and not tailored for western Washington growers.

Performance measure: By August 15, 2012, the Commission will work with conservation districts to enhance the use of the Commission's Conservation Practice Data System (CDPS) for project identification. By Sept 30, 2012, 12 Puget Sound districts will enter data into the CPDS system (increase of 5 from present) and identify projects that, when implemented, will address threats to Puget Sound. By December 2013, there will be a 50 percent increase in the use of the CPDS to link projects to funding sources. By June 2013, the Commission will work with conservation districts, Ecology, federal agencies, and others to identify opportunities for improvements to agriculture conservation program funding.

A3.1 NTA 2: Landowner Incentives for TDRs and Ecosystem Markets. Ecology and Commerce, in coordination with DNR and the State Conservation Commission, will provide technical support and fund local projects to identify and implement landowner incentives, including Transfer Development Rights (TDR)s and ecosystem services markets.

Performance measure: Amount of technical support and local funding provided.

A3.1 NTA 3: Forest Watershed Services. DNR will support pilot market transactions for delivery of watershed services from private forest landowners to downstream water beneficiaries in at least the Snohomish and Nisqually watersheds.

Performance measure: Two pilot transactions completed by December 2012.

A3.2 Retain economically viable working forests and farms.

Forest lands: The key recommendation from the 2008 NW Environmental Forum on protecting Washington forests led by the UW College of Forestry is the establishment of a legislatively appointed Task Force to direct and produce an overall plan for integrating Washington's complex and various regulatory, tax, and forest land protection initiatives.

Agricultural lands: As described earlier, since 1950 we have lost more than half of the farmland in the Puget Sound region. Effectively preserving agricultural land will involve tackling a complex set of interrelated issues including real work to ensure that agriculture continues to be a viable, and vibrant, industry in Puget Sound.

Ongoing Programs

Key Ongoing Program Activity

- DNR will incorporate analysis of third-party certification standards when DNR recalculates the sustainable harvest on state trust lands in 2014.

Near-Term Actions

A3.2 NTA 1: Working Forest Strategy. DNR will lead a collaborative process to develop a comprehensive strategy for retaining economically viable, long-term working forestlands.

Performance measure: Initiate collaborative strategy by October 2013.

A3.2 NTA 2: Agriculture Strategy. PSP, in collaboration with WSDA, Ecology, the Conservation Commission, and agricultural partners will develop a Puget Sound agricultural strategy by December 2013. This strategy will identify needs for maintaining the health of the industry, and key areas where the agricultural industry can contribute to the protection and restoration of Puget Sound. It will be included in the 2013 Action Agenda.

Performance measure: Convene an advisory committee and agree on scope and approach by September 2012; convene at least 3 workshops to solicit information from agricultural partners by March 2013 (north Puget Sound, south Puget Sound, peninsula), produce a draft strategy by July 2013 for inclusion in the 2013 draft Action Agenda; review the strategy with the Action Agenda and in at least three additional workshops with agricultural partners in October 2013. Include the final agriculture strategy in the 2013 Action Agenda update.

Emerging Issues and Future Opportunities

- Assessing the ecological functions and values that can be achieved on working farms in the Puget Sound region, and the risks to these functions and values associated with conversion of farmland to non-farm uses.
- Continued development of incentive based approaches and conservation markets to conserve land and ecosystem functions while promoting the long-term sustainability of farming in the region.
- Identify and map all land within the Puget Sound basin that is currently in agricultural use to create a baseline.
- Work directly with farmers to better understand ecological and economic issues and viable solutions.

A4. Encourage compact regional growth patterns and create dense, attractive and mixed-use and transit-oriented communities

Encouraging compact urban patterns would direct development away from working farms and forestlands and protect food and fiber production, wildlife habitat, ecosystem functions and water quality. Compact development patterns reduce impervious cover that leads to run-off pollution, and decrease shoreline development that leads to erosion and habitat destruction. Finally, compact development is more energy efficient, reducing energy-related pollution including green house gas emissions.

Local Priorities

Although no local integrating organizations identified compact development as a priority sub-strategy, West Sound identifies the need to encourage infill development and within priority conservation areas to address historic and potential new development patterns, legacy lots, and redevelopment to ensure no net loss of ecosystem function

A4.1 Integrate growth, infrastructure, transportation, and conservation planning at sub-regional levels and across jurisdictions.

Regional planning alliances similar to the Puget Sound Regional Council, Thurston Regional Planning Council, or Skagit Alternative Futures could plan for growth and corresponding infrastructure needs and concurrent ecosystem protection and recovery strategies at scales that are more efficient and provide more opportunity for examining and optimizing future planning scenarios and alternatives that reduce sprawl, increase density in urban areas, and promote and plan for regional transit solutions. For example, they could tackle issues related to which jurisdictions or portions of jurisdictions are best suited to accommodate projected growth, develop regional economic development strategies which could allow for revenue sharing and minimization of competition among local governments, address inequities of tax structure that occurs with new development (e.g. fiscal zoning) and annexation issues.

The near-term action under this sub-strategy is for the Department of Commerce to develop a Soundwide program to support integrated regional planning. The program would provide funding, incentives, and assistance to local governments to create new alliances, or support existing regional alliances that undertake integrated and sophisticated regional planning to guide state, metropolitan, and local investments in ecosystem protection, land use, transportation, and housing, as well as to challenge localities to undertake zoning and land use reforms.

Incentives for participation could include expert policy institutes, training, technical assistance and additional funding, and/or extra points when applying for federal or state Puget Sound funds. The program should define desired outcomes; for example, a regional capital facilities plan, a regional economic development strategy, or regional transit solutions that encourage transit-oriented communities.

Near-Term Actions

A4.1 NTA 1: Regional Sustainable Communities Program: Commerce will develop a Soundwide program to undertake integrated regional planning that will guide state and local investments in ecosystem protection, land use, transportation and housing, similar to the federal sustainable communities program. Draft scoping document will be completed by January 2013 for discussion with the Leadership Council to advance for decision making.

Performance measure: Commerce will deliver a proposed program scope to Puget Sound Partnership by January 2013. Based on the scoping document and discussions with the Leadership Council, Commerce will develop additional milestones to advance the program by February 2013.

A4.2 Provide infrastructure and incentives to accommodate new and re-development within urban growth areas.

Barriers to achieving dense and vital urban centers can include restrictive development regulations, environmental constraints, legacy pollution, land ownership patterns, inadequate infrastructure, lack of coordination between cities and special purpose governments, lack of urban amenities, lack of grocery stores, lack of schools, public perceptions, and fear of political risks. If we are to achieve compact urban patterns that direct development away from working farms and forestlands and protect wildlife habitat, ecosystem functions and water quality overall in the Puget Sound, we must work to encourage new and re-development in urban growth areas while at the same time recognizing the potential for protection and restoration of critical habitats within UGAs.

Infrastructure gaps also can present a hurdle tore-development in urban growth areas, whether it is water supply, sewer treatment capacity, or transportation improvements. Beyond such functional infrastructure, investments in urban amenities and recreational facilities also can make a large difference in how cities attract additional population and private investment. Infrastructure is expensive and is a growing concern as cities address both existing and planned future development.[12]

[12] Doug Peters, Commerce, Comment Letter to PSP, August 2011

Near-Term Actions

No near-term actions identified.

A4.3 Enhance and expand the benefits of living in compact communities.

Accommodating growth inside urban growth areas likely will require increasing density in some places. To ensure this space is actually used, we must determine how to achieve truly livable density that is attractive to families. While there are currently no near-term actions identified for this sub-strategy, it will be a critical effort to begin to better understand this issue and to work with local governments to achieve and support density in the right places.

Near-Term Actions

No near-term actions identified.

Target View: Land Development

The land surrounding Puget Sound is home to several million people who live, work, and play in our region. The needs for homes, office buildings, stores, and agricultural lands to support our lives must be taken into consideration as we strive to preserve working forests and habitats, and reduce polluted runoff into streams and the Sound.

In 1990, Washington State passed the Growth Management Act (GMA), which requires local governments to comprehensively plan for the location and manner of land development. Although the GMA has been successful in addressing our growth needs, there still are many pressures to develop in our rural areas which would further affect some of our high quality remaining habitat. Watershed-based approaches to locating where development occurs within Urban Growth Areas (UGA)s and how it occurs within UGAs are essential to minimizing pressures to ecological processes, habitat structures, and ecosystem functions.

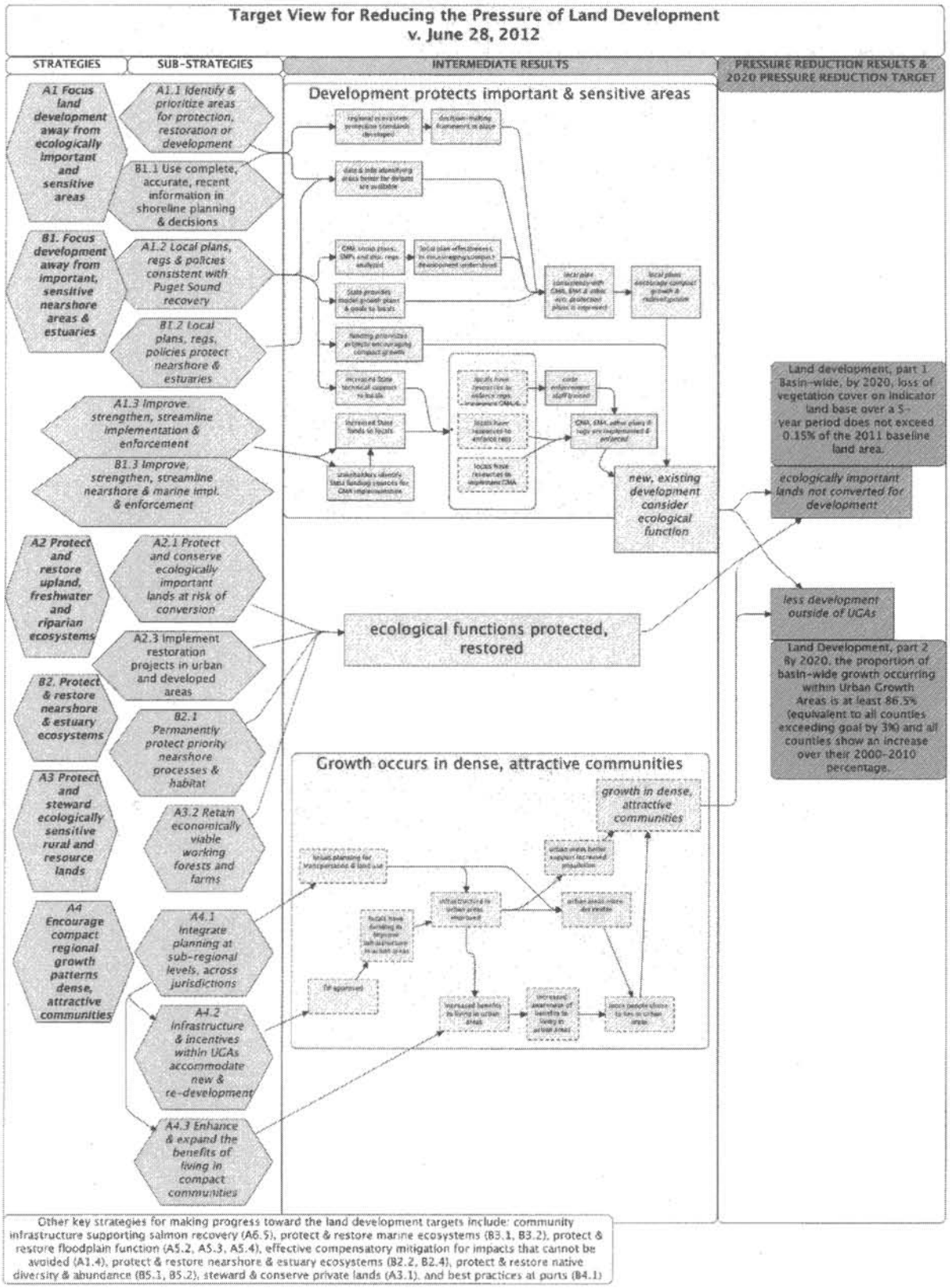
A functioning, resilient Puget Sound ecosystem includes landscapes that provide important habitat and hydrology functions and a land base to support the built environment for a growing human population. The 2020 target for land development has two parts:

- For avoiding development of ecologically important areas:
    - Basin-wide, by 2020, loss of vegetation cover on indicator land base over a 5-year period does not exceed 0.15 percent of the 2011 baseline land area.
- For directing growth to urban growth areas:
    - By 2020, the proportion of basin-wide growth occurring within Urban Growth Areas is at least 86.5 percent (equivalent to all counties exceeding goal by 3 percent) and all counties show an increase over their 2000-2010 percentage.

There are several Action Agenda strategies related to the land development target, including:

- Protect and restore upland, freshwater, and riparian ecosystems (A2.1, A2.3)
- Encourage compact regional growth patterns and create dense, attractive and mixed-use and transit-oriented communities (A4.3, A4.1, and A4.2)
- Focus development away from ecologically important and sensitive nearshore areas and estuaries (B1.2, B1.1, B1.3)
- Protect and restore nearshore and marine ecosystems (B2.1, B2.2, B2.4)
- Maintain and enhance the community infrastructure that supports salmon recovery (A6.5)
- Protect and restore marine ecosystems (B3.2, B3.1)
- Focus land development away from ecologically important and sensitive areas (A1.3, A1.4, A1.1, A1.2)
- Protect and steward ecologically sensitive rural and resource lands (A3.2, A3.1)
- Protect and restore floodplain function (A5.3, A5.2, A5.4)
- Protect and restore native diversity and abundance of species (B5.1, B5.2)
- Use, coordinate, expand, and promote financial incentives and programs for best practices at ports and in the marine industry that are protective of ecosystem health (B4.1)

In the following results chain, or logic model, yellow polygons identify strategies and actions from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets. See the results chain for the land cover target for a depiction of how reducing land development threats contributes to future ecosystem conditions and the Partnership's 2020 ecosystem recovery targets for land cover.


Target View for Reducing the Pressure of Land Development
v. June 28, 2012
STRATEGIES
SUB-STRATEGIES
INTERMEDIATE RESULTS
PRESSURE REDUCTION RESULTS & 2020 PRESSURE REDUCTION TARGET
A1 Focus land development away from ecologically important and sensitive areas
A1.1 Identify & prioritize areas for protection, restoration or development
B1.1 Use complete, accurate, recent information in shoreline planning & decisions
B1. Focus development away from important, sensitive nearshore areas & estuaries
A1.2 Local plans, regs & policies consistent with Puget Sound recovery
B1.2 Local plans, regs, policies protect nearshore & estuaries
A1.3 Improve, strengthen, streamline implementation & enforcement
B1.3 Improve, strengthen, streamline nearshore & marine impl. & enforcement
Development protects important & sensitive areas
new, existing development consider ecological function
A2 Protect and restore upland, freshwater and riparian ecosystems
A2.1 Protect and conserve ecologically important lands at risk of conversion
A2.3 Implement restoration projects in urban and developed areas
B2. Protect & restore nearshore & estuary ecosystems
B2.1 Permanently protect priority nearshore processes & habitat
ecological functions protected, restored
A3 Protect and steward ecologically sensitive rural and resource lands
A3.2 Retain economically viable working forests and farms
A4 Encourage compact regional growth patterns dense, attractive communities
A4.1 Integrate planning at sub-regional levels, across jurisdictions
A4.2 Infrastructure & incentives within UGAs accommodate new & re-development
A4.3 Enhance & expand the benefits of living in compact communities
Growth occurs in dense, attractive communities
growth in dense, attractive communities
Land development, part 1 Basin-wide, by 2020, loss of vegetation cover on indicator land base over a 5-year period does not exceed 0.15% of the 2011 baseline land area.
ecologically important lands not converted for development
less development outside of UGAs
Land Development, part 2 By 2020, the proportion of basin-wide growth occurring within Urban Growth Areas is at least 86.5% (equivalent to all counties exceeding goal by 3%) and all counties show an increase over their 2000-2010 percentage.
Other key strategies for making progress toward the land development targets include: community infrastructure supporting salmon recovery (A6.5), protect & restore marine ecosystems (B3.1, B3.2), protect & restore floodplain function (A5.2, A5.3, A5.4), effective compensatory mitigation for impacts that cannot be avoided (A1.4), protect & restore nearshore & estuary ecosystems (B2.2, B2.4), protect & restore native diversity & abundance (B5.1, B5.2), steward & conserve private lands (A3.1), and best practices at ports (B4.1)

Target View: Land Cover

Land cover is an essential indicator of ecosystem health because of its importance for both terrestrial and aquatic ecosystem processes and habitats. During the past 50 years, Puget Sound lost at least two-thirds of its remaining old growth forest, more than 90 percent of its native prairies, and 80 percent of its saltwater and freshwater marshes. From 1992-2006, approximately 60,000 acres of forest-covered lands were converted to developed land.

A functioning, resilient ecosystem includes a mosaic of forestlands, agricultural lands, open space, natural lands (i.e., forest, prairie), and developed lands and related infrastructure to support habitat needs, support natural processes, and generate ecosystem services.

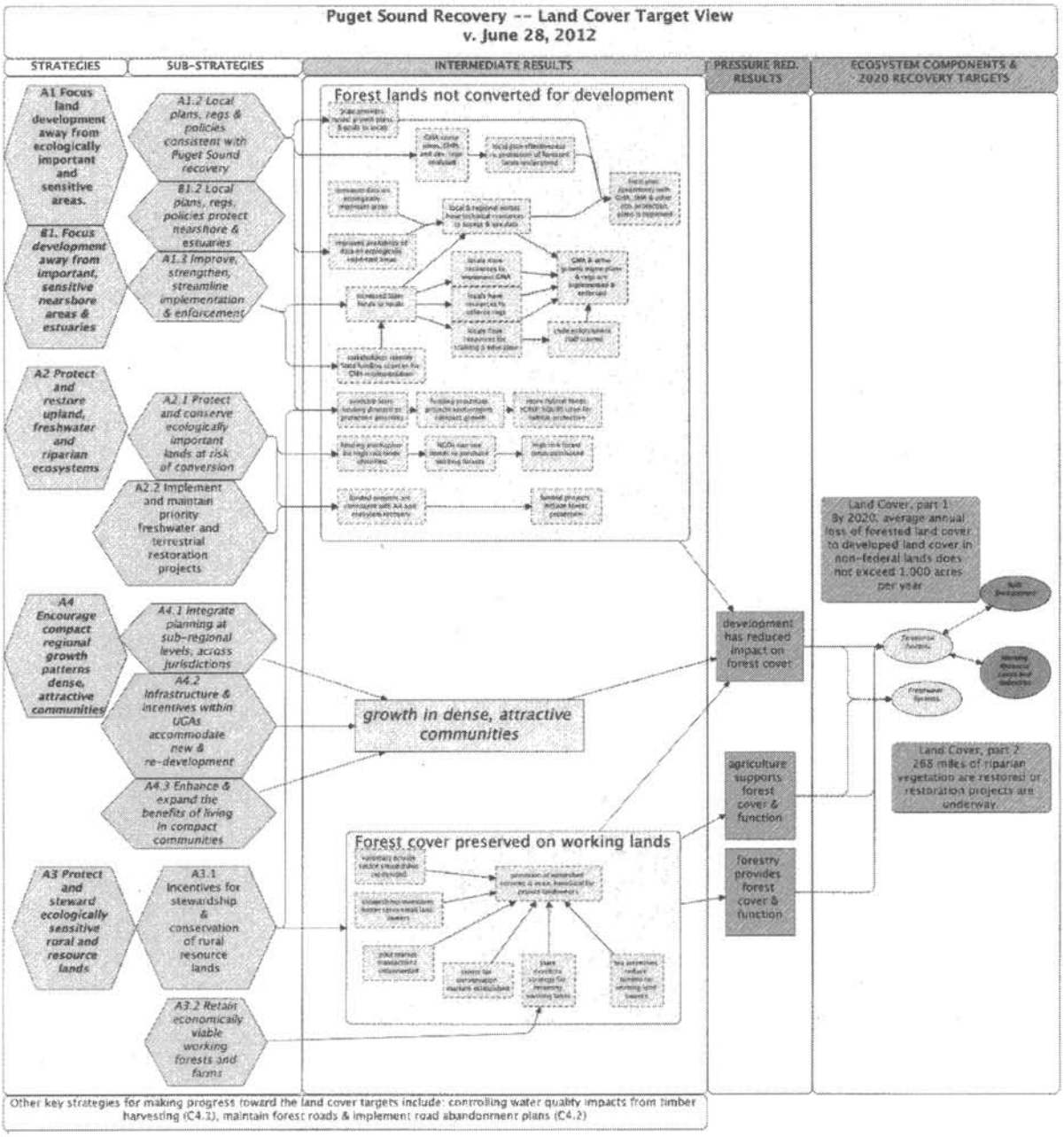
The 2020 recovery target for land cover in forested lands and riparian areas is:

- average annual loss of forested land cover to developed land-cover in non-federal lands does not exceed 1,000 acres per year and 268 miles of riparian vegetation are restored or restoration projects are underway.

There are several Action Agenda strategies related to the land cover targets:

- Focus land development away from ecologically important and sensitive areas (A1.3, A1.2)
- Protect and restore upland, freshwater and riparian ecosystems (A2.1, A2.2)
- Encourage compact regional growth patterns and create dense, attractive and mixed-use and transit-oriented communities (A4.2, A4.3, A4.1)
- Manage surface runoff from forest lands (C4.1, C4.2)
- Protect and steward ecologically sensitive rural and resource lands (A3.1, A3.2)
- Focus land development away from ecologically important and sensitive nearshore areas and estuaries (B1.2)

In the following results chain, or logic model, yellow polygons identify strategies and actions from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets.


Puget Sound Recovery -- Land Cover Target View
v. June 28, 2012
STRATEGIES
SUB-STRATEGIES
INTERMEDIATE RESULTS
PRESSURE RED. RESULTS
ECOSYSTEM COMPONENTS & 2020 RECOVERY TARGETS
A1 Focus land development away from ecologically important and sensitive areas.
B1. Focus development away from important, sensitive nearshore areas & estuaries
A1.2 Local plans, regs & policies consistent with Puget Sound recovery
B1.2 Local plans, regs, policies protect nearshore & estuaries
A1.3 Improve, strengthen, streamline implementation & enforcement
Forest lands not converted for development
A2 Protect and restore upland, freshwater and riparian ecosystems
A2.1 Protect and conserve ecologically important lands at risk of conversion
A2.2 Implement and maintain priority freshwater and terrestrial restoration projects
A4 Encourage compact regional growth patterns dense, attractive communities
A4.1 Integrate planning at sub-regional levels, across jurisdictions
A4.2 Infrastructure & incentives within UGAs accommodate new & re-development
A4.3 Enhance & expand the benefits of living in compact communities
growth in dense, attractive communities
A3 Protect and steward ecologically sensitive rural and resource lands
A3.1 Incentives for stewardship & conservation of rural resource lands
A3.2 Retain economically viable working forests and farms
Forest cover preserved on working lands
development has reduced impact on forest cover
agriculture supports forest cover & function
forestry provides forest cover & function
Land Cover, part 1: By 2020, average annual loss of forested land cover to developed land cover in non-federal lands does not exceed 1,000 acres per year
Land Cover, part 2: 265 miles of riparian vegetation are restored or restoration projects are underway
Other key strategies for making progress toward the land cover targets include: controlling water quality impacts from timber harvesting (C4.3), maintain forest roads & implement road abandonment plans (C4.2)

Protect and Restore Floodplain Function

The Challenge

Floodplains play a vital, often unrecognized role in the health of the Puget Sound ecosystems and watersheds. Floodplains support a variety of key ecological functions: They slow and store flood waters, filter our water, generate economically and culturally valuable fisheries, produce fertile soils for farming, recharge our aquifers, create a variety of recreational opportunities, and provide critical habitat and sustenance for a diverse array of terrestrial and aquatic life. Floodplains are one of the most productive ecosystems in Puget Sound, yet they are also one of the most degraded portions of the Puget Sound ecosystem, and these impacts have significant consequences for people and nature. Several factors have impeded floodplain recovery (and related salmon recovery and water quality goals) to date. These factors include a lack of public support, high costs associated with restoration, and the existence of divergent and uncoordinated agency goals. Despite the tens of millions of dollars spent on ecosystem recovery and flood risk reduction, habitat remains in decline and flood risks continue to mount.

Local, state, and federal agencies employ a variety of programs to address floodplain management issues – sometimes in contradictory ways. Flood risk reduction projects developed in ways that don't take fish and wildlife needs into account get caught up in ESA conflicts that prevent or delay construction and add mitigation costs. Habitat restoration projects developed as single-purpose projects are opposed by communities concerned with maintaining farmland or water management infrastructure. Progress on both sides has been too slow and arguably outweighed by the increased costs associated with continued development. The net result has been a continued decline of ecosystem functions and increase in human flood risks. Yet divergent floodplain management goals – flood hazard mitigation, clean water, salmon – are not inherently at odds with one another. Those portions of the river corridor that present the greatest risks to people (i.e., incur the most flooding and erosion) are often the same areas where salmon habitat, water filtering wetlands, groundwater recharge and flood storage are most likely to occur.

Climate Change

As identified in *Preparing for Climate Change: Washington State's Integrated Climate Response Strategy* (April 2012), flood frequency is projected to increase progressively from the 2020s through the 2080s, with the largest increases predicted for mixed rain-snow runoff basins located in Puget Sound. Flooding can cause widespread damage to communities and property.

The state response strategy identified several high priority, overarching strategies related to floodplain protection and restoration. These include:

- Protecting people and communities from climate change impacts
- Reducing the risk of damage to buildings, transportation systems, and other infrastructure. This strategy specifically calls for reducing flood damage by restoring floodplains and capturing more water
- Safeguarding fish and wildlife and protecting critical ecosystem services that support human and natural systems
- Reducing the vulnerability of coastal communities, habitat, and species
- Supporting the efforts of local communities and strengthened capacity to respond and engage the public

The sub-strategies and actions in the Action Agenda call for protection and reconnection of floodplains. Specific actions related to climate change are included.

To protect and restore floodplains in Puget Sound and address the issues described above, this section outlines a series of four comprehensive sub-strategies. Throughout these sub-strategies, two predominant themes are (1) floodplains provide myriad functions and services that both benefit and create risks to society, and (2) only through recognizing these services and risks and managing them in a holistic, coordinated fashion will we break through the status quo and put the region on a path to making people safer and the Puget Sound ecosystem healthier (i.e., achieving both the ecosystem and human well being targets that must be a part of Puget Sound Recovery).

Relationship to Recovery Targets

The Partnership defines a functioning, resilient ecosystem to include freshwater floodplains that support natural processes and deliver ecological services to keep people and property safe during flood flows, support fisheries production, and provide water filtration and ground water recharge.[13] The Partnership's Leadership Council set two recovery targets for floodplains in the Puget Sound that it aims to achieve by 2020:

- 15 percent of degraded floodplain areas are restored or floodplain projects to achieve that outcome are underway across Puget Sound
- No additional loss of floodplain function in any Puget Sound watershed relative to a 2011 baseline

Given their vital role in maintaining the health and functioning of the Puget Sound, it is important that intact floodplains be protected and that floodplain areas that have been developed are restored or are managed in a way to recapture as much of the affected functions as possible. The strategies in this section are designed to help achieve the targets.

[13] Leadership Council Resolution 2011-13, "Adopting a 2020 ecosystem recovery target for floodplains" Available at: http://www.psp.wa.gov/downloads/LC_Resolutions/Resolution_2011-13.pdf

Local Priorities

Several local areas prioritized protection and restoration of floodplains.

Local Integrating Organization	Priorities
South Central	*Top Priority* • Restore floodplains to recreate ecosystem function
South Puget Sound	*Strategic Initiative: Salmon Recovery/Habitat Restoration* • Reconfigure I-5 through the Nisqually lowlands to reconnect the flood plain throughout the valley
Hood Canal	*From General priority list* • Restore floodplains and channel migration zones
Stillaguamish and Snohomish Watersheds, Skagit Watershed	The Stillaguamish, Snohomish and Skagit river systems are significant in Puget Sound. Floodplain protection and restoration strategies are under discussion.

A5. Protect and restore floodplain function

A5.1 Improve data and information to accelerate floodplain protection, restoration, and flood hazard management.[14]

Complete and up-to-date information is foundational to achieving floodplain recovery. All the sub-strategies and NTAs associated with floodplain protection and recovery assume that decision makers have access to reliable data on floodplain locations, conditions, and recovery priorities.

Near-Term Actions

A5.1 NTA 1: Floodplain Protection and Policy Team Actions. PSP will advance floodplain protection and restoration by facilitating actions, policy changes, and program changes necessary to reduce critical barriers to habitat protection and restoration. Funding will be focused on the places that have the greatest potential to recover floodplain functions.

Performance Metric: By December 2012, PSP convenes a Puget Sound Floodplain Protection and Recovery Policy Team to establish a working definition of 'floodplain' and 'floodplain function' in the context of the 2020 floodplains recovery target; By December 2012, work with local levee owners to identify the barriers to implementing levee setbacks and habitat friendly levee management practices and work with key parties to address barriers, including an evaluation of changes that could be made to PL84-99 that requires damaged levees to be reconstructed in place rather than use the funding to do a levee setback; By June 2013, identify the policy and program changes of federal, state and local flood risk management, flood mitigation and ecosystem protection and restoration programs to foster multi-objective floodplain management.
By June 2013, identify floodplain areas; prioritize those most important for protection,

[14] During the comment period, some commenters recommended combining sub-strategies A5.1 and A5.2; these changes were not made at this time but will be considered in future Action Agenda updates.

restoration, farmland preservation or other compatible and non-compatible uses; and identify the implementation steps needed to protect functioning floodplain areas. By June 2013, draft an action plan to address the programs and target programmatic recommendations for legislative change, rule amendments, and administrative changes, needed to achieve the floodplains pressure reduction target using the results in the July 2010 "Floodplain Management: A Synthesis of Issues Affecting Recovery of Puget Sound" report and other relevant and timely information.

A5.2 Align policies, regulations, planning, and agency coordination to support multi-benefit floodplain management, incorporating climate change forecasts.

Floodplain management policies have been developed over many decades. Some of these policies conflict with Puget Sound recovery goals and present obstacles to achieving the floodplain restoration target. Flood risk management and ecosystem recovery are not mutually exclusive goals yet have been historically pursued independent of one another.

One of the principle challenges to achieving the 15 percent restoration goal is the sheer cost involved in floodplain restoration projects, most of which will involve expensive infrastructure work. Asking agencies to coordinate their programs to pool funding and achieve greater efficiencies is easy in theory; however, agencies are required to use cost-benefit analyses focused specifically on their programmatic mandate when making decisions about which projects or activities to fund. Developing a more holistic approach to cost-benefit analysis that speaks to multiple agency goals will be critical to enabling a coordinated, multi-agency approach to funding floodplain projects that will make people safer and our ecosystem healthier. Creating a decision making framework that enables agencies to identify projects that meet multiple program goals is a critical step toward being able to coordinate floodplain investments and finance floodplain recovery projects.

Projected changes in weather patterns are expected to cause an increase in the frequency and magnitude of flooding, increased sediment delivery to our rivers, and a rise in the Puget Sound sea level. These changes have significant implications for infrastructure and other land uses in floodplains and near-shore environments. Restoring floodplain functions can help mitigate this impact while creating more resilient communities. At the same time, our floodplain ecosystems will need to adapt to these changing conditions. Incorporating climate change forecasts into floodplain management strategies implies having a deeper understanding of what the potential is for localized impact to climate change, identifying how these impacts can be accounted for in existing planning processes, and most importantly appropriately reflecting the value of floodplain protection and restoration into decision making. The strategies delineated in this section represent the long-term solution and the NTAs represent only the beginning of a much longer conversation needed to identify the full set of needed actions.

SALMON RECOVERY

Protecting and Restoring Floodplains – A Salmon Recovery Plan Priority: Functioning floodplains are critically important for salmon across the Puget Sound and need to be protected and restored. Specific floodplain protection and restoration areas are identified for all the mainstem, natal, watersheds in Volume II. Two key issues that have come out of salmon recovery but are relevant to the greater recovery effort are the Biological Opinion (BiOp) issued by NOAA/NMFS on FEMA's National Floodplain Insurance Program (NFIP) and the Army Corps of Engineers Levee Vegetation Management Standards.

- NMFS BiOp on FEMA NFIP: BiOp indicated that the development that has been allowed in the floodplains across the Puget Sound has acted as a 'take' of salmon and orcas. This BiOp is an important document in the information related to the need to protect and restore floodplain habitat.
- Levee Vegetation: the allowable amount and size of vegetation along Corps certified levees impacts the riparian habitat for many critical salmon-bearing streams and rivers. Opportunities may exist to increase riparian vegetation, consistent with Corps of Engineer levee maintenance standards (or variances to these standards with the approval of levee owners). Work has been done to reinforce the Seattle variance but more work is needed to ensure this can be used.

How are these priorities integrated: The Action Agenda strategies and actions generally reflect the themes and actions identified in the original salmon recovery plan through the need to protect and restore floodplains into functioning ecosystems. As all Chinook salmon populations need to get to a low risk status, prioritization of floodplain areas for protection, restoration and farmland protection should be considered a sequencing question. In addition, identification of these areas should consider those already important for salmon in the Salmon Recovery Plans. Finally, prioritization efforts should not slow down the existing work to protect and restore floodplain areas known as important per the Salmon Recovery Plan.

As with the integration of working lands priorities, consideration about the flexibility of conservation tools may need to be more clearly articulated. The watershed chapters have specific information about where floodplain restoration gains could be made.

Ongoing Programs

Key Ongoing Program Activity

- In coordination with the Corps of Engineers and local levee owners, PSP is currently leading the development of new regional levee-based vegetation standards; the standards are expected to be complete by 2012. The standards will need to be evaluated by the Corps and other federal agencies to determine if it supports recovery. PSP will work to change the federal policy or, failing that, to use the framework as a state guideline to encourage local governments to pursue an alternative approach.

Near-Term Actions

None – work in the near term will focus on implementation of ongoing programs

A5.3 Protect and maintain intact and functional floodplains.

In Puget Sound, protection of the remaining intact habitat functions of floodplains and restoration of lost functions is noted as a high priority in many listed species recovery plans and the Action Agenda calls for several near-term actions supporting these outcomes. Most of the intact and functional floodplains are in undeveloped areas. The focus of this sub-strategy is on ecosystem-level programmatic actions that contribute to maintaining and protecting floodplains. It is also important to note that in parallel to the protection and restoration of floodplains, there needs to be an effort to change the demand for development in dense/Urban Growth Areas (UGAs).

The Federal Emergency Management Agency (FEMA) implements the National Flood Insurance Program (NFIP). NFIP issues flood insurance to homeowners and greatly influences the type and extent of development in floodplains. In late 2008, the National Marine Fisheries Service (NMFS) issued a Biological Opinion (BiOp) finding that the NFIP jeopardizes the existence of several Puget Sound species listed under the Endangered Species Act (ESA). NMFS has identified seven actions for FEMA that would bring the NFIP into compliance with the ESA, the third of which calls for FEMA to modify its implementation of the NFIP minimum criteria to prevent and/or minimize the degradation of channel and floodplain habitat. NMFS set a deadline of September 22, 2011 for work by FEMA and 122 communities in Puget Sound to implement this action.[15] FEMA, with concurrence from NOAA Fisheries, has prepared additional guidance that is intended to clarify certain aspects of the BiOp and that should be considered with the BiOp when compliance actions are undertaken. FEMA and local jurisdictions are working to ensure their policies and procedures prevent and/or minimize degradation of existing channel and floodplain habitat functions.

Ongoing Programs

FEMA and NOAA technical assistance teams are currently working with other local, state and federal governments to implement the BiOp and provide tools and mechanisms to promote consistency with other regulations by 1Q 2012, and on an ongoing basis as needed. A performance metric is the number of NFIP communities with BiOp compliance packages approved by FEMA.

Key Ongoing Program Activities

- DNR, WDFW, and other state agencies, tribes, local governments, and non-governmental entities use applicable federal and state grants, local government funds, and private funds to purchase development rights from working forest and farm landowners for lands at risk of conversion in key Puget Sound watersheds.

[15] http://www.psp.wa.gov/downloads/LC2010/111910/05e_FEMA_BiOP_Memo.pdf

Near-Term Actions

A5.3 NTA 1: FEMA Annual Reporting for NFIP BiOp. By 2012, FEMA will complete augmented annual reporting requirements relative to the obligations of the 122 communities in Puget Sound to abide by the NMFS NFIP BiOp, including policy sufficiency, implementation effectiveness, and on-the-ground implementation effectiveness.

Performance measure: (status of FEMA reporting requirements) By 2012, FEMA reporting requirements are complete.

A5.3 NTA 2: CAO Updates on Frequently Flooded Areas. By 2013, Ecology, Commerce, and other interested state agencies will develop a strategy for and lead effective state engagement with local governments in the next round of CAO updates on frequently flooded areas.

Performance measure: By 2013, strategy is complete

A5.3 NTA 3: BiOp Compliance and Floodplain Target. By 2013, PSP will evaluate how BiOp compliance contributes to achieving the Floodplains target by December 2013. This includes policy analysis of jurisdictional compliance, development that has occurred since the BiOp, and recommendations for next steps.

Performance measure: By 2013, evaluation is complete.

A5.3 NTA 4: Levee Vegetation. PSP will continue to work with the Army Corps of Engineers to craft a regional variance to their vegetation on levees policy.

Performance measure: By June 2013, new language for regional variance developed and adopted.

A5.4 Implement and maintain priority floodplain restoration projects.

The target identified for Puget Sound recovery calls for a 15 percent restoration of floodplains. This is an ambitious goal, but, because of the importance of floodplains to overall Puget Sound recovery, an absolutely critical one. Achieving it will require overcoming key barriers in order to deliver the necessary (1) public support, (2) funding, and (3) interagency coordination. It will take significant commitment and collaboration from agencies and a new approach that aligns flood risk management efforts and programs so that the necessary support and funding is garnered to accelerate recovery actions.

Floodplain forested lands are critically important habitat and provide several indispensible ecosystem services. The ecosystem services include rainfall diversion and storage to stem the flow of water to reduce downstream flood damage; surface water quality protection; groundwater recharge; and mitigation of erosion and sedimentation deposit.

The production of arable soils is one of the most valuable ecosystem services society gets from floodplains. The result is that the majority of farmland in Puget Sound is located in floodplains because

of the rich, fertile soil. However, agricultural land use can significantly alter the functionality of floodplains. In their rating of existing floodplain function in Puget Sound, the NMFS found that agriculture-dominated water resource inventory areas (25 percent or greater agricultural use) had "poor" or "poor-fair" conditions.[16] Farmers also experience the direct social and economic costs of floods when they occur. As we look to the future there is an opportunity to change agricultural management practices to make it more compatible with recovering floodplain functions. Coordinating with these floodplain agricultural interests can enhance stewardship of critical floodplain habitat while maintaining viability for critical resource lands.

It is important to locate new and replacement public infrastructure (e.g., bridges, roads, rails, treatment plants) outside of floodplains and ensure that the design of new or replacement infrastructure optimizes and enhances floodplain function. Repairs to infrastructure that cannot be relocated should be the least disruptive of floodplain function as possible.

Ongoing Programs

There are several grant programs and other finance mechanisms that create incentives for protection, enhancement, or restoration of floodplain function on forest and agricultural lands, some of which are listed below.

The **Family Forest Fish Passage Program** (FFFPP) is a cost-share program that helps small forest landowners renovate barriers on their land to allow fish passage in small waterways. Artificial barriers in streams can prevent many fish from reaching miles of upstream habitat, and can be devastating to species such as salmon. As a public resource, fish are protected by state Forest Practice Rules which require landowners to restructure fish barriers by 2016 in a way that allows unobstructed fish passage. The program provides 75–100 percent of the cost of removing the barrier, with the funding provided varying based on the quality of the habitat, number of salmon and trout species benefiting from the correction, and project cost. This program allows working forest lands to remain viable while supporting ecosystem function.

The **Forestry Riparian Easement Program** (FREP) compensates eligible owners of small forest lands in exchange for a 50-year conservation easement on qualifying timber. Landowners agree to leave timber unharvested during the easement period, while still maintaining property rights and full access. The riparian benefits of the forested lands are maintained by the state. This program allows landowners to benefit from helping to preserve local waterways, thereby improving rural communities while helping to restore flood protection in these areas.

The **Aquatic Lands Enhancement Account** (ALEA) program is targeted at re-establishing the natural, self-sustaining ecological functions of the waterfront, providing or restoring public access to the water, and increasing public awareness of aquatic lands as a finite natural resource and irreplaceable public heritage. Typical projects include removing bulkheads to restore natural beach function, restoring estuaries, and restoring shoreline for salmon habitat. Funded by revenue generated from DNR's management of state-owned aquatic lands, these grants are available to local agencies, state agencies, and Native American tribes.

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[16] Smith, C.J. 2005. Salmon Habitat Limiting Factors in Washington State. Prepared for the Washington State Conservation Commission, Olympia, Washington. In http://www.psp.wa.gov/downloads/LC2010/072010/03b_Floodplain_Management_Report%20Judge%20Final-July%202010.pdf

The **Land and Water Conservation Fund** (LWCF) provides funding to preserve and develop outdoor recreation resources, including parks, trails, and wildlife lands. Project goals typically involve protecting wildlife habitat or renovating parks. Funded by revenue from federal sales and leasing of off-shore oil and gas resources, these funds are available to local agencies, park and recreation districts, school districts, special-purpose districts, state agencies, and Native American tribes.

The **Salmon Recovery Funding Board** (SRFB) funds riparian, freshwater, estuarine, near-shore, saltwater, and upland projects that protect existing, high quality habitats for salmon. It also funds projects to restore degraded habitat to increase overall habitat health and biological productivity of the fish. Funds come from the sale of state general obligation bonds and federal Pacific Coastal Salmon Recovery Funds (PCSRF). These funds are available to state and local agencies, conservation districts, Native American tribes, non-profit organizations, private landowners, regional fisheries enhancement groups, and special purpose districts.

The **Estuary and Salmon Restoration Program** (ESRP) provides grants to protect and restore the Puget Sound near-shore. The program was created by WDFW to support the emerging priorities of the Puget Sound Nearshore Ecosystem Restoration Program. Typical projects include protection of nearshore and wetland habitat, restoration of salmon habitat and estuaries, and removal of bulkheads. Funding comes from the State Building Construction Fund. Federal funding also has been received from the NOAA's Community Based Restoration Program and USFWS. Federal funding for projects in Puget Sound is expected from EPA. Funds are available to local, state and federal agencies, Native American tribes, academic institutions, private institutions and non-profit organizations.

The **Wetlands Reserve Program (WRP)** provides grants to assist eligible applicants in the restoration, creation, protection and enhancement of wetlands on their property through a voluntary, environmentally safe and cost effective manner. The WRP is administered by the Natural Resources Conservation Service (NRCS) through consultation with the State Technical Committee. In addition to WRP, the NRCS has several other conservation programs that help reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters.[17]

Puget Sound Acquisition and Restoration (PSAR) funds were requested by the Governor as part of her initiative to protect and restore Puget Sound by 2020 to accelerate implementation of the Puget Sound Salmon Recovery Plan. Funding has been provided by the legislature through the capital budget to protect and restore habitat in Puget Sound with a focus on acquiring and protecting critical habitat and restoring habitat function. These funds are available to state and local agencies, conservation districts, Native American tribes, non-profit organizations, private landowners, regional fisheries enhancement groups, and special purpose districts. In 2011, the program was revised to prohibit state agencies from using PSAR funds to acquire land.

Key Ongoing Program Activities

- RCO, PSP, and Puget Sound lead entities with local and regional partners implement relevant habitat restoration projects identified in Salmon Recovery 3-year work plans (see Section A6).

[17] NRCS programs: http://www.wa.nrcs.usda.gov/programs/index.html

- Snohomish Sustainable Lands Strategy and Skagit Tidegate Initiative are multi-benefit approaches that enable agricultural infrastructure improvements and/or provide regulatory certainty in exchange for restoration actions.

Near-Term Actions

A5.4 NTA 1: Prioritization of State Highways with Floodplain Impacts. WSDOT will identify and prioritize the state highway facilities (approximately 500 structures and 185 miles of highway) that have the biggest impacts on floodplain function and connectivity, including consideration of WSDOTs 2011 Climate Impacts Vulnerability Assessment Report, by December 2014 (or 18 months after funding is obtained)

Performance measure: By June 2013, obtain funding for the analysis. Complete the analysis and present the results to the Ecosystem Coordination Board and Leadership Council by December 2014. By February 2015, identify future actions and performance measures for integrating the prioritization work into the WSDOT decision-making process for repair and replacement projects.

A5.4 NTA 2: Ag Land Ecosystem Services Markets. By December 2013, the State Conservation Commission, working with Conservation Districts and Watershed Groups and counties will have three pilot projects underway that demonstrate ecosystem services markets associated with flood hazard prevention and agricultural lands in floodplains.

Performance measure: By November 2012, WSCC will have convened discussions and identified candidate areas; By December 2013, three pilot projects demonstrating ecosystem service markets for floodplains are in place.

A5.4 NTA 3: Candidate Areas for Land Swaps. The State Conservation Commission will work with conservation districts, agricultural community, watershed planning groups, and local jurisdictions to use the outputs from the characterization work (A5.1 NTA 1) to identify potential land swaps (i.e., county land use and conservation districts) and identify candidate areas available to expand for agriculture outside of priority floodplain areas by June 2013.

Performance measure: By December 2012, the Commission will convene interested parties in at least two organizing meetings to identify candidate areas. By June 2013, potential land swaps will be identified in five candidate areas available to expand for agriculture.

Emerging Issues and Future Opportunities

- The Floodplain Protection and Policy Team could tackle additional key items such as:
    - Develop a decision making framework that enables agencies to identify cross-agency floodplain project priorities based on their ability to meet multiple goals and delineates a coordinated funding approach, including cost-share mechanisms, for floodplain-friendly modifications to flood protection infrastructure in a cost-effective manner.

    - Identify federal, state, local, and private funding to develop case studies that are illustrative of the benefits of a multi-objective approach to floodplain restoration and implement a pilot program to fund projects that leverage the work of the case studies.
    - Assess the disincentives for reestablishing habitat land on agricultural lands.
- Support changes to state comprehensive flood management planning and project funding policies to ensure that plans and projects supported with state funding fully incorporate projected changes to sea level rise, flood frequency and volumes, sediment regimes and other issues that could be a major threat to human safety and floodplain ecosystem health.

Target View: Floodplains

A functioning, resilient ecosystem requires freshwater floodplains that support natural processes and deliver ecological services to keep people and property safe during flood flows, support fisheries production, and provide water filtration and groundwater recharge. Floodplains are lush regions that provide food and fresh water, as well as good agricultural land through soil and habitat formation. We also know that improving riverside and floodplain habitat is a key part of virtually all recovery plans for salmon.

Unfortunately, many floodplains in Puget Sound have been lost through a combination of shoreline armoring and levees, as well as residential, commercial, industrial and agricultural development. Better management of floodplains is essential for recovering salmon and Puget Sound.

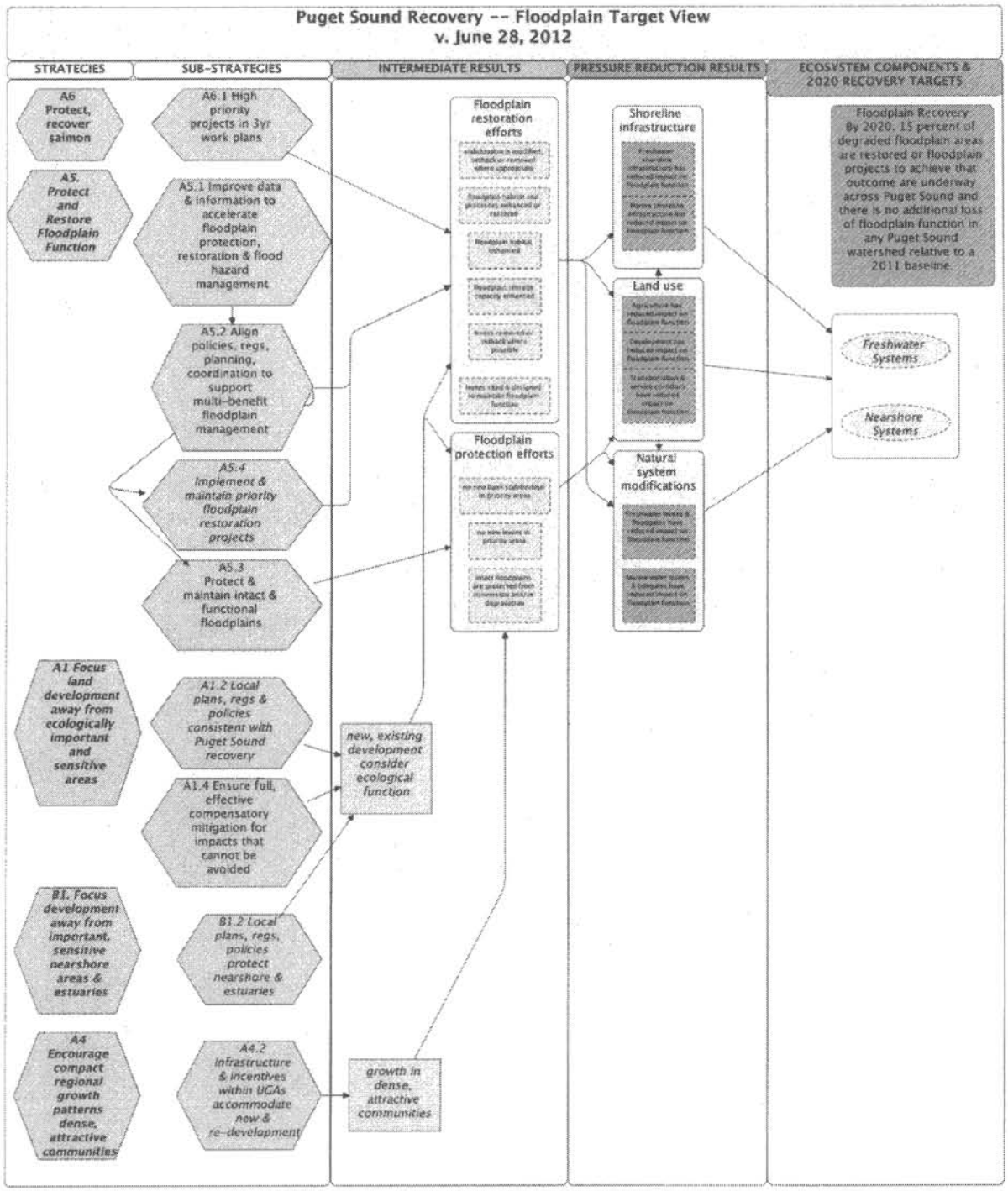
The 2020 target for floodplains is:

1. Restore, or have projects underway to restore, 15 percent of Puget Sound floodplain area.
2. Have no net loss of floodplain function, in any watershed (for example, due to conversion for development).

The Action Agenda strategies most related to achieving the recovery target for floodplains are:

- Improve data and information to accelerate floodplain protection, restoration, and flood hazard management (A5.1)
- Align policies, regulations, planning, and agency coordination to support multi-benefit floodplain management, incorporating climate change forecasts (A5.2)
- Protect and maintain intact and functional floodplains (A5.3)
- Implement and maintain priority floodplain restoration projects (A5.4)
- Provide infrastructure and incentives to accommodate new and re-development within urban growth areas (A4.2)
- Focus land development away from ecologically important and sensitive areas (A1.2, A1.4)
- Focus land development away from ecologically important and sensitive nearshore areas and estuaries (B1.2)
- Implement high priority projects identified in each salmon recovery watershed's 3 year work plan (A6.1)

In the following results chain, or logic model, yellow polygons identify strategies and sub-strategies from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets.


Puget Sound Recovery -- Floodplain Target View
v. June 28, 2012
STRATEGIES
SUB-STRATEGIES
INTERMEDIATE RESULTS
PRESSURE REDUCTION RESULTS
ECOSYSTEM COMPONENTS & 2020 RECOVERY TARGETS
A6 Protect, recover salmon
A6.1 High priority projects in 3yr work plans
A5. Protect and Restore Floodplain Function
A5.1 Improve data & information to accelerate floodplain protection, restoration & flood hazard management
A5.2 Align policies, regs, planning, coordination to support multi-benefit floodplain management
A5.4 Implement & maintain priority floodplain restoration projects
A5.3 Protect & maintain intact & functional floodplains
A1 Focus land development away from ecologically important and sensitive areas
A1.2 Local plans, regs & policies consistent with Puget Sound recovery
A1.4 Ensure full, effective compensatory mitigation for impacts that cannot be avoided
B1. Focus development away from important, sensitive nearshore areas & estuaries
B1.2 Local plans, regs, policies protect nearshore & estuaries
A4 Encourage compact regional growth patterns dense, attractive communities
A4.2 Infrastructure & incentives within UGAs accommodate new & re-development
new, existing development consider ecological function
growth in dense, attractive communities
Floodplain restoration efforts
Floodplain protection efforts
Shoreline infrastructure
Land use
Natural system modifications
Floodplain Recovery By 2020, 15 percent of degraded floodplain areas are restored or floodplain projects to achieve that outcome are underway across Puget Sound and there is no additional loss of floodplain function in any Puget Sound watershed relative to a 2011 baseline
Freshwater Systems
Nearshore Systems

Protect and Recover Salmon

The Challenge

Salmon are a symbol of the Pacific Northwest and Puget Sound. The tribal cultures of the Pacific Northwest developed around the salmon as an abundant and critical resource. In addition, salmon have been an integral part of the Puget Sound ecosystem for thousands of years – a critical food source for local wildlife and a source of nutrients for the streamside forests.

When early settlers arrived the salmon were initially viewed as an inexhaustible resource. However we know now that was not true. A history of habitat destruction, overharvesting, and poor hatchery practices have led to a significant decline of the salmon. Puget Sound Chinook, Hood Canal Summer Chum, Puget Sound steelhead and Puget Sound bull trout are all now listed under the federal Endangered Species Act.

There are currently 22 Chinook populations remaining, with estimated abundance at 10 percent or less than historic levels. In 2005, Recovery Plans were completed for Puget Sound Chinook Salmon and Hood Canal and Eastern Strait of Juan de Fuca Summer Chum. These National Oceanic and Atmospheric Administration (NOAA) -approved plans, along with the 2006 NOAA supplement and the watershed three-year work plans guide implementation of the salmon recovery plan. In addition, there is a draft bull trout recovery plan that is being updated and finalized by the US Fish and Wildlife Service.

The Chinook and Hood Canal Summer Chum Recovery Plans articulate a long-term (50 year) approach with consistent funding, an integration of the different management decisions across harvest, hatchery, habitat protection, and habitat restoration, and a flexible adaptation approach that incorporates new information. The salmon recovery plans call for protection and restoration of habitats (specifically estuaries, floodplains, riparian areas, and the nearshore), improved access to habitat, sufficient water flows, improved water quality, harvest management, hatchery management, as well as integration of habitat, harvest and hatchery actions.

Tribal Treaty Rights

A treaty is a legally binding contract between sovereign nations. Treaties are recognized under the U.S. Constitution as the "supreme law of the land." In 1854-55 tribes in western Washington signed treaties with the U.S. government, ceding most of the land that is now western Washington which allowed the peaceful settlement of the territory. In the treaties the tribes reserved the right to fish, hunt, and gather shellfish and other natural resources in all of their traditional places to preserve the tribal way of life. The courts have found that the treaty rights to hunt and fish in usual and accustomed areas is a property right. Those rights pre-date the property rights of all other citizens of the State of Washington. The unique legal status of tribes and presence of tribally reserved rights and cultural interests throughout the state creates a co-management relationship between tribes and the state agencies responsible for managing and protecting fish and shellfish of the state. The tribes' treaty rights are guaranteed under the treaties and by federal law.

The tribes' treaty rights have been affirmed by the federal courts including the U.S. Supreme Court in numerous rulings including the 1974 U.S. v. Washington case known as the Boldt decision. The ruling upheld tribal treaty-reserved rights, established the tribes as co-managers of the salmon resource with the state of Washington, and re-affirmed the tribal right to half of the harvestable number of salmon returning to Washington waters every year.

The tribes note for those rights to have meaning, however, there must be salmon for treaty tribes to harvest. Salmon populations continue to decline at an alarming rate despite massive harvest reductions, hatchery mitigation and a huge financial investment in habitat restoration during the past four decades. A primary cause of the decline is that salmon habitat is being damaged and destroyed faster than it can be restored. This trend shows no sign of improvement and has led to the loss by some tribes of basic ceremonial and subsistence fisheries, a cornerstone of tribal culture.

In the summer of 2011, the treaty Indian tribes in western Washington launched the Treaty Rights at Risk initiative that calls on the federal government to take charge of salmon recovery. The federal government has both the obligation and authority to recover salmon and protect tribal treaty rights. Tribes want the federal government to align its agencies, programs and authorities to lead a more coordinated and effective salmon recovery effort. A white paper developed for the effort cites numerous examples from across western Washington of continued loss of habitat due to shoreline armoring, timber harvesting, an increase in paved lands, and filling and diking of estuarine wetlands. The Treaty Rights at Risk initiative is a call to action, intended to galvanize and energize response by federal, state, local and tribal governments and policy makers to reverse the decline of our salmon and their habitat.

Chinook and Summer Chum recovery work is an ongoing, long-term effort by tribes, state, federal and local government, non-governmental organizations, businesses and private landowners. Much of the work to implement the recovery plans is already underway and needs continued or more support. Challenges in implementing the approved salmon recovery plans include:

- Regional concerns about the lack of habitat protection: In the spring and summer of 2011, NOAA/National Marine Fisheries Service (NMFS) and the Northwest Indian Fisheries Commission (NWIFC) each published documents that present strong critiques of the existing habitat protection system. These documents highlight the need to improve regional habitat protection efforts so that ecological functions for salmon are sustained.
- Under-investment in capital projects: When the Chinook Plan was completed in 2005 the estimated annual investment for the first ten years was $120 million for Chinook and bull trout for capital and some non-capital actions. The investment rate has consistently been less than half of this estimated need. The Summer Chum plan also estimated a need of $136 million for the first ten years for capital and non-capital actions.
- Addressing other barriers to habitat restoration: Potentially conflicting values for how best to manage the lands including resolving agricultural land needs with salmon habitat needs, addressing the impacts of transportation infrastructure such as highways and railroads, and permitting challenges for restoration projects.
- Under-investment in human infrastructure: Implementation of salmon recovery programs requires a robust human infrastructure within watersheds and regional entities. For local communities to agree on technically and community supported salmon recovery strategies and actions it is necessary to have people on the ground who can facilitate those conversations with all the relevant jurisdictions, tribes, and other stakeholders and also push for implementation of the high priority actions. Current staffing reductions are reducing the ability to implement harvest, hatchery, habitat restoration, and habitat protection actions.
- Lack of investment in several specific priorities identified in the Recovery Plans: Resolving technical and policy uncertainties about water availability and implementation of protective water quantity measures, resolving uncertainty about whether the regional water quality actions address the needs of salmon, furthering our understanding of watershed habitat status and trends, as well as project effectiveness to improve adaptive management, and a coordinated approach for making decisions associated with harvest, hatchery, habitat restoration, and habitat protection management.

Climate Change

While Pacific salmon have persisted in the face of exceptional climate variability for thousands of years – involving such large-scale factors as the advance and retreat of glaciers covering huge swaths of western North America – future climate change projections are troubling when considered in combination with the impacts that human development has had, and continues to have, on the landscapes of Puget Sound and elsewhere (Francis and Mantua 2003).

Pacific salmon have complex life cycles and highly diverse survival strategies, but all species rely to some degree on functional freshwater, estuarine, and marine habitat for successful reproduction, growth, and development. Impacts of climate change are likely to affect Pacific salmon across all of these habitats, but recent studies (e.g. Beechie et al. 2008; Mantua et al. 2008) have identified summertime stream temperatures, seasonal low flows, and changes in the frequency and magnitude of peak flow events as key pressures limiting the productivity of salmon populations in freshwater environments. By the latter half of this century, most watersheds in Puget Sound are likely to experience higher summertime water temperatures, lower summertime flows over longer periods of time, and higher peak flows occurring earlier in the winter/spring transitional period (Mantua et al. 2008). Particularly for species such as steelhead, coho, sockeye, and stream-type Chinook that rely heavily on freshwater for rearing over the

first one to two years of life, these changes have the potential to significantly impact productivity. For others – such as pink, chum, and ocean-type Chinook – changes in freshwater environments will likely have relatively less impact.

Climate change is also expected to have a range of complex impacts on the marine environment. Projected warmer ocean temperatures are likely to increase stratification, yet potential increases in winds may counteract this impact and actually improve upwelling of the nutrients that drive oceanic food webs. In sum, though, the result of multiple stresses including altered thermal structure and increasingly acidic waters is likely to be negative for the marine environment in general (Miles 2009), and by extension, for Pacific salmon specifically.

Francis and Mantua (2009) find that in general, salmon populations in regions with healthy habitat are likely to persist in the face of climate change as long as the time scale of environmental change does not exceed the rate at which they are able to adapt. Salmon recovery actions that focus on habitat restoration and protection – particularly in lower elevation watersheds (Battin et al. 2007) – with the intent of maintaining and increasing functional habitat are thus an important component of a larger suite of strategies to improve the capacity of salmon populations to withstand climate change impacts expected over the next half century, and beyond.

Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy (Draft April 2012) identifies high priority response strategies related to salmon recovery:

- **Improving water management to address climate-related water supply reduction.** This includes ensuring sufficient cold water in salmon bearing streams during critical seasons.
- **Safeguarding fish and wildlife and protecting critical ecosystem services** that support human and natural systems.
- **Reducing the vulnerability of coastal communities, habitat and species**.
- **Supporting the efforts of local communities** and strengthen capacity to respond and engage the public.

The State Strategy calls for reducing non-climate stressors to help fish, wildlife, plans and ecosystem be more resilient to the effects of climate change. The strategies and actions throughout the Action Agenda are designed to achieve this need. It also calls for managing species and habitats to protect ecosystem functions and provide sustainable cultural, recreational, and commercial use in a changing climate. This means incorporating climate change information into existing and new management plans, refining vulnerability assessments, conserving genetic diversity.

Salmon Recovery Plan and Action Agenda Integration

The Puget Sound Partnership is charged to integrate the recovery plans into the overall ecosystem recovery effort, and the Action Agenda update is the opportunity to detail that effort. This integration includes: setting a recovery target based on the existing Chinook recovery goals, adding recovery specific information to the Action Agenda strategies and actions with the strong nexus to salmon recovery, as well as identifying how those actions address salmon recovery priorities (and where ecosystem and salmon recovery priorities might differ), identifying actions that are particular to salmon recovery such as hatchery and harvest management, representing salmon recovery funding specific needs in the

overall funding strategy priorities, and selecting a strategic initiative focused on salmon habitat protection.

Relationship to Recovery Targets

Salmon recovery goals: The Leadership Council adopted a recovery target for Chinook based on the Recovery Plan's long-term goal to achieve harvestable, self-sustaining levels of Puget Sound Chinook.

For Chinook, the Recovery Plan states that the Puget Sound Evolutionarily Significant Unit (ESU) of Chinook will have a negligible risk of extinction if: 1) All watersheds improve from current conditions, resulting in improving status for the fish; 2) At least two to four Chinook populations in each of five bio-geographical regions of Puget Sound attain a low risk status over the long-term; and 3) At least one or more populations from major diversity groups historically present in each of the five Puget Sound regions attain a low risk status. Each of the individual watershed chapters includes details on population targets 50 years out from 2003.

Strategy and Action Integration

Many strategies in the salmon recovery plan have other ecosystem benefits. Likewise, many of the strategies in the Action Agenda are essential for salmon recovery. With this Action Agenda update, the Partnership has taken the following steps to integrate the two and help achieve the recovery targets:

1) Identify which Action Agenda strategy categories had the strongest nexus to salmon recovery based on the Chinook and Summer Chum Recovery Plans. The vast majority of strategies and actions in the Action Agenda will support salmon recovery by improving ecosystem function.
2) Identifying relevant sections of the Recovery Plans that should be used in developing strategies and sub-strategies. In particular, the actions for land protection, nearshore and estuary restoration and freshwater flows were called out.
3) Check the pre-draft Action Agenda strategies and near-term actions to make sure that salmon recovery needs, or differences needing resolution, are identified. In some cases, modifications to the strategies and actions were made before the draft (e.g., some of the land use and floodplain strategies and actions). Each strategy area has a call out box that summarizes the related salmon recovery priorities, consistency and differences between the two plans.
4) Ask the Local Integrating Organizations working on the profiles and local priorities to be sure to consider the recommendations in their watershed chapters.
5) Update the Action Agenda text and near-term actions based on input during the public review process. The strategic initiative concept on habitat was broadly supported during the review, sub-strategies were clarified, and the near-term actions in A.6 and elsewhere were significantly strengthened as a result of the review.

Funding Strategy Integration

Funding is a key need for salmon recovery as well as for implementation of the Action Agenda. Major funding sources for salmon recovery include Pacific Salmon Recovery Funding through NOAA for habitat projects and other activities, Puget Sound Acquisition and Restoration (PSAR) for capital projects, and

the Estuary and Salmon Restoration Program (ESRP), and local match through jurisdictions and other local partners. These funds, especially the local match, are becoming increasingly difficult to provide.

The following elements of the funding strategy have the strongest connection to the Recovery Plan funding needs.

- E1. Maintain and enhance federal funding for implementation of Action Agenda priorities. A near-term action is included to increase Pacific Coast Salmon Recovery Funds.
- E2. Focus federal agency budgets and national programs on Action Agenda priorities
- E3. Maintain, enhance and focus state funding for implementation of Action Agenda priorities. A near-term action is included to renew and increase Puget Sound Acquisition and Restoration Funds.
- E4. Maintain and enhance local funding for implementation of Action Agenda priorities. A near-term action is included in FS3 is designed to provide a mechanism to support local funding

Biennial Science Work Plan integration

Salmon recovery scientific needs are reflected in the Biennial Science Work Plan.

Local Priorities

Salmon recovery efforts occur in all local areas. Some local integrating organizations call out salmon recovery as a priority.

Local Integrating Organization	Priorities
Strait of Juan de Fuca	*Top Priorities* • Elwha River Ecosystem Recovery – Implement Elwha River Ecosystem Recovery Efforts and associated projects. • Salmon Recovery Plans (Puget Sound Salmon Recovery Plan, Hood Canal/ Eastern Strait of Juan de Fuca Summer Chum Recovery Plan, Puget Sound Steelhead Recovery Plan – in development) – Implement N. Olympic Peninsula Lead Entity (NOPLE) for Salmon and Hood Canal Coordinating Councils Lead Entity (HCCC-LE) 3-year Work Plans.
South Central	*Theme*: There needs to be a more concerted effort to effectively advocate for federal and state funding (including preserving current funding) for salmon recovery. In addition, there is a need for an integrated funding strategy for Puget Sound with salmon recovery and stormwater as central elements. The strategy should also be aligned with land use and regulatory changes *Top Priority* • Implement salmon recovery habitat protection and restoration recommendations.
South Puget Sound	*From Strategic Initiative: Salmon Recovery/Habitat Restoration* • Implement 3- year work plans (top tier/high priority projects) • Fully implement the 2011 Nisqually Fall Chinook Stock Management Plan

Local Integrating Organization	Priorities
Hood Canal	*High Priority* • Hood Canal Coordinating Council Lead Entity for salmon recovery will target funding to highest Tier I salmon recovery projects between 2012-2014
Whatcom	*From working strategy list* • Continue implementing WRIA 1 Salmonid Recovery Plan key actions.
West Puget Sound	*From working strategy list* • Integrate harvest and hatchery plans into local recovery planning • Engage regional leaders in funding solutions for high price, high priority capital projects (e.g. SR3 Bridge at Chico) • Assist with regional and local Steelhead Recovery Planning
San Juan Islands, Skagit Watershed, Stillaguamish and Snohomish Watersheds, Island Watershed	Implementation of the salmon recovery plans is an important action these areas.

A6. Protect and recover salmon

A6.1 Implement high priority projects identified in each salmon recovery watershed's three-year work plan.

In addition to the strategies and actions identified in the watershed chapters of the original Puget Sound Chinook Recovery Plan, each of the watersheds associated with a chapter in the Recovery Plan annually updates their proposed salmon recovery project list. This list always looks three years out and is referred to as the three-year work plan. The watershed community prioritizes these projects based on the strategies outlined in their chapter.

The pace of implementation of these projects has been much slower than originally envisioned in the plan due to both financial and other barriers to implementation. The following near-term actions are intended to address some of these key barriers.

Ongoing Programs

Key Ongoing Program Activities

- Updating and implementing the three-year work plans is a key ongoing program. Several local integrating organizations identified implementation of their local three-year work plan as a near-term action. While not all three-year work plans are listed as near-term actions in 2012, the plans are being implemented.

Near-Term Actions

A6.1 NTA 1: Secure Annual Chinook Investment. PSP, in collaboration with the Salmon Recovery Council, will secure the annual investment as required to fully implement the approved Puget Sound Chinook Salmon Recovery Plan, and work to align that funding

in support of the highest priority protection and restoration projects as identified by salmon recovery lead entities. This investment strategy will be developed as part of the overall Puget Sound recovery funding strategy.

Performance measures: By December 2013, the $120 million as estimated in 2005 is in place from a variety of federal, state, local, and private sources. By January 2014, update the estimate needed to implement the plan and make the related administrative changes to the NOAA-approved recovery plan, and adjust the performance measure to reflect the estimate. Obtain the new annual investment by December 2014.

A6.1 NTA 2: Restoration Permit Barriers. By June 2014 identify and address barriers to faster permitting of salmon recovery restoration projects so that the majority of restoration projects can begin construction within one year of completing design and securing funding. By September of 2012, PSP will initiate this process and identify a lead and next steps.

Performance measure: By September 2012, PSP identifies a lead and by December 2012, works with that lead to complete a scope of work. By June 2013, at least three major barriers and ways to address them have been identified. By December 2013, steps to address the barriers are in place.

A6.1 NTA 3: BNSF Railroad Cooperative Agreement. By December 2013, PSP, in collaboration with the Salmon Recovery Council, will develop a cooperative agreement with Burlington Northern Santa Fe Railroad to enable the implementation of high priority salmon recovery projects that intersect with the railroad right of way.

Performance measure: Convene a workshop with salmon recovery, other ecosystem recovery project implementers, and PSNERP to document progress to date with BNSF and identify next steps to develop an agreement by December 2012. Initial agreement framework with BNSF completed by June 2013. Cooperative agreement in place by December 2013.

A6.1 SJI 9: San Juan County Lead Entity. San Juan County Lead Entity for Salmon Recovery will target funding to highest Tier I salmon recovery projects between 2012-2014, as listed in the San Juan Salmon Recovery three-year work plan for WRIA 2. Projects include acquisition and conservation easements, protection and restoration actions.

Performance measure: To be determined.

A6.1 STRT 1: Elwha River Ecosystem Recovery. Implement Elwha River Ecosystem Recovery Efforts and associated projects:
a. Stock preservation and weir operation
b. Monitoring (adults, juveniles, smolts)
c. Habitat restoration projects

Performance measure: Continuous weir operation and monitoring of salmonids (adults, juveniles, and smolts) on the Elwha River

A6.1 STRT 2: Straits Salmon Recovery Plans: Implement N. Olympic Peninsula Lead Entity (NOPLE) for Salmon and Hood Canal Coordinating Councils Lead Entity (HCCC-LE) 3-year Work Plans:

a. North Olympic Peninsula Lead Entity (NOPLE) 3-year Work Plan
b. NOPLE Elwha revegetation project
c. NOPLE Dungeness River floodplain restoration, Phase II
d. NOPLE Elwha Engineered Log Jams
e. Hood Canal Coordinating Council (HCCC) LE 3-year Work Plan
f. HCCC LE Snow Creek and Salmon Creek estuary restoration

Performance measure: Initiate or significantly advance all of the four specific Priority Actions identified by the Strait ERN for the Strait Action Area.

A6.1 HC 6: Hood Canal Salmon Recovery. Hood Canal Coordinating Council Lead Entity for salmon recovery will continue to target funding to highest Tier I salmon recovery projects, as listed in the Hood Canal Three-Year Work Plan. Projects include acquisition, protection, and restoration actions.

Performance measure: To be determined.

A6.1 WS 9: West Sound SR3 Chico Creek Culvert Replacement. By December 2013, the West Sound LIO, in coordination with Washington Department of Transportation, will develop a funding strategy and schedule for replacing the SR3 culvert with a bridge on Chico Creek.

Performance measure: By December 2013, funding strategy and schedule completed.

A6.2 Implement the high priority salmon recovery actions identified in other parts of the Action Agenda and the Biennial Science Work Plan.

The vast majority of strategies and actions in the Action Agenda will support salmon recovery by improving ecosystem function. Full implementation of the Action Agenda will support salmon recovery.

Near-Term Actions

A6.2 NTA 1: Implement the Puget Sound Federal Agency Action Plan. Federal agencies with authorities in Puget Sound will work to implement and account for actions listed in the federal agency action plan and matrix to protect and restore habitat and respond to the concerns raised by treaty tribes in western Washington.

Performance measure: By December 2012, EPA will work with Puget Sound Federal Caucus agencies to identify priority activities from the federal action plan and matrix which can be achieved in the near term and develop a tool for tracking and reporting on the progress of these actions. Work will also continue on all activities identified in the matrix.

A6.2 NTA 1: Develop a State Authorities Matrix. PSP will lead a collaborative process with State Agencies to develop an authorities matrix in response to the Tribal Treaty Rights at Risk paper.

Performance measure: PSP will complete the matrix by March 2013.

A6.3 Implement harvest, hatchery, and adaptive management elements of salmon recovery.

The Chinook recovery plans have unique actions related to harvest management, hatchery management and adaptation.

Ongoing Programs

- *Harvest management*: Harvest of salmon in Puget Sound is co-managed by the Treaty Tribes and the State of Washington. Fisheries are focused on healthy wild runs and hatchery salmon but there is some incidental take of listed stocks as well. The National Marine Fisheries Service reviews the plan that guides fisheries management decisions made by the co-managers to evaluate its potential impact on recovery. The Comprehensive Management Plan for Puget Sound Chinook: Harvest Management component submitted by the Puget Sound tribes and the state of Washington was approved by NMFS in 2011 and will be in effect through 2014.
- *Hatchery management:* To evaluate the impact of hatcheries and hatchery actions on recovery of listed species, NMFS requires each hatchery to submit a Hatchery Genetic Management Plan (HGMP). This plan describes the operation of the hatchery and evaluates the potential impact of those operations on recovery of listed species. Draft plans have been submitted to NOAA for review by the tribal and state hatcheries in Puget Sound. In addition the tribes and the state of Washington are working together to write Hatchery Action Implementation Plans (HAIPs) that consolidate descriptions of hatchery programs from each watershed into a single document that addresses co-manager priorities, legal requirements of the Puget Sound Salmon Management Plan and Endangered Species Act, and recommendations of the Hatchery Scientific Review Group. These plans also will describe how the hatchery actions will integrate with harvest management and habitat actions to work towards achieving salmon population goals.
- *Monitoring and adaptive management:* Monitoring of salmon populations and habitat is ongoing work that needs to continue. Ongoing work also includes development of the adaptive management plans that document the changes in the limiting factors and salmon populations, as well as incorporates this information into implementation. This work is being conducted by both by the Recovery Implementation Technical Team (RITT) and watershed groups, but needs funding to advance. There is also a significant gap in our understanding of how landscape changes impact our ability to recover salmon. Continued and increased investment in watershed based habitat status and trends monitoring, as well as project effectiveness monitoring is key to improving our adaption efforts. Work has begun to integrate these and other salmon recovery monitoring needs into the broader Puget Sound Monitoring Program.

Key Ongoing Programs

- Harvest: Implementation of the Comprehensive Management Plan for Puget Sound Chinook: Harvest Management component.

- Hatcheries: Completion and implementation of Hatchery Genetic Management Plans
- Adaptive Management and Monitoring: The coordinated adaptation work of the watersheds, RITT and NOAA.

Near-Term Actions

A6.3 NTA 1: Implementation of Hatchery Actions. WDFW and the tribes, in coordination with NOAA Fisheries, will advance implementation of hatchery actions by completing and approving Hatchery Genetic Management Plans by December 2013.

Performance measure: By August 2012, co-managers (tribes and WDFW) complete Hatchery Genetic Management plans (HGMPs) for at least the first ten key Puget Sound hatchery programs and submit them to NOAA Fisheries; By April 2013, NOAA-Fisheries issues permits for at least the first ten key HGMPs; By December 2012, Co-managers complete and submit the balance of the HGMPs to NOAA-Fisheries; By December 2013, NOAA issues hatchery permits for updated Hatchery Genetic Management Plans.

A6.3 NTA 2: Salmon Recovery Monitoring and Adaptive Management Plans. PSP, in coordination with the Puget Sound Recovery Council and the Puget Sound Regional Implementation Technical Team (RITT), will facilitate and support salmon recovery watershed groups to complete and implement monitoring and adaptive management plans for each Puget Sound Salmon Recovery watershed chapters by June 2014. This is a condition of the approved Chinook Recovery Plan to improve the quality and success of plan implementation.

Performance measure: Monitoring and adaptive management plans for three watersheds by March 2013; implementation performance measures for these three watersheds by June 2013; Monitoring and adaptive management plans for remaining eleven watersheds by July 2014; Implementation performance measures for these eleven watersheds by September 2014. All fourteen watersheds will be complete with steps 1 and 2 of the RITT Framework (Step 1: Modify the generic portfolio of elements (common framework) based on individual watershed chapter; Step 2: Develop conceptual model for watershed chapter by Dec 2012.

A6.4 Protect and recover steelhead and other imperiled salmonid species.

Puget Sound steelhead were recently listed as threatened under the Endangered Species Act and planning for the recovery of Puget Sound steelhead is now underway. The ongoing coordination with NMFS, the Governor's Salmon Recovery Office, Puget Sound Partnership and the Puget Sound watersheds to develop a Puget Sound Steelhead Recovery Plan needs to continue.

Near-Term Actions

A6.4 NTA 1: Steelhead Population Identify Report and Viability Criteria. By July 2012, NOAA via the Puget Sound Steelhead Technical Recovery Team will finalize a population identification report and viability criteria for steelhead populations within the Puget Sound Steelhead Distinct Population Segment.

Performance measure: Steelhead population and identification report and viability criteria completed by July 2012.

A6.4 NTA 2: Steelhead Recovery Plan. Complete development process for a Puget Sound steelhead recovery plan by 2015. PSP will assist and facilitate the Puget Sound Salmon Recovery Council in the initial steps needed in order to submit a draft Puget Sound steelhead recovery plan to NOAA for federal review by December 2014. These plans will be inclusive and integrated and will look at various implementation actions to achieve recovery, including actions like the designation of Wild Steelhead Management Zones where consistent with the objectives identified in the watershed specific recovery plans. WDFW and the tribes, by agreement of the co-managers, will work to establish 3 streams (one in each Technical Recovery Team identified Major Population Group) where no juvenile hatchery steelhead would be released, no recreational fisheries for steelhead would occur, and habitat protection and restoration actions would be accelerated. This early steelhead recovery action would consider information already compiled for the Steelhead Recovery Plan that is under development.

Performance measure: PSP to convene meetings to identify steelhead recovery plan lead, plan costs and funding by October 2012, RFP out to draft chapters for populations by December 2012, Chapters for 2-5 populations completed by July 2013, and remaining chapters drafted by July 2014 with Plan submitted to NOAA by December 2014.

A6.4 WS 11: West Sound Steelhead Recovery Chapter. By July 2013, the West Sound Watersheds Council will develop a local chapter of a Steelhead Recovery Plan. The Council will propose a budget and implementation strategy for its local chapter of the Recovery Plan by December 2013.

Performance measure: Local chapter developed by July 2013, budget and implementation strategy for local chapter by December 2013.

A6.5 Maintain and enhance the community infrastructure that supports salmon recovery.

Implementation of the salmon recovery plans requires a robust infrastructure within local watersheds and at the Soundwide, federal, tribal, and state level to implement the habitat, harvest and hatchery actions. Both the capacity and the implementing structures to do the work in the best way possible are needed. The following is a list of entities to be kept strong and integrated for salmon recovery:

Ongoing Programs

- *Lead Entities*: Lead Entities are responsible for local coordination related to managing and advancing watershed-level strategic restoration protection and restoration activities. Their work includes managing the three-year work plans that articulate near-term recovery actions and adapting local strategies (RCO, local match) .
- *Local Jurisdictions*: Cities and counties are responsible for many of the decisions about habitat protection and land use management as well as key participants in habitat restoration actions. Local jurisdictions include counties, cities, and special districts such as drainage and public utility districts.

- *Co-managers*: The tribes and WDFW are responsible for determining appropriate harvest rates and implementing the recommendations of the Hatchery Science Review Group (HSRG)
- Other state agencies, notably the Governor's Salmon Recovery Office (State-level direction and coordination) and the Recreation and Conservation Office (grant management for protection and restoration projects).
- *Tribes*: Strongly connected to salmon recovery through tribal treaty rights, technical expertise, cultural values, and political work.
- *NOAA*: The federal agency responsible for the Chinook, Summer Chum, and Steelhead plans
- Other federal agencies: Notably USFWS (responsible for Bull Trout), Army Corps of Engineers (water resources), FEMA (floodplain management), EPA (water pollution and other water resources).
- *Project Sponsors*: A broad array of sponsors implement habitat restoration projects including but not limited to local governments, regional fisheries enhancement groups, land trusts, tribal governments, and conservation districts.
- *Puget Sound Partnership*: The state agency that, by statute, administers the regional salmon recovery program. This includes coordination of the annual updates to the Chinook recovery strategy and related three-year work plan from each Puget Sound salmon recovery watershed, facilitating regional agreement across Puget Sound on the distribution of available salmon recovery funds, assisting the watersheds in developing and submitting to the state Salmon Recovery Funding Board an annual prioritized list of salmon recovery projects for funding, staffing and facilitating the work of the Puget Sound Salmon Recovery Council and the Watershed Leads to support regional collaboration and decision making on salmon recovery plan implementation, facilitating the Regional Technical Implementation Team (RITT) to provide scientific guidance on salmon recovery implementation, as well as facilitating regional discussions and strategy development for implementation of priority actions in and funding for the salmon recovery plan.

Current budget constraints have resulted in loss of staffing at all levels mentioned above, impacting our collective ability to implement salmon recovery. Funding for this capacity, including for keeping the entities engaged, is increasingly difficult.

Near-Term Actions

A6.5 NTA 1: Lead Entity and Partner Funding Strategy. By December2013, PSP in collaboration with the Salmon Recovery Council and RCO, will identify a funding strategy and approach to support salmon recovery lead entities and the associated partner programs essential to implementing the salmon and steelhead recovery.

Performance measure: Strategy and approach completed by December2013.

Emerging Issues and Future Opportunities

- Integrate climate change scenario information, including water availability and sea level rise, in three-year work plans and funding programs. This could include adjusting prioritization criteria for project sponsors and funders.
- Addressing liability issues for private landowners with restoration projects on their land.

Tribal Habitat Priorities

Puget Sound Tribes engaged in an intensive coordination process among themselves to identify priority actions that need to be taken to address the continued loss of salmon habitat. Although there is close agreement between the Tribal Habitat Priorities and the strategic initiatives in the Action Agenda, there is more work to be done to ensure that progress is made. PSP will work with Tribes through the Partnership Tribal Comanagement Council to address additional items in the Tribal Habitat Priorities listed below (D2.2 NTA 1).

1) **The Puget Sound Management Conference under the leadership of the PSP Leadership Council, the Ecosystem Coordination Board, and Salmon Recovery Council, supported by the PSP staff, will do the following to protect the ecosystem processes required to support the habitat necessary to meet salmon recovery goals of viable, harvestable populations.**

   a) Establish quantitative metrics for habitat at each life history phase for each population to ensure harvestable surplus and a viable salmon population.
   b) Identify necessary changes to Federal, State, tribal and local statutes, regulations and policies that allow the continued loss of habitat including, but not limited to, eliminating the single family and agricultural activity exemptions from the Shoreline Management Act and the Growth Management Act.
   c) Implement and fund the recovery plans for Puget Sound salmon and steelhead (all H's) including, but not limited to, Puget Sound Chinook salmon and Strait of Juan de Fuca/Hood Canal summer chum salmon to support viable, harvestable populations.
   d) Modify Flood Control and Coastal Emergency Act (PL84-99) to provide funding for levee set-backs to enhance flood plain functions.
   e) Require all affected agencies to clearly identify, define, implement and enforce quantitative metrics for essential habitat required under existing authorities.
   f) Develop a comprehensive funding strategy for Puget Sound recovery with focus on new dedicated sources of funding.
   g) Develop a comprehensive public outreach, awareness, and behavior change program to promote public stewardship of Puget Sound resources.
   h) Prevent large oil spills and reduce the incidence of chronic oil spills through enforcement of existing rules and modify legislation where required to ensure protection.
   i) Adequately fund and strengthen spill readiness and response capacity.
   j) Update state water quality standards by ensuring promulgation of new human health criteria with an accurate fish consumption rate before undertaking implementation rule development and by developing numeric criteria of fine sediment.
   k) Implement water resource management rules (establish instream flows) in critical watersheds.

2) **Implement and improve consistency, coordination of enforcement and alignment of federal, state and local regulations for the protection of priority nearshore, estuary and floodplain habitat.**

   a) The appropriate entities shall ensure effective coordination and enforcement of existing regulations.
      (1) EPA will enforce CWA and ensure that delegated responsibilities to WDOE are effectively discharged.
      (2) WDOE will enforce Water Quality Standards and the State Water Pollution Control Act.
      (3) NOAA will ensure that the conditions of the DNR HCPs are met.
      (4) NOAA will monitor the implementation of the FEMA BIOP to ensure compliance.
      (5) WDOE will enforce water right permits, beneficial use requirements and illegal withdrawal regulations.
      (6) WDFW will enforce Hydraulic Code provisions.
      (7) WDNR will enforce Forest Fish Rules and commitments under HCPs.
      (8) Federal and State agencies will act to ensure that habitat held in trust to guarantee reserved treaty rights supporting the tribal way of life is not degraded to the point that additional restrictions are required.
      (9) Ensure that best management practices result in meeting water quality standards.

   b) Where inconsistencies exist between current regulations and the desired ecosystem protection and restoration, the affected agencies will consult and align their authorities to achieve this objective.

c) Develop strategy to achieve zero discharge of waste water into Puget Sound, including short-term targets by Action Area identifying specific facilities for conversion.
d) Align Federal, State, and local agencies' resources and regulatory jurisdictions to implement large scale process restoring projects.
e) NOAA will develop a Biological Opinion on the impact of dikes/levees on Chinook production.
f) NOAA OCZM will ensure that the SMA protects shoreline processes essential to the productivity and capacity for harvestable viable salmon populations.

3) Increase opportunity, focus and effectiveness of incentive based approaches, including non-financial incentives, for the protection and restoration of priority floodplain, wetland, estuary and nearshore habitat.

a) Identify and prioritize key habitat.
b) Protect key habitat through land purchase, conservation easements, purchase of development rights or tax incentives such as tax credits or reductions.
c) Develop measurable standards that must be met by those applying for or receiving incentives.
d) Develop regulations that allow continued land use consistent with protection and recovery targets, but make conversion to other uses prohibitive.
e) Develop programs that recognize good stewards of key habitat and help them identify efficiencies, new markets, etc.

4) Address key institutional, financial and community barriers to priority habitat restoration projects.

a) Establish a sound wide taxing district to support actions, monitoring and adaptive management of Puget Sound protection and restoration projects.
b) Implement a program to illustrate the value of a healthy Puget Sound Ecosystem to Public Health and the economic well being of the residents.
c) Streamline permitting requirements for ecosystem restoration projects with agreed long term beneficial results.
d) Overcome institutional barriers to align funding sources to implement large scale projects including implementation of projects identified by PSNERP.
e) ESA Listing Services will ensure that federal agencies consult on actions that impact listed species.

5) Hatchery production will augment harvest and supplement natural stock restoration in a manner that is compatible with habitat protection and restoration, as well as preserving and enhancing the genetic and life history diversity of natural production.

a) WDFW and tribal fishery resource managers will develop hatchery management plans that recognize the requirements in each watershed, take into account habitat and harvest plans, and provide for sustainable production from both hatchery and natural sources.
b) WDFW and Tribal fishery resource managers will complete Hatchery Genetic Management Plans (HGMPs) for NOAA review and approval.

6) Develop and implement monitoring programs critical to the evaluation of viable salmonid population (VSP) parameters, key indicators of freshwater and marine habitat and ecosystem response to salmon recovery efforts which will be comparable in detail to monitoring harvest and hatchery practices.

a) Apply the RITT Adaptive Management Framework throughout Puget Sound.
b) Spawning ground abundance, smolt migration abundance and total abundance for natural and hatchery origin populations will be estimated.
c) Monitor key habitat status and trends indicators for floodplain, channel migration zone, wetland, estuary, nearshore and Salish Sea habitat including stream flow, temperature, habitat extent and condition, prey and predator abundance and associated species complexes.
d) Monitor effectiveness of restoration projects, Best Management Practices and buffers.
e) Establish geographically appropriate measures to evaluate actions (reach, drift cell, etc).
f) Monitor the implementation and effectiveness of regulations intended to protect salmon habitat and make changes as necessary.
g) Implement a comprehensive Puget Sound marine salmonid survival study focused on management needs for associating key habitat indicators with returning abundances.

Target View: Wild Chinook Salmon

Salmon remain an important part of the economic and cultural identity of Puget Sound. The goal of the region's recovery plan is that there is a 95 to 99 percent probability that Puget Sound Chinook salmon can persist on their own for 100 years. This equates to an abundance of 60,580 to 271,640 wild Puget Sound Chinook salmon, depending on the productivity of the Chinook populations.

Puget Sound Chinook have an approved plan developed by local watershed communities, and are one of the few species in Puget Sound that have numerical targets and benchmarks for recovery. Chinook salmon are generally at less than 10 percent of their historic levels in Puget Sound river systems, with some below one percent. An estimated eight to 15 populations of Chinook have been lost entirely.

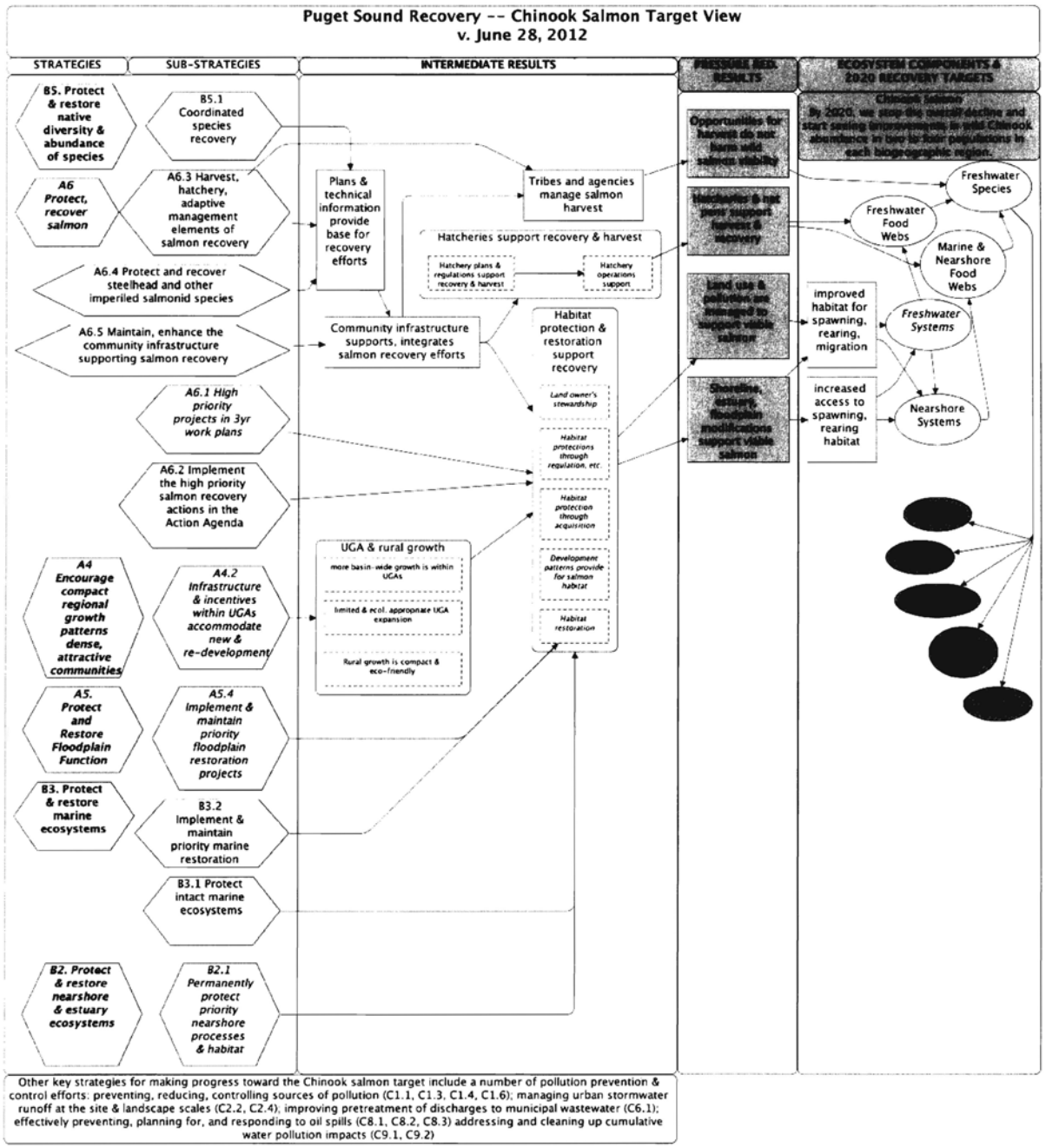
The 2020 recovery target for wild Chinook salmon is:

- We stop the overall decline and start seeing improvements in wild Chinook abundance in two to four populations in each biogeographic region.

The Action Agenda strategies most related to the wild Chinook salmon target are:

- Protect and recover salmon (A6.1, A6.2, A6.5, A6.3, A6.4)
- Protect and restore marine ecosystems (B3.2, B3.1)
- Implement species recovery plans in a coordinated way (B5.1)
- Prevent, reduce, and control the sources of contaminants entering Puget Sound (C1.3, C1.6, C1.1, C1.4)
- Effectively prevent, plan for and respond to oil spills (C8.1, C8.2, C8.3)
- Address and clean up cumulative water pollution impacts in Puget Sound (C9.2, C9.1)
- Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales (C2.4, C2.2)
- Implement and maintain priority floodplain restoration projects (A5.4)
- Permanently protect priority nearshore physical and ecological processes and habitat (B2.1)
- Reduce the concentrations of contaminant sources of pollution conveyed to wastewater treatment plants (C6.1)
- Provide infrastructure and incentives to accommodate new and re-development within urban growth areas (A4.2)

In the following results chain, or logic model, yellow polygons identify strategies and sub-strategies from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets.


Puget Sound Recovery -- Chinook Salmon Target View
v. June 28, 2012
STRATEGIES
SUB-STRATEGIES
INTERMEDIATE RESULTS
B5. Protect & restore native diversity & abundance of species
B5.1 Coordinated species recovery
A6 Protect, recover salmon
A6.3 Harvest, hatchery, adaptive management elements of salmon recovery
A6.4 Protect and recover steelhead and other imperiled salmonid species
A6.5 Maintain, enhance the community infrastructure supporting salmon recovery
A6.1 High priority projects in 3yr work plans
A6.2 Implement the high priority salmon recovery actions in the Action Agenda
A4 Encourage compact regional growth patterns dense, attractive communities
A4.2 Infrastructure & incentives within UGAs accommodate new & re-development
A5. Protect and Restore Floodplain Function
A5.4 Implement & maintain priority floodplain restoration projects
B3. Protect & restore marine ecosystems
B3.2 Implement & maintain priority marine restoration
B3.1 Protect intact marine ecosystems
B2. Protect & restore nearshore & estuary ecosystems
B2.1 Permanently protect priority nearshore processes & habitat
Plans & technical information provide base for recovery efforts
Tribes and agencies manage salmon harvest
Hatcheries support recovery & harvest
Hatchery plans & regulations support recovery & harvest
Hatchery operations support
Community infrastructure supports, integrates salmon recovery efforts
Habitat protection & restoration support recovery
Land owner's stewardship
Habitat protections through regulation, etc.
Habitat protection through acquisition
Development patterns provide for salmon habitat
Habitat restoration
UGA & rural growth
more basin-wide growth is within UGAs
limited & ecol. appropriate UGA expansion
Rural growth is compact & eco-friendly
PRESSURE RED. RESULTS
ECOSYSTEM COMPONENTS & 2020 RECOVERY TARGETS
Opportunities for fresh & salt water wild salmon rearing
Land use & patterns are managed to support viable salmon
Shoreline, estuary, floodplain modifications support viable salmon
improved habitat for spawning, rearing, migration
increased access to spawning, rearing habitat
Freshwater Species
Freshwater Food Webs
Marine & Nearshore Food Webs
Freshwater Systems
Nearshore Systems
Other key strategies for making progress toward the Chinook salmon target include a number of pollution prevention & control efforts: preventing, reducing, controlling sources of pollution (C1.1, C1.3, C1.4, C1.6); managing urban stormwater runoff at the site & landscape scales (C2.2, C2.4); improving pretreatment of discharges to municipal wastewater (C6.1); effectively preventing, planning for, and responding to oil spills (C8.1, C8.2, C8.3) addressing and cleaning up cumulative water pollution impacts (C9.1, C9.2)

Protect and Conserve Freshwater Resources

The Challenge

Surface water flows and groundwater levels in most watersheds of Puget Sound have been altered as a result of dams and other hydrological modifications, loss and change of vegetative cover, water withdrawals for municipal, domestic, commercial, industrial, and agricultural water supplies, and in some cases, over-allocation of water rights. Climate change will compound these problems by reducing snowpack and groundwater infiltration, increasing stormwater runoff, raising stream temperatures, and concentrating pollutants in water bodies. As a result, Puget Sound aquatic habitats are degraded, native species have declined, and there is an uncertain future water supply for human consumption, especially in rural areas. Low water flows are identified as priority issues for salmon in 14 of the 19 Puget Sound Water Resource Inventory Areas (WRIA).

Climate Change

Increasing temperatures will significantly reduce snowpack in Cascade and Olympic Mountains. This will lead to reduced summer streamflows, reduced soil moisture, higher summer stream temperatures, and an increased risk of drought for water users, including agriculture, municipalities, and fish and wildlife. Increased water demand could increase the potential for conflict among users. Coldwater fish species including salmon, steelhead, and bull trout are especially at risk.

One of the high priority, overarching strategies in *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy* (April 2012) is to improve water management to address climate-related supply reductions. This strategy includes promoting integrated water management in vulnerable basins, implementing enhanced water conservation and efficiency programs, ensuring sufficient cold water in salmon-bearing streams during critical seasons, and adapting water management and planning practices to reflect changing water availability and flow timing.

Recommended actions include, but are not limited to, developing guidance on whether and how to incorporate projected climate information and adaptation actions into planning, policy and investment decisions related to approval of new or changing existing water rights, adoption of instream flow rules, implementing well-coordinated land and water policies, fostering climate-ready utility initiatives, improving existing water infrastructure, and adopting up-to-date water conservation technologies.

The sub-strategies in this section help to implement the state strategy, as do strategies in Sections A1-5 and C2 of the Action Agenda. Additional adaptation work will be needed for this strategy in the future.

SALMON RECOVERY

Freshwater – A Salmon Recovery Plan Priority: Adequate water availability is critical for salmon. Water availability for salmon recovery also includes the timing and the type of flow (e.g. peak flows, rain-on-snow events, water levels during summer vs levels during spring). The Recovery Plan calls for resolving technical and policy uncertainties around water availability and flow, and the implementation of protective water quantity measures.

How are these priorities integrated: While the Action Agenda strategies and actions have some actions around instream flows and water availability, the Recovery Plan places a higher emphasis on resolving the water availability issues than is highlighted in the Action Agenda. The flow work has not advanced in the region as articulated in 2005. More work is needed to address the concerns around instream flows for salmon recovery.

Puget Sound watersheds require a comprehensive approach to protecting year-round, instream flows for people and instream uses. This is particularly important with increasing human population in the region and concomitant projected increases in water demand. Current approaches to managing stream flows, groundwater, water use, land use, and stormwater management are fragmented and the many programs that address water quantity are not coordinated. Many of the programs for managing water are funding from the State's General Fund, and have seen disproportionate cuts in recent years. A fundamental realignment in policy, regulation, and funding structure is needed at the state level to repair the system, one that ensures the protection of natural hydrologic processes and associated habitats within Puget Sound watersheds. Some of these actions will also help improve water quality.

Relationship to Recovery Targets

Puget Sound has a specific recovery target for summer stream flows that support salmon habitat needs, other ecosystem needs, and provide water for people. This target includes a series of river-specific sub-targets to be achieved by 2020:

- Maintain stable or increasing flows in highly regulated rivers (Nisqually, Cedar, Skokomish, Skagit, Green)
- Monitor low flow in the Elwha River after dam removal
- Maintain stable flows in unregulated rivers that currently are stable (Puyallup, Dungeness[18], Nooksack)
- Restore low flows to bring the Snohomish River from a weakly decreasing trend to no trend
- Restore low flows to bring the Deschutes River[1], North Fork Stillaguamish River, and Issaquah Creek from a strongly decreasing trend to a weakly decreasing trend

The strategies in this section are designed to help achieve the targets. Protecting and improving stream flows also will help support recovery targets related to insects in small streams, wild Chinook salmon

[18] These stations are high in the watershed and do not reflect significant water resources activity downstream. For example, ongoing work is increasing late summer/fall flows in the Dungeness River downstream of this gage, identified as critically limiting to recovery of listed species.

abundance (which in turn supports recovery targets for Puget Sound resident killer whales), and freshwater quality.

Local Priorities

Some local integrating organizations identified conservation of freshwater resources as a high priority.

Local Integrating Organization	Priorities
Strait of Juan de Fuca	*Top priority* • Instream Flow Rules – Adopt and/or implement instream flow rules for Water Resource Inventory Areas (WRIAs) 17, 18 East, 18 West, and 19
West Puget Sound	*From working priority list* • Rank, fund and construct water reuse projects in the West Sound that emphasize reusing water for consumptive use first • Identify opportunities to conserve groundwater within aquifers and reserve instream flow; Develop watershed by watershed "budgets"
Whatcom	*From working priority list* • Continue implementing WRIA 1 Watershed Management Plan-Phase 1 • Implement instream flow restoration projects
Hood Canal	*From General priorities* • Work with WRIA planning units to implement priority actions

A7. Protect and conserve freshwater resources to increase and sustain water availability for instream flows

The aim of this strategy is to develop coordinated, watershed-based water management approaches, accounting for existing ecosystem goals, water management agreements, projected future climate conditions and water availability, projections of future instream flow demands, and maintaining low flows in tributaries. This strategy approaches freshwater protection and conservation from three perspectives:

- Regulation, monitoring, and enforcement
- Water demand and conservation
- Ground water supplies and recharge

A7.1 Update Puget Sound instream flow rules to encourage conservation.

A critical tool for protecting and conserving freshwater resources is rulemaking for instream flows. The Washington State Department of Ecology (Ecology) has authority to set instream flows under several statutes – Chapters 90.22, 90.54, and 90.82, of the Revised Code of Washington. The term "instream flow" is used to identify a specific stream flow (typically measured in cubic feet per second, or cfs) at a

specific location for a defined time, and typically following seasonal variations. Instream flows are usually defined as the stream flows needed to protect and preserve instream resources and values, such as fish, wildlife, water quality, aesthetics, and recreation.

It is important to note that instream flows are intended to set limits on the use of other, less senior water users. Often instream flows, once established, will not be met for much of the time. Instream flows can help to stop the decline of stream flows. However, other programs are needed to restore flow levels so that instream flows can be met more often.

Instream flows are most often described and established in a formal legal document, typically an adopted state rule. Ecology establishes in stream flow rules through the Administrative Procedures Act (RCW 34.05). In areas of the state where watershed planning has occurred, local planning units can make recommendations to Ecology for instream flow rules to be established or, for existing rules, amended. The Washington Department of Fish and Wildlife (WDFW) provides technical assistance in the form of instream flow studies, flow study interpretation and analysis in light of hydrology and species-specific ecology, developing instream flow recommendations based on interpretation of instream flow study results, and explaining instream flow ecology and methods to stakeholders.

Most of the watersheds in Puget Sound's WRIAs 1, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, and 17 are currently covered by instream flow rules. Only four of these rules, however, address permit-exempt groundwater withdrawals that can have a cumulative effect on stream flows, especially in late summer. For example, the instream flow rule for Kennedy– Goldsborough WRIA 14 was codified in 1988 and has not been updated. In general in the Puget Sound region, there is limited data on actual water use and the effects of groundwater withdrawal on stream flows. This lack of data can make it hard to understand and communicate how additional water withdrawals might impact senior water right users, and listed species.

An additional challenge to updating instream flow rules is the degree of local support and/or opposition to the rule-making process within any given basin. The degree of support or opposition can greatly influence both the cost and time required to adopt or update a rule, as evidenced by recent rule-making activity in WRIA 17 and WRIA 18. New instream flow rules often limit access to groundwater supplies, raising concerns among home builders, realtors, and property owners. To address this challenge, it will be important to work with local officials, legislators, tribes, and stakeholders to reach agreement on regulatory approaches and solutions to water supply problems. Finding solutions to the growing demand for water can take longer than developing the rule language itself. Education and outreach efforts are also critical for building public understanding and support. Outreach strategies would be tailored for specific basins. Ecology's staffing for instream flow rules has been reduced in recent years due to budget cuts – there are currently only two instream flow rule writers for this work statewide.

Ongoing Programs

Ecology's Watershed Plan Implementation and Flow Achievement Capital Grant Program and Watershed Planning Operating Budget Grants include specific technical approval criteria such as amount of water added to instream flows and improvements to fish habitat.

Performance measures from Ecology's Water Resources Division include: two instream flow rules adopted (Q6, 2009–2011 biennium), number of instream flow rules adopted, zero percent of monitored stream flows below critical flow levels, and 1,250 acre-feet of water saved for instream flow (for each

period, 2009–2011 biennium). Additional measures include percentage of Hood Canal summer chum and Puget Sound Chinook stocks with spawner escapement (number of fish returning to a stream or river to spawn) exceeding their 1993-97 pre-ESA listing base period. An increasing number of populations with spawner escapement exceeding the population's pre-ESA base period would indicate progress toward a healthier Puget Sound ecosystem.

Ongoing programs also establish minimum flow regimens on rivers where flows are controlled by dams. In general, these rivers have stable or positive trends relative to minimum flows. Note that minimum flow requirements for dam releases is just one mitigation for a variety of negative environmental impacts that dams can cause. There are six Puget Sound rivers where flows are highly controlled by dams: the Cedar River, the Elwha River (although this will change in the future as the dams are removed), the Green River, the Nisqually River, the Skagit River, and the Skokomish River. Two additional Puget Sound rivers, the Deschutes River and the Snohomish River, are slightly regulated by dams.

Key Ongoing Program Activities

- Ecology will continue to support implementation of the recommendations from approved watershed plans prepared under the Watershed Planning Act (RCW 90.82), to the extent possible within legislatively-approved funding levels, consistent with the Action Agenda and coordinated with other local restoration and protection efforts. Approved watershed plans in Puget Sound include Nooksack, San Juan, Island, Nisqually, Skokomish-Dosewallips, and Quilcene. Other areas stopped the RCW 90.82 planning process (Kitsap, Kennedy-Goldsborough, Chambers-Clover, Deschutes, Lower Skagit-Samish, Upper Skagit), and still other areas are not expected to participate in RCW 90.82 planning (Stillaguamish, Snohomish, Cedar-Sammamish, Duwamish-Green, Puyallup-White). Work is needed to provide support and funding for flow-protection and enhancement actions in approved watershed plans.
- Ecology will renew efforts to require metering in all new and existing diversions in the Puget Sound region and use metering data in making water availability decisions, modeling groundwater, and updating instream flow rules.

Near-Term Actions

A7.1 NTA 1: Set Instream Flows in Priority Watersheds. Ecology, with support from WDFW, will by 2020 set flow rules in the remaining priority Puget Sound watersheds that currently do not have instream flow rules:

1. Dungeness River portion of WRIA 18 (currently in progress – to be completed by 2013);
2. WRIA 16;
3. The western portion of WRIA 17 (Sequim Bay watershed); and
4. The western portion of WRIA 18 (Elwha-Morse watershed planning area).

Priority will be given to critical basins or those with known significant problems meeting instream or out-of-stream demands. Note that including the Elwha River in an instream flow rule may be delayed because of the need to develop a method to determine and set instream flows in the Elwha after dam removal and river stabilization.

Performance measure: Done or not.

A7.1 NTA 2: PEP Development and Implementation. Ecology will develop and implement the comprehensive basin flow protection and enhancement programs (PEP) called for in the recovery plans for Puget Sound Chinook and Hood Canal/Strait of Juan de Fuca summer Chum. By 2014 Ecology will identify near-term flow recovery targets and initiate a PEP program for a high priority watershed.

Performance measure: Done or not.

A7.1 NTA 3: Water Code Compliance and Enforcement. Ecology will establish a strong program for Puget Sound watersheds to increase water code compliance and enforcement. This program will include the creation of Ecology "compliance officer" staff positions. These positions would be similar to "water masters" used in other parts of the state, but also different because of the absence of adjudication and increased focus on mitigation strategies. By 2013, Ecology will develop a program plan to meet this goal. This plan will include identifying funding sources, a schedule, duties, and geographic jurisdiction for compliance officers, who will be local contacts to water users, provide a local compliance presence, protect the resource, support mitigation, reduce water use, and protect senior water rights, including instream flows.

Performance measure: Done or not.

A7.1 STRT 6: Strait Instream Flow Rules. Adopt and/or implement Instream Flow Rules for Water Resource Inventory Areas (WRIAs) 17, 18 East, 18 West, and 19.

a. Adopt and implement Dungeness Instream Flow and Water Management Rule
b. WRIA 18 East stream flow improvements
c. Implement WRIA 17 Instream Flow and Water Management Rule
d. Adopt Instream Flow Rules for WRIA 18 West
e. Adopt Instream Flow Rules for WRIA 19

Performance measure: Initiate or complete 66% of the Priority Actions identified by the Strait ERN for the Strait Action Area.

A7.2 Decrease the amount of water withdrawn or diverted and per capita water use.

The previous sub-strategy focused on regulation and monitoring of freshwater resources through implementation of instream flow protection programs; this sub-strategy considers freshwater resource protection through demand and conservation strategies. Managing demand and promoting conservation will be critical as the human population increases in the Puget Sound region. Population stress on water supply will be further exacerbated by predicted decrease in snow-pack and increased frequency of droughts brought about by climate change. The near-term objectives for water demand and water conservation address four key sectors: municipalities, agriculture, industry, and rural domestic water users. Demand and conservation goals will be met through a combination of implementation/enforcement of rules, voluntary participation in conservation programs, market-based approaches to adjust water usage, and deployment of current and emerging water conservation technologies.

Ongoing Programs

Key Ongoing Program Activities

- The Partnership will support municipal water systems' implementation of Washington Department of Health's Water Use Efficiency Rule, including establishing water conservation goals, metering, and reporting from all municipal suppliers.
- Ecology will support an increase in periodic audits of industrial water users.

Near-Term Actions

None. Work in the near-term is focused on implementation of ongoing programs.

A7.3 Implement effective management programs for groundwater.

A critical approach to protection and restoration of freshwater resources includes management of groundwater in conjunction with surface water to better account for the interaction between the two.

Work on groundwater should emphasize monitoring of groundwater resources (including exempt wells) and use projections, and completion and implementation of groundwater management plans throughout Puget Sound. It will require an emphasis on work in areas without current groundwater management plans that are at high risk of groundwater pollution and/or current or future demand. The Critical Aquifer Recharge Area (CARA) program (under the state's Growth Management Act) is one potential vehicle for coordinating protection of groundwater resources across Puget Sound counties to support instream flows.

Near-Term Actions

A7.3 NTA 1: Exempt Wells. Ecology will work with tribal nations, local governments, and other partners to develop and support a consistent approach to making decisions about exempt wells, and to ensure that both the physical and legal availability of water is considered in decisions. This will include workshops on exempt well issues to be completed by 2013.

Performance measure: Done or not.

Emerging Issues and Future Opportunities

In addition to the specific ongoing program activities and near-term actions described above, there are a number of ideas for future work that might be undertaken to address protection of freshwater flows in Puget Sound. These ideas should be an ongoing part of the regional discussion about freshwater flows, and may inform future funding decisions, programmatic priorities and guidance, and/or may become near-term actions in future Action Agenda cycles. They include:

- Establishment of a stable dedicated funding source for water resource management. The dependence on General Funds for these initiatives must be reduced for progress to be made. A funding program should address funding both for state agencies and for local governments to help build partnerships that can make progress in implementing water resource elements of the Action Agenda.
- The proper balance between establishing new instream flow rules and updating existing rules. Ecology currently has no resources to update existing rules. Diverting resources to update existing rules would slow establishment of new instream flows. In general, this is a very resource challenged area of the Action Agenda.
- Development of additional information on the effects of groundwater withdrawals on stream flows and completion of groundwater resource assessments/water mapping.
- Application of more holistic, watershed and integrated water budget and planning based approaches that would examine all the water needs in a watershed (e.g., growth, industry/agriculture, stream flows) and all the potential water resources (e.g., reclaimed water, stormwater, and rainwater harvesting) and work to best match needs and resources.
- Consideration of a comprehensive "Puget Sound Water Plan", which would integrate all of the water issues in the basin, including water rights, water quality, land use permitting, habitat protection, and watershed management, and provide a mechanism to deploy relevant programs to increase the likelihood that instream flow targets will be met. Some commenters on the draft Action Agenda suggested that additional enforcement authorities are needed to ensure instream flows are met.
- Use of water acquisition through, for example, water right leases and purchases, to restore/protect flows.
- Consideration of new implementation mechanisms for planning, these might include consideration of watershed districts, which would have independent revenue (e.g., taxation authority) and the ability to review all permits for conformity with the plan and to step in where a proposal has a watershed-wide impact and take the lead for planning, for example for flood hazard mitigation or water supply planning.

- Work with stakeholders and partners to build on existing public-private models, to support utilities adoption of demand management strategies (such as tiered pricing structures) to discourage inefficient and unnecessary use of municipal water, particularly in flow-limited areas or low flow periods.
- More specific incorporation of climate change projections throughout Puget Sound.
- The potential for work with Canadian partners in the development of groundwater management programs for transboundary aquifers such as the Abbotsford-Sumas Aquifer.
- The need to ensure adequate flow in both mainstem rivers and tributaries.

Target View: Summer Stream Flows

Summer stream flows support salmon habitat needs, other ecosystem needs, and water for people. The summer (June through October) lowest 30-day average flow is a statistical measure of flow that has been linked to salmon habitat needs.

Summers in the Puget Sound region are often glorious, with comfortable temperatures and little rain. One result of this great weather is that the flow of water from rivers and streams around the Sound also declines, affecting salmon runs, wildlife, and our water supply. There are other man-made reasons for lower summer stream flows, such as new wells that tap ground water and new buildings and development that cover up the ground and decrease seepage – reducing the amount of water that would reach the stream in summer.

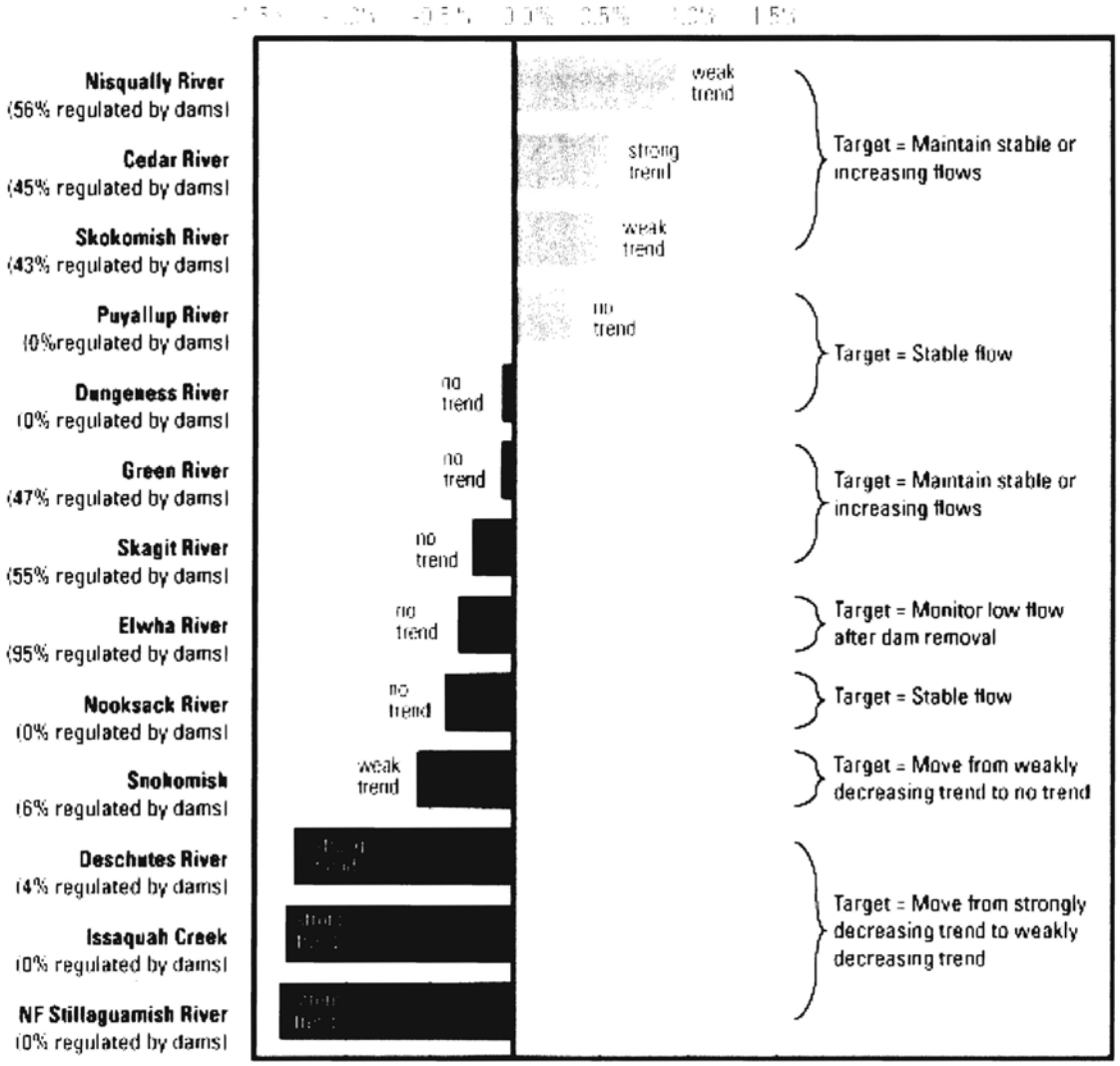
Of course, stream flows vary from year to year. But there are good measurements available for most of the rivers in the Puget Sound basin. The 2020 recovery target for summer stream flows is to meet the following river-specific targets:

- Maintain stable or increasing flows in highly regulated rivers: Nisqually, Cedar, Skokomish, Skagit, and Green.
- Monitor low flow in the Elwha River after dam removal.
- Maintain stable flows in unregulated rivers that currently are stable: Puyallup, Dungeness, and Nooksack.
- Restore low flows to bring the Snohomish River from a weakly decreasing trend to no trend.
- Restore low flows to bring the Deschutes River, North Fork Stillaguamish River, and Issaquah Creek from a strongly decreasing trend to a weakly decreasing trend.

The river-specific targets for stream flow are displayed in the following graph. All flows are from U.S. Geological Service gages. Most gages are near the mouth of the river, except the Deschutes River and Dungeness River gages are higher in the watershed.

Average Change in Low Water Flows in 13 Puget Sound Rivers

Percent per year, 30-day average summer low flow, 1975-2010

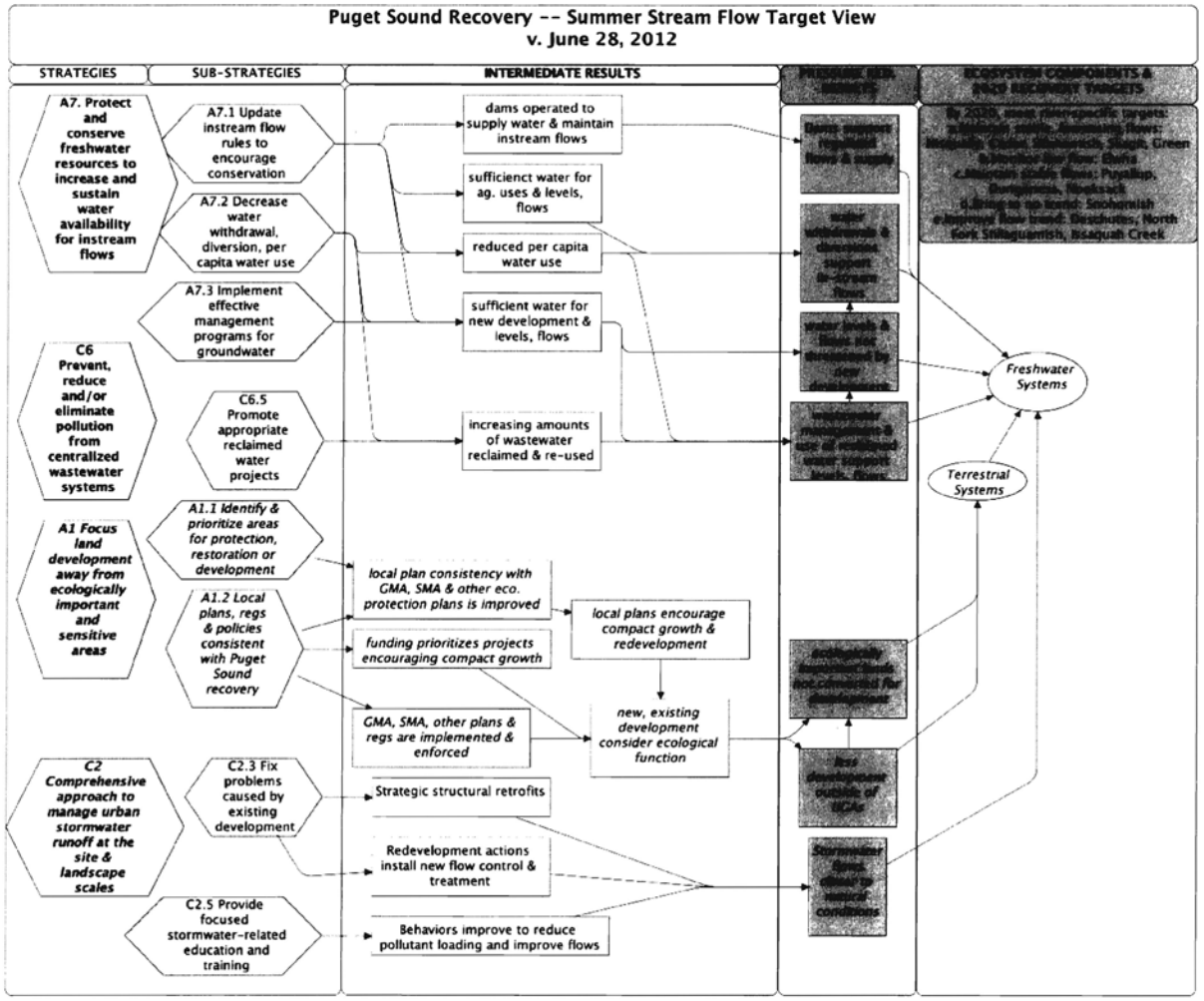


Source: Washington State Department of Ecology

The Action Agenda strategies most related to the summer stream flow target are:

- Protect and conserve freshwater resources to increase and sustain water availability for instream flows (A7.1, A7.3, A7.2)
- Focus land development away from ecologically important and sensitive areas (A1.1, A1.2)
- Promote appropriate reclaimed water projects (C6.5)
- Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales (C2.3, C2.5)

In the following results chain, or logic model, yellow polygons identify strategies and sub-strategies from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets.



STRATEGIES AND ACTIONS TO RECOVER PUGET SOUND TO HEALTH

B: MARINE AND NEARSHORE

« Cover photo: Creative Commons, courtesy of Prorallypix on Flickr.

Protect and Restore Marine and Nearshore Ecosystems

The protection and restoration of marine and nearshore ecosystems is vital to the long-term health of Puget Sound and the quality of life of its residents. Historical human activities have dramatically affected and damaged many of these systems, and in order to successfully protect and restore our marine and nearshore ecosystems we need to ensure that priority restoration and protection efforts are carried out; working waterfronts remain economically viable; citizens can easily access Puget Sound; eelgrass beds are able to flourish; marine and nearshore habitats continue to sustain diverse species and food webs; and non-native species do not impair the complex functions of the Puget Sound ecosystem.

This chapter describes six overarching strategies that are essential to the protection and restoration of nearshore and marine systems:

- **B1** – Focus development away from ecologically important and sensitive nearshore areas and estuaries;
- **B2** – Protect and restore nearshore and estuary ecosystems;
- **B3** – Protect and restore marine ecosystems;
- **B4** – Protect and steward working waterfronts and improve public access to Puget Sound;
- **B5** – Protect and restore the native diversity and abundance of Puget Sound species;
- **B6** – Prevent and respond to the introduction of invasive species.

The 2020 ecosystem recovery targets most related to protection and restoration of marine and nearshore ecosystems are: shoreline armoring; estuaries; eelgrass; Pacific herring; orcas; and Chinook salmon.

B1-3 Local Priorities

Protection and restoration of marine shorelines and estuaries is a priority for all Local Integrating Organizations. The agreed upon strategies, or example ideas under discussion, are presented below. Some LIOs also have associated near-term actions that are listed with the related Soundwide sub-strategy.

LIO/Area	Priorities
San Juan Islands	*Tier 1 Strategies* • Provide information and work with landowners regarding the importance of retaining and restoring native vegetation, trees and ground cover and geologic processes. • Improve on compliance and enforcement capacity • Identify and implement shoreline protection tools including land preservation via acquisition and conservation easements, restoration, and protection of marine areas consistent with treaty rights.

LIO/Area	Priorities
	Tier 2 Strategies • Identify and implement shoreline protection tools including land preservation via acquisition and conservation easements, restoration, and protection of marine areas consistent with treaty rights. (Same as Tier 1 above) • Provide convenient landowner access to technical assistance for maintaining views, shoreline access, and ecological function of the shoreline. • Shoreline regulatory strategy (update CAO and SMP). • Implement San Juan Marine Stewardship Area Monitoring Plan.
Strait of Juan de Fuca	*From High Priority Strategy list* • Shoreline Master Program updates, implementation, and intergovernmental coordination (Jefferson County, Clallam County, and cities of Port Townsend, Sequim, and Port Angeles). *From additional 19 Strategic priorities* • Aquatic Resources Habitat Conservation Plans - Develop and implement Aquatic Resources Habitat Conservation Plans (HCP) • Marine Resource Plans (Clallam and Jefferson MRCs) - Implement Marine Resources Committee's Action Plan for Clallam and Jefferson counties and Northwest Strait Commission Regional Projects
South Central Puget Sound	*From High Priority Strategy list* • Change Shoreline Management Act (SMA) statutes and regulations to limit residential shoreline armoring and overwater coverage, and promote "green" shoreline replacements: • Seek better alignment of state standards for stormwater, Shoreline Master Programs, and floodplain development regulations with Soundwide targets and Action Agenda priorities • Implement "green" shoreline replacements: Promote green shoreline BMPs, incentives, fund/implement shoreline restoration plans • Work with local governments to develop and implement policies and regulations that advance Action Agenda implementation
South Sound	*From South Sound Strategic Initiative: Habitat Acquisition and Protection* • Secure perpetual public ownership of McNeil Island • Implement Conservation Plans (McLane Creek, Goldsborough Creek, Skookum Creek, Nisqually Protection (and Restoration) Plan • Bayshore Acquisition at Oakland Bay • Protect existing, functioning drift cells in South Sound *From South Sound Strategic Initiative: Salmon Recovery/Habitat Restoration* • Restore Chambers Creek and Sequalitchew Creek Estuaries • Restore Deschutes Estuary • Implement all South Sound nearshore projects described by the PSNERP process • Restore function to drift cells in South Sound with a focus on BNR ownership
Hood Canal	*From general priorities under development* • Implement and enforce existing regulatory programs of the counties (SMP, CAO, County Comp.) and states (RCW's and WAC's) • Improve financial and technical assistance programs aimed at fostering voluntary stewardship and improving re/development standards • Complete and begin to implement county SMP restoration plans and MRC plans • Consult with landowners and public about potential high priority PSNERP projects;

LIO/Area	Priorities
	advocate for funding for high priority projects with landowner support • Restore estuaries by removing infrastructure and setting back levees/revetments where feasible
West Sound	*Draft Strategies under development* • Prioritize and protect marine and nearshore ecosystems by improving shoreline permitting compliance monitoring and enforcement • Align regulatory programs across cities/counties for better coordination on development, and address publicly owned shoreline; Improve communication, planning, and integration between County and City SMPs and Navy INRMPs • Identify priority areas that are compromised by armoring, and encourage armoring removal and erosion control alternatives that better protect and restore nearshore ecosystem processes
Whatcom, Stillaguamish & Snohomish Watersheds, Island Watershed, Skagit Watershed	*These areas are still developing strategies and actions. The types of strategies under discussion include, for example:* • Continue implementing local CAO, GMA, and SMP plans • Complete a nearshore and estuary strategic plan for assessment, restoration, and protection projects that is coordinated with other planning efforts (e.g., Salmon Recovery, Shoreline Management) • Evaluate need to protect ecosystem processes and quality of life needs when considering tidal energy projects • Protect high value habitat: unique spawning areas, juvenile rearing areas, eelgrass beds, and bird habitats • Complete large scale estuary restoration projects • Implement projects to remove bank armoring where appropriate and/or use "green" armoring techniques, • Update Fish and Wildlife Habitat Conservation Areas of the Critical Area Ordinances • Create incentive program for landowners to remove existing bulkheads or replace them with soft shore armoring. • Complete and implement Shoreline Master Program updates on schedule; implement restoration components of shoreline management plans

B1. Focus development away from ecologically important and sensitive nearshore areas and estuaries

The Challenge

There is perhaps no better vantage point from which to appraise the health of Puget Sound than in the region's marine waters and nearshore habitats. There is near-universal agreement that the estuary's recovery depends foremost on protecting and restoring the areas, species and ecosystem processes that are most essential for ecological function. To that end, many entities have set separate priorities for habitat protection and restoration efforts in the region, from the local level to the entire basin. Similarly, other entities have championed the need to better protect certain species or key members of the food web through recovery plans or other associated efforts (see Section B5 for further details). The challenge facing the planning community (and this section of the Action Agenda) is to consolidate

independent assessments into a more cohesive and coordinated policy directive that articulates where and how, in the face of pressures associated with human population and economic growth, we will direct shoreline and marine development and which places we will strive to recover or set aside.

The Growth Management Act (GMA) and the Shoreline Management Act (SMA) direct local jurisdictions to plan for growth and development while ensuring no net loss of critical areas and their associated ecosystems (wetlands, streams, slopes, etc.) or of shoreline ecosystem functions and processes. Development regulations, borne out of those plans, are not always effective in achieving environmental objectives. An integrated approach to planning and permitting that involves all levels of government and the private sector is needed.

Climate Change

Sea level rise and storm surge will increase the frequency and severity of flooding, erosion, and seawater intrusion – increasing risks to vulnerable communities, infrastructure, and coastal ecosystems. Combined with increased ocean acidity and warmer marine temperatures, climate change will have profound effects on marine nearshore and estuaries.

Sea level in the Puget Sound region is expected to increase 6 inches (range of 3 to 22 inches) by 2050 and by 13 inches (range of 6 to 50 inches) by 2100[19]. Changes at specific locations within Puget Sound will vary from these regional projections. Major impacts associated with sea level rise are likely to be inundation, flooding, erosion and infrastructure damage, with the largest impacts occurring when storm or river flooding events converge with high tides.

Priority Response Strategies identified in *Preparing for Climate Change: Washington State's Integrated Climate Response Strategy* (April 2012) related to the marine nearshore and estuaries include:

- **Reducing the risk of damage to buildings, transportation systems and other infrastructure**. This includes supporting local efforts to prepare for coastal flooding and storm surges, as well as considering climate change impacts when new development and infrastructure are sited.
- **Safeguarding fish and wildlife habitat and protecting critical ecosystem services that support human and natural systems.** This includes protecting and restoring habitat and reducing existing stresses on fish, wildlife, and ecosystems.
- **Reducing the vulnerability of coastal communities, habitat and species.** This priority includes protecting people, property, and infrastructure from coastal hazards and avoiding new development in highly vulnerable areas. It also includes preventing coastal degradation and destruction, as well as seeking opportunities for upland habitat creation as sea levels rise.

The state adaptation strategy identifies several coast and ocean adaption strategies with related actions. These strategies are recommended to help:

- Limit new development in highly vulnerable areas;
- Protect the shoreline from rising sea levels using green or "soft" alternatives to traditional "hard" shore armoring, seawalls, and dikes;

[19] Mote, P.W., A. Petersen, S. Reeder, H. Shipman, and L.C. Whitely Binder. 2008. *Sea Level Rise in the Coastal Waters of Washington State*. Report prepared by the Climate Impacts Group, Center for Science in the Earth System, Joint Institute for the Study of the Atmosphere and Oceans, University of Washington, Seattle, Washington and the Washington Department of Ecology, Lacey, Washington.

- Accommodate rising sea levels through engineering and construction practices or raising the height of piers or buildings;
- Manage retreat from highly vulnerable sites;
- Restore and maintaining wetlands, preserving sediment transport processes, and preserving habitat for vulnerable species; and
- Enhance monitoring and research of ocean chemistry changes and effects on marine ecosystems.

Strategies for implementation include:

- **Leading by example through development of a state framework to guide decision-making and protect people, assets, and natural areas from coastal hazards.**
- **Avoiding development in highly vulnerable areas and promoting sustainable development in appropriate, less vulnerable areas**. Example actions include providing guidance, updating maps and information to help local jurisdictions, identifying incentives and regulatory tools to reduce risk exposure, providing updated guidance, assessing damage costs and removing incentives that encourage rebuilding in at-risk areas.
- **Accelerating efforts to protect and restore nearshore habitat and natural processes.** Example actions include identifying priority conservation and restoration areas that can increase natural resiliency and protect vulnerable communities, developing restoration and protection guidelines, and identifying policy options to avoid or minimize shoreline hardening, especially in Puget Sound to promote green shoreline and landward setback programs.
- **Building local capacity to respond to climate impacts by providing tools to assess vulnerability and advancing research, monitoring and engagement efforts.** Example actions include completion of a sea-level rise and vulnerability assessment that includes Puget Sound, and assisting of coastal planners.

Many of the sub-strategies, ongoing programs and near-term actions in the Action Agenda help implement the state Climate Response Strategy.

Relationship to Recovery Targets

Protection and restoration of nearshore and marine systems is critical to achieving recovery targets for estuaries, and shoreline armoring. The target for estuaries is that all Chinook natal river deltas meet 10-year salmon recovery goals (or ten percent of restoration need as a proxy for river deltas lacking quantitative acreage goals in salmon recovery plans) and 7,380 quality acres are restored basin-wide by 2020. For shoreline armoring, the recovery target is that from 2011 to 2020 the total amount of armoring removed is greater than the total amount of new armoring, with an emphasis on removing/preventing new armoring at feeder bluffs and use of soft shore techniques for all new and replacement armoring unless it is demonstrably infeasible.

Nearshore and marine protection and restoration also will contribute to other recovery targets including eelgrass recovery, floodplains, orcas, herring, and wild Chinook salmon.

B1.1 Use complete, accurate, and recent information in shoreline planning and decision making at the site-specific and regional levels.

Washington's nearshore science community, through the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP), has outlined a comprehensive set of protection and restoration priorities to improve sediment supply and other critical ecosystem processes for the Sound (Cereghino, in progress). These priorities have not yet been reconciled with potentially complementary analyses and efforts by the salmon recovery watersheds as part of the federally-approved Chinook Salmon Recovery Plan, local conservation inventories, and other habitat and natural resource-specific rankings including the Puget Sound Watershed Characterization Project. This sub-strategy seeks to unite and apply the results across disciplines from the basin to local scale. Such consolidation will clarify what areas have the greatest potential to aid recovery and which areas have least—and will help planners, decision-makers and the public to evaluate where best to apply protective measures, restore, and direct development. This sub-strategy is an important part of climate change adaptation.

Ongoing Programs

PSNERP, which has become PSP's nearshore program, is a partnership between the U.S. Army Corps of Engineers (USACE), state, local, and federal government organizations, tribes, industries, and environmental organizations with the goal of guiding the restoration and protection of Puget Sound nearshore ecosystems. The project aims to achieve a shared understanding that can guide and coordinate restoration, including a recommendation to Congress for authorization through the Water Resources Development Act of a comprehensive plan to implement ecosystem restoration throughout the Puget Sound nearshore.

The Chinook Salmon Recovery Plan watershed chapters each contain nearshore and estuary restoration priorities. This program and the salmon recovery three-year work plans are more fully described in Section A6.

The Shoreline Master Programs (SMPs) also identify local protection and restoration priorities. SMPs include:

- Goals for shoreline use, economic development, public access, circulation, recreation, conservation, and historical/cultural values;
- Environmental designations of shorelines based on their physical, biological and development characteristics; and
- Policies and regulations for shoreline uses, shoreline modification activities.

Statewide, 260 local programs must be updated by 2014, including programs in all of the Puget Sound counties.

Northwest Straits Initiative also provides marine nearshore data and information through marine resource committees in a seven counties.

In addition, the strategies and actions in Section B1 which relate to watershed characterization and the Department of Natural Resources' (DNR) Aquatic Landscape Prioritization will document science-based priorities for protection, restoration, enhancement and managed growth that reconcile sediment supply

priorities with high-value areas for salmon, shellfish, and other natural resources. The product of this effort is likely to be maps or other documents showing the science-based priorities for protection, restoration, enhancement, and managed growth at a drift cell (or smaller) scale.

Key Ongoing Program Activity

- DNR is developing and implementing an Aquatic Reserves network wide comprehensive inventory and monitoring program to inform the adaptive management of Aquatic Reserves and the larger Puget Sound recovery effort. This work will inform and support efforts by the Washington Department of Fish and Wildlife (WDFW), the Department of Ecology (Ecology), and PSP to develop a network of marine protected areas in Puget Sound.

Near-Term Actions

B1.1 NTA 1: Integrated Nearshore Priorities. PSP will lead the integration of existing science-based, geographic priorities for nearshore protection, restoration, enhancement and managed growth by July 2014. This includes identifying areas where local inventories and sediment supply priorities overlap with high-value areas for salmon, shellfish, and other natural resources at the drift-cell scale. The outcome of this effort will be agreed upon maps or other documents showing the science-based priorities for protection, restoration, enhancement, and managed growth at a drift cell (or below) scale, as well as outreach to implementers to consider this information as part of prioritization efforts including capital projects.

Performance measure: By December 2012, PSP will convene an interagency workgroup and complete scoping for the technical work of integration; Data integration work complete by August 2013 and quality control checks and revisions by December 2013. The integrated product, including data and maps, are presented to all salmon recovery watersheds, LIOs and local governments by June 2014.

B1.1 NTA 2: Human Use Patterns in Marine Areas. Ecology will identify human use patterns for marine areas in Puget Sound by 2013, to support marine spatial planning.

Performance measure: Human-use mapping completed by June 30, 2013.

B1.1 WS 3: West Sound Eelgrass and Forage Fish Surveys. By 2013, The West Sound Watersheds Council, in coordination with the Suquamish Tribe, DNR, and others, will develop and implement periodic surveys of eelgrass and forage fish spawning habitat under a scientifically rigorous methodology, and update spawning habitat maps.

Performance measure: To be developed.

B1.2 Support local governments to adopt and implement plans, regulations, and policies that protect the marine nearshore and estuaries, and incorporate climate change forecasts.

Federal and state resource management agencies and local governments need current best available science to support their decisions for development and redevelopment in nearshore and marine environments. Larger jurisdictions may have the resources to research and develop their own science-based decision-making guidelines, but smaller municipalities rely on state government, non-governmental organizations (NGOs), or collaborative partnerships to provide handbooks and model ordinances. Over time, this sub-strategy will need to focus on climate change adaptation integration.

Ongoing Programs

Ecology is producing the Shoreline Master Program Handbook, which is designed to assist local government planners in meeting the requirements of the SMA (RCW 90.58) and revised SMP guidance (WAC 173-26, Part III). Handbook chapters provide recommendations for various components of the SMP process and are based on best available science.

The State of Washington Aquatic Habitat Guidelines Program and WDFW developed technical assistance guidance in 2009 for local governments to integrate local land use planning and state salmon recovery efforts. The *Land Use Planning for Salmon, Steelhead and Trout: A land use planner's guide to salmonid habitat protection and recovery* (Knight 2009) contains information on state salmon recovery efforts, sources of best available science, and model policies and development regulations for implementing salmon recovery. The best available science on watershed processes, riparian and wetland management is translated into planning tools, model policies and model regulations that can be incorporated into GMA and SMA planning programs to protect salmonids and prevent further loss or degradation of habitat. The objective of the guidebook is to further the goal of recovering naturally spawning salmon in Puget Sound by incorporating recovery efforts with local land use planning and decision-making.

The Aquatic Habitat Guidelines Program has also endorsed a whitepaper by Washington Sea Grant *Protection of Marine Riparian Functions in Puget Sound, Washington* (Brennan et al., 2008). The whitepaper provides shoreline planners and managers with a summary of current science and management recommendations to inform the protection of ecological functions marine riparian areas. In a broader document that addresses functions of all nearshore habitats, the Aquatic Habitat Guidelines Program, WDFW, and others in the scientific community produced a summary of best available science for the nearshore environment. The document, *Protecting Nearshore Habitat and Functions in Puget Sound: June 2010 Revised Edition*, provides a synthesis of current science on several important nearshore habitats and processes, and directions for where to find data and specific recommendations for moving through the mitigation sequence (EnviroVision et al. 2010). The goal of the document is to help local planners prepare SMP updates and also to assist Ecology in their review to ensure that SMP updates are based on good science.

Finally, city and county governments that are updating their shoreline master programs are required to develop a restoration plan that identifies locations for preservation. Jurisdictions that border Puget Sound and the largest rivers Puget Sound rivers are documenting priority areas for protection and acquisition. Government agencies and some city or county governments support mitigation banking or in-lieu fee mitigation programs. Although these programs are designed to offset development impacts, they can generate funds to help leverage protection and conservation efforts because they involve acquiring property or development rights for conservation purposes. In addition, strategies and actions in B1.1 will help ensure that local governments have complete and accurate information to inform planning.

The Northwest Straits Initiative through its seven marine resource committees also provides information on local shoreline resources.

SHORELINE MASTER PROGRAM

The state Shoreline Management Act, adopted by voters in 1972, ensures that all of us – the public, interest groups, local, state and tribal governments – work together to ensure our shorelines:

- Are kept safe and unpolluted;
- Are developed and managed fairly; and
- Give our children and future generations that special "sense of place" we cherish in Washington.

The mechanism for putting new shoreline development regulations and policies in place is called a "shoreline master program." Over 260 local programs must be updated by 2014, including programs in all of the Puget Sound counties. These updates are a unique opportunity to create a positive future for Washington's shorelines.

Master programs are defined in the Shoreline Management Act as: "... the comprehensive use plan for a described area, and the use regulations together with maps, diagrams, charts, or other descriptive material and text, a statement of desired goals, and standards..." [RCW 90.58.030(3)(a)] SMPs include: goals for shoreline use, economic development, public access, circulation, recreation, conservation, and historical/cultural values; environmental designations of shorelines based on their physical, biological and development characteristics; and policies and regulations for shoreline uses, shoreline modification activities. Every SMP is unique, and many newer SMPs are integrated to some degree into local comprehensive plans and development regulations.

Ecology oversees the Shoreline Master Program, maintaining review and approval authority, while providing technical assistance and other support for SMP updates. Ecology also tracks the update process and provides information to help residents participate in updates in their community. See http://www.ecy.wa.gov/programs/sea/sma/st_guide/SMP/SMPintro.html for more information.

Near-Term Actions

B1.2 NTA 1: **Update Local Shoreline Master Programs. Ecology will provide funding and, with WDFW, technical assistance to local jurisdictions to update local shoreline master programs by current deadlines, with all updates complete by 2014. A key deliverable for Ecology and local governments is to implement SMPs in a manner that validates achievement of no net loss of ecological function and guides Puget Sound toward shoreline armoring target.**

Performance measure: To be developed.

B1.2 STRT 4: Straits Shoreline Master Programs. Shoreline Master Program Updates, Implementation, and Intergovernmental Coordination (Jefferson County, Clallam County and cities of Port Townsend, Sequim, and Port Angeles).

a. City of Port Townsend SMP – stormwater education
b. City of Port Townsend SMP – bulkhead removal
c. City of Port Townsend SMP – restore native marine riparian vegetation
d. City of Port Angeles SMP Update
e. City of Sequim SPM Update
f. Jefferson County SMP – Annual Restoration Planning Summit
g. Jefferson County SMP – Assess shoreline restoration progress
h. Jefferson County SMP – Identify and implement shoreline armoring, riparian enhancement, fill removal and culvert replacement projects
i. Jefferson County SMP update
j. Clallam County SMP implementation
k. Clallam County SMP adaptive management
l. Clallam County SMP update
m. Ecosystem valuation
n. Enhanced shoreline protection
o. Finfish aquaculture speaker forum

Performance measure: Develop the economic baseline (Ecosystem Valuation) for the ecosystem functions that will be monitored by the No Net Loss indicators for all 5 local jurisdictions within the Strait Action Area; Alternative Option: Initiate or complete 30% of the new Priority Actions identified by the Strait ERN for the Strait Action Area.

B1.2 WS 2: West Sound SMP update alternatives to shoreline armoring. During the Shoreline Master Program (SMP) update process for all North Central / West Sound jurisdictions in 2012-13, the West Sound Watersheds Council will ensure that restoration plans for every SMP include alternatives to traditional shoreline armoring, and incentives for the removal of existing armoring.

Performance measure: The goal is for no net gain in shoreline armoring within any West Sound jurisdiction over the next two years.

B1.3 Improve, strengthen, and streamline implementation and enforcement of laws, regulations, and permits that protect the marine and nearshore ecosystems and estuaries.

Nearshore-related regulatory authorities include Washington State Hydraulic Code, Shoreline Management Act (SMA), Growth Management Act, and the State Environmental Protection Act (SEPA). At the federal level, these regulations include the Clean Water Act (CWA), The Endangered Species Act (ESA), the Coastal Zone Management Act (CZMA), and others.

The Hydraulic Code administered by WDFW and the SMA administered by Ecology are the two principal state regulatory authorities for shoreline armoring in Washington State. Recent data based on the Hydraulic Project Approval (HPA) program issued by WDFW indicate that construction of bulkheads (i.e., shoreline armoring) in Puget Sound is occurring at a brisk pace. Habitat losses and displacement along Puget Sound shorelines continue to occur as a result of bulkheading. Such losses contribute to the degradation of nearshore ecosystem processes and function.

Ongoing Programs

A number of issues continue to limit the effectiveness of the HPA program at protecting shorelines within the context of shoreline armoring. WDFW currently lacks regulatory authority to (1) address the need for a bulkhead (i.e., perceived need for armoring continues to supersede protection of shoreline functions); (2) require alternatives to traditional bulkheads, even in low-energy environments; and (3) address cumulative impacts or impacts that continue beyond the longevity of the permit, which is typically five years. Under the current regulations, protection of personal property will continue to supersede protection of shoreline processes and function along marine shorelines.

Comprehensive updates of local SMPs are required of all Puget Sound jurisdictions by 2012. New shoreline rules based on the SMA and as outlined in WAC 173-26 are expected to limit the amount of new shoreline armoring. New provisions regarding shoreline stabilization structures and development include: allowing armoring only where it is demonstrated necessary to protect a primary structure; reducing the adverse effects of new shoreline modifications by limiting their number and extent; giving preference to modifications that have a "lesser impact on ecological functions" and requiring mitigation; and, giving priority to "soft" over "hard" shoreline modifications. Provisions for new shoreline development attempt to limit the amount of new or enlarged stabilization and the need for future stabilization during the life of a development. Replacement of erosion control structures must be designed, located, sized, and constructed to ensure no net loss of ecological functions.

Near-Term Actions

B1.3 NTA 1: HPA Capacity Effectiveness. By December 2012, WDFW will use the results of a LEAN analysis to apply existing and new HPA capacity to more effectively protect fish life.

Performance measure: Complete LEAN process and begin to implement recommendations by December 2012.

B1.3 NTA 2: Hydraulic Code Rules Revision. By December 2014, WDFW will use best available science to revise Hydraulic Code Rules (chapter 220-110 WAC) and clarify conditions under which hydraulic projects must be conducted to prevent or mitigate the impacts to fish life and habitat.

Performance measure: Rulemaking complete.

B1.3 SJI 7: SJI Technical Assistance. San Juan County Community Development and Planning Department (CDPD) and the Town of Friday Harbor will make ongoing technical assistance (best management practices) available on-site to 100% of permit applicants, with a goal of 75% of customers avoiding hard armoring or otherwise implementing soft armoring techniques by 2014. This work will leverage the effort

underway via EPA grant funding and shoreline workshops coordinated by Friends of the San Juans, San Juan Islands Conservation District, and Washington Sea Grant.

Performance measure: Technical assistance (best management practices) available on-site to 100% of permit applicants, with a goal of 75% of customers avoiding hard armoring or otherwise implementing soft armoring techniques by 2014.

B1.3 SJI 8: SJI Technical Assistance Capacity. San Juan Community Development and Planning Department (CDPD) and the Town of Friday Harbor will provide capacity for technical assistance related to compliance with environmental regulations by 2013.

Performance measure: To be determined.

B2. Protect and restore nearshore and estuary ecosystems

Conserving intact areas can allow for robust and long-lasting protection of nearshore processes, functions, and habitats, and is often described by nearshore restoration practitioners as "protecting the best." By setting aside areas that are largely intact, we can better maintain ecosystem functioning even in the absence of other restoration or management actions. Furthermore, protection of intact areas complements existing efforts to restore habitats degraded by human activities by both enabling restoration and increasing its effectiveness. Accelerating protection and restoration are specifically identified as part of climate adaption.

Restoration of nearshore processes, structure and function also plays an important role. Recent research and analyses of Puget Sound marine and nearshore environments such as the *2010 Puget Sound Science Update* have pointed to particular stressors or pressures that need to be addressed in order to recover ecosystem health.

Salmon recovery nearshore and estuary projects are listed in Section A6.1 as part of the salmon recovery three-year work plans for the watersheds, as well as several Soundwide actions.

B2.1 Permanently protect priority nearshore physical and ecological processes and habitat, including shorelines, migratory corridors, and vegetation particularly in sensitive areas such as eelgrass beds and bluff backed beaches.

This sub-strategy seeks to accelerate the implementation of priority projects that address problems identified for Puget Sound nearshore (e.g., shoreline armoring) environments and move acquisition and restoration efforts forward. Specific locations identified by the analysis of Soundwide restoration priorities identified in B1.1 can be applied to targeted protection and conservation activities and programs. The landscape scale prioritization unites goals of multiple programs and disciplines from the basin to the local scale. If the priorities identified in B1.1 are incorporated into local comprehensive plans and zoning ordinances, the prioritization can help planners, restoration practitioners, and decision-makers direct growth away from existing areas of high ecological value and towards areas where resource conservation is not the primary objective.

While the protection of undeveloped lands and shorelines is a well established conservation strategy, the same concept can be applied to the preservation of ecological processes and structures in marine contexts that face pressure from development. Residential and commercial development along shorelines often includes overwater structures such as docks, fixed piers, bridges, floating breakwaters, moored vessels, and pilings. One key impact of overwater structures is the shading of nearshore habitats. Shading affects the growth of eelgrass and other nearshore plants that provide foraging areas and shelter for marine birds, juvenile salmon, forage fish, and shellfish. Shading can therefore impact the distribution, behavior, and survival of fish and other aquatic wildlife that occupy adjacent shoreline habitats. Sharp gradients of light and shadow, such as those that occur near overwater structures, affect feeding behavior and efficiency of visual foragers (e.g., salmon, Dungeness crab) as well as fish schooling and migratory movements. Natural wave energy patterns can be altered by multiple rows of pilings in nearshore waters, which change the distribution and deposition of sediments. Overwater structures also have the potential to introduce contaminants into sensitive areas because older creosote- or copper-treated wood pilings or decks are known to lead toxics such as polycyclic aromatic hydrocarbons and copper arsenate compounds.

SALMON RECOVERY

Protecting and Restoring Nearshore and Marine Habitat – A Salmon Recovery Plan Priority: A high priority of the Recovery Plans is the protection and restoration of estuaries and the marine nearshore areas. These areas are vitally important for salmon spawning and rearing habitat, as well as prey habitat. Each watershed plan (Volume II) identifies local priority actions, including the need to link with local Shoreline Management Plans. The San Juan Islands prioritization tool, South Sound tool, and other tools are specifically detailed in Volume II.

How are these priorities integrated: The Action Agenda strategies and actions emphasize the protection and restoration of these areas although the initial focus was on the PSNERP information for selecting areas of focus rather than the Recovery Plan. While these two approaches are connected and continued effort is needed to maintain the connection and strengths of each as identified in Section B1.1.

Ongoing Programs

A variety of programs and mechanisms are used to protect and conserve nearshore habitats in Puget Sound. Acquiring property and development rights is a central mission for land trusts such as the Trust for Public Lands, Forterra, Jefferson Land Trust, and others.

The new provisions of the Shoreline Management Act (SMA) regarding overwater structures (as outlined in WAC 173-26-231) state that structural shoreline modifications must be built to avoid, or if that is not possible, minimize and mitigate impacts to ecological processes and functions and critical areas resources. A variety of measures to reduce impacts are offered, such as using glass inserts, grading or reflective panels on piers and docks; using a north-south orientation; reducing width and increasing height; and locating structures in deeper water.

As part of their Aquatic Leasing Program, the Department of Natural Resources (DNR) has recently updated their leasing policies to better protect nearshore habitat. Among the policies, applicants are required to follow a set of habitat stewardship measures to protect critical aquatic habitats. Measures apply to both the design and use of materials for overwater structures.

The Northwest Straits Initiative and marine resource committees provide education, outreach and conduct restoration projects. These projects are implemented with both private and public landowners.

Key Ongoing Program Activity

- Through the habitat stewardship measures of the Aquatic Lands Habitat Conservation Plan, DNR will condition aquatic use authorizations to ensure new or retrofitted over-water structures do not impact eelgrass beds and/or other covered habitats and species.

Near-Term Actions

B2.1 NTA 1: Protect 10% of Bluff-Backed Beaches. PSP will promote acquisitions, easements, or other protective covenants to permanently protect at least 10% of bluff-backed beaches with high sediment supply or other priority nearshore habitats facing potential shoreline development pressure by June 2014.

Performance measures: By Sept 2012, identify location of bluff-backed beaches with high sediment supply and development pressure or other priority nearshore habitats facing development pressures; By December 2012, convey the location information to salmon recovery watershed groups and LIOs for consideration; By December 2012, convene at least one meeting with each Action Area (LIO) with bluff backed beaches; By May 2013, identify candidate locations and local projects, and incorporate into salmon recovery three year work plans if appropriate for each area. Capital projects awarded grants by March 2014. By June 2014, any new regulatory protections are in place. By August 2014, 10 % of the bluff-backed beaches with high sediment supply or priority nearshore habitats facing development pressure are protected.

B2.1 NTA 2: Community Use Dock Incentives. For state-owned aquatic lands, DNR, in consultation with WDFW and Ecology, will identify potential permit, economic, and social incentives for encouraging community use docks as an alternative to single family docks by July 2013.

Performance measure: Incentives identified by July 2013.

B2.1 NTA 3: Overwater Structures Design Guidance. DNR, in consultation with the Aquatic Habitat Guidelines Interagency Group, will publish design guidance on construction, repair and rebuilding of overwater structures to increase light by 2013.

Performance measure: Guidance adopted by 2013.

B2.1 SJI 10: San Juan Lead Entity Shoreline Protection. San Juan County Lead Entity for Salmon Recovery will identify priority habitats for acquisition by 2013 in updates to the Salmon Recovery strategy, and will lead acquisition of, or establishment of

conversation easements for 25% of priority habitat shoreline miles with willing sellers/owners by 2014.

Performance measure: Identify priority habitats for acquisition by 2013 in updates to the Salmon Recovery strategy, lead acquisition of, or establishment of conversation easements for 25% of priority habitat shoreline miles with willing sellers/owners by 2014.

B2.2 Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands.

Restoration projects for marine and nearshore environments occur through a variety of programs and entities including:

- City and county governments
- Tribal organizations
- State resource agencies (e.g., WDFW's Estuary and Salmon Restoration Program)
- Federal agencies (e.g., EPA, NOAA, USFWS, USACE)
- Congressional appropriations or authorizations (e.g., America Reinvestment and Recovery Act)
- Non-governmental organizations (e.g., People for Puget Sound, Puget Sound Restoration Fund, Northwest Straits Initiative)

Prioritization of restoration projects in Puget Sound occurs at multiple levels as described in Section B1.1. These efforts include the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) at the Soundwide scale, cities and counties through Shoreline Management Plan (SMP) updates, and basin or watershed scales primarily through the local salmon recovery efforts. Program goals range from protecting habitat to restoring water quality and native species. Many organizations also partner to collaboratively secure funding and restore priority areas. Over time, it may be appropriate to continue to investigate more funding opportunities for restoration programs and projects including use of US Army Corps of Engineers authorities.

Some of the Soundwide restoration priority areas occur on local, state, or federally owned land. These public lands provide opportunities for restoration without economic investment for acquisition, landowner negotiation, or access permission. Such projects often can be implemented more quickly than similar projects on private lands and should be the focus of governments across Puget Sound. As governments implement high-visibility restoration projects in publicly used spaces, they provide models for future restoration efforts on public or private lands.

SALMON RECOVERY

Marine and Nearshore Habitat Restoration – A Salmon Recovery Plan Priority: Habitat Restoration is an integral part of recovery and must be conducted in a way that targets priority areas for ecosystem functions. Restoration priorities for each watershed are identified in Volume II of the Salmon Recovery Plan and then further fleshed out in each of the annual three-year work plans. There are robust river delta restoration plans associated with salmon recovery (e.g. in the Nisqually, Snohomish, Stillaguamish, Skagit, Dungeness, and Elwha chapters).

How are these priorities integrated: The Action Agenda strategies incorporate the actions in the three-year work plan as part of what is needed to recover the Puget Sound. Additionally, specific restoration projects are part of priorities of the Local Integrating Organizations. From a salmon recovery perspective, derelict vessel and creosote log removal are lower priorities and should sequenced as later actions.

Ongoing Programs

The PSNERP effort described in B1.1 will include a recommendation to Congress for authorization through the Water Resources Development Act of a comprehensive plan to implement ecosystem restoration throughout the Puget Sound nearshore.

The Estuary and Salmon Restoration Program (ESRP) provides funding and technical assistance to restore Puget Sound. It was established by the Legislature in 2006 and is implemented by the Washington Department of Fish and Wildlife (WDFW). The goal of the program is to use the science-driven strategies of PSNERP to move from opportunistic project funding to strategic ecosystem restoration.

In addition, WDFW tracks nearshore restoration projects funded by the Estuary and Salmon Restoration Program to determine the efficiency and effectiveness of grant projects. The program tracks project activities, provides supplemental funding to exemplary projects, and provides incremental funding to larger projects. The program also includes project-based learning, which is similar to adaptive management in that funding is provided for projects that are meant to resolve technical uncertainty or increase the efficiency or effectiveness of current restoration methods.

DNR operates a statewide Aquatic Restoration Program that funds restoration and enhancement projects in freshwater, saltwater, and estuarine aquatic systems. These projects are on, adjacent to, or have a direct benefit to state-owned aquatic land. The goal of the program is to protect and restore healthy ecological conditions. Funded projects are those that have long-term viability, have a direct benefit to state-owned aquatic land, are based on sound technical knowledge, and are supported by the community.

WDFW also frequently conducts restoration on state lands to restore impaired habitats. State and local parks departments currently conduct smaller scale restoration on publicly-owned lands.

DNR operates the Dredged Material Management Program including oversight of all disposal activities occurring on the public's state-owned aquatic lands. The program is focused on protecting aquatic environments and DNR manages disposal at eight sites around Puget Sound. Recently, some estuary restoration projects have demonstrated the use of clean dredged sediment from these disposal sites (e.g., Fidalgo Bay Habitat Restoration Project).

DNR also manages a Creosote Removal Program to remove creosote-treated debris from marine and nearshore waters. Creosote-treated wood is associated with existing or abandoned overwater structures (i.e., pilings or decks) and is known to lead toxics such as polycyclic aromatic hydrocarbons and copper arsenate compounds. The program was launched in 2004 with funding from a variety of sources. Volunteers from Marine Resources Committees, Washington State University BeachWatchers, People for Puget Sound and local parks staff have inventoried and removed creosote-treated material from Puget Sound beaches and overwater structures.

The salmon recovery watershed three-year work plans and related funding described in Section A6.1 include nearshore and estuary restoration projects.

Key Ongoing Program Activity

- DNR, in collaboration with the Department of Ecology (Ecology), WDFW, the Department of Veterans Affairs, and the State Parks Department, will deploy Puget SoundCorps crews on protection and restoration projects on state-owned lands.

Near-Term Actions

B2.2 NTA 1: Implementation of Projects Identified by PSNERP. By December 2014, WDFW and the Corps will advance implementation of projects identified by Puget Sound Nearshore Ecosystem Restoration Project (PSNERP), including those described in the Strategic Restoration Conceptual Engineering - Final Design Report. Implementation will occur both through Corps programs as anticipated through the General Investigation process, and through other non-Corps federal, state, tribal and local programs by 2013.

Performance measure: Number of projects funded; number implemented; amount of various nearshore habitats restored; Milestone: Final Feasibility Report for the PSNERP GI is completed by August 31, 2012, advancing projects for construction authorization through the Corps process.

B2.2 NTA 2: State Parks Nearshore Restoration. State Parks will identify opportunities to provide nearshore restoration by December 2012. Based on this assessment, State Parks will refine its performance measures for this action including setting semi-annual estimates of the numbers of projects or linear feet to be restored by March 2013. By December 2015, State Parks will restore nearshore habitat identified, including removal of hard armoring at state parks.

Performance measure: By December 2012, identify opportunities; By March 2013, identify numbers of projects or linear feet target; By December 2015, complete projects.

B2.2 NTA 3: Prioritizing Restoration on State-Owned Aquatic Lands. DNR will develop a strategy to prioritize restoration projects on state-owned aquatic lands including those within protected landscapes such as Aquatic Reserves to ensure maximum long-term benefit from habitat restoration.

Performance measure: DNR restoration project prioritization criteria developed by 2013 (done or not), List of near and long-term projects developed by 2014 (done or not).

B2.2 NTA 4: Creosote Piling Inventory and Removal. DNR will complete a derelict creosote piling inventory of Puget Sound. DNR has removed 10,000 pilings since 2007 and will remove an additional 3,000 pilings by 2017, prioritizing removals near important herring spawning beds.

Performance measure: Inventory completed by 2013 (done or not); 3,000 piling removed by 2017 (done or not).

B2.3 Remove armoring, and use soft armoring replacement or landward setbacks when armoring fails, needs repair, is non protective, and during redevelopment.

Shoreline property owners are inherently interested in maintaining the quality of their homes, beaches and nearby habitats. Given dynamic erosion process and the exposed nature of beachfronts, over time shoreline property owners must occasionally consider development options to better protect their structures and other investments while limiting adverse impacts to nearshore habitat. Such decisions are not particularly rare. Every year, more than one mile of shoreline in the Puget Sound is newly armored, and an even greater amount of armoring is replaced. Often, the decision to newly armor one stretch of beach has a ripple effect on nearby properties. While some fraction of those hard armoring efforts may be required to safeguard property from imminent harm or risk, the remaining instances present an opportunity to employ better habitat-supporting alternatives, like soft-shore armoring, landward setback of structures at risk and other techniques that the public, contractors and others might be inclined to use, if they were made aware of them and convinced of their effectiveness.

Because bulkhead removal and soft-shore techniques may become more difficult or less effective in the face of sea level rise, other, more assertive techniques like the landward setback of homes and other structures may have greater long-term benefits for shoreline properties and allow for landward migration of beaches, tidelands and associated ecosystems. Such an anticipatory approach (and NTAs) are consistent with the Washington State Integrated Climate Change Response Strategy (2012), which stresses the importance of creating opportunities for coastal habitat creation upslope as sea levels rise.

Ongoing Programs

As described above, the new provisions of the SMA regarding shoreline stabilization structures and development outlined in WAC 173-26 require shoreline jurisdictions to give priority to "soft" over "hard" shoreline modifications. Some local SMPs provide incentives that allow greater flexibility for development and expansion of existing development if bulkheads are removed or replaced with soft-shore techniques, but these approaches have not been widely implemented.

Cities and counties are beginning to provide guidance and incentives to waterfront landowners for soft-shore armoring techniques. In 2009, the City of Seattle's Department of Planning and Development developed the *Green Shorelines* guidebook for lakefront homeowners. The guidebook describes alternatives to conventional shoreline armoring, emphasizing aesthetic and environmental benefits of plants and beaches. In 2010, U.S. EPA, under the Puget Sound Watershed Management Assistance Program, awarded the City of Seattle a four-year grant of more than $500,000 to research incentives for removing bulkheads and improving the ecological function of residential shorelines along Lake Washington. The city proposed to pilot Green Shores for Homes credits and locally-developed incentives on Lake Washington. San Juan County will participate as a project partner and will pilot Green Shores for Homes in marine coastal locations. The Islands Trust, a federation of local governments within the British Columbia Gulf Islands, has also joined this initiative as a transboundary partner and Washington Sea Grant also is a partner and coordinates this effort. The goal of implementing Green Shores for Homes simultaneously in British Columbia and Washington, as well as in urban freshwater and rural marine shorelines, is to provide models for other jurisdictions within the Salish Sea to protect shoreline ecological function from future impacts of growth.

In addition to revising the existing regulatory structure for redevelopment of existing bulkheads, incentives provide a non-regulatory approach to addressing ecosystem degradation caused by shoreline armoring. Voluntary or incentive programs are those programs that encourage stewardship through rewarding desired behavior. Voluntary programs for shoreline armoring may include grants, property tax reductions, or low interest loans. Such a program requires the development of local outreach and communication strategies.

Finally, the Green Shores for Homes program for the City of Seattle and San Juan County includes funding for the development of incentives. The goal is to invite those homeowners in the areas classified as amendable to the Green Shores for Homes approach and encourage them to participate.

Near-Term Actions

B2.3 NTA 1: Homeowner Incentives for Landward Setbacks. Building on work done to date, PSP will convene a process with partners to develop and recommend incentives that help homeowners permanently remove armoring and encourage setback of houses by June 2014. Incentives could include, but would not be limited to financial, regulatory, low interest loans or grants. This work will help restore nearshore processes, promote landward retreat of homes facing sea level rise, and promote progress toward shoreline armoring target.

Performance measure: By December 2012, identify the group and complete the scoping process including holding at least two meetings with partners; By June 2013, complete technical steps including identifying where to target the program for highest ecological value; By December 2013, identify draft possible incentive options for discussions; By June 2014, present options and recommendations to ECB and Leadership Council including miles of bulkheads that could be replaced with soft armoring or setbacks and a homeowner outreach plan.

B2.4 Implement a coordinated strategy to achieve the 2020 eelgrass recovery target.

Eelgrass beds are essential spawning areas and nurseries for herring, other forage fish, and salmon, and generate food consumed throughout the marine food web. The overall acreage of eelgrass beds in Puget Sound is a key indicator for ecosystem health, along with their spatial distribution throughout the areas where salmon, Dungeness crab, and other species migrate and grow. In 2006, there were approximately 50,000 acres of eelgrass beds in Puget Sound. Although the total acreage has been relatively stable for a few years, these eelgrass beds are concentrated into a few areas, and some regions of Puget Sound, such as Hood Canal, have experienced localized losses. Many other Puget Sound habitats have shrunk in size, diminished in quality, fragmented, and the processes that form and sustain them have been disrupted.

In the long-term, climate change is anticipated to lead to greater stress on eelgrass followed by decline. Hardened shorelines will be particularly problematic for eelgrass as sea level rises. Population growth is also likely to increase stressors on eelgrass, nutrient loading that can lead to excessive phytoplankton growth also stresses eelgrass, by limiting light to eelgrass beds, polluted runoff from land and polluted wastewater, or spills, from boats and vessels can damage eelgrass beds as can anchoring of commercial and recreational boats and vessels. Finally, the effects of using of herbicides to control *Zostera japonica* (a Class C noxious weed) on native marine eelgrass beds is not well understood, and should be monitored.

Given the diversity of eelgrass stressors in Puget Sound, the preferred approach is to pursue multiple strategies concurrently that explicitly address improving information, protection, and restoration.

Ongoing Programs

Key Ongoing Program Activities

DNR carries out a variety of programs to support eelgrass protection and recovery, and will emphasize the following activities:

- Estimate the total area of eelgrass in Puget Sound annually (including assessment of eelgrass bed connectivity and shoot density) and provide feedback on the effectiveness of efforts to protect and restore this critical habitat. This information will track progress toward the Partnership's target to increase eelgrass area by 20% by 2020. Annual sound-wide estimates will be produced within one year of sampling in order to assure that information is delivered in a timely manner to guide management actions.
- Synthesize and publish guidance based on the best available science describing key eelgrass stressors in Puget Sound.
- Through the habitat conservation measures of the Aquatic Lands Habitat Conservation Plan, condition aquatic use authorizations to ensure new or retrofitted over-water structures do not impact important habitats such as eelgrass and kelp beds.
- Research how other estuaries have recovered seagrasses and identify proprietary tools implemented in other successful eelgrass recovery efforts that can be deployed here to prevent further damage to or loss of eelgrass on state-owned aquatic lands.
- The Northwest Straits Initiative is one example of other partners who also participate in eelgrass monitoring and recovery.

Near-Term Actions

B2.4 NTA 1: Eelgrass Recovery Target Strategy. DNR, working in collaboration with PSP, will convene partners in state and local government, tribes, the federal agencies, BC Canada, and non-governmental and business groups to develop a broad-based strategy to achieve the 2020 eelgrass recovery target and track progress.

Performance measure: Strategy options identified by Dec 2012, Strategy developed by September 2014 (done or not).

B2.4 NTA 2: Identification of Eelgrass Restoration Sites. DNR will identify and recommend sites that are suitable for eelgrass restoration in Puget Sound. Sites will be selected using habitat suitability analysis, hydrodynamic modeling, and eelgrass resilience to local stressors. This will include identification of sites on state-owned aquatic lands with a focus on areas with long-term protections already in place.

Performance measure: Maps defining potential eelgrass restoration sites; site evaluations; final recommendations – completed by May 2014 (done or not); state aquatic land work complete by July 2014 (done or not).

Target View: Shoreline Armoring

A functioning, resilient ecosystem requires dynamic shorelines maintained by coastal processes such as shoreline erosion and ecological exchange between terrestrial and aquatic systems. The natural shoreline of Puget Sound is constantly changing due primarily to the action of waves and tides. On unarmored shorelines of the Sound, sand and gravel from bluffs erode into the intertidal areas, are transported by waves and currents and ultimately supply sediment to form and maintain beaches and spits. However, on some shorelines in the Sound, these processes are altered by bulkheads, seawalls and other methods used to prevent erosion. Currently, more than a quarter of all the shoreline around the Sound is armored with bulkheads and seawalls affecting important shoreline processes such as sediment supply and transport. The natural processes that occur on unarmored shorelines are important because they support vital functions like providing habitat for key species such as herring, surf smelt and salmon.

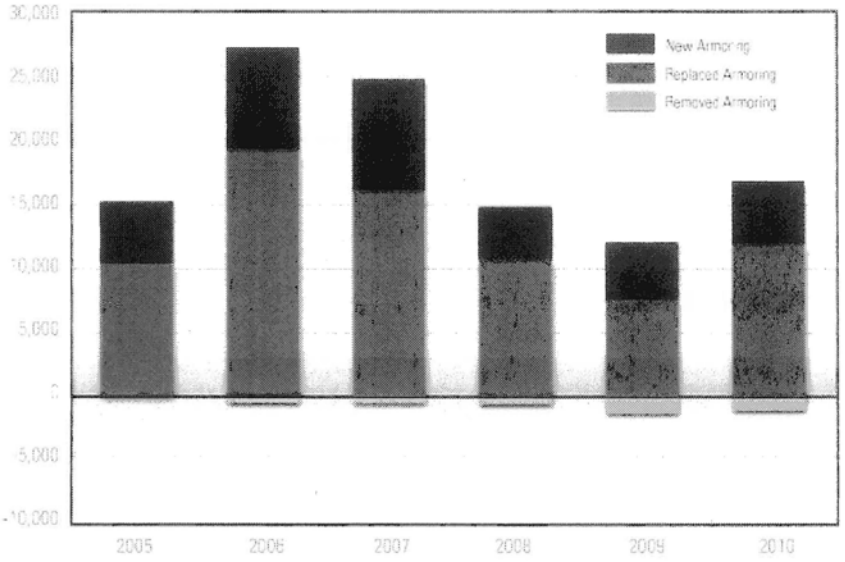
Shoreline armoring in the Sound is frequently associated with residential development as many landowners install armoring to protect their properties. Removing existing armoring is both costly and difficult, and is best accomplished on a scale larger than individual parcels. Public shorelines can provide high potential for removal actions. To reduce the total amount of armoring in the Sound, it will be necessary to minimize the need for new armoring by properly locating new structures and strategically remove existing armoring in key locations. Additionally, using "soft shore" designs for new and replacement armoring will reduce some of the impacts associated with traditional hard armoring.

The 2020 target for shoreline armoring has three parts:

- The amount of armoring removed is greater than the amount of new armoring added, for a net decrease in total armored shoreline;
- Efforts should be focused on feeder bluffs (highly erodible bluffs that supply sediment to beaches), and;
- Jurisdictions should require the use of "soft shore" techniques for all new and replacement armoring wherever feasible.

The graph below shows the extent of shoreline armoring in Puget Sound through 2010.

Puget Sound Shoreline Armoring Summary
in feet, 2005-2010

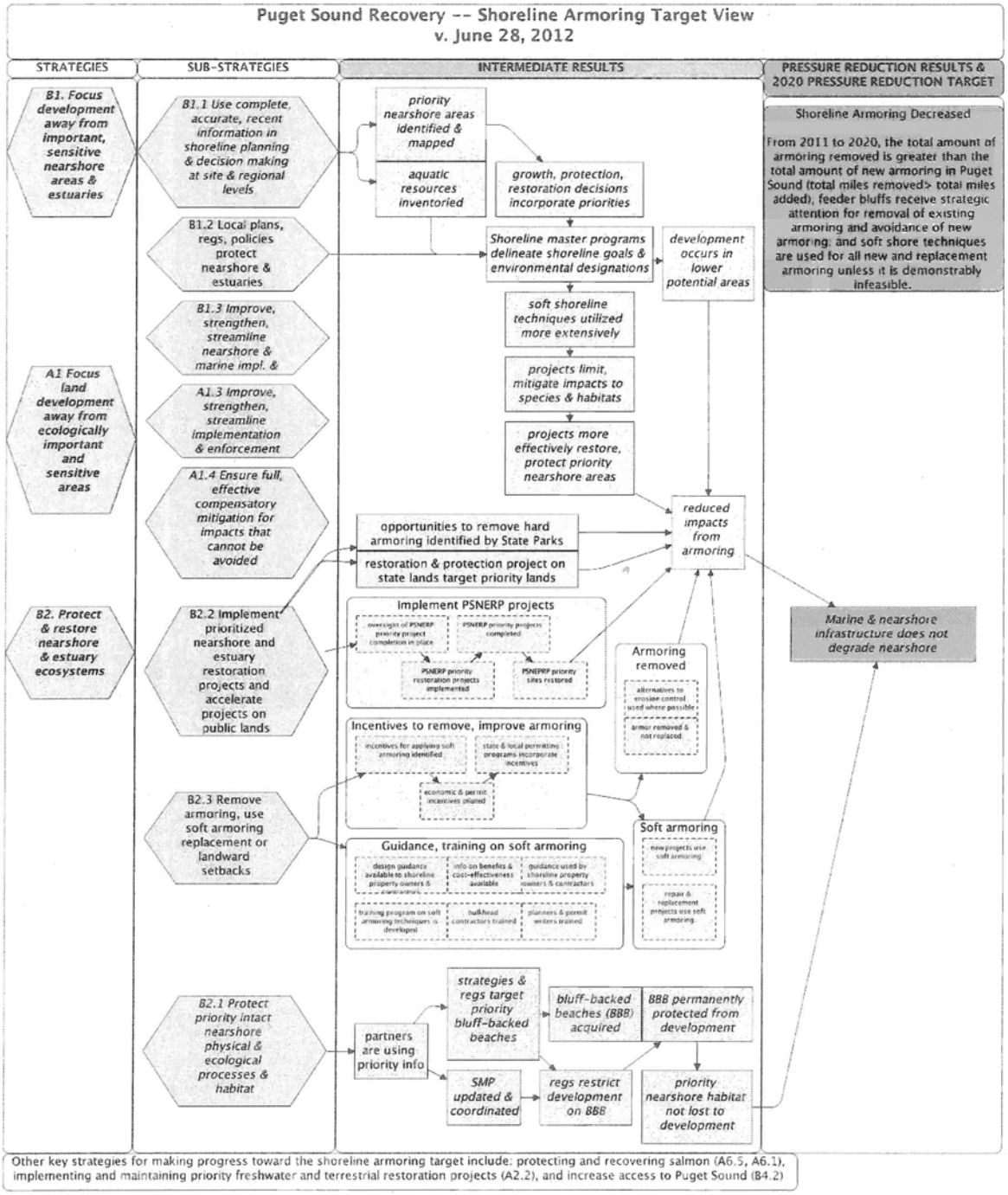


Source: Randy Carman, Washington Dept of Fish and Wildlife

There are several Action Agenda strategies related to the shoreline armoring target:

- Protect and restore nearshore and estuary ecosystems
    - Remove armoring, and use soft armoring replacement or landward setbacks when armoring fails, needs repair, is non protective, and during redevelopment (B2.3)
    - Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands (B2.2)
    - Permanently protect priority nearshore physical and ecological processes and habitat (B2.1)
- Focus land development away from ecologically important and sensitive areas
    - Improve, strengthen, streamline implementation and enforcement to protect marine and nearshore ecosystems and estuaries (B1.3)
    - Improve local government ability to implement plans, regulations, and permits consistent with Puget Sound recovery (A1.3)
    - Support local governments to adopt and implement plans, regulations, and policies that protect the marine nearshore and estuaries, and incorporate climate change forecasts (B1.2)
    - Use complete, accurate and recent information in shoreline planning and decision making at the site-specific and regional levels (B1.1)
    - Ensure full, effective compensatory mitigation for impacts that cannot be avoided (A1.4)
- Protect and reovery salmon by maintaining and enhancing the community infrastructure that supports salmon recovery (A6.5) and implementing high priority projects in three-year work plans (A6.1)
- Increase access to Puget Sound (B4.2)
    -

In the following results chain, or logic model, yellow polygons identify strategies and actions from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets. The ecosystem benefits of meeting the shoreline armoring target are demonstrated in other results chains presented in this document; see especially the targets and strategies related to eelgrass and herring.


Puget Sound Recovery -- Shoreline Armoring Target View
v. June 28, 2012
STRATEGIES
SUB-STRATEGIES
INTERMEDIATE RESULTS
PRESSURE REDUCTION RESULTS & 2020 PRESSURE REDUCTION TARGET
B1. Focus development away from important, sensitive nearshore areas & estuaries
A1 Focus land development away from ecologically important and sensitive areas
B2. Protect & restore nearshore & estuary ecosystems
B1.1 Use complete, accurate, recent information in shoreline planning & decision making at site & regional levels
B1.2 Local plans, regs, policies protect nearshore & estuaries
B1.3 Improve, strengthen, streamline nearshore & marine impl. &
A1.3 Improve, strengthen, streamline implementation & enforcement
A1.4 Ensure full, effective compensatory mitigation for impacts that cannot be avoided
B2.2 Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands
B2.3 Remove armoring, use soft armoring replacement or landward setbacks
B2.1 Protect priority intact nearshore physical & ecological processes & habitat
priority nearshore areas identified & mapped
aquatic resources inventoried
growth, protection, restoration decisions incorporate priorities
Shoreline master programs delineate shoreline goals & environmental designations
development occurs in lower potential areas
soft shoreline techniques utilized more extensively
projects limit, mitigate impacts to species & habitats
projects more effectively restore, protect priority nearshore areas
reduced impacts from armoring
opportunities to remove hard armoring identified by State Parks
restoration & protection project on state lands target priority lands
Implement PSNERP projects
oversight of PSNERP priority project completion in place
PSNERP priority projects completed
PSNERP priority restoration projects implemented
PSNERP priority sites restored
Armoring removed
alternatives to erosion control used where possible
armor removed & not replaced
Incentives to remove, improve armoring
incentives for applying soft armoring identified
state & local permitting programs incorporate incentives
economic & permit incentives piloted
Guidance, training on soft armoring
design guidance available to shoreline property owners & contractors
info on benefits & cost-effectiveness available
guidance used by shoreline property owners & contractors
training program on soft armoring techniques is developed
bulkhead contractors trained
planners & permit writers trained
Soft armoring
new projects use soft armoring
repair & replacement projects use soft armoring
partners are using priority info
strategies & regs target priority bluff-backed beaches
SMP updated & coordinated
bluff-backed beaches (BBB) acquired
regs restrict development on BBB
BBB permanently protected from development
priority nearshore habitat not lost to development
Shoreline Armoring Decreased
From 2011 to 2020, the total amount of armoring removed is greater than the total amount of new armoring in Puget Sound (total miles removed> total miles added), feeder bluffs receive strategic attention for removal of existing armoring and avoidance of new armoring; and soft shore techniques are used for all new and replacement armoring unless it is demonstrably infeasible.
Marine & nearshore infrastructure does not degrade nearshore
Other key strategies for making progress toward the shoreline armoring target include: protecting and recovering salmon (A6.5, A6.1), implementing and maintaining priority freshwater and terrestrial restoration projects (A2.2), and increase access to Puget Sound (B4.2)

B3. Protect and restore marine ecosystems

B3.1 Protect intact marine ecosystems particularly in sensitive areas and for sensitive species.

The conservation of marine environments that provide rare or unique habitats, culturally and historically important sites, recreational and commercial fisheries, and recreational enjoyment in Puget Sound is an important part of conservation and recovery. Marine Protected Areas (MPAs) are one management tool often used by federal, state, and local agencies to provide long term protection for marine resources. They can be effective tools when properly designed, effectively managed, and supported by marine resource users and managers.

Ecological responses to MPA establishment have been documented by numerous scientific studies in Washington and other temperate marine environments. Responses include greater target species densities, biomass, species size, and species richness within the boundaries of the MPA, replenishment of fish stocks in surrounding areas, increased reproductive rates due to larger fish sizes, increased ecosystem resilience, and reduced risk of population collapse. Responses in deep water pelagic and soft sediment habitats remain uncertain though studies are ongoing.

Ongoing Programs

There are 127 MPAs in the marine waters of Puget Sound and the outer coast. They are managed under a variety of names (e.g., marine reserves, marine sanctuaries, fishery conservation zones, aquatic reserves) with ranging degrees of protection established for diverse purposes. Almost all existing MPAs restrict fishing and shellfish harvest to some degree, and three-quarters of MPAs restrict non-harvest activities to some degree such as vessel anchoring or recreational access.

In 2008, to further a Puget Sound Action Agenda NTA, the Washington State Legislature convened a MPA Work Group to inventory current MPAs in Washington, assess their management, and determine ways to improve the use and effectiveness of MPAs in Washington as a management tool. The work group conducted a performance evaluation of existing MPAs and provided a set of recommendations that address: (1) coordination and consistency regarding goals, criteria for establishment, management practices, terminology, and monitoring practices; (2) integration of science, local governments, and NGOs into establishment and management decisions; and, (3) improvements to MPA effectiveness in Washington. The work group analysis and recommendations are detailed in a 2009 published report by Fish and Wildlife (Van Cleve et al. 2009).

Near-Term Actions

B3.1 NTA 1: Marine Protected Area Effectiveness. By June 2014, PSP, in collaboration with WDFW and DNR will identify the threats, coverage gaps, and conservation concerns addressed by existing Puget Sound marine protected areas and assess the potential effectiveness of these MPAs to protect threatened species and habitats, including rockfish and forage fish.

Performance measure: Produce a written summary of threats and conservation concerns addressed by current MPAs by September 2012; Complete an assessment of effectiveness and coverage gaps by September 2013. PSP delivers recommendations to managing agencies to improve overall coordination and design of MPA network by June 2014.

B3.1 NTA 2: Outfall Strategy on State-Owned Aquatic Lands. DNR, in collaboration with tribal governments, Ecology, WDFW, and DOH, will develop and implement a strategy to reduce impacts from outfalls on state-owned aquatic lands in Puget Sound.

Performance measure: Strategy development, including an implementation work plan, will be complete by December 2013.

B3.2 Implement and maintain priority marine restoration projects.

Priority restoration actions for the marine environment include the removal of derelict fishing gear, vessels, and creosote-treated wood. Derelict fishing gear includes nets, lines, crab and shrimp traps/pots, and other recreational or commercial harvest equipment that has been lost or abandoned in the marine environment. Modern nets and fishing line made of synthetic materials have been in use since the 1940s and take decades, even hundreds of years, to decompose in water. The derelict gear can entangle divers, trap or wound fish, shellfish, birds, and marine mammals, and result in other environmental hazards.

Ongoing Programs

The Northwest Straits Initiative started a comprehensive program to locate and remove harmful derelict fishing gear from Puget Sound in 2002. In July 2009, the Northwest Straits Initiative received $4.6 million federal stimulus grant through the American Recovery and Reinvestment Act (ARRA) and the National Oceanic and Atmospheric Administration (NOAA) to work full-time to essentially rid Puget Sound of derelict commercial fishing nets, which had been accumulating for decades. As of September 30, 2011, the Northwest Straits Initiative has removed 4,088 derelict fishing nets and 2,886 crab pots from Puget Sound, restoring 566 acres of marine habitat. It is estimated that about 1,000 derelict fishing nets remain in shallow sub-tidal areas of Puget Sound and the Northwest Straits are continuing removal operations as funding allows. On a separate note, support for continued gear loss-prevention efforts in Washington is strong. In 2012, state law was amended to require more timely reporting of lost or abandoned fishing nets. Despite the success of efforts to remove derelict gear in shallow waters, the development of safe and effective techniques to remove nets in waters deeper than 100 feet is needed to reduce the entanglement risks they pose to rockfish and other deepwater species.

DNR manages a Derelict Vessel Removal Program (DVRP) to address the problem of derelict or abandoned vessels in Washington State's waters. Derelict and abandoned vessels can pollute nearshore and marine waters with fuel and oil spills, threaten human safety as a navigational hazard, and impact aquatic habitats. The goal of the program is to remove high priority vessels that are 200 feet or less and provide funding and expertise to assist public agencies in the removal and disposal of vessels across the state.

Key Ongoing Program Activities

- DNR will meet Government Management, Accountability, and Performance (GMAP) expectations for derelict vessel removals annually and will apply United States Coast Guard (USCG) Large Derelict Vessel Task Force recommendations to Puget Sound within one year of recommendations being issued.

Near-Term Actions

B3.2 NTA 1: Legacy Net Removal. The Northwest Straits Foundation will work with WDFW, DNR, tribes, fishers and others to remove approximately 500 known remaining legacy nets in shallow sub-tidal waters by December 2013.

Performance measure: By December 2012, approximately 250 nets will be removed from waters of Island, San Juan, and Kitsap Counties. By August 2013, approximately 170 nets in Whatcom County will be removed. By December 2013, remaining nets in Hood Canal and other counties will be removed.

B3.2 NTA 2: Deep Water Net Removal. The Northwest Straits Foundation will complete development and at least one pilot implementation of a new methodology for deep-water net removal by December 2013. To date, approximately 130 nets are known to exist in Puget Sound in waters deeper than 105'. These nets may be degrading important habitat for listed rockfish species. Pilot removal operations will focus on concentrations of known deep water nets in documented rockfish habitat in the San Juan Islands.

Performance measure: By December 2012, identify known deep water nets for pilot removal operations. By September 2013, develop up to three possible removal options in partnership with WDFW, DNR, NOAA, tribes, fishers, and others. By December 2013, pilot chosen removal option on identified nets.

Emerging Issues and Future Opportunities

In addition to the specific ongoing program activities and near-term actions described above, there are a number of ideas for future work that might be undertaken to address pressures on the nearshore and marine ecosystems in Puget Sound. These ideas should be an ongoing part of the regional discussion about Puget Sound protection and recovery, and may inform future funding decisions, programmatic priorities and guidance, or may become near-term actions in future Action Agenda cycles. They include:

- Whether or not we have effective statutory and regulatory tools in place to meet the shoreline armoring target. In particular, some interests believe that a number of targeted statutory changes are needed to ensure we can adequately support nearshore protections to meet recovery targets. These could include (1) revising RCW 77.55.141 to give WDFW the ability to protect sediment supply and other shoreline processes, and (2) revising RCW 90.58.030 so that all bulkheads must go through the shoreline permitting process.
- Whether or not we have effective set of tools in place to ensure that permit holders will meet permit conditions, particularly those associated with mitigation of shoreline impacts. As

understanding of what is needed to protect nearshore physical and ecological processes continues to expand and planning and permit writing move to incorporate this information, a potential gap remains around permit implementation—checking back and monitoring to ensure that conditions are met and continue to perform over time. In addition to asking for information from permit holders on their ongoing compliance with permit conditions, some have talked about the idea of requiring bond posting for shoreline permits as a way to ensure that permit conditions are met.

- Opportunities may exist for state and local governments to carry out compliance monitoring related to nearshore and marine protection and restoration to identify shared priorities and pool resources—potentially increasing the efficiency of monitoring and allowing for additional monitoring investments.
- Development of no anchor zones in specific areas of Puget Sound as needed.
- Integrate climate change, including sea level rise into nearshore protection and restoration planning and implementation. This will include evaluation of shoreline management laws, integrating sea level rise criteria into project identification, development and funding, evaluating infrastructure at risk, further development of coastal retreat options, and developing policies and information to guide insurers in dealing with properties in vulnerable areas, providing more assistance to coastal planners, and continuing to raise awareness.
- Further identification of feasible state-level policy programs to avoid or minimize shoreline hardening. As called out in the state climate response strategy, options will need to include streamlining local and state permitting processes to provide incentives for green shorelines and soft armoring practices.
- Identification of how to incorporate recovery targets into review of Shoreline Master Plans.

Target View: Estuaries

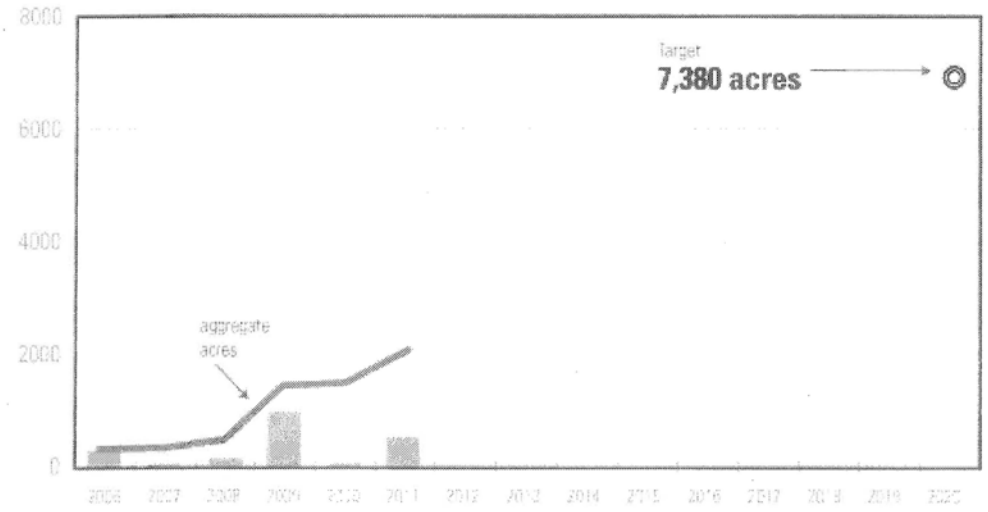
River delta estuaries are where river floodplains meet the sea, creating a uniquely important environment that provides a feeding and resting habitat for young salmon, migratory birds, and many other species. Young salmon that can rear longer in delta estuaries have been observed to grow faster and are more likely to survive their ocean migration.

In Puget Sound there are 16 large river-mouth estuaries: nine larger deltas drain the Cascade Mountains, and seven smaller deltas drain the Olympics. Of the approximately 62,000 acres of mapped historical swamp and marsh, only an estimated 14,640 acres remain. The 'great swamps' of the Skagit and Snohomish once contained over 37,000 acres alone (compared to around 1,620 acres for all the Olympic deltas combined). Across the region, estuaries and tidal wetlands have been diked, drained, or filled, either converted to farms and agriculture, or developed into modern ports and industrial sites. In the most highly developed river mouth estuaries, such as the Duwamish and Puyallup Rivers, estuarine habitat covers only a minute fragment of its original extent, and may never be recovered.

The 2020 target for estuaries is that all Chinook natal river deltas - Nooksack, Skagit, Stillaguamish, Snohomish, Duwamish, Puyallup, Nisqually, Skokomish, Dungeness and Elwha - meet 10 year salmon recovery goals (or 10 percent of restoration need as proxy for river deltas lacking quantitative acreage goals in salmon recovery plans); and 7,380 quality acres are restored basin wide, which is 20 percent of restoration need. The graph below illustrates the acres of estuarine habitat that need to be restored from 2006 – 2020 to achieve the 2020 recovery target.

Acres of Estuarine Habitat Restored in 16 Major River Deltas in Puget Sound

Years 2006-2020



Source: National Estuary Program Online Reporting Tool (NEPORT), Environmental Protection Agency

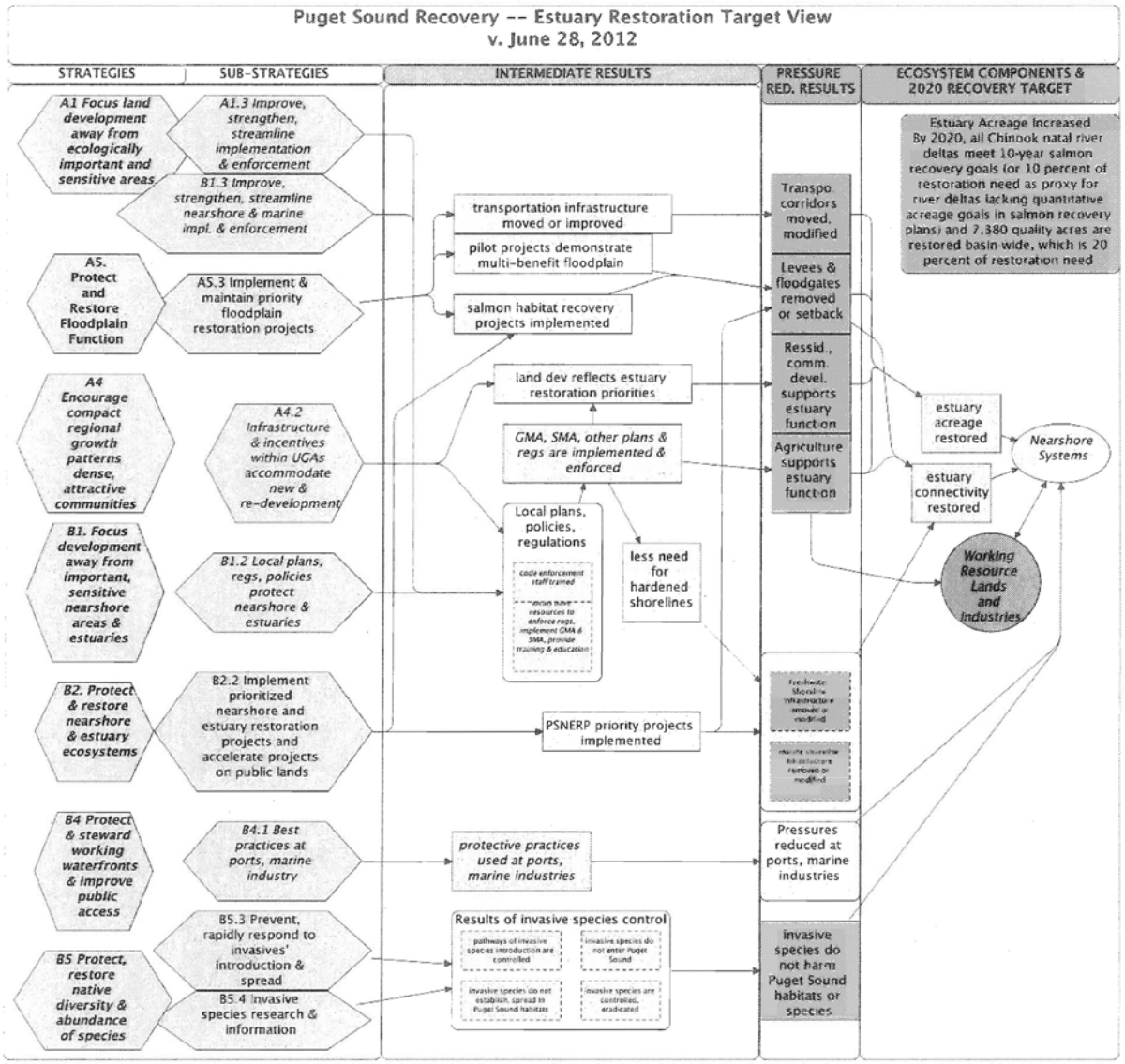
Green columns show acres restored in each year and the orange line represents the cumulative acres restored between 2006 and 2011. The dashed line projects the restoration required to achieve the target of 7,380 quality acres restored by 2020. The*

figure represents restoration projects completed between 2006 and 2011 within the 16 major Puget Sound river mouth estuaries, as defined by the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP).
**The target of 7,380 acres represents only 20 percent of the total estimated estuary restoration needed for a fully functioning, resilient ecosystem.*

There are several strategies related to achieving the recovery target for estuaries, including:

- Focus development away from ecologically important and sensitive nearshore areas and estuaries (B1.2, B1.3)
- Prevent and respond to the introduction of terrestrial and aquatic invasive species (B5.3, B5.4)
- Use, coordinate, expand and promote financial incentives and programs for best practices at ports and in the marine industry that are protective of ecosystem health (B4.1)
- Provide infrastructure and incentives to accommodate new and re-development within urban growth areas (A4.2)
- Improve, strengthen and streamline implementation and enforcement of laws, plans, regulations, and permits consistent with protection and recovery targets (A1.3)
- Protect and maintain intact and functional floodplains (A5.3)
- Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands (B2.2)

In the following results chain, or logic model, yellow polygons identify strategies and sub-strategies from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets.


Puget Sound Recovery -- Estuary Restoration Target View
v. June 28, 2012
STRATEGIES
SUB-STRATEGIES
INTERMEDIATE RESULTS
PRESSURE RED. RESULTS
ECOSYSTEM COMPONENTS & 2020 RECOVERY TARGET
A1 Focus land development away from ecologically important and sensitive areas
A1.3 Improve, strengthen, streamline implementation & enforcement
B1.3 Improve, strengthen, streamline nearshore & marine impl. & enforcement
A5. Protect and Restore Floodplain Function
A5.3 Implement & maintain priority floodplain restoration projects
A4 Encourage compact regional growth patterns dense, attractive communities
A4.2 Infrastructure & incentives within UGAs accommodate new & re-development
B1. Focus development away from important, sensitive nearshore areas & estuaries
B1.2 Local plans, regs, policies protect nearshore & estuaries
B2. Protect & restore nearshore & estuary ecosystems
B2.2 Implement prioritized nearshore and estuary restoration projects and accelerate projects on public lands
B4 Protect & steward working waterfronts & improve public access
B4.1 Best practices at ports, marine industry
B5 Protect, restore native diversity & abundance of species
B5.3 Prevent, rapidly respond to invasives' introduction & spread
B5.4 Invasive species research & information
transportation infrastructure moved or improved
pilot projects demonstrate multi-benefit floodplain
salmon habitat recovery projects implemented
land dev reflects estuary restoration priorities
GMA, SMA, other plans & regs are implemented & enforced
Local plans, policies, regulations
code enforcement staff trained
resources to enforce regs, implement GMA & SMA, provide training & education
less need for hardened shorelines
PSNERP priority projects implemented
protective practices used at ports, marine industries
Results of invasive species control
pathways of invasive species introduction are controlled
invasive species do not enter Puget Sound
invasive species do not establish, spread in Puget Sound habitats
invasive species are controlled, eradicated
Transpo. corridors moved, modified
Levees & floodgates removed or setback
Ressid., comm. devel. supports estuary function
Agriculture supports estuary function
Pressures reduced at ports, marine industries
invasive species do not harm Puget Sound habitats or species
Estuary Acreage Increased
By 2020, all Chinook natal river deltas meet 10-year salmon recovery goals (or 10 percent of restoration need as proxy for river deltas lacking quantitative acreage goals in salmon recovery plans) and 7,380 quality acres are restored basin wide, which is 20 percent of restoration need
estuary acreage restored
estuary connectivity restored
Nearshore Systems
Working Resource Lands and Industries

Protect and Steward Working Waterfronts and Improve Public Access to Puget Sound

The Challenge

Washington State's economy is intrinsically connected to the commercial and recreational maritime industry, including deepwater ports for international trade, shipbuilding facilities, boatyards, and marinas. We must identify ways in which the economic vitality of working waterfronts can be promoted, advanced and fostered while simultaneously achieving environmental benefits. It is important to design Puget Sound protection and restoration strategies in a manner that recognizes the contribution of the maritime industry to the region's economic portfolio.

Public access to Puget Sound offers the general public the opportunity "to reach, touch, and enjoy the water's edge, to travel on the waters of the state, and to view the water and the shoreline from adjacent locations" (WAC 173-26-221(4). This access, and subsequently use and enjoyment, is important to the health and well-being of the region's citizens as it offers recreational opportunities such as swimming, boat launching and beachcombing to everyone. Public access also provides a means to get up close and personal with the surrounding environment through activities such as bird and whale watching and low tide hiking which provides hands on education experiences and further promotes the desire to maintain the health of the Sound.

The most common type of public access to shorelines is physical access, such as that provided by trails, docks, promenades, and bridges. Physical access may be implemented through dedication of land or easements, cooperative agreements, or acquisition of land along the shoreline. Public access can also be visual, such as via viewing towers and bridges or breezeways between buildings. A third type of access is "cultural access" to interpretive, educational, or historical features of the shoreline.

Public access to Puget Sound and its shorelines is threatened by numerous pressures. Geographic aspects such as natural topography, ongoing coastal erosion, and natural weathering make implementation and preservation of beach accesses challenging. In addition, anthropogenic sources such as population growth, privatization of coastal land, and waterfront commercial development all create demand for and limit public access to shorelines. It will be important to find ways to create and preserve public access as the natural and built environment around the shorelines of Puget Sound continue to change.

Climate Change

As described in *Preparing for Climate Change: Washington State's Integrated Climate Response Strategy* (April 2012), "rising sea levels could affect port operations, damage seawalls and structures, and flood low-lying port land and surrounding transportation networks. The severity of impacts will depend on the local rate of sea level rise, the proximity to rivers subject to flooding, and the dependence of the port on vulnerable transportation links. Marinas and waterfront recreation facilities could also require more frequent repairs and modifications. Changes in the water level and coastal erosion could submerge or undermine fuel tanks for marinas and other facilities, which often locate their tanks close to their operations." In addition, rising sea level, erosion, and changes in surface water runoff patterns will alter coastal sediment transport systems. This could result in larger volumes of sediment delivery that require more frequent dredging.

A top priority response strategy related to ports is to reduce the risk of damage to buildings, transportation systems and other infrastructure. In addition, Port best practices that protect ecosystem health are part of other priority response strategies including reducing the vulnerability of coastal communities, habitats and species.

Relationship to Recovery Targets

Protecting and stewarding working waterfronts will contribute towards progress on targets for toxins in fish, marine sediment quality, and shoreline armoring. Protecting and stewarding working waterfronts and increasing public access to Puget Sound will contribute to human well-being targets, yet to be established.

Local Priorities

For the 2012 Action Agenda Update, Local Integrating Organizations did not identify working waterfronts and public access as top priorities. The Whatcom LIO is discussing a strategy to coordinate/collaborate with Port of Bellingham and City of Bellingham on restoration projects and opportunities for public access in context with the waterfront redevelopment.

B4. Protect and steward working waterfronts and improve public access to Puget Sound

B4.1 Use, coordinate, expand, and promote financial incentives and programs for best practices at ports and in the marine industry that are protective of ecosystem health.

The Ports of Seattle and Tacoma are important gateways for international trade, and other major ports in Puget Sound include the Ports of Everett, Bremerton, Bellingham, Olympia, and Port Angeles. Ports and marinas have an important role to play in the protection and recovery of Puget Sound. Many ports are involved in habitat restoration and mitigation projects across a variety of scales and locations, from

shoreline in marine industrial areas to upland properties. The transition from a primarily resource-based economy has left some Puget Sound communities with degraded and polluted waterfronts from old industrial activities, in addition to pollution created by Combined Sewer Overflows (CSOs) and stormwater runoff. Many ports take on these types of cleanup projects through the Model Toxics Control Account (MTCA) or Superfund action, which prevents the spread of toxic plumes from abandoned industrial sites.

A significant number of large ports around Puget Sound require maintenance and/or new project dredging as part of their ongoing operations. Dredging is also a significant component of cleanup projects. For toxics control and reduction, it is critical that dredging and dredged material management practices ensure no degradation of the environmental quality of urban bays and waterways. The primary program that controls toxic substances from dredging is the Dredged Material Management Program (DMMP), an interagency effort that oversees the disposal and use of dredged sediments.

Marinas and boatyards are critical to controlling waste generated by boat maintenance and repair activities and are regulated by the Clean Water Act well as by state law governing hazardous waste disposal. Without regulated marinas and boatyards, these activities would likely occur in areas where hazardous wastes are released directly into the environment. Marinas are also key points of outreach and education for recreational boaters, such as promoting best practices for bilge water and waste disposal.

Given the sizable presence of Department of Defense (DOD) naval facilities in Puget Sound, it is also important to consider including DOD as a partner in programs that promote best practices for ports and the marine industry that are protective of ecosystem health.

Ongoing Programs

In 2005 the Clean Marina Washington program was launched to improve environmental protection at marinas. Fifty-nine marinas are currently certified under the program. In 2011, the Northwest Marine Trade Association helped launch the Clean Boating Foundation, a non-profit organization aimed at helping boatyards improve their environmental practices through a voluntary Certified Clean Boatyard program.

In 2011 the legislature established a goal to phase-out copper bottom paint for recreational boats 65 feet and under by 2020 (SB 5436): "After January 1, 2018, new recreational water vessels with antifouling paint containing copper may not be sold in the state. Beginning January 1, 2020, the sale of copper antifouling paint intended for use on recreational water vessels is prohibited."

Puget Sound ports have completed numerous development projects involving land and water cleanup and habitat remediation, and various projects are underway. Examples of recently completed projects include Port of Tacoma's cleanup of the former Kaiser aluminum smelter and the Port of Anacortes's "O" Avenue mitigation project, which included low-impact development features.

Key Ongoing Program Activities

- The Bellingham Bay Demonstration Pilot Program began in 1996 to improve the environmental health of Bellingham Bay through cleanup of polluted sediments, restoration of historically lost habitat, control of pollution sources, and revitalization of under-utilized waterfront properties.

The Pilot includes 12 cleanup sites around Bellingham Bay and several habitat restoration projects. Clean up milestones for the Bellingham Bay Demonstration Pilot Project vary by individual project components. Progress on cleanup of contaminated sites in Bellingham Bay are viewable at the Department of Ecology's (Ecology) website: http://www.ecy.wa.gov/programs/tcp/sites_brochure/blhm_bay/sites/bel_bay_sites.html. Ecology will focus efforts on three significant cleanup and habitat restoration projects in Bellingham Bay: Cornwall Ave., Whatcom Waterway, and G-P Mill.

- Elliott Bay/Lower Duwamish cleanup: the U.S. Environmental Protection Agency (EPA) is scheduled to release its feasibility study for the Lower Duwamish cleanup in early 2012. A fact sheet with various cleanup alternatives and their associated expected time frames for completion is available here: http://www.epa.gov/region10/pdf/sites/ldw/factsheet_oct2010rev.pdf
- Ecology will focus efforts on continuing to control pollutant sources and remediate toxics in the Lower Duwamish and East Waterway.
- Port Angeles Harbor Cleanup: Several sites in Port Angeles Harbor are in various stages of investigation and/or cleanup of toxic contamination as part of Ecology's Puget Sound Initiative. Further information is available here: http://www.ecy.wa.gov/programs/tcp/sites_brochure/psi/portAngeles/psi_portAngeles_bay.html
- Ecology, in conjunction with the Clean Boatyard Washington program, will work toward ensuring Puget Sound boatyards meet the requirements as described in the Boatyard General Permit with a goal that 100 percent of Puget Sound boatyards covered under the Boatyard General Permit will meet the benchmarks for copper and zinc in stormwater discharges by 2014.
- Puget Sound ports and marinas covered under the National Pollution Discharge Elimination System Industrial Stormwater permit will comply with the permit's benchmarks and stormwater pollution prevention plan requirements.
- Washington Sea Grant will coordinate and host the third national Working Waterfronts conference in March 2013 in Tacoma.

Other ongoing activities and near-term actions related to working waterfronts are described in C1 (control of pollution sources to Puget Sound), C9 (cleanup of contaminated sites within and near Puget Sound).

Near-Term Actions

None – work in the near term will focus on implementation of ongoing programs. Near-term actions related to cleanup of working waterfronts also are addressed in C9.

Emerging Issues and Future Opportunities

- Exploration (and funding) for research and innovation to identify lower impact methods of shoreline armoring in an urban industrial context.
- Support for the recommendations contained in *Marine Spatial Planning in Washington: Final Report and Recommendations of the State Ocean Caucus to the Washington State Legislature*, in particular Recommendation 4 which includes (among others) the following objectives:
    - Foster and encourage sustainable uses that provide economic opportunity and preserve coastal heritage without significant adverse environmental impacts

    - Preserve and enhance public access to, commercial and recreational uses of, and other values for marine waters and shorelines
    - Protect and encourage working waterfronts and support the infrastructure necessary to sustain water-dependent uses such as marine industry, commercial shipping, commercial, tribal and recreational fisheries, and shellfish aquaculture
- Exploration of opportunities for stormwater treatment pilot projects and development of innovative treatment methods at public ports; and support expansion of innovative and effective stormwater treatment projects currently in use.
- Identification and adoption of low impact development techniques to maximize effectiveness in the context of working waterfronts.
- Explicitly incorporate climate change impacts and the recommendations from *Preparing for Climate Change* (April 2012) including working with ports to determine short- and long-term strategies to protect port infrastructure and transportation linkages to ensure movement of commerce and international trade.

B4.2 Increase access to and knowledge of publically owned Puget Sound shorelines and the marine ecosystem.

Much of Puget Sound shorelines are privately held. Ecology maintains information on public access to Puget Sound in the Coastal Zone Atlas and the Trust for Public Lands has done additional analysis to map and evaluate public access to Puget Sound.
https://fortress.wa.gov/ecy/coastalatlas/UICoastalAtlas/Tools/PublicAccess.aspx.
In June 2012, the Puget Sound Partnership will launch a mobile application and website to disseminate maps, descriptions, and directions to all publicly-owned shorelines, to make this information more accessible and easier to use.

The marine ecosystem is accessed directly by boaters and divers and by residents who travel or commute by ferry boat and who visit marine education centers such as the Seattle Aquarium or the Port Townsend Marine Science Center.

Ongoing programs such as the Shoreline Master Program (SMP) require consideration of public access to Puget Sound shorelines as part of local SMP updates, and agencies, such as State Parks and WDFW, provide an maintain both shoreline and marine access points.

Near-Term Actions

B4.2 NTA 1: State Parks Interpretive Experiences. Increase passive, active and virtual interpretive experiences on Puget Sound ecology, threats, vital signs, and recovery actions at State Parks and other publically owned lands that provide access to Puget Sound. Maximize opportunities to connect Park visitors with the regional ecosystem recovery effort.

Performance measure: By December 2012, review existing interpretive plans for Puget Sound interpretive experience opportunities. By June 2013, identify potential funding sources for implementation of unfunded elements identified through interpretive plan review. Future metrics will depend on acquisition of funding.

Emerging Issues and Future Opportunities

There are a number of opportunities to explore additional strategies and investments to improve access to Puget Sound. Many of these were suggested by commenters during the comment period on the draft 2012 Action Agenda update and can be followed up on and considered for the next update. These include:

- Revising grant criteria and allowable expenditures so that sites acquired with public funds for conservation purposes will consistently include public access compatible with restoration and protection objectives.
- Making a concerted investment to preserve, repair and maintain parks, nature centers, fishing piers, trails, promenades and other shoreline access points throughout Puget Sound.
- Creating programs to subsidize free or low cost admission to the Seattle Aquarium, Port Townsend Marine Science Center, Poulsbo Marine Science Center, Arthur D. Feiro Marine Lab, MAST Science Center in Redondo, Point Defiance Aquarium, Marine Life Center in Bellingham, Nisqually Reach Nature Center, Makah and Suquamish Museums and similar facilities where the public can connect with and learn more about the Puget Sound marine environment.

In addition, public access strategies and actions will need to incorporate changes in sea level rise as needed.

Target View: Eelgrass

Eelgrass is a marine plant that grows in the shallow waters of Puget Sound. It flowers and produces seeds, unlike seaweed, and expands quickly in the spring and summer, only to slow its growth in the winter in response to lower water temperature and light. Eelgrass is important because it provides food and habitat for birds, fish, crabs, shellfish and other marine organisms. It also dampens wave energy thereby protecting shorelines from erosion and improving water quality.

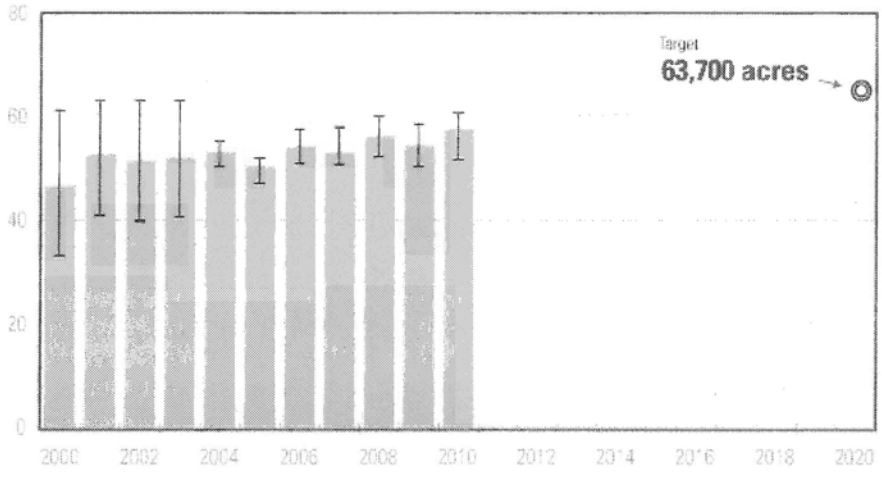
Eelgrass and other seagrass species are used as indicators of estuarine health throughout the world because they respond sensitively to many natural and human-caused environmental factors that affect water quality and shoreline sediment. Changes in the abundance or distribution of this resource are likely to reflect changes in environmental conditions. They are also likely to affect many other species that depend on eelgrass habitat.

One way to improve Puget Sound is to increase the amount of eelgrass that grows in its waters. Though some larger Puget Sound eelgrass beds are stable or possibly increasing in size, many of the smaller more widely dispersed beds are in decline. Although research is underway, currently, the reason for this decline is not fully understood.

The 2020 recovery target for eelgrass is:

- to increase the acres of eelgrass in Puget Sound by 20 percent from the 2000 to 2008 baseline period - an increase from about 53,100 acres to about 63,700.

Acres of Eelgrass in Puget Sound
in thousands, 2000-2020



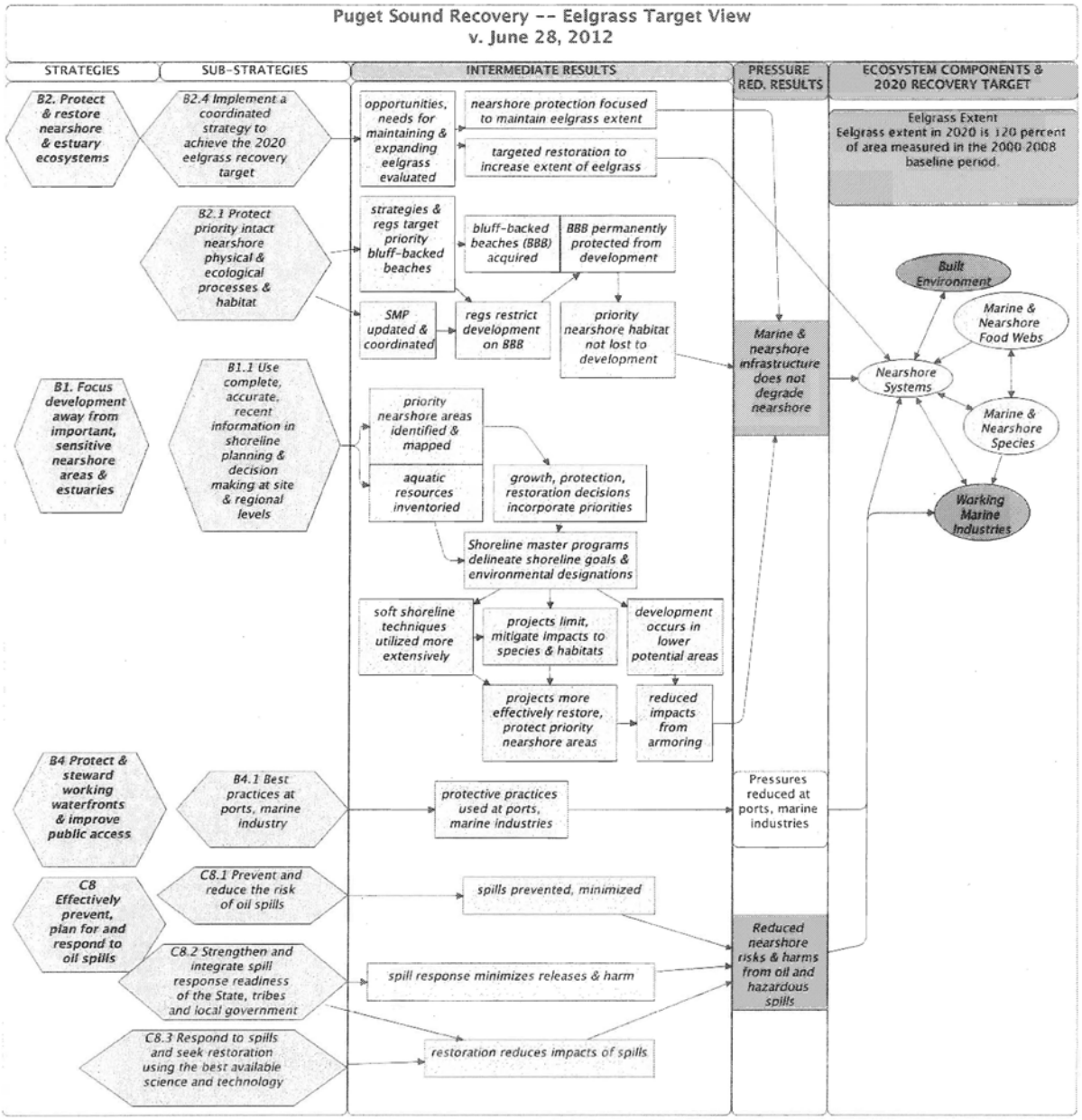
Source: Aquatic Resource Division, Nearshore Habitat Program, Washington State Department of Natural Resources

The black bars in the graph represent the margin of error for the estimated acreage, showing the uppermost and lowermost potential value for each year. In 2004, DNR modified its survey methodology and the precision of the estimates improved.

The Action Agenda strategies most related to the eelgrass target are:

- Implement a coordinated strategy to achieve the 2020 eelgrass recovery target (B2.4)
- Permanently protect priority nearshore physical and ecological processes and habitat (B2.1)
- Effectively prevent, plan for and respond to oil spills (C8.1, C8.2, C8.3)
- Use, coordinate, expand and promote financial incentives and programs for best practices at ports and in the marine industry that are protective of ecosystem health (B4.1)
- Use complete, accurate and recent information in shoreline planning and decision making at the site-specific and regional levels (B1.1)
- Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales (C2)

In the following results chain, or logic model, yellow polygons identify strategies and actions from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets.


Puget Sound Recovery -- Eelgrass Target View
v. June 28, 2012
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PRESSURE RED. RESULTS
ECOSYSTEM COMPONENTS & 2020 RECOVERY TARGET
B2. Protect & restore nearshore & estuary ecosystems
B2.4 Implement a coordinated strategy to achieve the 2020 eelgrass recovery target
opportunities, needs for maintaining & expanding eelgrass evaluated
nearshore protection focused to maintain eelgrass extent
targeted restoration to increase extent of eelgrass
Eelgrass Extent
Eelgrass extent in 2020 is 120 percent of area measured in the 2000 2008 baseline period.
B2.1 Protect priority intact nearshore physical & ecological processes & habitat
strategies & regs target priority bluff-backed beaches
bluff-backed beaches (BBB) acquired
BBB permanently protected from development
SMP updated & coordinated
regs restrict development on BBB
priority nearshore habitat not lost to development
Built Environment
Marine & Nearshore Food Webs
Nearshore Systems
Marine & Nearshore Species
Working Marine Industries
B1. Focus development away from important, sensitive nearshore areas & estuaries
B1.1 Use complete, accurate, recent information in shoreline planning & decision making at site & regional levels
priority nearshore areas identified & mapped
aquatic resources inventoried
growth, protection, restoration decisions incorporate priorities
Shoreline master programs delineate shoreline goals & environmental designations
soft shoreline techniques utilized more extensively
projects limit, mitigate impacts to species & habitats
development occurs in lower potential areas
projects more effectively restore, protect priority nearshore areas
reduced impacts from armoring
Marine & nearshore infrastructure does not degrade nearshore
B4 Protect & steward working waterfronts & improve public access
B4.1 Best practices at ports, marine industry
protective practices used at ports, marine industries
Pressures reduced at ports, marine industries
C8 Effectively prevent, plan for and respond to oil spills
C8.1 Prevent and reduce the risk of oil spills
spills prevented, minimized
C8.2 Strengthen and integrate spill response readiness of the State, tribes and local government
spill response minimizes releases & harm
C8.3 Respond to spills and seek restoration using the best available science and technology
restoration reduces impacts of spills
Reduced nearshore risks & harms from oil and hazardous spills

Protect and Restore the Native Diversity and Abundance of Puget Sound Species

The Challenge

Puget Sound's terrestrial and freshwater species interact with marine species to form a complex and biologically rich food web that requires protection and responsible stewardship to maintain function and minimize disruption. The biodiversity of Puget Sound has provided valuable health, economic, and cultural benefits to humans, beginning with the earliest native residents. Many of these benefits are quantifiable in pounds of fish harvested or board-feet of timber produced. Other benefits, such as ecosystem services, are more difficult to quantify but are beginning to gain recognition through new and innovative metrics. The intrinsic value of biodiversity, such as its scenic beauty or contribution to quality of life, may never be fully measured but is nonetheless universally recognized as an important asset to protect. Protection and recovery of native species is an integral part of maintaining overall species diversity throughout Puget Sound. Currently sixteen Puget Sound species are listed as federally threatened or endangered and sixteen additional species are on the state endangered and threatened species lists. The Washington Department of Fish and Wildlife (WDFW) also lists eight species as sensitive, and approximately 35 Puget Sound marine fish and bird species are candidates for review and possible listing as State Endangered, Threatened, or Sensitive species.

One of many things that threaten biodiversity is the introduction of invasive plants and animals. It is significantly less expensive and more effective to prevent or rapidly respond to introductions of invasive species than to control and eradicate them once they have become established; however prevention and rapid response present many challenges especially in the context of the international shipping that occurs in Puget Sound. In recent years, a number of invasive species have taken hold in Puget Sound despite efforts to prevent them. These include such species as Japanese knotweed, Spartina, nutria, and New Zealand mud snails. Knotweeds are noxious weeds that spread quickly, particularly along rivers and streams, where they can out-compete native plants and destroy habitat for spawning fish. Spartina is a cord grass that out-competes native vegetation and converts mudflats into single-species meadows. Spartina destroys important habitat for migratory shorebirds and waterfowl, increases the threat of flooding and severely affects the state's shellfish industry. Nutria, large invasive rodents, threaten the health of marine and freshwater habitats. New Zealand mud snails are a highly invasive threat to freshwater and brackish water environments. They can dominate river and lakebed habitat by achieving densities of more than 100,000 per square meter.

Sub-strategies in this area address recovering native species and preventing and rapidly responding to invasive species.

Climate Change

Climate change will have significant impacts on biodiversity including changes in habitat, types of species and where they are found in Puget Sound, and on species' lifecycles and predator-prey interactions. Already reduced populations may be further weakened formerly healthy populations may decline. Warmer temperatures allow nonnative plants, animals, insects and pathogens to expand their range and enhance winter survival. Native habitats will experience an increase in disturbances such as wildfires, floods, drought, or disease or insect outbreaks opening them up to more frequent invasion by opportunistic nonnative species that are adapted to survive in changed habitats. Ocean acidity will likely have significant impact on marine ecosystems, impairing the ability of organisms to form shells or skeletons. This will affect species important to the food web like shellfish, corals, and pteropods (a food source for salmon, herring, and whales). This stress will provide opportunities for nonnative species to become established and flourish.

Several of the high priority response strategies in *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy* (Draft April 2012), relate directly to biodiversity and invasive species:

- **Safeguarding fish and wildlife and protecting critical ecosystem services that support human and natural systems.** This means protecting and restoring habitat, protecting sensitive and vulnerable species and their habitats, and reducing existing stresses on fish, wildlife, plants and ecosystems.
- **Reducing the vulnerability of coastal communities, habitat and species.** This includes preventing coastal habitat degradation and destruction and seeking opportunities for upland habitat creation.
- **Reducing forest and agriculture vulnerability to climate change.** This strategy includes enhancing surveillance and eradication of pests and diseases.
- **Supporting the efforts of local communities and strengthening capacity to respond and engage the public.**

The specific strategies and actions related to biodiversity and invasive species focus on the conservation, restoration, and improvement of ecological functions and processes, and ways to help species and ecosystems recover from the impacts of climate change and extreme events. Reducing non-climate stressors to help build the resilience of natural systems is critical. Actions include protecting and restoring connections between rivers and floodplains, restoring estuaries, managing freshwater withdrawals, maintaining stream flows, reducing existing pollution and contamination, and maintaining and restoring stream flows. For example, reducing stormwater pollution improves water quality and aquatic habitat, increasing the resilience of aquatic species to additional stresses from climate change. In addition, the state response strategy calls for taking early action to eliminate or control non-native species that take advantage of climate changes, especially where they threaten native species or current ecosystem function.

The strategies and sub-strategies, ongoing programs and near-term actions in this section of the Action Agenda are similar to those in *Preparing for Climate Change* and will help minimize impacts of climate change in Puget Sound.

Relationship to Recovery Targets

Protection and recovery of native Puget Sound species is important for achieving the recovery targets associated with toxics in fish, marine sediment quality, shoreline armoring, orcas, wild Chinook, Pacific herring, and eelgrass. Control of invasive species in Puget Sound basin also will support recovery targets for biological health of wadeable, lowland streams, shellfish beds, and eelgrass acres.

Local Priorities

For the 2012 Action Agenda Update, in general, Local Integrating Organizations did not identify invasive species prevention and response as a top priority. Promoting invasive species eradication efforts is one of the Strait of Juan de Fuca's 19 Strategic Priorities. Other LIOs, including Hood Canal, Island, Stillaguamish-Snohomish, and Skagit are discussing invasive species strategies, including the need to continue support for local prevention and eradication programs.

B5. Protect and restore the native diversity and abundance of Puget Sound species, and prevent and respond to the introduction of terrestrial and aquatic invasive species

B5.1 Implement species recovery plans in a coordinated way.

Recovering at-risk native species is vital to restore the biological health and integrity of Puget Sound. Implementation of existing species recovery plans will be most effective if overlapping actions within these plans are identified and redundancies eliminated.

Existing terrestrial species recovery plans include:

- Fisher (http://wdfw.wa.gov/publications/00228/wdfw00228.pdf)
- Marbled Murrelet (http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B08C)
- Northern Spotted Owl (http://ecos.fws.gov/docs/recovery_plan/100915.pdf)
- Western Gray Squirrel (http://wdfw.wa.gov/publications/pub.php?id=00119)
- Streaked Horned Lark (http://wdfw.wa.gov/publications/pub.php?id=00391)

Existing freshwater species recovery plans include:

- Oregon Spotted Frog (http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=D02A)
- Western Pond Turtle (http://wdfw.wa.gov/publications/pub.php?id=00398)

Existing marine species recovery plans include:

- Puget Sound Chinook Salmon (http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/PS-Chinook-Plan.cfm)
- Hood Canal Summer Chum (http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/Hood-Canal-Plan.cfm)
- Sea Otter (http://wdfw.wa.gov/publications/00314/wdfw00314.pdf)
- Southern Resident Killer Whale (http://www.nwr.noaa.gov/Marine-Mammals/Whales-Dolphins-Porpoise/Killer-Whales/ESA-Status/upload/SRKW-Recov-Plan.pdf)
- Puget Sound Rockfish Conservation Plan http://wdfw.wa.gov/conservation/fisheries/rockfish/)
- Marbled Murrelet (http://ecos.fws.gov/docs/recovery_plan/970924.pdf)

Each plan lays out a species-specific approach to ensure self-sustaining populations at appropriate levels of abundance. Recovery plans generally include an assessment of the stock status and an evaluation of the factors that contribute to declining populations and measures to mitigate them. These plans also recommend specific actions to protect species habitat needs, their food and forage requirements, and protection from human disturbance and harvest management.

In addition, WDFW has identified management recommendations for 101 species and five priority habitats. These can be found at http://wdfw.wa.gov/conservation/phs/mgmt_recommendations/.

Many of the actions to protect and restore habitat and to improve fresh and marine water quality and quantity described in other sections of the Action Agenda echo the types of actions called for in species recovery plans.

Ongoing Programs

The U.S. Fish and Wildlife Service (USFWS) is the lead federal agency for protecting and restoring biodiversity in Puget Sound, and has jurisdiction under the Endangered Species Act (ESA) for all federally listed species except for salmon, steelhead, and marine mammals. The USFWS has provided substantial funding to protect and restore species biodiversity, as well as estuary restoration in Puget Sound. The USFWS also implements and funds research on the impacts of climate change on biodiversity in Puget Sound.

The National Oceanic and Atmospheric Administration (NOAA) has jurisdiction under Section 10 of the Endangered Species Act and its implementing regulations require habitat conservation plans (HCPs) for salmon, steelhead, and marine mammals. Elements of HCPs include, but are not limited to:

- An assessment of impacts likely to result from the proposed taking of one or more federally listed species.
- Measures that the permit applicant will undertake to monitor, minimize, and mitigate for such impacts, the funding available to implement such measures, and the procedures to deal with unforeseen or extraordinary circumstances.
- Alternative actions to the taking that the applicant analyzed, and the reasons why the applicant did not adopt such alternatives.
- Additional measures that the U.S. Fish and Wildlife Service may require.
- Both the U.S. Fish and Wildlife Service and NOAA prioritize restoration actions within plans.

At the state level, WDFW conserves and protects native fish and wildlife by:

- Protecting Puget Sound species and habitats by regulating construction projects in or near water that may harm fish and their habitat, and enforcing environmental, fishing, and hunting laws
- Identifying and implementing hatchery reform actions to reduce risks to native salmon and steelhead.
- Ensuring fishery impacts on native fish are reduced to levels consistent with conservation goals.
- Initiating new and enhancing existing partnerships with conservation, invasive species, and other organizations to help conserve Washington's fish and wildlife.
- Protecting, acquiring and restoring the habitat of species.
- Participating in Shoreline Management Act and Growth Management Act efforts of local governments.
- Completing and implementing the highest priority conservation actions.
- Developing an integrated climate change response and adaptation strategy for species, habitats and ecosystems to maintain healthy and sustainable fish and wildlife populations and to prevent the loss of critical ecological functions.

Federal law requires states to develop comprehensive wildlife conservation strategies, known as Wildlife Action Plans (WAP), in order to receive federal funding through the Wildlife Conservation and Restoration Program and State Wildlife Grants program. The purpose of these strategies or plans is to conserve wildlife and vital natural areas before they become too rare and costly to protect.

WDFW's Comprehensive Wildlife Conservation Strategy (CWCS) creates a framework to protect species and habitats in greatest need of conservation; moves from species management to an ecosystems-based management approach; and expands the emphasis on biodiversity conservation, at the statewide and eco-regional scales including Puget Sound lowlands, the Cascade and Olympic eco-regions.

Through adaptive management, the strategy will do the following:

- Re-examine and redefine the relative priority of wildlife species and associated habitats
- Help coordinate land acquisitions among state and local agencies
- Improve coordination among federal and state agencies in conservation planning
- Complete habitat assessments at the local level
- Provide good biological information to local planners and decision makers to improve their ability to administer the Growth Management Act and other locally administered land use laws; and expand efforts to help local governments use "best available science" in protecting important habitats by providing them with good habitat mapping products.
- Better integrate the management of marine and aquatic ecosystems with terrestrial ecosystems, both within WDFW and among state and federal agencies
- Incorporate management recommendations into operational work plans within WDFW and other conservation partners
- Incorporate specific conservation actions into WDFW's cost accounting systems to help develop and monitor project budgets and priorities
- Prevent the introduction of new aquatic invasive species and control or eradicate established populations

Finally, both the Pacific Coast Joint Venture and the U.S. North American Bird Conservation Initiative (NABCI) seek to advance protection and recovery of bird populations across their migratory range and provide significant opportunities for collaboration with public and private entities in British Columbia and beyond. The Pacific Coast Joint Venture develops partnerships between public and private agencies and organizations to pool financial and management resources to fund and carry out on-the-ground projects to protect lowland wetlands and upland habitats. The U.S. North American Bird Conservation Initiative Committee uses a similar model to ensure the long-term health of North America's native bird populations. This Committee works with cross border partners to advance integrated bird conservation, based on sound science and cost-effective management.

Near-Term Actions

B5.1 NTA 1: Develop and Implement Species Plans. Develop (where necessary) and implement actionable plans for imperiled Puget Sound species.

Performance measure: Number of actionable plans for imperiled species currently lacking such plans.

B5.1 NTA 2: Fish and Wildlife Action Plan. WDFW, in coordination with the US Fish and Wildlife Service and the National Oceanic and Atmospheric Administration, will complete a Fish and Wildlife Action Plan for Puget Sound by June 30, 2013. This action will carry out the agency's Comprehensive Wildlife Conservation Strategy in the Puget Trough, Cascades and Northwest Coast eco-regions to integrate terrestrial and aquatic species specific recovery plans, existing management tools, and interagency conservation plans into a unified ecosystem approach to set priorities focused on conserving and restoring critical habitat, improve biodiversity protection and restoration efforts and better coordinate them.

Performance measure: A completed Fish and Wildlife Action Plan for Puget Trough by June 30, 2013.

B5.2 Create a more integrated planning approach to protect and enhance biodiversity in the Puget Sound basin.

Multiple state and federal agencies, local governments, non-profit organizations, and tribes operate programs and create plans that either explicitly benefit biodiversity in Washington State or have the potential to impact biodiversity. An integrated approach to identify programmatic overlap and gaps is important for maximizing the impact of biodiversity work in Washington State, minimizing duplication of effort and maximizing coordination of resources and synergies across plan implementation.

Existing state biodiversity plans and/or programs and policies that benefit biodiversity include:

- Washington Biodiversity Conservation Strategy
- WDFW's Comprehensive Wildlife Conservation Strategy
- WDFW's Priority Habitat and Species
- The Washington Natural Heritage Plan (produced by the Washington Natural Heritage Program in the Department of Natural Resources (DNR)

- DNR's Aquatic Lands Enhancement Account
- DNR's Aquatic Lands Habitat Conservation Plan
- DNR's Forest Practices Habitat Conservation Plan
- DNR's Natural Heritage Program for priority species and ecosystems
- Forest Practices Act (administered by DNR)
- Washington Wildlife and Recreation Program
- Washington Invasive Species Council's Invaders at the Gate Strategic Plan

The Washington Biodiversity Council (2004-2010) (the Council) (http://www.rco.wa.gov/biodiversity/about_the_council.shtml) created a comprehensive framework for securing Washington State's biodiversity, the Washington Biodiversity Conservation Strategy (http://www.rco.wa.gov/doc_pages/other_pubs.shtml#biodiversity). The concepts and recommendations described in the strategy are instructive for crafting an integrated planning approach to biodiversity. In 2010, Governor Gregoire asked the Natural Resources Cabinet to absorb the Biodiversity Council's oversight role. The Council completed this transition in June 2011 by handing off ongoing projects to member agencies. Without a single point of contact for biodiversity policy work in the state, coordination and collaboration to carry out the biodiversity conservation strategy will remain a challenge.

Ongoing Programs

Priority Habitats and Species (PHS) Program: The PHS program (http://wdfw.wa.gov/conservation/phs/) serves as the backbone of WDFW's proactive approach to the conservation of fish and wildlife. It is the principal means by which WDFW provides important fish, wildlife, and habitat information to local governments, state and federal agencies, private landowners and consultants, and tribal biologists for land use planning purposes. Using the best available science, the PHS program identifies which common and at-risk species and habitat types are priorities for conservation, where these habitats and species are located, and what should be done to protect these resources when land use decisions are made. The program is supported by a list of priority habitats and species, maps, management recommendations and technical assistance staff. The database may be directly accessed at http://wdfw.wa.gov/mapping/phs/.

Landowner Assistance:

- *WDFW Private Landowner Assistance*: WDFW enrolls private landowners in a voluntary private lands access program and participants may request technical assistance from WDFW staff to help improve fish and wildlife habitat on their lands. Department staff may also be available to help landowners apply for or implement federal programs administered by the Farm Service Agency (FSA) or the Natural Resource Conservation Service (NRCS) (for example, Conservation Reserve Program (CRP) and Environmental Quality Incentives Program (EQIP). WDFW has developed guidance documents for the inventory, assessment, and prioritization of fish passage barriers and for the design of road culverts for fish passage. Additionally, biological and engineering assistance may be available from WDFW to help assess and review new and replacement fish passage structures.
- *Incentive-Based Landowner Conservation Programs*: DNR provides financial and technical assistance to communities and forest stewardship assistance to non-industrial private landowners as well as technical assistance on leases of state-owned aquatic lands. (More

information is available here: http://www.landscope.org/washington/programs/wa_programs/watersheds/dnr/#cmz).

- Financial and technical assistance includes:
    - Helping rural landowners to remove or fix fish passage barriers.
    - Compensating small forest landowners for not harvesting timber along riparian corridors.
    - Offering private landowners the option of donation or compensation to preserve timberlands on islands of timber within rivers or streams.
    - Helping non-industrial private forest landowners manage their properties to improve timber production, forest health, wildlife and fish habitat, water quality, aesthetics, and fire safety.
    - Supporting the Washington Register of Natural Areas to recognize voluntary participation to protect and conserve priority species or ecosystems, as identified in the Washington Natural Heritage Plan.

Local Habitat Assessment: Washington Department of Fish and Wildlife has developed a suite of habitat assessment tools. One of these ranks relative habitat value across a whole county or watershed. The Local Habitat Assessment (LHA) methodology produces a color-coded map that is easy to interpret and use to inform local land use planning initiatives at a variety of scales. WDFW has collaborated with several Puget Sound jurisdictions to produce LHA maps for whole counties, watersheds, or smaller sub-areas. Assessments have been completed in Skagit County, the Birch Bay watershed in Whatcom County, and Kitsap County.

- *Puget Sound Basin Characterization*: WDFWs LHA is being integrated into a Puget Sound Characterization that applies several ecological assessments including water flow, water quality and the Puget Sound Nearshore Ecosystem Restoration Project. The Puget Sound Watershed Characterization is a collaborative effort between Ecology, WDFW, and the Puget Sound Partnership that covers the entire Puget Sound Basin. The project is producing landscape-scale assessments that provide scientific information on which areas are the most important to protect for water resources and habitats.

Biodiversity Scorecard: Washington Biodiversity Council and University of Washington researchers collaborated to develop a draft scorecard model to track the status of the state's biodiversity, similar to PSP's dashboard indicators. The model considers the status of species and ecosystems, ecosystem processes, human activities, and ecosystem services. This project is now housed with the Washington Natural Heritage Program (at DNR).

Conservation Opportunity Maps: These maps assess the distribution of important species, plant communities, and ecological systems, and overlay that with human population trends. They provide high-level guidance on where to invest in biodiversity conservation activities in Washington State.

- WDFW has developed a data viewer application for the maps using ArcGIS, which enables users to see the data underlying the maps.
- The Washington Natural Heritage Program is enhancing the map viewer on the LandScope Washington site to include these maps and data.

Biodiversity Conservation Toolbox for Land Use Planners: This toolbox aims to put biodiversity conservation information for Washington planners in one place. It is organized in six main categories to address the primary needs that planners identified: resources, guidance documents, case studies, policy language, data and maps, and training and conferences.

- The Washington Department of Commerce, Growth Management Services, now hosts this toolbox on its Critical Areas and Best Available Science page

Green Bylaws Toolkit: The Canadian Environmental Law Clinic published the *Green Bylaws Toolkit*. This is a comprehensive resource that will help local governments protect threatened ecosystems. The Toolkit explains how to use a myriad of tools – from planning to regulatory bylaws – to protect wetlands, grasslands and other important ecosystems.

Biodiversity Project Website: The website was created to provide a hub for biodiversity information in Washington State.

- LandScope Washington, administered by the Washington Natural Heritage Program, now hosts the content on stewardship and incentives, education, and Washington's ecoregions

Aquatic Habitat Conservation Plan: DNR's draft conservation plan includes management measures to minimize impacts on state owned lands from over water structures, log booming, and shellfish aquaculture and to meet the requirements of the federal Endangered Species Act. The plan is being finalized and implemented.

Forest Practices Habitat Conservation Plan: Carrying out DNR's Forest Practices Habitat Conservation Plan (FPHCP) maintains and restores aquatic and riparian habitat in forests to meet the requirements of the federal Endangered Species Act, as well as those of the federal Clean Water Act (CWA) for species included in the plan.

WDFW and DNR will integrate the Forest Practices Application and Hydraulics Project Approval permitting process to protect fish and other natural resources; as well as reduce paperwork burdens and uncertainty for applicants, and enhance compliance and effectiveness monitoring. To reduce reliance on the state General Fund, the agencies will assess fees for services to cover administrative costs.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

B5.3 Prevent and rapidly respond to the introduction and spread of terrestrial and aquatic invasive species.

The goal of this sub-strategy is to 1) gain an understanding of invasive species presence and extent in Puget Sound terrestrial and aquatic ecosystems; 2) prevent the introduction of new high-priority, high-risk invasive species to these ecosystems; 3) rapidly respond when new priority invasive species are detected; 4) stop invasive species already here from spreading to other locations; and 5) completely eliminate them as soon as possible, wherever possible.

Accomplishing these goals requires the following elements:

- A forum to provide policy-level planning and direction for regional invasive species efforts and coordination, collaboration, and information sharing among federal, state, tribal, local, and private partners

- Cooperation and collaboration with Canadian provincial and federal partners to align invasive species management programs across the international border
- Education and outreach that increases awareness of the invasive species problem and offers solutions
- A Puget Sound invasive species monitoring program
- A Puget Sound early detection and rapid response system
- Prevention efforts that target the highest risk pathways, such as hull fouling and ballast water
- Maintained or enhanced programs to control, contain, or eradicate existing infestations
- Asking and answering research questions that fill critical information gaps

Ongoing Programs

Efforts to prevent and respond to invasive species in Puget Sound are focused on a number of ongoing programs.

- *The Washington Invasive Species Council (the Council).* The Washington Invasive Species Council (WISC) is the legislatively-established forum to provide policy-level planning and direction for regional invasive species efforts and coordination, collaboration, and information sharing among federal, state, tribal, local, and private partners. Their strategic plan sets priorities, identifies gaps and provides goals, recommendations, and actions to address the significant threat invasive species pose to recovering Puget Sound. A key element of this sub-strategy is maintaining capacity to support the Council's role to provide outreach and policy-level planning, direction, coordination, and information sharing among member agencies and stakeholders. The Council provides structure and infrastructure for coordinated efforts to prevent and manage invasive species including integration of invasive species policies and protocols into existing processes such as the State Environmental Policy Act and Governor's Office of Regulatory Assistance Joint Aquatic Resource Permit Application (JARPA). Major funding sources include the Vessel Response Account and contributions from member agencies.
- *Basin-wide detection and rapid response efforts.* A second element is to enhance ongoing basin-wide detection and rapid response efforts to address invasive species risks. The effectiveness of the state's ability to prevent and respond to invasive species lies in these ongoing programs:
    - Washington State Department of Agriculture (WSDA) leads, and works with WDFW, to monitor for and eradicate Spartina infestations. WSDA also leads the monitoring for and eradication of invasive knotweed infestations, as well as other insect, plant pathogens, and weed pests. In addition, the WSDA prevents the introduction of invasive aquatic plants through its quarantine and inspection program, and controls other invasive aquatic plants.
    - WDFW regulates pathways and practices that introduce non-native animals, classifies non-native animals and responds to newly found animal invaders through its Aquatic Invasive Species Prevention and Enforcement, and Ballast Water Management programs. The state ballast water inspection and compliance program works to minimize the risks associated with hull fouling and ballast water discharges, two significant pathways for the introduction and spread of marine invasive species. The state general fund is the primary resource contributor.

- Washington State Noxious Weed Control Board classifies the threats related to terrestrial and aquatic plants and works with local weed boards and landowners to control and eradicate invasive plants infesting private property.
- Washington State Department of Ecology (Ecology) provides technical and financial assistance to local governments and lake associations to manage and eradicate freshwater invasive weeds such as Brazilian elodea and Eurasian milfoil. In addition, the Ecology coordinates the state's efforts related to the U.S. Environmental Protection Agency's (EPA) Vessel General Permit for managing incidental discharges from the normal operation of vessels.
- Washington State Department of Transportation (DOT) controls terrestrial and aquatic weed species along the state's major highway corridors as vehicular traffic and linear corridors serve as primary vectors for introduction and spread.

Funding sources for this work includes the Aquatic Invasive Species Prevention and Enforcement Account, Freshwater Aquatic Algae Control Account, state general fund (GF-S), and federal grants. It is essential to maintain and, in some cases, enhance these base programs. Reducing their capacity will open the gate to further invasions and associated effects on the region's economy and ecosystem. For example, tunicate management is not funded after FY2010–2011.

- *Cooperation and collaboration.* It is important to cooperate, collaborate and identify opportunities to improve coordination, strengthen existing partnerships, and develop new partnerships across jurisdictional boundaries and levels of government including tribes, and with non-profit organizations and private businesses, and with neighboring states, regional organizations, and Canadian entities to enhance public awareness, align programs and maximize limited resources to address common invasive species threats to Puget Sound.

Near-Term Actions

B5.3 NTA 1: Invasive Species Baseline Assessment. By December 2014, the Invasive Species Council, in consultation with WSDA, will expand its baseline assessment to include an additional 15 of the Council's priority invasive species. The assessment provides locations of species, details about management programs, and identifies gaps that exist.

Performance measure: 100% complete by December 31, 2014

- *25% complete (Sep 30, 2012);*
- *31% complete (Dec 31, 2012);*
- *38% complete (Mar 31, 2013);*
- *44% complete (Jun 30, 2013);*
- *44% complete (Sep 30, 2013);*
- *56% complete (Dec 31, 2013);*
- *69% complete (Mar 31, 2014);*
- *88% complete (Jun 30, 2014);*
- *88% complete (Sep 30, 2014)*

B5.3 NTA 2: Invasive Species Early Detection and Monitoring. By June 2014, the Invasive Species Council, in consultation with WSDA, will develop an early detection and monitoring program plan for priority invasive species in Puget Sound. The Council will coordinate

the plan and implementation efforts with the Puget Sound Coordinated Ecosystem Monitoring Program.

Performance measure: Plans will be developed for five species. Secure funding by March 2013; Issue request for proposal. Hire contractor by June 2013; Identify existing invasive species monitoring efforts and protocols used in Puget Sound by December 2013; Develop conceptual monitoring plan that identifies targeted species and locations, and estimated costs to implement by June 2013; Seek funding opportunities to implement monitoring plan by October 2014.

B5.3 NTA 3: Managing Invasive Species on/in Boats and Ships. WDFW will prepare implementable recommendations for managing invasive species transported on and in the hulls of recreational watercraft and commercial ships.

Performance measure: Complete a management plan with recommendations by June 30, 2015.

- *Issue request for proposals and select contractor: June 2012;*
- *Complete assessment of non-indigenous marine species in Puget Sound: December 2012;*
- *Develop/identify standard methods for designating high-risk watercraft in Puget Sound: June 2013;*
- *Identify BMPs for in-water watercraft cleaning: December 2013;*
- *Identify other non-watercraft biofouling vectors for future research: 6/30/2014;*
- *Draft management plan reviewed by stakeholder group and Washington Invasive Species Council: December 2014*

B5.3 NTA 4: Ballast Water Treatment Effectiveness. By June 2015, WDFW will complete an assessment of and make recommendations to improve the effectiveness of open sea exchange and treatment in meeting state ballast water standards.

Performance measure: Complete report and make available to resource managers and the public by June 30, 2015.

- *Issue sub-award to University of Washington to analyses samples and conduct data analysis: 12/31/2012*
- *University competes analysis of archived samples and identifies research gaps: 6/30/2013*
- *WDFW collects new samples to fill research gaps: 12/31/2013*
- *Draft report reviewed by state Ballast Water Work Group: 12/31/2014*

B5.3 NTA 5: Zebra/Quagga and New Zealand Mud Snail Plans. By June 2015, WDFW will develop plans to respond to 1) a potential zebra/quagga mussel invasion in the Puget Sound Basin and 2) limit the spread of New Zealand mud snails.

Performance measure: Complete zebra/quagga mussel invasion management plan by June 30, 2015; Complete plan to limit spread of New Zealand mud snails by June 30, 2015.

- *Assess EPA grant opportunities and/or department legislation request for project funding: 6/30/2013*

- *Secure project funding; and issue contract to prepare management plans; 6/30/2014*
- *Draft management plans reviewed by Puget Sound Science Panel and Washington Invasive Species Council: 12/31/2014*

B5.4 Answer key invasive species research questions and fill information gaps.

Key questions related to invasive species include: How invaded are Puget Sound terrestrial and aquatic ecosystems, and what is the full extent of the problem and level of risk? Answers to these questions can be used to develop more targeted response strategies. The aim of this sub-strategy is to provide a strong scientific basis for managing invasive species, understanding the effects of climate change on the spread and distribution of invasive species in terrestrial and aquatic ecosystems, and targeting specific pathways and species for management. Organizations that will play a role in answering these questions include Puget Sound Science Panel and Puget Sound Institute.

Near-Term Actions

B5.4 NTA 1: Environmental and Economic Impact of Invasive Species. The Washington Invasive Species Council, in consultation with WSDA, will complete a risk assessment to evaluate the environmental and economic impacts of invasive species in the Puget Sound marine and nearshore ecosystems and incorporate short-term climate change considerations.

Performance measure: Workgroups will be convened by December 2012. WISC will revise performance measures to denote the number of pathways that will be considered by September 2013. Draft pathway analysis will be submitted to the Science Panel by August 2014. Final study will be completed by June 2015.

Emerging Issues and Future Opportunities

- Development of biodiversity markets
- A mitigation bank for protection of prairie habitat
- Expansion of technical assistance to support local government efforts to plan and manage for biodiversity conservation
- Implementing the Washington Biodiversity Council recommendations for a sustainable leadership strategy by identifying a single state agency or entity to coordinate Puget Sound biodiversity
- Investigating whether and how invasive responses could be handled under Ecology's Aquatic Invasive Species Management General Permit so there is no delay responding to an early detection of an invasion
- Adding invasive species prevention protocols as components of JARPA review
- Increasing vessel inspections related to ballast water discharges
- Implementing recommendations from *Preparing for Climate Change: Washington State's Integrated Climate Response Strategy.* This includes, but would not be limited to:
    - More explicitly incorporating climate change considerations into existing and new management plans for protecting sensitive and vulnerable species. This could include

modifying protection and recovery plans to accommodate migration, as well as longer-term shifts in species range associated with climate change and its effects. It could also include conservation of genetic diversity by protecting diverse populations and genetic material.

- Conducting and refining species and habitat vulnerability assessments to determine appropriate management approaches in a changing climate.
- More explicitly incorporating climate change considerations for species, habitats and ecosystem processes into land use, water and other natural resource planning and regulatory activities.

Target View: Pacific Herring

Pacific herring are a vital component of the marine ecosystem, and are a key indicator of the overall health of Puget Sound. Healthy stocks of herring indicate that the food web in Puget Sound is functioning to provide a prey base for fish, seabirds, and marine mammals; that nearshore and open-water habitats are functioning properly; and that fisheries for bait and other products are available for Puget Sound residents.

Herring are one of a number of small, schooling fish species called "forage fish" that are preyed upon by larger predators for food (other species include surf smelt, Pacific sand lance, and northern anchovy). The Puget Sound Partnership has focused on Pacific herring as a key sentinel for Puget Sound health. Herring are one of the most abundant forage fish species, and their populations have been tracked since the 1970s.

Overall, the number of herring in Central and Southern Puget Sound has been relatively stable for the past 40 years. However, the population of one large and important stock of Pacific herring, the Cherry Point stock in north Puget Sound, has declined by 90 percent since 1973. There are many factors that may have contributed to this decline, including pollution, overfishing, changes to the natural shoreline, parasites, changes in abundance of predators or prey, and disease. Some scientists think the decline may be part of a natural cycle, related to large-scale ecosystem conditions.

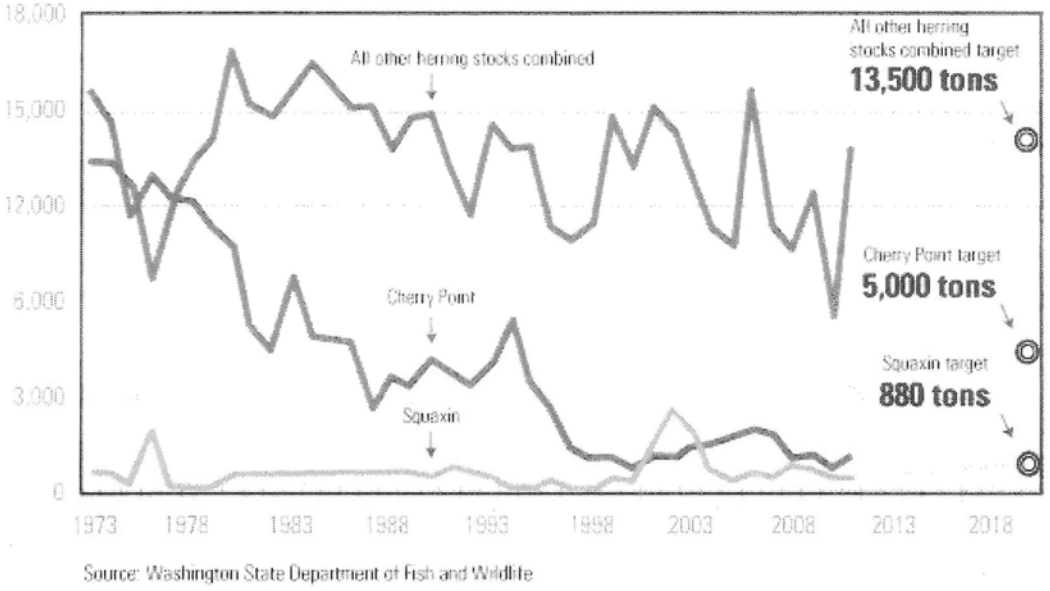
Efforts to help the recovery of Cherry Point herring have been taken, but we have yet to see their population turn around. More needs to be done to understand the causes of the decline. For herring in the rest of Puget Sound, appropriate fishery management is important to ensure continuation of the commercial and sport harvest. In addition, we need to protect the water quality and habitats essential to the well-being of all herring populations.

Further, as prey for virtually every large predator in Puget Sound, healthy herring populations play a significant role in a healthy food web. Herring are particularly susceptible to some types of toxic contaminants, such as PAHs (see "Toxics in Fish"). In addition, levels of some types of contaminants, such as PCBs (see "Toxics in Fish") increase in fish tissues as the chemicals move up the food chain, from herring to salmon, birds, seals, orcas, and humans.

The 2020 recovery target for Pacific herring is: to increase the overall amount of spawning herring throughout Puget Sound to about 19,000 tons, meeting targets specified for Cherry Point (5,000 tons), Squaxin Pass (850 tons), and all other stocks (13,500 tons).

Spawning biomass of Pacific herring stocks in Puget Sound

In tons, 1973-2020



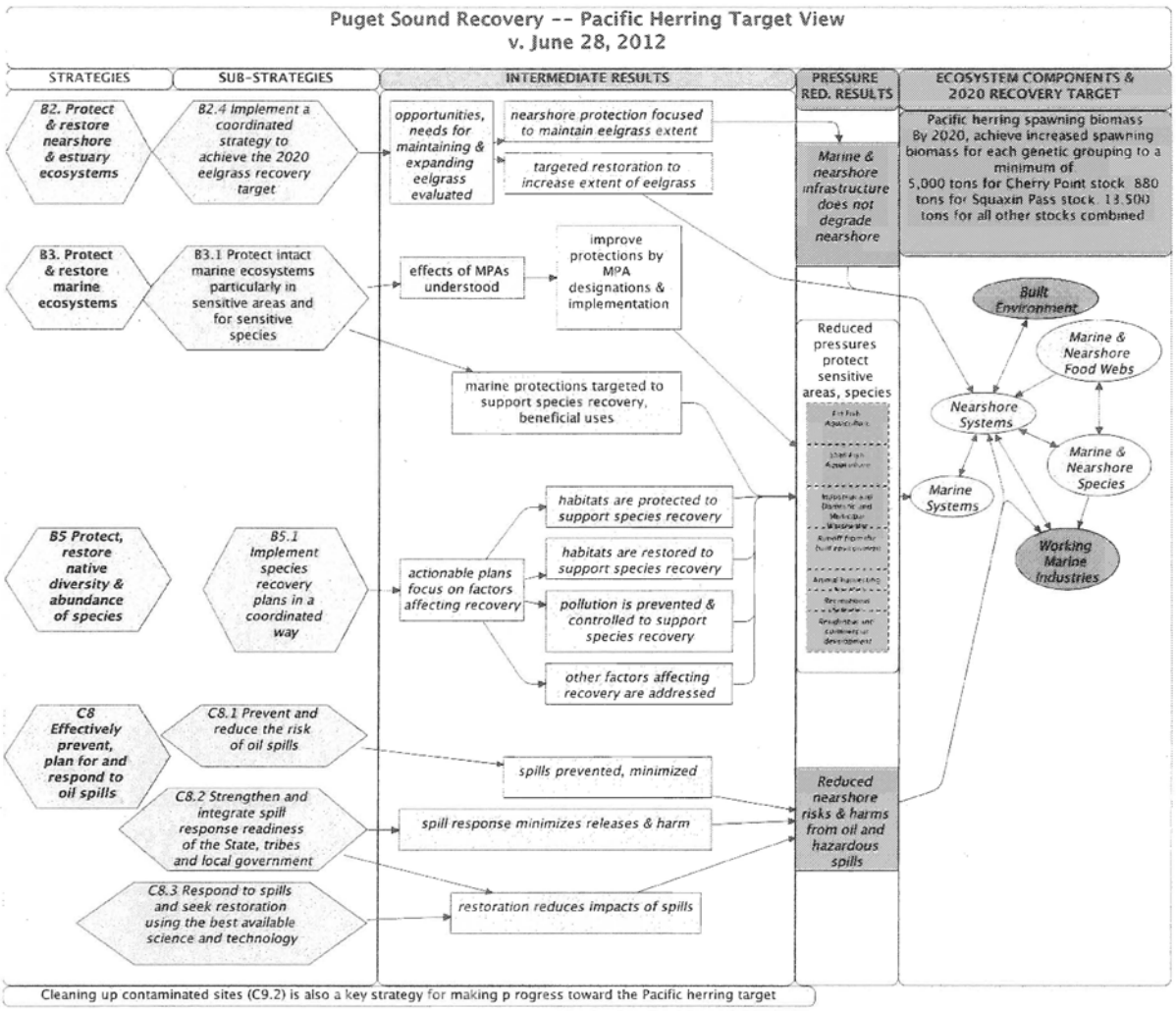
Source: Washington State Department of Fish and Wildlife

The graph represents the tons of adult Pacific herring estimated to be in Puget Sound, based on annual surveys. The estimated number of tons that spawn each year is called the spawning biomass. The herring targets are grouped based on results of genetic studies that indicate Cherry Point and Squaxin Pass herring stocks are genetically distinct and that all other sampled Puget Sound herring stocks are not genetically distinguishable from each other.

The Action Agenda strategies most related to the Pacific herring target are:

- Protect intact marine ecosystems particularly in sensitive areas and for sensitive species (B3.1)
- Implement species recovery plans in a coordinated way (B5.1)
- Effectively prevent, plan for, and respond to oil spills (C8.1, C8.2, C8.3)
- Implement a coordinated strategy to achieve the 2020 eelgrass recovery target (B2.4)
- Clean up contaminated sites within and near Puget Sound (C9.2)

In the following results chain, or logic model, yellow polygons identify strategies and actions from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets.


Puget Sound Recovery -- Pacific Herring Target View
v. June 28, 2012
STRATEGIES
SUB-STRATEGIES
INTERMEDIATE RESULTS
PRESSURE RED. RESULTS
ECOSYSTEM COMPONENTS & 2020 RECOVERY TARGET
B2. Protect & restore nearshore & estuary ecosystems
B2.4 Implement a coordinated strategy to achieve the 2020 eelgrass recovery target
opportunities, needs for maintaining & expanding eelgrass evaluated
nearshore protection focused to maintain eelgrass extent
targeted restoration to increase extent of eelgrass
Marine & nearshore infrastructure does not degrade nearshore
Pacific herring spawning biomass
By 2020, achieve increased spawning biomass for each genetic grouping to a minimum of
5,000 tons for Cherry Point stock 880 tons for Squaxin Pass stock 13,500 tons for all other stocks combined
B3. Protect & restore marine ecosystems
B3.1 Protect intact marine ecosystems particularly in sensitive areas and for sensitive species
effects of MPAs understood
improve protections by MPA designations & implementation
marine protections targeted to support species recovery, beneficial uses
Reduced pressures protect sensitive areas, species
Built Environment
Marine & Nearshore Food Webs
Nearshore Systems
Marine & Nearshore Species
Marine Systems
Working Marine Industries
B5 Protect, restore native diversity & abundance of species
B5.1 Implement species recovery plans in a coordinated way
actionable plans focus on factors affecting recovery
habitats are protected to support species recovery
habitats are restored to support species recovery
pollution is prevented & controlled to support species recovery
other factors affecting recovery are addressed
C8 Effectively prevent, plan for and respond to oil spills
C8.1 Prevent and reduce the risk of oil spills
C8.2 Strengthen and integrate spill response readiness of the State, tribes and local government
C8.3 Respond to spills and seek restoration using the best available science and technology
spills prevented, minimized
spill response minimizes releases & harm
restoration reduces impacts of spills
Reduced nearshore risks & harms from oil and hazardous spills
Cleaning up contaminated sites (C9.2) is also a key strategy for making p rogress toward the Pacific herring target

Target View: Orcas

Orca whales are an iconic species of the Pacific Northwest. We are thrilled when we see a killer whale breaching (jumping) high out of the water or when a resident pod swims majestically by a state ferry. Orcas also are at the top of the marine food chain – their main diet is Chinook salmon, as well as cod, herring and other fish species. Therefore, their health is a great indicator of the overall supply and quality of living organisms in the Sound.

The orcas in Puget Sound are generally known as southern resident orca whales and are actually a large extended family, or clan, comprised of three pods: J, K and L pods. They are often seen during the summer in the protected inshore waters of the Salish Sea, especially in Haro Strait west of San Juan Island, the Strait of Juan de Fuca and in Georgia Strait near the Fraser River. Orcas can live as long as 80 to 90 years.

The historic population of southern resident orcas may have numbered around 200 individuals, but by mid-2011, the population totaled fewer than 90 whales. Current potential threats to resident orcas include reduced quantity and quality of food, high levels of environmental contaminants possibly affecting immune and reproductive systems, human disturbance (especially boat traffic and noise disturbance), and the threat of oil spills. Further, there are currently only 17 female orcas capable of bearing young, and orcas generally wait three to five years between pregnancies. Also, about three orcas disappear from the population every year; generally their fates are unknown.

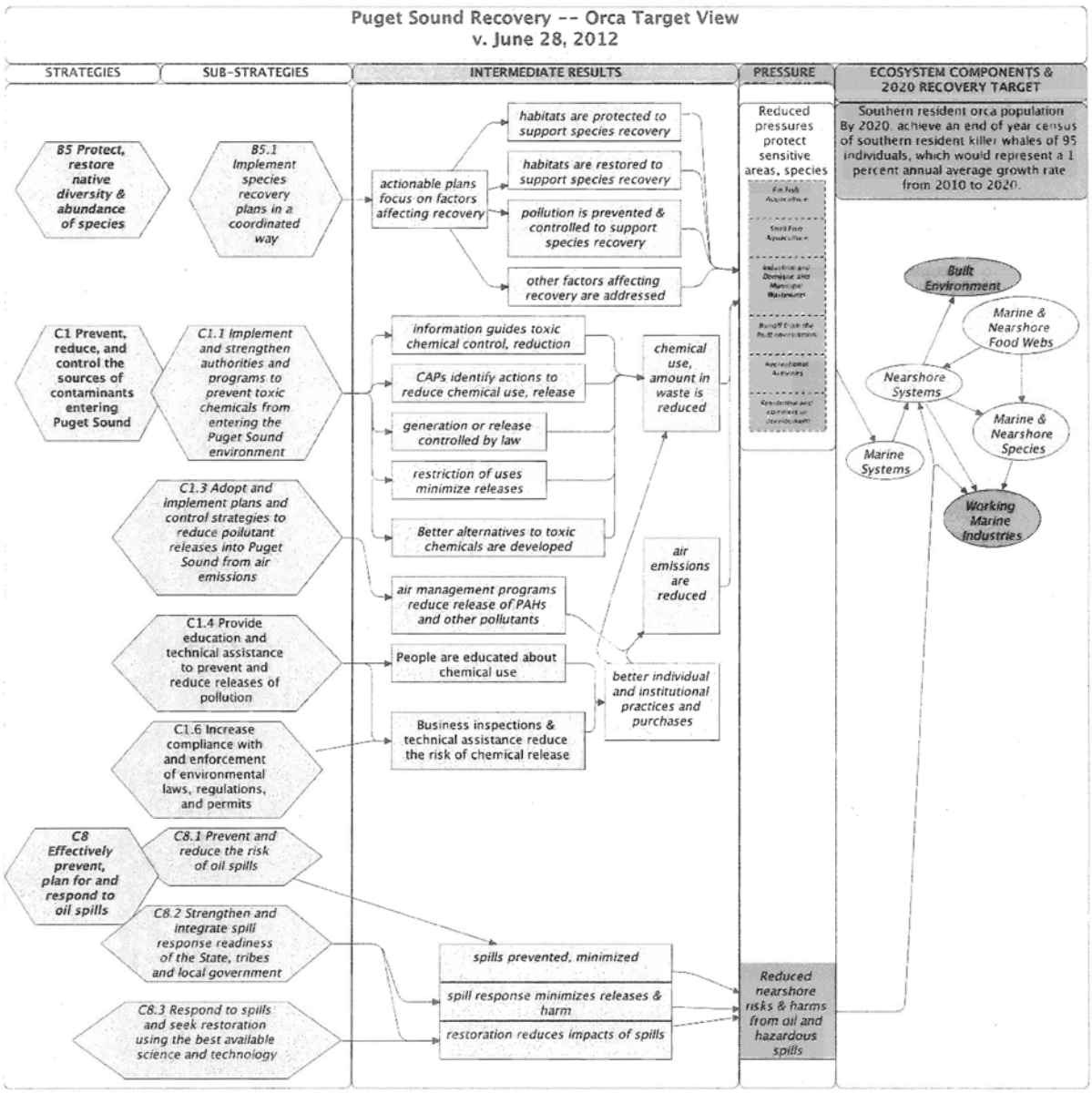
The 2020 target for orcas is, despite these challenges:

- To increase the number of southern resident orcas to 95 individuals. This would represent a one percent annual population growth rate from 2010 to 2020.

The Action Agenda strategies most related to the orca target are:

- Effectively prevent, plan for and respond to oil spills (C8.1, C8.2, C8.3)
- Prevent, reduce, and control the sources of contaminants entering Puget Sound (C1.4, C1.6, C1.3, C1.1)
- Implement species recovery in a coordinated way (B5.1)

In the following results chain, or logic model, yellow polygons identify strategies and actions from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets.


Puget Sound Recovery -- Orca Target View
v. June 28, 2012
STRATEGIES
SUB-STRATEGIES
INTERMEDIATE RESULTS
PRESSURE
ECOSYSTEM COMPONENTS & 2020 RECOVERY TARGET
B5 Protect, restore native diversity & abundance of species
B5.1 Implement species recovery plans in a coordinated way
actionable plans focus on factors affecting recovery
habitats are protected to support species recovery
habitats are restored to support species recovery
pollution is prevented & controlled to support species recovery
other factors affecting recovery are addressed
Reduced pressures protect sensitive areas, species
Southern resident orca population By 2020, achieve an end of year census of southern resident killer whales of 95 individuals, which would represent a 1 percent annual average growth rate from 2010 to 2020.
C1 Prevent, reduce, and control the sources of contaminants entering Puget Sound
C1.1 Implement and strengthen authorities and programs to prevent toxic chemicals from entering the Puget Sound environment
information guides toxic chemical control, reduction
CAPs identify actions to reduce chemical use, release
generation or release controlled by law
restriction of uses minimize releases
Better alternatives to toxic chemicals are developed
chemical use, amount in waste is reduced
C1.3 Adopt and implement plans and control strategies to reduce pollutant releases into Puget Sound from air emissions
air management programs reduce release of PAHs and other pollutants
air emissions are reduced
C1.4 Provide education and technical assistance to prevent and reduce releases of pollution
People are educated about chemical use
better individual and institutional practices and purchases
C1.6 Increase compliance with and enforcement of environmental laws, regulations, and permits
Business inspections & technical assistance reduce the risk of chemical release
C8 Effectively prevent, plan for and respond to oil spills
C8.1 Prevent and reduce the risk of oil spills
C8.2 Strengthen and integrate spill response readiness of the State, tribes and local government
C8.3 Respond to spills and seek restoration using the best available science and technology
spills prevented, minimized
spill response minimizes releases & harm
restoration reduces impacts of spills
Reduced nearshore risks & harms from oil and hazardous spills
Built Environment
Marine & Nearshore Food Webs
Nearshore Systems
Marine & Nearshore Species
Marine Systems
Working Marine Industries

STRATEGIES AND ACTIONS TO RECOVER PUGET SOUND TO HEALTH

C: REDUCE AND CONTROL THE SOURCES OF POLLUTION TO PUGET SOUND

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Reduce and Control the Sources of Pollution to Puget Sound

Reducing and controlling the sources of pollution to Puget Sound is of paramount importance to the long-term health of the Puget Sound ecosystem and its residents. Human and animal wastes, fertilizers, pesticides, and the toxic chemicals that run off pavement during storms and are discharged from industrial facilities can enter the water and harm aquatic life, and also pose several health and safety problems to humans. A successful approach to pollution in Puget Sound must ensure that toxics in marine waters and sediments, and in mammals, fish, birds, shellfish and plants, do not harm the persistence of these species; urban stormwater runoff, as well as agricultural and forest runoff, is effectively controlled and managed in an integrated way; loadings of toxics, nutrients, and pathogens do not exceed levels consistent with healthy ecosystem function; shellfish populations are healthy and abundant; the threat and severity of oil-spills is minimized; and our legacy of pollution impacts in Puget Sound are addressed and cleaned up.

This chapter describes nine overarching strategies that are essential to reduce and control the sources of pollution to Puget Sound:

- **C1** – Prevent, reduce, and control the sources of toxic contaminants entering Puget Sound;
- **C2** – Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales;
- **C3** – Prevent, reduce, and control aagricultural runoff;
- **C4** – Prevent, reduce, and control surface runoff from forest lands;
- **C5** – Prevent, reduce, and/or eliminate pollution from decentralized wastewater treatment systems;
- **C6** – Prevent, reduce, and/or eliminate pollution from centralized wastewater systems;
- **C7** – Abundant, healthy shellfish for ecosystem health and for commercial, subsistence, and recreational harvest consistent with ecosystem protection;
- **C8** – Effectively prevent, plan for, and respond to oil spills;
- **C9** – Address and clean up cumulative water pollution impacts in Puget Sound.

The 2020 ecosystem recovery targets most related to reducing and controlling the sources of pollution are: freshwater water quality; marine sediment quality; toxics in fish; insects in small streams; dissolved oxygen in Puget Sound; management of on-site sewage systems; swimming beaches; shellfish bed recovery.

Prevent, Reduce, and Control the Sources of Contaminants Entering Puget Sound

The Challenge

For decades, humans have released toxic chemicals, nutrients, and pathogens into Puget Sound and its watersheds through a variety of activities. Concerns about the possible harmful effects of these contaminants led to the creation of Washington's Pollution Control Commission in 1945, almost 30 years before the federal Clean Water Act, as well as the Puget Sound Water Quality Authority in 1985. While these and other federal and state efforts have been important at addressing threats to water quality, many sources continue to release contaminants to the water, air, and lands of the Puget Sound basin.

Contaminants of concern for Puget Sound include excess nutrients, pathogens, sediments, and toxic chemicals. Human-caused releases of excess nutrients, pathogens, and sediments can harm aquatic life and the human uses of fresh and marine waters. A number of toxic chemicals used by humans (e.g., pesticides, industrial chemicals) are released to the Puget Sound environment where they harm or threaten harm to biota and humans. Among toxic chemicals, persistent, bioaccumulative, toxic (PBT) chemicals raise special challenges because they remain in the environment for a long time and accumulate in people and in the food chain. They also can travel long distances and generally move easily between air, land and water. Prevention is especially important for PBT chemicals, since they can remain in the environment and continue to harm wildlife. One example is PCBs, which were banned more than 30 years ago, but remain in the environment and continue to harm wildlife and people. An effective way to reduce and control problems from all types of pollution is to prevent the initial release of contaminants to the environment.

In 2007, Washington became the first state in the country to ban specific polybrominated diphenyl ethers (PBDEs) because of human health and environmental concerns. More recently, Washington State enacted laws banning the use of bisphenol A (BPA) in children's bottles and other containers, banning the use of lead wheel weights to balance tires, and restricting the amount of copper in vehicle brake pads. Starting in 2012, manufacturers of children's products in Washington will be required to report to Ecology if their products contain chemicals on a list of chemicals of high concern to children, under the Children's Safe Products Act (CSPA).

PUGET SOUND TOXICS ASSESSMENT

In 2011, the Department of Ecology, in coordination with PSP and other organizations, completed a multi-year study of toxic chemicals in Puget Sound. The 17 chemicals evaluated in this study were selected based on the threat or known harm to biota, the broad range of conveyance pathways, and the availability of monitoring data. These chemicals of concern include metals, petroleum, persistent bioaccumulative toxic (PBT) chemicals such as PCBs, and contaminants of emerging concern, including endocrine disrupting compounds. Of the 17 chemicals, only five have been restricted nation-wide under the federal Toxics Substances Control Act (TSCA). Additional contaminants of emerging concern, such as those from pharmaceutical waste, personal care products, and plastic pollution, may also be important toxic threats to Puget Sound, although much less is known about the exposures and effects of those contaminants in Puget Sound.

The Puget Sound Toxics Assessment found that:

- Levels of copper, mercury, PCBs, PBDEs, dioxins and furans, DDT and related compounds, and PAHs occur at levels in the Puget Sound basin associated with documented or potential adverse effects to a variety of aquatic organisms.
- Sources of toxics are varied and include vehicles, pesticides, industrial air emissions, combustion emissions, and leaching or off-gassing of toxics from products in the environment. Industrial, commercial, and institutional point sources do not account for the largest releases of toxic chemicals; a variety of diffuse sources account for the majority of toxic chemical releases.
- Runoff and leaching from roofing materials appears to be a large source of release of metals
- Vehicle-related releases – from wear of vehicle components, combustion of fuel, and leaks of motor oil and fuel – contribute large amounts of a variety of contaminants (e.g., copper, zinc, PAHs, dioxins and furans)
- Toxic chemicals move into Puget Sound aquatic habitats through numerous pathways, including surface runoff, air deposition, discharges from industrial sources and wastewater treatment plants, groundwater discharges, CSOs, spills, contaminated sediments, exchange with oceanic waters, and biological transport.
- Surface runoff or stormwater is the primary way that many of the contaminants evaluated in this study enter Puget Sound. Runoff from commercial/industrial lands typically has the highest concentrations. Due to the large of forests in the Puget Sound basin, considerable loads of contaminants are delivered to aquatic environments in runoff from forest-covered lands.
- Atmospheric deposition of contaminants to surface waters is an important loading pathway for PBDEs and some PAHs.

The assessment concludes that:

- Priorities for source control actions should focus on copper, PAHs, bis(ethylhexyl)phthalate, and petroleum
- High priority should be given to implementing control strategies to prevent the initial release of contaminants
- Source control strategies should focus on reducing or treating stormwater inputs, especially identifying and controlling contaminant releases from existing and new developments
- Source control strategies should be developed around reducing contaminant inputs from vehicles
- Field investigations should be conducted to improve information about runoff and leaching from roofing materials

For more information see Ecology reports:

- *Assessment of Selected Toxic Chemicals in the Puget Sound Basin*, 2007-2011 (Publication No. 11-03-055)
- *Primary Sources of Selected Toxic Chemicals and Quantities Released in the Puget Sound Basin* (Publication No. 11-03-024)

This strategy is focused on source-reduction efforts to keep chemicals and other contaminants from being used or generated in the Puget Sound region or released to the Puget Sound environment. This strategy includes reducing and restricting the use of toxic chemicals, controlling initial releases of contaminants to the Puget Sound environment, and improving how businesses and other entities use and manage chemicals and other contaminants through technical assistance, education, inspections, and targeted enforcement efforts. Other strategies in Priority C deal with efforts to control specific pathways of delivery, such as wastewater and stormwater pollution, and to clean up areas where pollution has occurred. For instance, while this strategy includes approaches for reduced releases of contaminants to wastewater treatment plants, much of what we think of as wastewater controls is presented in strategies C5 and C6. Similarly, controlling sources contaminants to reduce the levels of pollution entrained in stormwater and surface runoff is addressed in this strategy but other aspects of management of urban stormwater and runoff from agricultural and forest lands are presented in strategies C2, C3, and C4.

Sub-strategies and actions to reduce the release of contaminants to the Puget Sound environment include governmental and non-governmental actions to implement and strengthen authorities and programs to prevent chemical releases to the Puget Sound environment; adopt and implement plans and control strategies to address air pollutant emissions and discharges from vessels; increase compliance with and enforcement of environmental laws and standards; develop safer alternatives to chemicals; and provide education and technical assistance.

Climate Change

Climate change impacts on precipitation timing including seasonal streamflow, more severe winter flooding, and more frequent and extreme storm events, will likely increase runoff from stormwater. Preventing, reducing, and controlling contaminants before they reach land and water is important part of preparing for this increase in runoff.

Contaminant related strategies and actions are generally addressed in *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy (April 2012)* in the priority strategies to reduce the vulnerability of coastal communities, habitat and species, as well has those to address stormwater covered in Action Agenda Section C2.

Relationship to Recovery Targets

Preventing the introduction or release of contaminants to the water, air, and lands of the Puget Sound basin is essential to achieving several recovery targets. These include ensuring that by 2020, the levels of specific toxic chemicals, including PCBs, PDBEs, and polycyclic aromatic hydrocarbons (PAHs), and other endocrine-disrupting compounds, are below threshold levels in fish tested in Puget Sound; marine sediments in Puget Sound bays and regions show minimal impacts from toxic chemicals in marine sediment quality indicators; shellfish beds are restored for harvest; and swimming beaches are safe for swimming (meet standards). These strategies also help achieve other recovery targets, including decreasing the number of impaired freshwater bodies, improving the average benthic invertebrate index scores of 30 lowland watersheds from "fair" to "good," and other water quality improvements to achieve by 2020.

Local Priorities

Local Integrating Organization	Priorities
South Central	*Top Priority* • Keep toxics and excess nutrients out of stormwater runoff and wastewater.
Strait of Juan de Fuca	*From 19 Strategic Priorities* • Toxic Source Reduction Programs - Improve, develop, and implement toxics source reduction programs and projects
Stillaguamish-Snohomish Watersheds, Island Watershed and Skagit Watershed	The importance of controlling toxics has been discussed as potential strategy in these three areas.

C1. Prevent, reduce, and control the sources of contaminants entering Puget Sound

C1.1 Implement and strengthen authorities and programs to prevent toxic chemicals from entering the Puget Sound environment.

Based on a priority of EPA Administrator Lisa Jackson, EPA has announced plans to reauthorize TSCA to reform and strengthen the effectiveness of the nation's chemical management legislation. Ecology, environmental agencies from other states, and various NGOs are involved in the TSCA-reform efforts. EPA is also implementing a Phthalates Action Plan, which includes issuing rulemakings under TSCA by 2012 to regulate eight phthalates. Ultimately, keeping toxic substances out of our waters will require more effective federal legislation. Until TSCA and other federal statutes are updated, states need to continue to address chemicals of concern.

Ecology has a Reducing Toxic Threats initiative that aims to prevent the use of toxic chemicals, assist businesses to reduce or manage the amount of toxic chemicals that enter the environment, and clean up toxics that have polluted the air, land, or water. Key focus areas include reducing the use of toxics in products and preventing toxics from entering stormwater. In its efforts to reduce and help phase out PBT chemicals, Ecology develops Chemical Action Plans (CAPs), which identify, characterize, and evaluate all uses and releases of a specific toxic chemical, and then recommend actions to protect human health and the environment. Past CAPs have addressed lead, mercury, and PBDEs. Ecology began focusing specifically on PAHs in 2010 as part of the Puget Sound Toxic Loading Study and plans to complete a CAP for PAHs by 2012. Results from the Puget Sound loading analysis identify wood smoke, creosote-treated lumber, and vehicle emissions as the largest sources of PAHs in Puget Sound.

These federal and state toxics control programs are complemented by an array of toxics reduction initiatives of local hazardous waste programs and environmental organizations such as the Washington Toxics Coalition and People for Puget Sound. These efforts are further discussed in the technical assistance and education sub-strategy below, C1.4. To be fully effective, federal, state, and local entities in the U.S. will also need to collaborate with Environment Canada to address transboundary sources of toxic contaminants in Puget Sound. This sub-strategy helps reduce the release of toxic chemicals to the

Puget Sound environment by continuing and enhancing programs that prevent the release of chemicals. Based on the priorities of Ecology's Reducing Toxic Threats Initiative and the findings of the Puget Sound Toxics Assessment, the near-term actions in this sub-strategy focus on preventing pollution that enters Puget Sound from a few key sources: vehicles, pesticides, and toxic pollutants in air emissions (also discussed in C1.3). Actions to address pesticide use are covered here and under the agricultural runoff strategy (C3). The Department of Ecology and its partners are specifically focusing in the near term on addressing chemicals of concern in Puget Sound as evaluated in the Puget Sound toxics assessment. However, it will also be important to better understand and characterize any potential threats to Puget Sound from contaminants of emerging concern, such as pharmaceuticals, personal care products, and micro-plastics, and then develop appropriate toxic-reduction strategies to address the most important problems.

Ongoing Programs

Over the next few years, Ecology's Reducing Toxics Threats Initiative plans to support congressional reform of TSCA, develop rules by December 1, 2012 to implement the state law relating to brake friction material, complete and implement the CAP for PAHs, establish a mercury lamp product stewardship program, and complete a CAP for PFOS (perfluorooctane sulfonate, a PBT chemical). Key performance metrics in evaluating the success of toxics efforts include the number and volume of chemicals of high concern to children replaced with safer alternatives and reduced environmental levels of toxics in fish, the primary exposure route to humans through consumption. Statewide, Ecology also has an overall target of reducing the amount of hazardous materials used by 2 percent per year, and a specific target of collecting or capturing an additional 1,500 pounds of mercury over 2011–2013. Ecology has been awarded a Toxics and Nutrient Grant from EPA's National Estuary Program, which provides funding for toxics reduction efforts in Puget Sound. This grant can be used to help implement near-term actions identified in the Action Agenda to reduce toxic threats.

Key Ongoing Program Activities

- By December 1, 2012, Ecology will develop rules to implement the state law relating to limiting copper used in vehicle brake friction material and will track the pounds/year of copper reduced. Brake pads and shoes manufactured after January 1, 2015, must not contain asbestos, lead, cadmium, mercury, or chrome (VI). Brakes manufactured after this date must also be marked to indicate the amount of copper they contain.
- The auto shred task force chartered by Ecology will issue its recommendations regarding how to reduce the amount of toxic chemicals present in all shred residue from shredding automobiles and other metal objects by 2012. In 2013, Ecology will begin implementation of the recommendations for an all shred residue program to reduce the amount of toxic chemicals in shred residue.
- After the completion of the PFOS CAP in 2013, Ecology will review the PBT list and prioritize the next PBTs for CAPs with a multi-year schedule. Ecology will also determine if it is necessary to revise the PBT Rule to update the list of PBTs. Rulemaking would be required if revisions are needed.

Near-Term Actions

C1.1 NTA 1: PAH and PFOS Chemical Action Plans. Ecology, working with its partners, will complete a PAH CAP by 2012 and a CAP for PFOS or all perfluorinated compounds (PFCs) by

2014, and begin to implement the recommendations from the Plans. (Wood smoke actions in the PAH CAP will build from the control strategies outlined in the Tacoma SIP for fine particulates. The PAH CAP may also include recommendations to reduce PAHs from incomplete combustion and/or other sources. The PFOS/ PFC CAP will include an evaluation of safer alternatives and recommendations for reducing use of PFOS and/or PFCs.)

Performance measure: PAH and PFOS or PFC chemical action plans completed or not; pounds/year of PAH reduced.

C1.1 NTA 2: Mercury Lamp Product Stewardship. Ecology will establish a mercury lamp product stewardship program by 2013.

Performance measure: Program established or not; pounds per year of mercury collected.

C1.1 NTA 3: Fish Consumption Rates. Ecology will, as soon as possible, establish accurate default fish consumption rates that are reflective of actual consumption rates of vulnerable populations who consume fish and shellfish from the Sound at a subsistence level and children who, by virtue of lower body mass may be disproportionately affected by toxins in their food supply. Ecology will complete the rulemaking processes for Sediment Management Standards, incorporating the revised and accurate fish consumption rate, no later than the end of 2013; the water quality rule shall be guided by Ecology's September 2011 draft Fish Consumption Rates – Technical Support Document and other appropriate relevant information as it becomes available. Ecology will report to the Leadership Council at least quarterly, beginning in October 2012, on the plan and progress towards adoption of a fish consumption rate.

Performance measure: Ecology establishes accurate default fish consumption rates as soon as possible; rulemaking process for Sediment Management Standards complete by the end of 2013; reports to the Leadership Council at least quarterly, beginning in October 2012.

C1.1 NTA 4: Estimates of Copper in Pesticides. The Washington Department of Agriculture will work with Ecology to review and refine estimates of the agricultural and non-agricultural release of copper from pesticide use in the Puget Sound basin and publish a summary report by December 2012. This report is one element as part of a process to evaluate copper loading in Puget Sound.

Performance measure: By December 2012, WSDA publishes a report describing opportunities to refine estimates of agricultural and non-agricultural release of copper from pesticide use in the Puget Sound basin. This will involve evaluating the 2004 report completed for the San Francisco Bay estuary, reviewing the assumptions used in the Puget Sound loading study, assessing changes in registration status of copper containing pesticides, and comparing and contrasting use patterns in Washington and California. Copper release information is used to evaluate surface water monitoring data collected in 2012.

C1.1 NTA 5: Pesticide Use Survey. By December 2013, Washington Department of Agriculture, in partnership with the USDA National Agricultural Statistics Service and coordination with PSP, will complete survey work and publish a report of refined estimates of primary releases of copper from non-agricultural pesticide use in the Puget Sound basin. This includes conducting a pesticide use survey of homeowners within the Puget Sound basin. In addition, WSDA will survey commercial and public applicators to provide a more complete profile of urban pesticide use. The results will be used to further refine the estimates for urban pesticide use (including copper compounds) as a source of toxic chemicals released to the Puget Sound environment This work is one element as part of a process to evaluate copper loading in Puget Sound.

Performance measure: By November 2012, survey drafted and distributed to 9500 homeowners. Report produced by December 2013. Discuss findings and next steps with the Leadership Council by March 2013. Copper use information is used to evaluate surface water monitoring data collected in 2012.

C1.1 NTA 6: Emerging Contaminants. Ecology and PSP will assemble information on chemicals of emerging concern, beyond the 17 chemicals of concern in the Puget Sound Toxics Loading Studies, including PBTs, endocrine disruptors, other chemicals, and nanotechnology and nanomaterials, and will recommend actions to (1) better understand the threats to Puget Sound and (2) address the highest priority problems.

Performance measure: By December 2013, Ecology will publish recommendations for actions to understand and address emerging contaminants.

In addition, actions related to removal of creosote pilings and derelict vessels are described in B3.

C1.2 Promote the development and use of safer alternatives to toxic chemicals.

Governmental and non-governmental green chemistry and green design initiatives such as EPA's Design for Environment Program help evaluate and promote products and process alternatives that are cost effective and safer for the environment. Green chemistry refers to the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances. Green design or Design for Environment refers to an approach for designing products or processes that minimizes negative environmental impacts throughout the life cycle of the product; often this includes replacing toxic material inputs with less toxic or non-toxic alternatives. This sub-strategy complements the sub-strategies focused on reducing the use of toxic chemicals through regulations, enforcement, technical assistance, and education by ensuring that safer alternatives to problem chemicals, formulations, and/or products are available for businesses and consumers to use.

Ongoing Programs

Activities to support the development and use of safer alternatives to toxic chemicals include developing new alternatives through green chemistry approaches, conducting assessments of alternatives, and providing guidance and training to assist organizations with their efforts to find safer alternatives. Ecology's Reducing Toxic Threats Initiative has identified several priority activities related to spurring the development of safer alternatives to toxics for 2011–13 and beyond, including:

- *Strategy Development*: Create a green chemistry roundtable "roadmap" for the state and implement recommendations, including establishing a green chemistry center.
- *Guidance Development*: Work with certain member states of the Interstate Chemicals Clearinghouse (IC2) to develop a chemical alternative assessment guidance document. Ecology also plans to develop a case study portfolio.
- *Alternatives Assessment*: Perform an assessment of five chemicals to identify safer alternatives (if grant funding is received).
- *Education and Training*: Train businesses on GreenScreen™ Version 1.2 (a tool to help businesses to evaluate the toxicity of various chemicals), train staff on a Quick Chemical Assessment Tool (a tool based upon the GreenScreen™ to evaluate alternatives to toxic chemicals), and conduct a green chemistry workshop for high school teachers.

Overall, by reducing toxic chemicals in products and promoting safer alternatives, Ecology aims to achieve the following statewide, quantitative performance targets:

- Reduce the annual pounds of hazardous materials used by two percent per year.
- Collect/capture an additional 1,500 pounds of mercury in FY2012–FY2013.

As part of its Phthalates Action Plan, EPA intends to conduct a Design for Environment and Green Chemistry alternatives assessment by 2012 to assist with phthalate rulemakings under TSCA and the identification of safer alternatives. EPA's alternative assessment will present data on the hazards associated with the eight phthalates found in Ecology's list of chemicals of high concern to children.

Key Ongoing Program Activity

- The EPA Design for Environment Program will complete an assessment of alternatives to commercial uses of phthalates in 2012 as part of its Phthalates Action Plan. By 2013, Ecology will interpret the data provided in EPA's phthalate alternative assessment, as well as other sources, and recommend alternative(s) to phthalates in specific applications. Ecology will also incorporate the information on safer alternatives into its guidance materials and technical assistance efforts and recommend and take actions to reduce phthalates entering Puget Sound. Future efforts will incorporate the recommendations of the Sediment Phthalate Workgroup, which provided recommendations on sediment recontaminated by phthalates in stormwater.

Near-Term Actions

C1.2 NTA 1: Chemical Alternatives Assessments. By 2013, Ecology will work with the Interstate Chemicals Clearinghouse (IC2) to develop a guidance document on chemical alternatives assessment and, depending on funding availability, will complete assessments of five chemicals to identify safer alternatives.

Performance measure: Draft guidance document issued in September 2012.

C1.2 NTA 2: Toxics in Roofing Materials. By 2013, Ecology will establish a task force that will oversee a study evaluating toxic materials (including toxic metals and, possibly, phthalates) in roofing materials and recommend strategies for promoting less-toxic alternatives or ways to use materials that minimize releases of toxic materials to

receiving waters. To support the task force's work, Ecology will solicit information from manufacturers on the presence of toxic chemicals in roofing materials. Using any data from manufacturers or previously published studies, Ecology will create and implement a sampling strategy to assess the release of contaminants from different roofing materials. The task force will use this information to develop its recommendations.

Performance measure: Ecology will have a draft report of study findings by June 2013. The Task Force will have recommendations on strategies to promote safer roofing alternatives by December 2013.

C1.2 NTA 3: Green Chemistry Road Map. In 2012, Ecology and business, government, and academic stakeholders will finalize and begin implementing a green chemistry road map for Washington, including efforts to establish a Washington State green chemistry center. By 2013, Ecology will host a green chemistry conference in the region.

Performance measure: Green chemistry road map developed or not; green chemistry center established or not; green chemistry conference held or not.

C1.3 Adopt and implement plans and control strategies to reduce pollutant releases into Puget Sound from air emissions.

One of the ways that toxic chemicals enter Puget Sound is through air emissions. Sources include vehicle emissions, air emissions from business and industry, and combustion emissions from wood stoves and fire places, among others. There are numerous woodstoves contributing to emissions; for example, in Pierce County, there are more than 25,000 uncertified stoves in the air quality non-attainment area alone. Statewide, Ecology has completed close to 9,000 retrofits on school buses and publicly owned fleets to reduce diesel emissions, resulting in large gains for public health; however, private fleets and vehicles are still large contributors to regional air quality issues. Private heavy duty trucks, locomotives, ships, and construction equipment all contribute large quantities of soot, PAHs, oils, and other toxics to the environment, and much of that ends up washing downstream into Puget Sound. This sub-strategy focuses on adopting air quality plans and requirements to reduce toxic air emissions, such as through SIPs to meet stricter National Ambient Air Quality Standards (NAAQS), and implementing the plans to achieve the reductions needed to meet the air quality goals. Over the longer term, there is also a need to improve air quality laws, regulations, and guidance to protect public health and the environment from air toxics.

Ongoing Programs

Air quality requirements will be tightening over the next several years, as EPA adopts new air quality standards for fine particulates and ozone, and as the boundaries of non-attainment areas in Puget Sound and elsewhere are subsequently redrawn. EPA adopted revised air quality standards for nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) in 2010 and is currently reviewing the air quality standards for fine particulates (PM 2.5). The ozone standard will likely be revised next in 2013. After adopting standards, EPA designates non-attainment areas, which are geographic areas that do not meet the standards, and

then states need to prepare revised SIPs that outline emissions reductions and control strategies needed to meet the standards.

With the changes in air quality standards over the next several years, the number of nonattainment areas in Washington is expected to increase from one to four or more. The Tacoma/Pierce County State SIP for fine particulates is due in 2012, and the necessary regulations will be adopted in 2013. New non-attainment areas for fine particulates are expected to be designated in Washington in 2012, and this will lead to modeling of particulate emissions and the identification of control strategies by 2014. Additional monitoring for NO_2 and SO_2 will begin in 2012, driven by the revised standards. Ecology is also continuing its efforts to reduce diesel emissions. Through the state budget process, Ecology has secured $7 million to assist local governments to outfit their diesel equipment with technology that would allow them to shut down their main engines while continuing to keep lights and radios functional. Ecology is also working with fire districts and emergency departments to reduce diesel idling emissions from fire trucks, emergency vehicles, and aid units.

An important aspect of air quality management in the region is inter-jurisdictional coordination, as sources of air pollutant emissions come from both within and outside the Puget Sound basin. For example, the NW AIRQUEST Consortium (Northwest International Air Quality Environmental Science and Technology Consortium), which encompasses Washington, Oregon, Idaho, Montana, Alaska, British Columbia, and Alberta, seeks to develop, maintain, and enhance a sound scientific basis for air quality management decision-making in the Pacific Western Region of North America. The SIPs that Ecology develops for specific non-attainment areas within Puget Sound consider the effects of transboundary air pollution and information from regional data centers such as NW AIRQUEST.

Key Ongoing Program Activities

- Ecology will complete development of a SIP for the Tacoma/Pierce County air quality non-attainment area for PM 2.5 by 2012, and will adopt the necessary regulations by 2013.
- Ecology will complete a statewide anti-idling regulation by July 1, 2013 to reduce petroleum emissions to the air. The regulations would be designed to reduce diesel soot, PAHs, and greenhouse gases from petroleum-powered engines and equipment.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

C1.4 Provide education and technical assistance to prevent and reduce releases of pollution.

This sub-strategy involves developing toxic chemical control and nutrient reduction strategies to encourage homeowners, businesses, and others to adopt behaviors that reduce their contribution to pollution. Numerous government and non-governmental organizations around Puget Sound have education and technical assistance programs; these include local stormwater, wastewater, and solid waste utilities; educational organizations such as Washington Sea Grant, Washington State University extension, and other colleges, universities, and schools; and non-profit and community-based organizations. Examples of programs that are particularly relevant to toxics reduction include:

- ***Local source control program*** is a partnership among Ecology and 25 local government jurisdictions that focus business technical assistance to prevent stormwater pollution and improve hazardous waste management practices. Local source control specialists help small businesses stop pollution that could harm Puget Sound.
- ***EnviroStars*** is a program that originated in 1995 in which local governments in six Puget Sound counties provide assistance and incentives for small businesses to reduce hazardous materials and waste, in order to protect public health, municipal systems, and the environment.
- ***People for Puget Sound*** works through education and action to protect and restore the land and waters of the Puget Sound basin. The organization has developed a series of fact sheets and communication resources on toxics threatening Puget Sound.
- ***PSP Stewardship Program*** is the Partnership's education and outreach effort to help people understand the threats to the Puget Sound ecosystem and what actions they can take to reduce toxic contaminants, nutrients, and other pollution into the Sound.
- ***STORM*** (Stormwater Outreach for Regional Municipalities) is a coalition of more than 60 municipal stormwater permitees in the Puget Sound region. These counties and cities work collaboratively to deliver relevant, vetted, coordinated stormwater messages and social marketing to the region's 4.5 million residents. STORM is a principal partner in the Puget Sound Starts Here campaign.
- ***Puget Sound Starts Here*** is a partnership of local governments, the Puget Sound Partnership, Department of Ecology, and local organizations that are part of the Partnership's ECO-Network. PSSH leverages the combined investments of all these organizations, and provides consistent public awareness and education messages across the twelve county Puget Sound region. Using state of the art communications techniques, it provides a regional communications umbrella to support and enhance the effectiveness of local stormwater program delivery.
- ***Take Back Your Meds*** is a group of organizations that support a statewide program for safe return and disposal of unused medicines to reduce access to addictive drugs, prevent poisonings, and reduce environmental contamination; it has a series of locations such as pharmacies where medicines can be dropped off.
- ***Washington Toxics Coalition*** advocates for policy changes to reduce toxic pollution, promotes safer alternatives to toxics, and educates people to create a healthy environment. Informational resources include strategies for reducing toxics at people's homes and gardens, in food, and in products children use.

These and other programs have had success in reducing the use and releases of toxic chemicals to our environment; however, funding constraints have limited the extent of implementation and, therefore, the results that have been achieved. Several existing EPA grants for Puget Sound-specific funding can be used for education and technical assistance; these include grants for work on toxics and nutrients, watersheds, and public engagement and stewardship, with Ecology and the Partnership serving as lead organizations.

Ongoing Programs

Ecology's Reducing Toxic Threats Initiative has several performance objectives and priority activities that relate to education and technical assistance for the 2011-13 biennium. Education-related objectives include developing a "Chemicals in Washington" report, responding to information requests from the "Toxic Free Tips" phone line and email, increasing distribution of Ecology's "Shoptalk" newsletter, increasing hits to Ecology's Hazardous Waste and Toxics Reduction Program website, and developing a

marketing strategy for sharing pollution prevention success stories. Statewide performance objectives and activities related to technical assistance include:

- Document 150,000 ponds in lead, mercury, and cadmium reductions from businesses reporting via the Toxics Release Inventory (TRI).
- Reduce annual pounds of hazardous waste generated overall by 4 percent annually, with a long-term goal of 80 percent statewide reduction from 1990 levels by 2020.
- Through the Local Source Control Partnership, fund local government agencies to conduct 600 small business technical assistance visits per quarter to explain hazardous waste requirements to small businesses and prevent sources of polluted runoff to Puget Sound and the Spokane River. (Ecology currently has funding from EPA to support local source control inspections in the Puget Sound region.) Ecology prepares a biennial progress report on the Local Source Control Program describing program activities and results.
- Ecology staff will conduct 520 compliance-related technical assistance visits during 2011–13 to help businesses determine how to manage their hazardous wastes and reduce toxics use.
- Develop policy guidance on safe hazardous waste management and toxics use reduction for hospitals, used paint recycling, and auto shred residue.
- Create web-based dangerous waste workshop module for business technical assistance.
- Receive and review 100 percent (approximately 450) of pollution prevention plans received annually from businesses and facilities.
- Visit or assist 100 percent of pollution prevention planner facilities using or producing waste containing lead, mercury, or cadmium (about 25 toxic metal visits per quarter).
- Conduct 2–4 detailed technical assistance projects annually and 20 energy assessments.

In addition to these toxics and hazardous-waste focused programs, state, tribal, and local agencies and non-governmental organizations across Puget Sound also have education and assistance programs that focus specifically on preventing and reducing water pollution problems, including the following two ongoing program activities. Additional programs are discussed in other strategies in Section C.

Key Ongoing Program Activities

- EPA and Ecology will continue to support and expand the Local Source Control Partnership in Puget Sound in which local jurisdictions provide education and technical assistance to small businesses to prevent pollution and reduce sources of polluted runoff.
- Ecology will continue to support site visits and other technical assistance for pollution prevention planner facilities in the state that use or produce waste containing lead, mercury, or cadmium to help them to reduce their hazardous wastes.

Near-Term Actions

C1.4 NTA 1: Landscaper Accreditation. The landscape industry, in cooperation with other stakeholders, will establish a sustainable landscaper accreditation program to promote environmentally friendly landscape development and maintenance practices. Ecology will support this effort by providing start-up funding. The industry-led program will be designed to improve habitat and water quality by reducing the use of pesticides containing toxic chemicals, reducing the use of fertilizers, reducing use of water for irrigation, reducing runoff from landscaped properties, increasing natural

stormwater filtration, reducing emissions from landscape equipment, and encouraging the use of native or other plants that provide riparian shade, support native pollinators, and require less pesticide, fertilizer, and water.

Performance measure: By December 2013, the organization identified to administer the accreditation program shall industry representatives will publish a report describing the program and/or next steps in establishing such a program.

C1.4 NTA 2: Environmentally Preferable Purchasing. By 2013, Ecology will work with the new Washington Department of Enterprise Services to develop environmental opportunity assessments for 6–10 contracts; these assessments will identify environmentally preferable purchases that could help reduce toxic pollution while seeking best value for the state. Best value includes looking at price, performance, availability and environmental considerations when developing and awarding contracts.

Performance measure: Number of completed "environmental opportunity assessments" for Department of Enterprise Services contracts, number of environmentally preferable purchases completed based on the assessments, pounds of hazardous wastes reduced per year.

C1.4 NTA 3: Conduct Local Source Control Business Assistance Visits. By July 2013, local governments, under contract with Ecology, will conduct at least 5,000 local source control visits to help small businesses reduce stormwater pollution and improve hazardous waste management.

Performance measure: Number of local source control visits completed per year.

C1.5 Control wastewater and other sources of pollution such as oil and toxics from boats and vessels.

Establishment of a No Discharge Zone (NDZ) along with sufficient and convenient pump out capacity and an effective outreach and education program will reduce pollution from vessels. The availability of sewage pump-out stations, the importance of the water body for human health and recreation, and the desire for more stringent protection of a particular aquatic ecosystem are important considerations in the designation of NDZs for vessel sewage. Discharge of untreated or partially treated human wastes from vessels sends toxic chemicals as well as pathogens, such as fecal coliform and viruses, into the water and increases human health risks. Excessive amounts of nutrients from vessel sewage exacerbate the known nutrient and low dissolved oxygen problems in Puget Sound.

In addition to wastewater management, boats and vessels have the potential, because they are operated in the marine environment, to be a source of other pollutants to Puget Sound. These include oils, greases, paints, soaps and trash. Programs like the Clean Marina program, a collaboration between Puget Soundkeeper Alliance, Northwest Marine Trade Association, EnviroStars Cooperative, Washington Sea Grant, Ecology, DNR, and the State Parks and Recreation Commission work with marinas to help boat owners reduce and eliminate all sources of pollution to Puget Sound.

Ongoing Programs

Using National Estuary Program grant funds, Ecology and DOH coordinate with State Parks' Clean Vessel Program to inventory and improve existing pump-out facilities, gauge stakeholder support, and determine the geographic scope of a NDZ. This work will culminate in a draft petition to EPA for the designation of a NDZ by fall 2013, with a final petition by the end of 2016. Expected performance measures include:

- Improved pump-out capacity
- Successful designation of NDZ in Puget Sound
- Reduction in vessel sewage discharged into Puget Sound

Near-Term Actions

C1.5 NTA 1: No Discharge Zone Evaluation and Petition. Ecology, in collaboration with State Parks and EPA, will administer grants to fund the development of a petition to EPA to establish a No Discharge Zone to prohibit recreational and commercial vessels from discharging sewage in all or parts of Puget Sound.

Performance measure: Completion of draft elements of an evaluation by July 2012 (Phase I); Completion of stakeholder outreach, surveys, geographical locations by July 2013 (Phase II); Completion of draft petition to EPA by September 2013.

C1.5 NTA 2: Pump-Out Station Improvements. Ecology and DOH, with National Estuary Program grant funding, will coordinate with Washington State Parks' Clean Vessel Program to assist in construction, repair and monitoring of pump-out stations to meet requirements of the NDZ petition.

Performance measures: Number of pump-out stations added or improved. Amount of sewage pumped out. Pump out capacity is able to support a NDZ designation.

C1.5 WS 9: West Sound Pump Out Stations. By January 2013, Kitsap Public Health will identify potential pump out stations and develop needs assessment to address marine vessel sewage.

Performance measure: To be determined.

C1.6 Increase compliance with and enforcement of environmental laws, regulations, and permits.

Local, state, and federal programs periodically inspect regulated facilities in Puget Sound to ensure compliance with applicable laws and regulations. These include air emissions control requirements under the Clean Air Act and the relevant SIP (as discussed in C1.3 above), industrial wastewater pretreatment requirements under the Clean Water Act (discussed in C6.1), and hazardous materials and waste management requirements such as the federal Resource Conservation and Recovery Act (RCRA) and the state Dangerous Waste and Pollution Prevention Plan regulations. This sub-strategy helps

assure compliance with environmental laws governing hazardous materials and waste through targeted enforcement of those laws. Many of the agencies that conduct compliance inspections, as well as some not-for-profit organizations, also have technical assistance programs that provide education, training, and assistance to businesses seeking to prevent pollution and emissions and improve facility operations (technical assistance efforts are discussed in strategy C1.4).

Ongoing Programs

Ecology has Puget Sound-specific funding from EPA for work in this area, under the Toxics and Nutrients grant award. Additional funding could allow Ecology staff to conduct more compliance inspections and follow-up activities to prevent and reduce toxic releases. Ecology has proposed the following performance measures for its hazardous waste compliance program for the next two years (these are statewide targets):

- FY2012: Conduct 345 compliance inspections, including 5 treatment, storage, and disposal (TSD) facilities and 82 large quantity hazardous waste generators. Attain a 39.5 percent or less chance of finding a significant environmental threat during a compliance inspection.
- FY2013: Conduct 410 compliance inspections, including 5 TSD facilities and 82 large quantity hazardous waste generators. Attain a 37 percent or less chance of finding a significant environmental threat during a compliance inspection.
- Respond to and close out 100 percent of hazardous-waste related complaints at Washington facilities (approximately 120-180 complaints per year).

Near-Term Actions

C1.6 NTA 1: Hazardous Waste, Wastewater, and Air Quality Compliance and Enforcement. Increase Ecology's hazardous waste, and wastewater compliance inspection and enforcement programs in the Puget Sound.

Performance measure: Number of compliance inspections completed per year, pounds of hazardous wastes and air pollutants reduced per year, volume of wastewater discharges reduced per year.

C1.6 NTA 2: Compliance for Use of Toxics in Products. Ecology will conduct compliance activities for state laws banning the use of toxic materials (e.g., PBDEs) in products, including taking appropriate enforcement actions against noncompliant products.

Performance measure: By June 30, 2013, Ecology will publish a report on product sampling and follow up actions taken.

C1.6 NTA 3: Water Quality Enforcement. Ecology, working with DOH, will increase the capacity for enforcement, and enforce all regulations pertaining to pathogens and contaminants that pollute waters of the state to ensure achievement of approved shellfish growing water certification.

Performance measure: By 2014 increase the number of inspections.

Emerging Issues and Future Opportunities

Specific longer-term activities to control sources of toxics that were identified during the Action Agenda update process include the following:

- If justified by findings from Puget Sound basin studies of pesticides, WSDA will work with Ecology and other partners to tailor pesticide management in the Puget Sound basin. A WSDA decision to adapt the management of pesticides in the Puget Sound basin will consider information about pesticide use (e.g., uses of copper containing pesticides, homeowner use of pesticides), refined estimates of pesticide contributions to toxic chemical loading, and surface water monitoring of pesticides.
- Ecology will continue to work with EPA and other partners to evaluate, recommend, and institute additional requirements to address threats posed by air toxics.
- Options should be evaluated for expanding the phase-out of copper bottom paint to include ships over 65 feet in length and/or commercial vessels of various sizes. A work group could be formed to develop recommendations related to an expanded phase-out.

Other ways that this strategy to reduce the sources of toxic chemicals entering Puget Sound could be advanced include the following items:

- Conducting scientific investigations of topics such as chemical causes of endocrine disruption (apparent as reproductive impairment) in Puget Sound fish, studies of the amount, fate, and transport of petroleum releases from drips and leaks, and gathering source data for PBT chemicals that were not included in the Puget Sound Toxics Loading Study.
- Exploring the possibility of additional authorities and/or voluntary agreements to have the private sector accept responsibility for product stewardship (e.g., targeting products that contain chemicals of concern). (Ecology already plans to develop a product stewardship program for lamps containing mercury.)
- Initiating a broad-based effort to investigate additional ways to reduce the release of toxic contaminants from vehicles and roadways (i.e., are there alternative means of ensuring the mobility of people and goods that would decrease the loads of toxic chemicals released to the environment?).
- Developing a chemical action plan or similar assessment and plan for reducing the use and releases of halogenated flame retardants. (This would be completed after a CAP on PFCs, depending on funding availability.)
- Addressing the use and application of sewage sludge.

Reduce Pressures on the Puget Sound Ecosystem from Runoff from the Built Environment

The Challenge

Urban stormwater runoff poses a high risk to the health of Puget Sound by causing two major problems.

First, the runoff transports a mixture of pollutants such as petroleum products, heavy metals, bacteria, nutrients, and sediments from construction sites, roads, highways, parking lots, lawns, and other developed lands with the following results:

- Urban stormwater is the leading contributor to water quality pollution in urban creeks, streams and rivers in the state.
- Urban stormwater is a significant contributor of toxics to marine sediment, including contaminated sites undergoing cleanup.
- Three species of salmon (Chinook, Summer Chum and Steelhead) and bull trout are listed as threatened species under the federal Endangered Species Act (ESA). Loss of habitat due to stormwater and development is one of the causes.
- Shellfish harvest at many beaches is restricted or prohibited due to pollution. Stormwater runoff is often one of the causes.
- Stormwater causes the death of high percentages of healthy coho salmon in Seattle creeks within hours of the fish entering the creeks before the fish are able to spawn.
- English sole are more likely to develop cancerous lesions on their livers in more urban areas. Stormwater pollutants likely play a role.
- Although more research is needed, there are some indications that urban stormwater runoff may contribute to the decline of eelgrass populations.

Second, during the wet winter months, high stormwater flows, especially long-lasting high flows, can:

- Cause flooding;
- Damage property; and
- Harm and render unusable fish and wildlife habitat by eroding stream banks, scouring stream beds and widening stream channels, depositing excessive sediment, and altering natural streams and wetlands.

In addition, more impervious surface area means fewer opportunities for water to soak into the ground. As a result, groundwater drinking water supplies may not replenished and streams and wetlands may

not be recharged. This can lead to water shortages for people and inadequate stream flows and wetland water levels for fish and other wildlife.

SALMON RECOVERY

Managing and Reducing Stormwater – A Salmon Recovery Plan Priority: Improvement in water quality is identified in the salmon recovery plan with a call to resolve uncertainty about whether the regional water quality actions address the needs of salmon. Volume I identifies general concerns related to stormwater runoff. Watershed chapters for WRIA 8 and WRIA 9 have strategies/actions related to stormwater and water quality. One item that is of particular interest in WRIA 8 and 9 but also in other watersheds is the issue of pre-spawn mortality of different species of salmon.

How these priorities are integrated: The Action Agenda contains more detailed strategies and actions to address stormwater runoff in the built environment than the Salmon Recovery Plan. While the Action Agenda addresses the general concerns in the Recovery Plan, the resolution about the effectiveness of actions still needs to be addressed.

A significant amount of the work completed for the 2011 Action Agenda Update was informed by the draft *Stormwater Vision and Financing Strategy for Puget Sound*, the *Task 1: Urban Stormwater Runoff Preliminary Needs Assessment Technical Memorandu*m (October 2010), and work by a subcommittee of the Ecosystem Coordination Board focused on stormwater funding. An interagency team of stormwater professionals used these foundation documents to suggest the draft sub-strategies and near-term actions contained in this section. The purpose of the *Stormwater Vision* is to suggest comprehensive actions and financing strategies that will reduce polluted surface runoff from urban and rural landscapes to Puget Sound.

The *Stormwater Needs Assessment* highlights (1) the needs for regional local governments to fully implement the municipal NPDES stormwater permit programs and (2) estimated costs to carry out stormwater retrofits (described below in the sub-strategy on existing development). Puget Sound municipal permit holders invested between $160–170 million in 2009 to implement the municipal permits. This figure represents a significant portion of the total they spent on stormwater management. While state and federal assistance via grants and loans are substantial (in FY 2011 the Department of Ecology (Ecology) disbursed $23.5 million for permit assistance and an additional $23.4 million for low impact development and retrofit projects), the state and federal portion of total costs pales in comparison to what local governments spent.

The Ecosystem Coordination Board (ECB) Stormwater Funding Subcommittee's report details recommendations that include the need for greater overall investment in stormwater management in the region and the need for more financial assistance to local governments, who currently shoulder the majority of costs. Current investments in addressing problems caused by existing development through structural retrofits are not nearly sufficient – the cost to retrofit existing development for treatment alone is estimated to cost, at a minimum, $3-16 billion (*Stormwater Needs Assessment*). Local stormwater utilities in many cases will need to be increased, and local governments need support to successfully raise local stormwater rates. Concurrently, the level of investment by the state and federal

government must be increased significantly to help share the burden of costs so that we can adequately address the scope of stormwater problems and meet related 2020 ecosystem recovery targets.

In addition to the strategy and sub-strategies presented here, the strategies to reduce land development pressures (A1, A2, A3, A4, A5, and B1 and 2) plus the toxics control strategies in C1 are essential to addressing stormwater.

Climate Change

Declining snow pack and loss of natural water storage, changes in precipitation timing including seasonal streamflow and more severe winter flooding, and more frequent and extreme storm events will likely strain our stormwater systems and increase the amount of polluted runoff flowing to Puget Sound. Potential impacts include:

- Winter flooding could strain the capacity of urban drainage infrastructure and result in more frequent combined sewer overflows.
- The intrusion of seawater due to increased melting of polar ice caps coupled with higher storm surges could damage equipment and strain the capacity of wastewater and stormwater systems.
- Backflow of water through stormwater pipes could cause localized flooding in low-lying areas. Drainage of low-lying areas will become more difficult and stormwater management may require installation of tide gates, control works, or pump systems.

To reduce the risk of damage to buildings, transportation systems, and other infrastructure is a high priority over-arching response strategy identified in *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy (April 2012)*, which directly relates to stormwater. This means identifying vulnerable areas and taking proactive steps to reduce risks to infrastructure and avoiding risks when siting new infrastructure, supporting local efforts to prepare for coastal flooding and storm surges and considering climate change impacts when new developments and infrastructure are sited.

Specific strategies related to stormwater include:

- **Managing water resources in a changing climate by implementing integrated water resources management approaches in highly vulnerable basins**. This includes developing guidance for whether and how to incorporate project climate information and adaptation actions into planning, policies and investment decisions. This will ensure that investments made now are not increasing future vulnerability and causing unintended consequences.
- **Building the capacity** of state, tribal and local governments, watershed/regional groups, water managers, and communities to identify and assess risks and vulnerabilities to climate change impacts on water. This includes making sure utilities have tools and modeling to integrate climate impact information into stormwater planning and design.
- **Enhance the preparedness of transportation, energy and emergency service provides to respond to more frequent and intense weather-related emergencies.** This includes early warning and adjustment of routine maintenance and inspection to prepare for more frequent and intense storms and floods.

The stormwater strategies and actions in the 2012 Puget Sound Partnership Action Agenda will need to be adapted over time to address climate change effects. This includes infrastructure siting and design, as well as prioritization criteria.

Local Priorities

Local Integrating Organization	Priorities
San Juan Islands	*Tier 1 Strategies* • Create effective compliance mechanisms for stormwater • Implement best management practices to reduce pollution of source wastes by residential runoff and non-point sources. *Tier 2 Strategies* • Restore native vegetation, trees, and ground cover. • Provide information to landowners about pollutants around the home and farm and provide information on proper storage and care. • Encourage Low Impact Development for new development and retrofits. • Provide information and work with the public regarding Low Impact Development (LID) so they can implement LID on their own properties, including farms. • Ensure coordination between planning and health departments on issuance of septic permits. • Implement San Juan Marine Stewardship Area Monitoring Plan, including the Stormwater Monitoring Plan.
Strait of Juan de Fuca	*Top Priorities* • Stormwater Management Program Updates and Implementation (Clallam, Jefferson, Port Angeles, Sequim, and Port Townsend).
South Central	*Key theme* To successfully advocate for state and federal funding for stormwater investments in Puget Sound, there needs to be a more refined assessment of total need and priorities across the region for retrofits, operation and maintenance, and source control. *Top Priorities* • Fund and implement stormwater retrofits, improvements to operations/maintenance of existing stormwater infrastructure, and additional source control measures. • Incorporate low impact development (LID) requirements into stormwater codes and develop and implement LID incentives. • Keep toxics and excess nutrients out of stormwater runoff and wastewater.
South Sound	*Strategic Initiative: Urban Stormwater/ Runoff* • Achieve a balance of local, state and federal funding for full implementation of NPDES) municipal stormwater permits, stormwater retrofitting and stormwater management on a watershed basis. • Work with Eatonville to manage their stormwater and domestic water consistent with salmon recovery objectives.

Local Integrating Organization	Priorities
Hood Canal	*High Priority* • HCCC is pursuing a stormwater retrofit program to identify and prioritize stormwater retrofit opportunities throughout the Hood Canal watershed. *Sample General Strategies* • Revise development code to incorporate current stormwater management practices, specifically by adopting and incorporating the most current Ecology stormwater manual. • Adoption of low impact development (LID) practices to be used as a first choice to the maximum extent practicable in new development, redevelopment, and retrofitting • Retention of natural land cover as the most effective way to prevent stormwater runoff.
West Sound	*High Priority* • Adopt and implement the most current stormwater and LID regulations and design guidance • Implement new stormwater program regulations that address vesting and create incentives for developers (upland areas in particular) to conserve ecosystem function. • Implement stormwater and LID Retrofit Plan projects in priority areas and continue stormwater and LID retrofit planning in other priority areas.
Whatcom	*Strategies under development* • Implement NPDES municipal and industrial permits • Continue implementing comprehensive stormwater management plans • Coordinate and support implementation of education and outreach plans associated with urban landscapes
Skagit Watershed, Stillaguamish-Snohomish Watersheds, Island Watershed	All three areas have discussed the important of implementing NPDES permits, stormwater retrofits in dense urban areas, and supporting low impact development efforts.

Relationship to Recovery Targets

The 2020 ecosystem recovery target for runoff from the built environment is native communities of insects in small streams of wading depth. This target was chosen because runoff from the built environment, also known as urban runoff, directly affects the structure, habitat, and fish and wildlife in small, wading-depth lowland streams of Puget Sound. Insects found in these small streams serve as strong indicators for the relative biological health of Puget Sound freshwater stream systems. If communities of native insects in these streams are plentiful and diverse, other biological components, including salmonids, should be healthy as well. A functioning, resilient Puget Sound requires lowland streams that support the salmonids and invertebrates native to this region, as indicated by benthic index of biotic integrity (B-IBI) scores. The target states that, "by 2020, 100 percent of Puget Sound lowland stream drainage areas monitored with baseline B-IBI scores of 42–46 or better retain these 'excellent' scores and mean B-IBI scores of 30 Puget Sound lowland drainage areas improve from 'fair' to 'good.'"

The Puget Sound Stream Benthos, a website developed by officials from the City of Seattle, King County, Pierce County, Snohomish County, and others provides a database that allows sharing of benthic macroinvertebrate data among organizations and provides tools for calculating metrics and indices. The database fulfills the goal of storing macroinvertebrate data in a manner that allows for reliable comparisons across sites and programs over time.

The stormwater runoff strategies in this section are designed to help achieve the target. In addition, these strategies help achieve targets for land development, land use and land cover, freshwater quality, shellfish beds, toxics in fish, and marine sediment quality. Finally, although more research is needed, there are some indications that urban stormwater runoff may contribute to the decline of eelgrass populations.

C2. Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales

C2.1 Manage urban runoff at the basin and watershed scale.

Urban runoff cannot be fully managed at the site and parcel levels alone – it is also necessary to manage runoff at the broader basin and watershed scales. Numerous regional and national studies show that as native vegetation and soils are replaced by rooftops, roads, and other hard surfaces, numerous environmental indicators decline. Local land use decisions (i.e., location, type, and intensity of development) directly affect urban runoff quantity and quality within watersheds. This sub-strategy addresses the need to protect native vegetation, soils, and high quality habitat; site new development appropriately; and better connect land use and stormwater management.

In addition to the sub-strategies listed in this section, the region must have a robust, effective program to regularly monitor and assess the effects of stormwater runoff on receiving waters and the effectiveness of best management practices (BMPs), programs and permit requirements in mitigating these effects. The ongoing monitoring and assessment work of the Stormwater Monitoring Work Group, Washington Stormwater Center and partners are described in strategy D4.

- **Protect native vegetation and high quality streams**. Protecting native vegetation, soils and high quality habitat, particularly in remaining stream drainages with "excellent" B-IBI scores through actions outlined in sections A and B, requires mapping locations of these streams, and carrying out strategies to protect the streams. This involves using tools such as the Puget Sound Watershed Characterization Project (Watershed Characterization), growth management and shoreline planning, critical areas and other land development regulations, proposed LID requirements in municipal National Pollutant Discharge Elimination System (NPDES) permits, stormwater management manuals, land conservation programs, landowner incentive programs, and other measures. More information on strategies and actions related to watershed characterization is described in strategy A1.1.
- **Site new development appropriately**. New development needs to be sited appropriately, using the watershed characterization study, Growth Management Act (GMA), Shoreline Management

Act (SMA), State Environmental Protection Act (SEPA), and other tools. The Watershed Characterization, other watershed plans, and, where needed, finer scale analyses can be used to identify areas most appropriate to protect, develop and restore through structural retrofits, legacy pollutant removal, and other means. Where development is targeted, smart growth concepts can ensure that compact, mixed-use, mass-transit supported development increases. More information on these issues is in A2, A3 and A4.

- **Better connect land use and stormwater management**. Land use planning and stormwater management need to be integrated. Development of watershed plans based on Watershed Characterization data that integrate land use planning and stormwater management could be accomplished by either (1) reactivating and funding Clean Water Act (CWA) Section 208 planning to include major land uses (urban, agricultural/rural, and forestry) and water resource elements such as stormwater, combined sewers, wastewater, water supply, reuse and non-point sources; or (2) supporting and funding the development of stormwater plans, watershed plans, or Water Resource Inventory Area (WRIA) plans that address the full spectrum of water resource elements and land use on a regional basis. The impacts of land use decisions on stormwater runoff and receiving waters should be evaluated. Regulations should be aligned with watershed plans, including municipal, industrial and construction NPDES permits, non-point source control programs, critical areas ordinances, SMA, SEPA, ESA, and the GMA if warranted.

Ongoing Programs

Watershed Characterization: The Puget Sound Watershed Characterization (Watershed Characterization), a collaborative effort between Ecology, PSP, and Washington Department of Fish and Wildlife (Fish and Wildlife) is designed to provide local governments with better information to improve land use planning and resource protection at the watershed scale. The Watershed Characterization is a regional-scale perspective that divides the Sound geographically into three areas: those most important to protect, those most beneficial to restore, and those most suitable for development. It is designed to describe a multi-scale framework for land-use planning. The results from the assessments should help guide the protection and restoration of watersheds and the habitats they support. The Watershed Characterization effort includes an outreach component to explain the role and proper application of these assessments.

Near-Term Actions

C2.1 NTA 1: Watershed Based Stormwater Management. To ensure all funds (existing and new) are used efficiently and effectively, Puget Sound Partnership (PSP) will work with the ECB to commission an evaluation of the feasibility, cost, and effectiveness of transitioning the existing municipal stormwater jurisdiction by jurisdiction permit approach using "general permits," to watershed-based municipal stormwater management. PSP will work with interested parties, particularly Ecology and local governments, to ensure their perspectives and concerns are addressed and accounted for when developing the scope of work for their evaluation.

Performance measure: To be determined.

C2.1 NTA 2: Protect Best Remaining Streams. King County, in cooperation with agencies populating the Puget Sound Stream Benthos database, will identify and map remaining streams

with B-IBI scores of at least 42-46 and develop an overall strategy and tailored actions to protect these areas by September 2013.

Performance measure: Map of targeted streams by March 2013; strategies and actions to protect targeted stream drainages by September 2013.

C2.1 NTA 3: Stormwater System Mapping. King County in cooperation with Ecology, local governments, WSDOT, and Department of Natural Resources, will help improve understanding and management of the region's stormwater infrastructure by developing protocols, methodology and definitions for stormwater system mapping. Following completion of this work , seek funding to develop a geo-referenced database of the Sound's regulated, municipal stormwater system.

Performance measure: Protocols, methodology and definitions to guide mapping and documentation efforts by May 2013; seek funding to develop geo-referenced database by December 2013.

C2.2 Prevent problems from new development at the site and subdivision scale.

New development at the site and sub-division scale can be a significant source of stormwater-related problems. Effective management of sediment on construction sites using Best Management Practices (BMPs) and other tools from the Stormwater Management Manual for Western Washington (or a local, equivalent manual), inspections, and enforcement (when needed) can prevent sediment and other contaminants from reaching surface waters, where they can cause harm. Appropriate design, siting, installation, and maintenance of permanent BMPs is critical to ensure they perform as designed. This sub-strategy includes federal Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES) permits for municipalities, state highways, industries, construction sites, and boatyards; continued transition to low impact development; and ensuring new development outside NPDES permitted areas uses standards and practices equivalent to those used within permitted areas.

- **Stormwater NPDES Permits**: Federal CWA NPDES permits are in place for municipalities, state highways, industries, construction sites, and boatyards. All NPDES stormwater permits for western Washington must be issued, implemented, overseen, complied with, and improved over time according to federally established timelines. Municipal stormwater permits need to contain requirements for low impact development (LID), monitoring, and structural retrofits. The need to bring in additional local governments under municipal permits to cover more land area of the basin should be evaluated. Funding is needed for municipal permittees to carry out permit requirements. Permits for federal and tribal lands/facilities also need to be consistent with state-issued NPDES stormwater standards and permits. The state-approved stormwater manuals should be updated as needed, including planning for climate change.
- **Low Impact Development**. The regional transition to low impact development should continue, Technical guidance and educational materials should continue to be developed and revised to help transition the region to the use of LID and other green infrastructure approaches. State-approved runoff manuals should continue to refine how these techniques are modeled, sited, designed and maintained. Guidance to local governments on integrating LID into codes and standards should also continue. This work includes providing information on projects, costs, performance, longevity, maintenance needs, and how best to integrate LID facilities into existing

drainage systems. Refining and providing incentives for LID and other green infrastructure approaches is part of this sub-strategy. Local governments need funding review of development proposals, inspections, enforcement, and maintenance of facilities.

- **Consistent, Basin-Wide Management of New Development**. To protect and restore resources and beneficial uses everywhere in the basin, including shellfish harvest areas and salmon habitat, ensure that new development outside NPDES-permitted areas includes stormwater management standards and thresholds that are technically equivalent to the Stormwater Management Manual for Western Washington. Ensure that local governments located outside NPDES-permitted areas carry out stormwater management programs that are consistent with the NPDES municipal stormwater permit for western Washington.

Ongoing Programs

NPDES permits: Ecology administers NPDES stormwater permits for municipalities, industries, construction sites, boatyards, and the Washington State Department of Transportation (WSDOT). Municipalities with populations over 100,000 are covered by NPDES Phase I permits. In Puget Sound, this includes King, Pierce and Snohomish counties and the cities of Seattle and Tacoma. Municipalities with populations under 100,000 located in urbanized areas, as defined by U.S. EPA rules, are covered under Phase II permits. In 2012, there were 76 local governments in Puget Sound covered by the western Washington Phase II permit. An NPDES municipal stormwater permit also exists that covers WSDOT's transportation facilities within the Phase I and II permit areas. Ecology maintains the Stormwater Management Manual for western Washington, the region's stormwater technical manual, which contains minimum requirements, technical standards and best management practices for new and redevelopment projects. Ecology also issues and oversees NPDES permits for construction sites, industries, and boatyards.

In 2009, the state legislature directed Ecology to work with stakeholders to establish a stormwater technical resources center. The Washington Stormwater Center, jointly managed by Washington State University (WSU) Extension, the City of Puyallup, and the University of Washington (UW), Tacoma Urban Waters will provide technical assistance to municipal and industrial stormwater NPDES permit holders, education and training, research and monitoring of LID practices, and review and approval of new stormwater BMPs.

Low Impact Development: Providing the right tools to transition the region to the use of LID techniques is key. WSU Extension and PSP, with help from regional professionals, are revising the region's manual on LID, the "LID Technical Guidance Manual for Puget Sound." WSU Extension and UW offer LID professional training and certificate programs. Seattle and other local governments have developed guidance, educational materials, and checklists for ongoing maintenance of systems. PSP is developing "Integrating LID into Local Codes: A Guidebook for Local Governments" to help local staff integrate LID into their codes and standards. Ecology plans to provide new standards and training on maintenance of systems. Many local governments, developers and builders, and consulting engineers provide leadership by designing and building innovative LID projects.

Key Ongoing Program Activities

- Ecology reissues updated municipal NPDES stormwater permits for western Washington and an updated *Stormwater Management Manual for Western Washington* by July 2012.

- WSU Extension and PSP reissue the updated *LID Technical Guidance Manual for Puget Sound* by July 2012.
- PSP issues the *Integrating LID into Local Codes* guidebook by July 2012.

Near-Term Actions

C2.2 NTA 1: NPDES Municipal Permits. Ecology will issue municipal permits for western Washington and provide financial assistance to permittees for implementation, particularly for code changes, stormwater system mapping, operations and maintenance, inspections and enforcement. This will require additional resources to Ecology for permit oversight, technical assistance, and enforcement. Ecology will provide incentives to NPDES permittees who, by interlocal agreement, lead or carry out regional or watershed scale NPDES implementation.

Performance measure: Reissued, improved municipal permits by July 2012; additional resources to Ecology by July 2013; financial assistance provided to permittees by December 2013; incentives provided to permittees for regional implementation by December 2013.

C2.2 NTA 2: Stormwater Treatment Standards. Ecology will evaluate under which circumstances (i.e., for which pollutants, from which land uses) discharges to Puget Sound should be required to provide treatment beyond sediment removal (i.e., TSS removal) to help meet 2020 recovery targets.

Performance measure: Evaluation with supporting documentation by March 2014.

C2.2 NTA 3: Stormwater Management Outside Permitted Areas. Ecology, in coordination with the state Department of Health, will identify two high priority shellfish growing areas degraded by urban stormwater discharges and work with local governments and other key parties to reduce these impacts to the areas.

Performance measure: Areas identified by September 2012; assistance provided to non-permitted local governments by December 2012; documentation of reduced impacts by March 2014 and at conclusion of projects.

C2.2 NTA 4: New Development Under Earlier Stormwater Programs. Ecology will initiate a process to assess projected implications and impacts of current state law concerning the level of stormwater control from new development approved under earlier stormwater programs.

Performance measure: RFP issued by August 2012; project lead awarded and project lead to develop new milestones to deliver a report on projected implications and impacts by at least December 2012.

C2.2 SJI 3: SJ Improve Stormwater Permit Review. San Juan County Community Development and Planning Department (CDPD) and the Town of Friday Harbor will improve the stormwater permit review process with pre-disturbance site review and follow-up site visits at 50 percent of properties permitted between 2012-2015.

Performance measure: Pre-disturbance site review and follow-up site visits at 50% of properties permitted between 2012-2015.

C2.2 STRT 5: Straits Stormwater Management Programs. Stormwater Management Program Updates and Implementation (Clallam, Jefferson, Port Angeles, Sequim, and Port Townsend).

a. City of Port Townsend Stormwater Management Plan
b. City of Sequim Stormwater Management Plan
c. City of Port Angeles CSO reduction
d. City of Port Angeles NPDES Stormwater Management Program implementation
e. Jefferson County Public Education Plan implementation
f. Jefferson County low impact development and BMP staff training
g. Jefferson County low impact development and BMP training for development community
h. Clallam County stormwater technical assistance
i. Clallam County outreach and education
j. Clallam County stormwater monitoring and data analysis
k. Clallam County stormwater management staff training
l. Clallam County land use analysis
m. Clallam County Stormwater Management Plan
n. Speaker forum on reducing stormwater impacts from roads

Performance measure: Adoption of LID incentives and ordinances by all 5 Strait Action Area local jurisdictions; Alternative Option: Initiate or complete 25% of the new Priority Actions identified by the Strait ERN for the Strait Action Area.

C2.3 Fix problems caused by existing development.

Most development within the Puget Sound basin was built prior to the use of local and state stormwater manuals that require management of stormwater discharges. This development, unless already retrofitted, may be presumed to be discharging untreated or undertreated stormwater, and inadequate management of high flows. Stormwater discharges from existing development can be mitigated through a variety of means: Structural retrofits, regular and enhanced maintenance to remove legacy pollutant loads, and/or redevelopment policies. The "Urban Stormwater Runoff Preliminary Needs Assessment Technical Memorandum" (October 2010), in a survey of 20 permit holders, found that system cleaning was highly effective: 234,000 tons of total solids were removed in 2009. This is believed to be due to "past underfunded maintenance" of stormwater systems. The report further estimates that, conservatively, an estimated $3–15.6 billion is needed to upgrade existing stormwater systems within municipal permit areas for treatment. The report states that "prioritization is necessary" (given the huge investment required) and that "acceleration of the maintenance, inspection, and pollutant source investigation elements of the... permit program, in combination with addressing the highest priority retrofits, is recommended." This sub-strategy includes: fixing problems from existing development through structural retrofits; ongoing regular maintenance and enhanced maintenance; and redevelopment policies and activities.

- **Structural Retrofit**: Over time, existing development needs to be upgraded, as needed, with flow control and treatment techniques that contribute towards meeting 2020 ecosystem recovery targets. Structural retrofits should focus on areas that would benefit most, and assess whether structural upgrades or other means (e.g., source control, maintenance) will achieve objectives. This work should include, assessing the level of effort needed (i.e., number of projects and acres retrofitted) to meet goals. Adequate, new funding will be needed to ensure significant progress is made.
- **Maintenance**: Stormwater pollution prevention plans must be carried out and all stormwater systems need to be regularly inspected and maintained to function to engineering design standards. Removing legacy loads from portions of the systems needs to be assessed and carried out, building on City of Tacoma's study on removal of legacy loads. Technical and financial assistance should be provided to local governments.
- **Redevelopment**: Ensure that redevelopment policies in state-approved stormwater manuals and permits are fully implemented and bring about improvements to runoff from existing development. Revise policies as needed as one tool to upgrade stormwater controls on existing development.

Ongoing Programs

Retrofit: Local governments in Puget Sound run capital improvement programs and, as funding becomes available, undertake projects to improve their stormwater systems. While flood prevention and property protection are most often targeted, many programs and projects also address water quality, fish habitat, and discharges to shellfish harvest areas. Municipal phase I permit holders are required to run structural stormwater programs that include construction of new and improvements to existing facilities.

The municipal NPDES permits require that existing stormwater systems be upgraded when certain thresholds are reached during a redevelopment project. This is an opportune time, or "window of opportunity" to improve existing stormwater infrastructure; however, the current rate of redevelopment within the basin is fairly low.

Maintenance: Local governments, industries, and boatyards regularly maintain their permanent BMPs according to permit requirements and to ensure they continue to perform as designed. This regular, systematic, ongoing maintenance is critical to the functioning of systems, since unmaintained stormwater infrastructure can actually export pollutants.

Several local governments, such as the City of Tacoma, have undertaken enhanced maintenance activities to remove legacy (or long-residing) pollutants from their systems. This system "flushing" can be highly effective at removing large amounts of pollutants in a cost-effective manner.

Near-Term Actions

C2.3 NTA 1: Stormwater Retrofit Projects. Ecology will lead a process to identify high priority retrofit projects that will contribute to the recovery of Puget Sound and complete conceptual design to a stage sufficient to seek project implementation funding. The work will build on retrofit prioritization work by WSDOT, King County and others, and will be replicable in other urban and suburban areas around the Sound..

Performance measure: RFP issued by August 2012; new regional stormwater retrofit prioritization process and list of projects by December 2013.

C2.3 NTA 2: Map, Prioritize, and Restore Degraded Streams. King County, in cooperation with agencies populating the Puget Sound Stream Benthos database, will identify and map stream drainages with "fair" B-IBI scores, and develops a prioritized list, strategies and actions to improve scores of 30 of these streams.

Performance measure: Map of targeted drainages by March 2013; prioritized list for restoration and strategies, actions, and budgets by September 2013.

C2.3 NTA 3: Legacy Pollutant Removal. Ecology, in cooperation with local governments, will provide guidance and financial assistance to local governments to help them remove legacy pollutant loads from their stormwater systems.

Performance measure: Shared guidance; financial assistance to permittees by December 2013.

C2.3 HC 4: HCCC Stormwater Retrofit Program. HCCC will develop the Hood Canal Regional Stormwater Retrofit Plan to coordinate stormwater and low impact development retrofit efforts on a regional scale. Stormwater retrofit and LID practices improve water quality, help protect shellfish beds, decrease flooding risks and increase aquifer recharge.

Performance measure: By the end of 2014 a list of prioritized stormwater retrofit projects will be available to determine feasibility for implementation

C2.3 WS 5: West Sound Stormwater Retrofit Projects. By December 2015, Kitsap County Surface and Stormwater Management Program, in coordination with jurisdictions and other partners, will design and construct high priority retrofit projects treating 10 acres of pollution generating impervious surfaces.

Performance measure: By December 2015 treat 10 acres of impervious surface.

C2.4 Control sources of pollutants.

Stormwater runoff from urban and rural areas is a significant source of toxics, nutrients, and pathogens delivered to Puget Sound. (Even small concentrations of polluted runoff can be harmful to fish and other aquatic life.)

Proper control and treatment of this stormwater, as discussed in earlier strategies and actions, is critical to Puget Sound recovery. It also is important to reduce the amount of contamination that becomes caught up in the stormwater stream. Many pollutants, such as dissolved metals, are very expensive and difficult to remove from the stormwater stream through treatment BMPs. Other pollutants, like pathogens, are commonly found in stormwater, and, like other pollutants, cause problems in receiving waters. It is far more cost-effective to minimize the introduction of pollutants to stormwater that to rely only on stormwater flow control and treatment. This sub-strategy includes on local pollution and control

programs; inspections, technical assistance, and enforcement; and development and implementation of total maximum daily loads (TMDLs).

- **Local Pollution and Control Programs**: Local programs should be developed and implemented to identify, track and control/eliminate sources of stormwater-related pollutants. Local governments need guidance and ongoing financial assistance to carry out this work. In addition, pollution identification and correction programs are discussed more fully in C.9.4.
- **Inspections, Technical Assistance, and Enforcement**: Needed work includes carrying out periodic inspections of businesses and industries with high likelihood of discharging pollutants of concern, working with property owners & operators to use best management practices to reduce discharges, and using technical assistance, incentives and enforcement to achieve compliance. Information from local pollution identification efforts, watershed plans, and regional monitoring activities should be used to identify pollutant hotspots/areas to restore. Local governments need guidance ongoing financial assistance to carry out this work. In addition, strategies and actions related to source control of toxics are discussed in Strategy C.1.
- **TMDLs**: Water quality implementation plans to eliminate impairments to water quality from stormwater discharges need to be developed and implemented. TMDLs need to contain monitoring, and follow up work should be conducted to ensure plans are achieving goals. Local governments need guidance and ongoing financial assistance to carry out this work. In addition, strategies and actions related to TMDLs are described more fully in C9.1.

Ongoing Programs

Local governments carry out source control actions through their illicit discharge detection and elimination programs (a requirement in all NPDES municipal permits). These programs can be effective tools to identify and address sources of illegal discharges to stormwater systems. In addition, NPDES phase I permit holders are required to run source control programs, which can lead to reductions in pollutants running off properties through site visits, assistance, and enforcement (when needed).

Near-Term Actions

C2.4 NTA 1: Compliance Assurance Program. Ecology and local governments will increase inspection, technical assistance, and enforcement programs for high-priority businesses and at construction sites.

Performance measure: Increased number of inspections, technical assistance, and enforcement activities by December 2012.

C2.4 NTA 2: Vehicle Leak Detection Program. King County, in cooperation with Seattle, WSDOT, the STORM advisory committee, and PSP will lead a regional discussion to develop options and recommendations for a new program to inspect and eliminate privately owned vehicle drips and leaks by June 2014. This work builds on the related work of existing grants to STORM and Seattle on vehicle leaks and drips.

Performance measure: By September 2012 convene first forum. By December 2013, convene up to three additional forums and use information from the STORM and Seattle grant-funded efforts to identify opportunities, challenges, options and

recommendations. By June 2014, complete a recommendation report for policy changes, public education and behavior change campaigns, and funding needs, and present recommendation report to the ECB, Science Panel, and Leadership Council for consideration. By September 2014, based on feedback from the ECB and Leadership Council, PSP will work with regional partners to identify a lead for next steps and measures.

C2.4 SJI 5: SJI Coordinated Best Management Practices. San Juan County Public Works will convene Community Development and Planning Department (CDPD), Department of Health and Community Services (DHCS), and the San Juan Islands Conservation District (CD) to identify and coordinate best management practices for stormwater, on-site septic systems, and animal wastes with community participation by 2013.

Performance measure: CDPD, DHCS, CD, and the Town of Friday Harbor will publicize information by the second quarter of 2014 at the DHCS, CDPD, and Town permit counters and associated websites, with a goal to target 100% of applicants by the end of 2014. San Juan County will provide for identified best management practices in County Code by 2014.

C2.4 SJI 6: SJI Stormwater Monitoring. San Juan County Public Works Stormwater Utility will lead and work jointly with the Stormwater Committee, the Water Resources Committee, the Marine Resources Committee, and the Town of Friday Harbor to implement an annual strategic monitoring plan by 2013 to measure levels of fecals, heavy metals, POPs, and PAHs in priority basins.

Performance measure: In the first year post-implementation, monitor 100% of priority basins, with monitoring actions ongoing after 2014.

C2.5 Provide focused stormwater-related education, training, and assistance.

Cities and counties rely on a variety of education, training and technical and financial assistance resources to deliver effective local stormwater management programs. By providing these resources, in addition developing supplementary guidance and model ordinances, stormwater can be more effectively managed throughout the region.

Focused information, education, and training on stormwater-specific issues should be provided for multiple audiences:

- **Citizens (especially homeowners):** Importance of problem, sources of contaminants and effects, their role in helping to solve problems.
- **Legislators and elected officials:** Issues, funding needs, results of significant studies and reports, product bans & phase-outs.
- **Local government staff:** Training on permit activities, including inspections and maintenance, source control, spill response, and LID implementation.
- **Businesses:** Source control training, best management practices, proper material disposal, and other technical assistance.

A variety of techniques, such as sharing of science and research, social marketing, prioritization of issues and contaminants, media with vetted messages, proven BMPs and program strategies, classes, and training workshops should be used.

Support for and participation in Puget Sound Starts Here (PSSH), STORM and other regional programs designed to facilitate coordination and implementation of municipal stormwater public education & stewardship programs should be encouraged. Transportation-related topics need to be included in this effort.

Ongoing Programs

The Partnership, Ecology, local governments, Washington Sea Grant, WSU Extension, and non-profit organizations carry out a broad stormwater-focused behavior change campaign. These programs emphasize problems, sources, solutions and roles, funding needs, and stormwater management on residential properties.

Puget Sound Starts Here is a partnership of local governments, PSP, Ecology, and local organizations that are part of the Partnership's ECO-Network. PSSH leverages the combined investments of all these organizations and provides consistent public awareness and education messages across the twelve-county Puget Sound region. Using state-of-the-art communications techniques, it provides a regional communications umbrella to support and enhance the effectiveness of local stormwater program delivery.

The Washington Stormwater Center serves as a central resource for integrated NPDES education, permit technical assistance, stormwater management and new technology research, development, and evaluation.

Near-Term Actions

C2.5 NTA 1: LID Training and Certification. Ecology will provide focused training for local government staff on LID project review, and inspections and approvals, as well as to local government staff and private sector on maintenance. Develop new professional certification for stormwater maintenance specialists. Provide business staff and contractors with training on source control, spill recognition, spill response, and erosion control.

Performance measure: Provide stormwater-related training by June 30, 2013 and follow-up training opportunities by June 30 2014.

In addition, actions related to stormwater-focused education are described in D7.

C2.5 NTA 2: Education for the Next Generation of Stormwater Professionals. The Tulalip Tribes will develop a near-term plan to provide sustainable water resource management academic curriculum in all Puget Sound counties for future stormwater professionals that is inclusive of tribal treaty rights, history and civics, and emphasizes continuing improvements in stormwater management in the context of the larger issues of sustainable water resource management and climate change.

Performance measure: TBD.

C2.5 WS 4: West Sound LID Training. By December 2014, Kitsap County Surface and Stormwater Management Program – with direct assistance from and close coordination with other stormwater utilities and agencies in the County – will provide training for 80% of LID professionals in Kitsap County, including plan review staff, designers, installers, inspection, and maintenance staff.

Performance measure: Training for 80% of LID professionals in Kitsap County by December 2014.

Emerging Issues and Future Opportunities

- More explicitly incorporate climate change information and state climate adaptation strategies into Puget Sound stormwater strategies. This includes downscaled climate projections for streamflows, sea level rise and salt water intrusion, as well as consideration of extreme weather events for planning, designing and siting stormwater infrastructure. Examples include prioritization criteria for retrofits and adaptation of basin-scale hydrologic models.
- Additional local governments should be evaluated for coverage to bring more land area under the NPDES permits over time.
- Providing LID training at colleges.

Target View: Insects in Small Streams

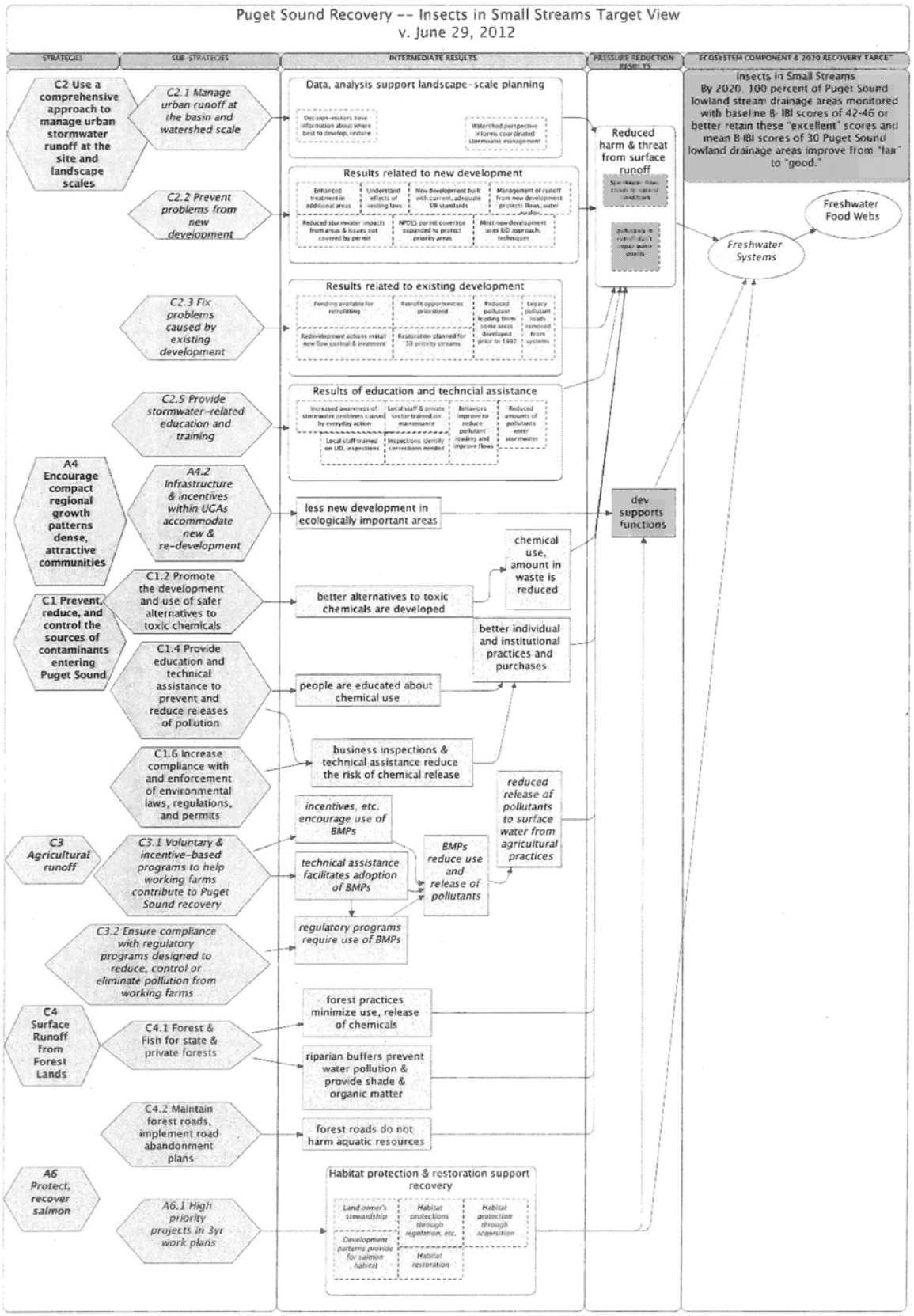
Runoff from developed lands and clearing of trees along waterways can harm the health of small streams that support salmon, other aquatic life, and wildlife. Water insects (benthic macroinvertebrates) are an indicator of biological health of stream systems, and a common method for quantifying this indicator is the Benthic Index of Biotic Integrity (B-IBI), which produces a numerical value to indicate a stream's ecological condition.

The 2020 recovery target related to urban runoff is for 100 percent of Puget Sound lowland stream drainage areas monitored with baseline B-IBI scores of 42-46 or better to retain these "excellent" scores and mean B-IBI scores of 30 Puget Sound lowland drainage areas improve from "fair" to "good." Further information on the B-IBI scoring system is available at the Puget Sound stream benthos website (www.pugetsoundstreambenthos.org), an ongoing project to store and analyze data from macroinvertebrate sampling programs. Sound-wide results have not been reported, but King County data show that about 37 percent of sites are rated "good" or "excellent" with the remaining 63 percent rated "fair" or "poor."

The Action Agenda strategies most related to achieving the recovery target for urban runoff are:

- Provide infrastructure and incentives to accommodate new and re-development within urban growth areas (A4.2)
- Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales (C2.1, C2.2, C2.3, C2.5)
- Prevent, reduce, and control the sources of contaminants entering Puget Sound (C1.2, C1.4, C1.6)
- Implement high priority projects identified in each salmon recovery watershed's 3-year work plan (A6.1)
- Prevent, reduce, and control agricultural runoff (C3.1, C3.2)
- Prevent, reduce, and control surface runoff from forest lands (C4.1, C4.2)

In the following results chain, or logic model, yellow polygons identify strategies and sub-strategies from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery target.


Puget Sound Recovery -- Insects in Small Streams Target View
v. June 29, 2012
STRATEGIES
SUB-STRATEGIES
INTERMEDIATE RESULTS
PRESSURE REDUCTION RESULTS
ECOSYSTEM COMPONENT & 2020 RECOVERY TARGET
C2 Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales
C2.1 Manage urban runoff at the basin and watershed scale
C2.2 Prevent problems from new development
C2.3 Fix problems caused by existing development
C2.5 Provide stormwater-related education and training
A4 Encourage compact regional growth patterns dense, attractive communities
A4.2 Infrastructure & incentives within UGAs accommodate new & re-development
C1 Prevent, reduce, and control the sources of contaminants entering Puget Sound
C1.2 Promote the development and use of safer alternatives to toxic chemicals
C1.4 Provide education and technical assistance to prevent and reduce releases of pollution
C1.6 Increase compliance with and enforcement of environmental laws, regulations, and permits
C3 Agricultural runoff
C3.1 Voluntary & incentive-based programs to help working farms contribute to Puget Sound recovery
C3.2 Ensure compliance with regulatory programs designed to reduce, control or eliminate pollution from working farms
C4 Surface Runoff from Forest Lands
C4.1 Forest & Fish for state & private forests
C4.2 Maintain forest roads, implement road abandonment plans
A6 Protect, recover salmon
A6.1 High priority projects in 3yr work plans
Data, analysis support landscape-scale planning
Decision-makers have information about where best to develop, restore
Watershed perspective informs coordinated stormwater management
Results related to new development
Enhanced treatment in additional areas
Understand effects of existing laws
New development built with current, adequate SW standards
Management of runoff from new development protects flows, water quality
Reduced stormwater impacts from areas & issues not covered by permit
NPDES permit coverage expanded to protect priority areas
Most new development uses LID approach, techniques
Results related to existing development
Funding available for retrofitting
Retrofit opportunities prioritized
Reduced pollutant loading from some areas developed prior to 1992
Legacy pollutant loads removed from systems
Redevelopment actions install new flow control & treatment
Restoration planned for 10 priority streams
Results of education and technical assistance
Increased awareness of stormwater problems caused by everyday action
Local staff & private sector trained on maintenance
Behaviors improve to reduce pollutant loading and improve flows
Reduced amounts of pollutants enter stormwater
Local staff trained on LID, inspections
Inspections identify corrections needed
less new development in ecologically important areas
better alternatives to toxic chemicals are developed
people are educated about chemical use
business inspections & technical assistance reduce the risk of chemical release
incentives, etc. encourage use of BMPs
technical assistance facilitates adoption of BMPs
regulatory programs require use of BMPs
BMPs reduce use and release of pollutants
forest practices minimize use, release of chemicals
riparian buffers prevent water pollution & provide shade & organic matter
forest roads do not harm aquatic resources
Habitat protection & restoration support recovery
Land owner's stewardship
Habitat protections through regulation, etc.
Habitat protection through acquisition
Development patterns provide for salmon habitat
Habitat restoration
chemical use, amount in waste is reduced
better individual and institutional practices and purchases
reduced release of pollutants to surface water from agricultural practices
Reduced harm & threat from surface runoff
dev. supports functions
Insects in Small Streams
By 2020, 100 percent of Puget Sound lowland stream drainage areas monitored with baseline B-IBI scores of 42-46 or better retain these "excellent" scores and mean B-IBI scores of 30 Puget Sound lowland drainage areas improve from "fair" to "good."
Freshwater Systems
Freshwater Food Webs

Prevent, Reduce, and Control Agricultural Runoff

The Challenge

Improperly managed surface water runoff from farms can convey a variety of pollutants to groundwater and Puget Sound. These pollutants include sediment, pathogens, pesticides and other chemicals, and excess nutrients. Nutrients can pose particular risks because they can support and enhance production and accumulation of algal blooms. As the algae die and decompose, they deplete the water of available oxygen, contributing to the death of aquatic organisms, such as fish and shellfish. In Puget Sound, inlets with few freshwater inputs and deep basins that have limited exchange with surrounding waters such as South Puget Sound and Hood Canal are particularly vulnerable. Excess nutrients can also contaminate drinking water from both surface and groundwater sources.

Agricultural and rural areas constitute about 30-35 percent of the Puget Sound, these lands include commercial agriculture, small farms, and rural development and they can produce significant sediment, nutrient, pathogenic, and chemical loads to stormwater through non-point sources. Strategies in this area seek to provide both incentives and tools to farmers to help them apply best management practices to improve the quality of surface water runoff, while ensuring that working farmland can be maintained and agriculture in the Puget Sound remains economically viable. Particularly challenging are the large number of small acreage farms. These farms typically contain small numbers of animals, including cows, horses, sheep, or goats. Wastes from these animals, if not properly managed can be a significant source of polluted runoff. Small agricultural operations such as those found in many areas of Puget Sound may not meet eligibility requirements for federal incentive programs.

Maintenance of agricultural land also is critical. Strategies and actions oriented towards protection and stewardship of ecologically sensitive rural and resource lands and maintaining the vibrancy of agriculture are discussed in A3.3.

Climate Change

Declining snow pack and loss of natural water storage, changes in precipitation timing may likely exacerbate runoff concerns from agricultural lands. A high priority overarching response strategy identified in *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy (April 2012)* directly relates to runoff:

- **Safeguard fish and wildlife and protect critical ecosystem services that support human and natural systems.** This includes reducing existing stresses on fish, wildlife, plants, and ecosystems. Reducing polluted runoff improves water quality and aquatic habitat, thereby increasing the resilience of aquatic species to additional stresses from climate change.

Implementing the agricultural runoff strategy in the Action Agenda helps prepare for climate change.

SALMON RECOVERY

Agricultural Runoff – A Salmon Recovery Plan Priority: As described in Action Agenda Section C2, improvement in water quality is identified in the salmon recovery plan with a call to resolve uncertainty about whether the regional water quality actions address the needs of salmon. Volume I identifies general concerns related to stormwater runoff. Several watershed chapters specifically mention rural runoff from areas such as agricultural lands as needing to be addressed.

How these priorities are integrated: The Action Agenda contains more detailed strategies and actions to address rural runoff than the Salmon Recovery Plan. More work is needed to address rural run-off priorities as identified in the specific watershed chapters. In addition, the resolution about the effectiveness of actions still needs to be addressed.

Relationship to Recovery Targets

Reducing pollution from agricultural lands is part of the overall effort to achieve recovery targets for freshwater quality, shellfish bed recovery, freshwater aquatic habitat, swimming beaches, dissolved oxygen in marine waters, eelgrass recovery, and marine sediment quality.

Local Priorities

Controlling and managing agricultural runoff is generally identified as important in the Skagit and Stillaguamish-Snohomish Watersheds. Both areas note the importance of working cooperatively with the farming community.

C3. Prevent, reduce, and control agricultural runoff

C3.1 Target voluntary and incentive-based programs that help working farms contribute to Puget Sound recovery.

Numerous programs, guidelines and technical assistance opportunities exist to help farmers identify potential pollution impacts from farming activities and implement best management practices to reduce, control or eliminate pollution.

For example, Conservation Districts (CD) and local United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) offices currently work with farmers to develop voluntary Farm Management Plans (farm plan). A farm plan identifies the resources on the property and the possible impacts to those resources from agricultural activities, identifies the practices the landowner

can undertake to correct these impacts, and identifies the state or federal funding programs the landowner may apply for in order to help implement the practices. If the landowner chooses to implement the practices consistent with the plan, the landowner will address the resource impacts. The practices a landowner might undertake include streamside fencing, manure composting, pasture renovation, and weed management techniques. The planning evaluates site specific characteristics such as the size of the farm, types of soil, slope of the land, proximity to streams or water bodies, types of livestock, or crops, resources such as machinery or buildings, and available finances. Once the farmer decides what changes he or she wants to make on their property, they work with the local Farm Planner to set a tentative implementation schedule.

Another program to address impacts to water quality due to agricultural activities is the Conservation Reserve Enhancement Program (CREP). CREP is administered by USDA's Farm Service Agency (FSA) and is a voluntary program that helps farmers protect environmentally sensitive land, decrease erosion, restore wildlife habitat and safeguard ground and surface water resources. Under CREP, eligible farmers can receive financial compensation when they enter into ten to fifteen year contracts to keep valuable resource land out of production and technical and financial assistance (up to fifty percent) to install restoration measures such as riparian plantings along streams.

These incentive-based programs, publicized by local programs, CDs and NRCS, are currently implemented in an "opportunistic" manner – that is, the landowner seeks out their local CD or Washington State University (WSU) Extension staff for information and assistance. Consequently, service delivery is not targeted to specific locations to address specific resource concerns, such as degraded riparian areas and water quality. These programs can be better targeted to address priority resources concerns and better coordinated with regulatory efforts to make them more effective.

Ongoing Programs

The primary objective of these actions is to enhance the targeting of ongoing landowner incentive programs to address specific resource concerns on commercial and non-commercial farms. In order to better target voluntary, incentive, and technical assistance programs and promote their use in Puget Sound, the State Conservation Commission has worked with all the Puget Sound Conservation Districts to develop a Puget Sound Conservation District Action Agenda. This document links the work of the 12 Conservation Districts in the Puget Sound basin to the specific threats identified by the Puget Sound Partnership. Funding is then provided by the State Conservation Commission to the CDs to implement on-the-ground activities that address the identified threats. In this way, specific CD work and landowner activities can be directly linked to specific Puget Sound threats.

The State Conservation Commission (Conservation Commission) also is working with counties and other state agencies to implement the Voluntary Stewardship Program (VSP). This new program is intended to address the contentious issue of the protection of critical areas on agricultural lands while maintaining viable agricultural production. The VSP provides counties with an alternative to protecting critical areas from agricultural activities through the Growth Management Act process. If they decide to opt-in, counties must identify, in accordance with specified criteria, watersheds that will participate in the VSP and nominate, watersheds for consideration by the State Conservation Commission as state priority watersheds.

Once a county has opted-in to the VSP and funding is made available, the county must also identify a watershed group to develop a work plan that will identify how critical areas in the watershed will be

protected in the context of agricultural activities. The work plan is submitted to the State Conservation Commission for approval in consultation with affected state agencies. The work plan must include measureable goals and benchmarks for the protection of critical areas. The watershed group must show progress on these goals and benchmarks every five years, or implement adaptive management if progress is not being made.

Near-Term Actions

C3.1 NTA 1: Water Quality Best Management Practices. By December 2012, the Department of Ecology, Department of Agriculture and State Conservation Commission, after conferring with federal, tribal, and local partners will work on a solution to improved implementation of best management practices that protect water quality.

Performance measure: By December 2012 develop a plan to improve BMP implementation.

C3.1 NTA 2: Effectiveness of Incentive Programs. By December 2013, the State Conservation Commission, in consultation with Ecology and the Washington State Departments of Agriculture and Health, Conservation Districts, federal agencies and tribes, will report to the Governor and the Legislature on the effectiveness of incentive programs to achieve resource objectives. The report will include a section from Ecology on compliance with water quality standards.

Performance measure: By December 2012, hold two coordinating meetings to evaluate the effectiveness of the agriculture incentive programs. By June 2013, produce a draft report with recommendations on necessary changes. Between June 2013 and November 2013, present the draft report to the agencies, tribes, and stakeholder groups for comment. By November 2013 present the report to the ECB and Leadership Council. Following presentation of the final report to the legislature and governor, the WSCC will work with the other entities on strategies to implement the recommendations in the report.

C3.1 NTA 3: Voluntary Stewardship Program. The Conservation Commission, Ecology, and WSDA should support implementation, funding, and assistance to those Counties participating in the Voluntary Stewardship program, as well as new capacity for enforcement of state and federal water quality regulations.

Performance measure: By December 2012, the WSCC will identify potential funding sources. By June 2013, funding will be made available to the four counties in the Program.

In addition, actions associated with Washington State departments of Ecology, Health, WSDA, and the Conservation Commission in identifying priority areas for implementation of voluntary, incentive, and technical assistance programs for rural unincorporated landowners, small acreage farms, and other working farms are described in A3.1.

C3.2 Ensure compliance with regulatory programs designed to reduce, control, or eliminate pollution from working farms.

The Washington Water Pollution Control Act, RCW 90.48, administered by the Department of Ecology (Ecology), prohibits the discharge of pollutants from all lands in the state, including agricultural lands. The Washington State Department of Agriculture (WSDA) inspects dairy operations and ensures their compliance under the Dairy Nutrient Management Act, RCW 90.64.

Ongoing Programs

Ecology has the responsibility to control and prevent the pollution of streams, lakes, rivers, ponds, inland waters, salt waters, watercourses, and other surface and underground waters of the State of Washington. Ecology also is authorized to provide grants to address pollution problems.

Ecology identifies priority areas for work to address agricultural runoff through a variety of processes, including ambient monitoring and the state Water Quality Assessment, which lists the impaired waters in the state. To address these impaired waters, Ecology may develop a Total Maximum Daily Load / Water Cleanup Plan or may work to directly implement the practices necessary to solve the water quality problems. In many cases, incentive and technical assistance programs are available to help land owners identify and implement best management practices; some of these programs provide financial assistance. Ultimately, Ecology uses a combination of tools – education, technical and financial assistance, and compliance actions to ensure water quality standards are met. In conducting this work, Ecology often works with and may provide funding for other entities such as CDs or WSU Extension.

Water quality best management practices (BMPs), referenced by RCW 90.48, is a legal term that refers only to those combinations of pollution controls used to prevent and control water pollution that achieve compliance with water quality law. Regulations in Washington State specifically define water quality BMPs as those approved by the Department of Ecology (WAC 173-201A-020), and those that are applied to attain compliance with the water quality regulations (WAC 173-201A-510).

Dairies must control the use of nutrients and limit bacteria discharge on their dairy operations in order to eliminate runoff from their fields getting into surface water or to minimize leaching into groundwater. Nutrients and bacteria may come from dairy manure, commercial fertilizer or other non-agricultural sources. Nutrient controls are intended to prevent nutrients from reaching surface water and thus helps to prevent reductions of dissolved oxygen or changes in pH. Bacteria controls are intended to prevent bacteria from reaching surface water which protects human health from harmful organisms, and supports safe shellfish production. Preventing nutrients and bacteria from reaching groundwater protects human health from contaminated drinking water and protects surface water from potential contamination through hydraulic connectivity between groundwater and surface water

To protect Puget Sound from dairy discharges of nutrients and bacteria, WSDA inspects all dairies and identifies those that have infrastructure conditions or management practices that may result or have the potential to discharge nutrients and bacteria to waters of the state, both surface and ground. If risks are identified, WSDA works with the dairy operation to identify structural improvements or changes in management practices that will reduce and eliminate the risk of discharge. WSDA inspections may include referrals to technical assistance agencies or may result in enforcement when needed.

WSDA inspections evaluate dairies to ensure that operators properly collect, transfer, treat and store manure and contaminated water. Proper collection, handling and storage of dairy generated manure and wastewater and protect water of the state and Puget Sound from nutrient and bacterial contamination. WSDA evaluates nutrient management on dairies by reviewing the dairy's soil tests, their nutrient application timing, methods, locations, amounts, and the crops grown on their fields. WSDA monitors the nutrient levels and operators response in management from year to year and takes compliance actions as needed. This recordkeeping requirement helps the dairy operator to focus on applying just enough nutrients for their fields in each growing season. Fall soil tests show how much nitrogen and phosphorus are left on fields after crop removal and thereby help inform the operator on management adjustments for future improvements.

Finally, there is a specific permit focused on addressing pollution from animal feeding operations. The Concentrated Animal Feeding Operation (CAFO) National Pollution Discharge Elimination System (NPDES) permit is administered by Ecology. This permit is required for all animal feeding operations that discharge to waters of the state. Animal feeding operations are defined as operations that confine and feed animals for a total of 45 days or more in any 12-month period where vegetation or post harvest residues are not sustained in the normal growing season over any portion of the facility where animals are confined. Ecology's work implementing the CAFO permit is focused on ensuring that manure is stored, handled and applied properly and at agronomic rates to prevent discharges to surface and groundwater. This includes discharges from application fields, waste storage facilities and animal confinement areas.

Near-Term Actions

C3.2 NTA 1: Priority Areas for Voluntary Incentive and Regulatory Programs. The State Conservation Commission and the Washington State Departments of Agriculture, Ecology, and Health will identify priority areas to better target and coordinate implementation of voluntary incentive and regulatory programs for rural landowners, small-acreage landowners, and working farms.

Performance measure: By Dec. 31, 2012, the WSCC will convene at least two meetings to identify priority areas. By June 30, 2013, WSCC will implement voluntary incentive programs in 5 target areas.

C3.2 NTA 2: Dairy Lagoon Assessment. By July 2013, WSDA will complete the current NRCS-funded lagoon assessment of all known dairy waste storage ponds, finalize risk based evaluations and prioritize lagoons based on the findings. The assessment ranks lagoons on potential risk to water resources. Lagoons identified as high risk will be provided technical assistance to address the problem.

Performance measure: Field assessment and risk evaluation of up to 500 lagoons completed by July 2013; Number of lagoons with identified risks are identified and operators made aware of available technical assistance by September 2013.

C3.2 NTA 3: Dairy Rule Final Agronomic Applications. By December 2012, WSDA will adopt a final rule defining records required by dairies to show agronomic applications (Chapter 90.64.010(17)) and create a penalty matrix for both discharge and records violations.

Rule adoption supports efficient program implementation by clarifying for dairies and stakeholders the expectations for recordkeeping as well as the basis for penalties.

Performance measure: Final rule adopted or not.

C3.2 NTA 4: CAFO Permit. By December 2012, Ecology will issue an updated CAFO permit.

Performance measure: Estimated Public Comment Draft Date: July 2012; Estimated Permit Issuance Date: November 2012; Estimated Permit Effective Date: December 2012.

Emerging Issues and Future Opportunities

Reducing nutrient pollution in Washington State, particularly in areas like parts of Puget Sound where harmful algal blooms and depressed oxygen levels affect both aquatic life and human use and health, is important.

Currently, only dairies or facilities covered under the CAFO permit have requirements and oversight to control nutrient applications. Monitoring nutrient applications from all sources, including manure, fertilizer, tilled-in cover crops, and other organic soil amendments is needed in Washington State to ensure beneficial application of nutrients are conducted.

Existing technical assistance to agricultural operators should be augmented with focused nutrient management education to third-party applicators of manure and fertilizers as well as major crop growers. The objective should be to increase awareness across the industry sectors of the importance of accounting for all nutrient sources, of making necessary applications at the right time, in the right place, in the right form and in the right amount. In addition, education on field conditions and appropriate measures to take to prevent runoff into adjacent or nearby surface water should also be communicated to landowners and applicators. The dairy industry has found savings in their fertilizer costs by better accounting of all sources; there may be similar economic advantages for other agricultural growers.

Manure handling and storage of manure solids can include periodic transport from manure generators to crop fields for stockpiling in preparation for spreading at a later time. Manure is an important source of crop nutrients and improves soil health. Continued export of manure to crop growers is an important element of sustainable agricultural practices and economy. However, improper transport and stockpiling can result in runoff of nutrients and bacteria as well as cause nuisance issues related to odor. Only dairies currently have regular oversight on this practice. Existing technical assistance to agricultural operators should be augmented with focused education to third-party haulers and applicators of manure as well as major crop growers on handling and storage. Discussions among agencies may be appropriate to review current standards for potential improvements in the standard as well as implementation.

Target View: Dissolved Oxygen in Marine Waters

One important measure of water quality and a component of the Marine Water Condition Index is the amount of dissolved oxygen in the water. Fish, crabs, and many other species living in Puget Sound need oxygen to survive. As dissolved oxygen decreases, animals become stressed. When levels of dissolved oxygen get too low, fish and other animals may die, often in widespread "fish kills." An over abundance of nitrogen can be a major cause of low dissolved oxygen since it fosters growth in marine plants and algae. When these plants and algae die, their decay robs the water of oxygen. Nitrogen occurs naturally in water, but we also add more through discharge from wastewater treatment plants, septic systems, and run-off from developed and agricultural lands. One way we can improve marine water quality is to reduce the amount of nitrogen we contribute from these sources. Linking the amount of nitrogen pollution from humans to the growth of algae and the amount of dissolved oxygen is critical to protecting water quality.

The 2020 recovery target for improving water quality is to keep dissolved oxygen levels from declining more than 0.2 milligrams per liter (mg/L) in any part of Puget Sound as a result of human inputs.

Because dissolved oxygen concentrations are a result of many natural and human influences, we cannot simply measure dissolved oxygen and understand how much humans contribute directly. This target requires a combination of monitoring data, studies on the sources of nitrogen and sophisticated mathematical models to determine whether human inputs are contributing to a decline in dissolved oxygen.

The Washington Department of Ecology and others are currently working on such studies. Initial results will be available sometime in late 2012. At that time we will understand whether humans contribute to low levels of dissolved oxygen and what management actions may be necessary to address them. In the future we will update these results using better models and more recent estimates of nitrogen loads coming into Puget Sound. Together, model assessments and the Marine Water Condition Index will be used to track current conditions and long term changes in dissolved oxygen and overall water quality of Puget Sound.

Ecology's Marine Water Condition Index

Annual, 1999-2010

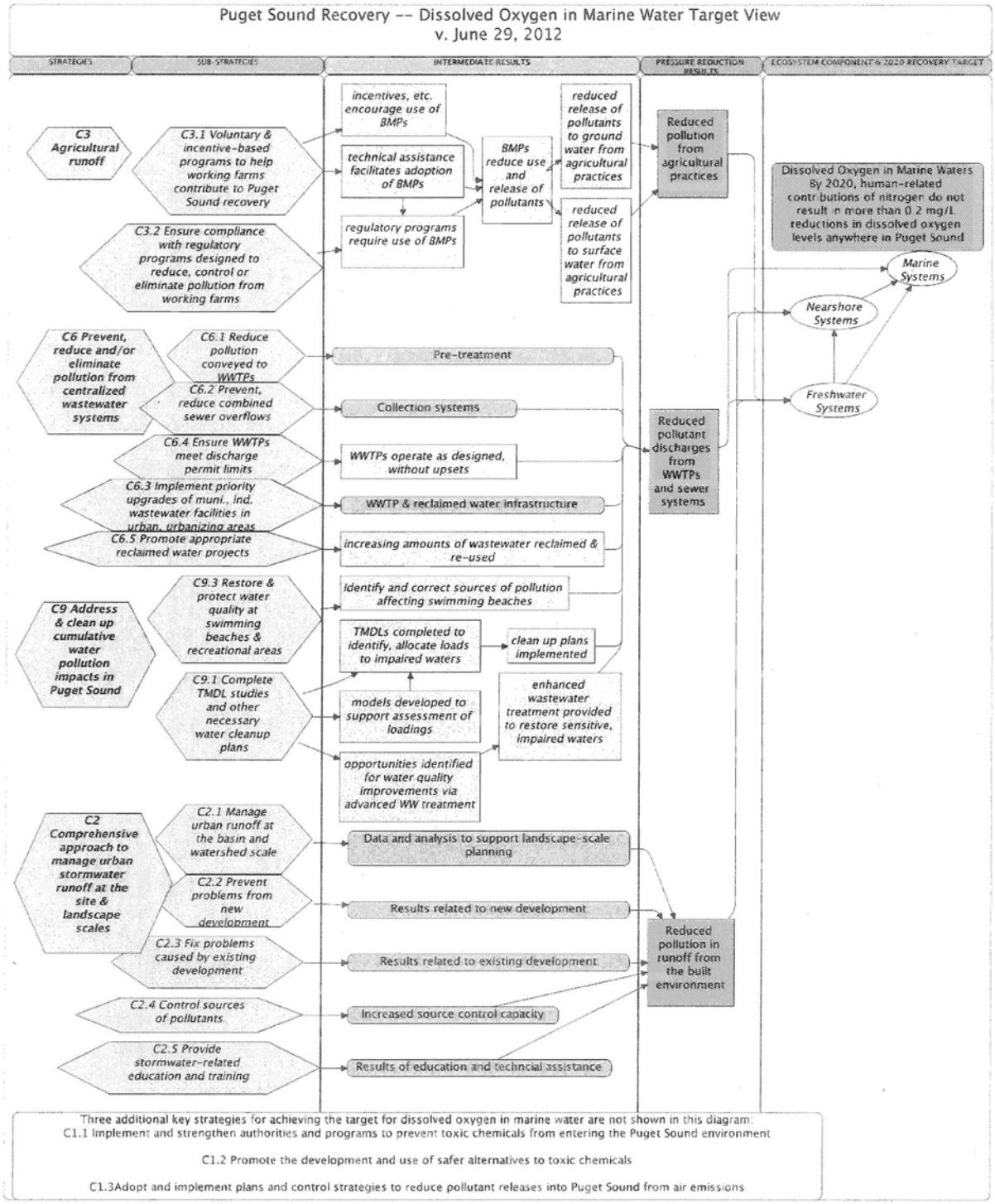
Source: Marine Monitoring Unit, Washington State Department of Ecology

The Marine Water Condition Index combines measurements relevant to water quality in Puget Sound. Changes in water quality are reported with numbers greater than zero indicating improving water quality in green and numbers smaller than zero indicating decreasing water quality in red. Although the index is well suited to track changes in water quality in Puget Sound it cannot be used to identify the specific sources of human contribution that are causing poor water quality.

The Action Agenda strategies most related to achieving the recovery target for dissolved oxygen in marine waters are:

- Prevent, reduce, and control agricultural runoff (C3.1, C3.2)
- Prevent, reduce and/or eliminate pollution from centralized wastewater systems (C6.1, C6.2, C6.4, C6.3, C6.5)
- Address and clean up cumulative water pollution impacts in Puget Sound (C9.3, C9.1)
- Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales (C2.5, C2.4, C2.1, C2.3, C2.2)
- Prevent, reduce, and control the sources of contaminants entering Puget Sound (C1.1, C1.2, C1.3)

In the following results chain, or logic model, yellow polygons identify strategies and sub-strategies from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery target.


Puget Sound Recovery -- Dissolved Oxygen in Marine Water Target View
v. June 29, 2012
STRATEGIES
SUB-STRATEGIES
INTERMEDIATE RESULTS
PRESSURE REDUCTION RESULTS
ECOSYSTEM COMPONENT & 2020 RECOVERY TARGET
C3 Agricultural runoff
C3.1 Voluntary & incentive-based programs to help working farms contribute to Puget Sound recovery
C3.2 Ensure compliance with regulatory programs designed to reduce, control or eliminate pollution from working farms
incentives, etc. encourage use of BMPs
technical assistance facilitates adoption of BMPs
regulatory programs require use of BMPs
BMPs reduce use and release of pollutants
reduced release of pollutants to ground water from agricultural practices
reduced release of pollutants to surface water from agricultural practices
Reduced pollution from agricultural practices
Dissolved Oxygen in Marine Waters By 2020, human-related contributions of nitrogen do not result in more than 0.2 mg/L reductions in dissolved oxygen levels anywhere in Puget Sound
Marine Systems
Nearshore Systems
Freshwater Systems
C6 Prevent, reduce and/or eliminate pollution from centralized wastewater systems
C6.1 Reduce pollution conveyed to WWTPs
C6.2 Prevent, reduce combined sewer overflows
C6.4 Ensure WWTPs meet discharge permit limits
C6.3 Implement priority upgrades of muni., ind. wastewater facilities in urban, urbanizing areas
C6.5 Promote appropriate reclaimed water projects
Pre-treatment
Collection systems
WWTPs operate as designed, without upsets
WWTP & reclaimed water infrastructure
increasing amounts of wastewater reclaimed & re-used
Reduced pollutant discharges from WWTPs and sewer systems
C9 Address & clean up cumulative water pollution impacts in Puget Sound
C9.3 Restore & protect water quality at swimming beaches & recreational areas
C9.1 Complete TMDL studies and other necessary water cleanup plans
Identify and correct sources of pollution affecting swimming beaches
TMDLs completed to identify, allocate loads to impaired waters
clean up plans implemented
models developed to support assessment of loadings
enhanced wastewater treatment provided to restore sensitive, impaired waters
opportunities identified for water quality improvements via advanced WW treatment
C2 Comprehensive approach to manage urban stormwater runoff at the site & landscape scales
C2.1 Manage urban runoff at the basin and watershed scale
C2.2 Prevent problems from new development
C2.3 Fix problems caused by existing development
C2.4 Control sources of pollutants
C2.5 Provide stormwater-related education and training
Data and analysis to support landscape-scale planning
Results related to new development
Results related to existing development
Increased source control capacity
Results of education and technical assistance
Reduced pollution in runoff from the built environment
Three additional key strategies for achieving the target for dissolved oxygen in marine water are not shown in this diagram:
C1.1 Implement and strengthen authorities and programs to prevent toxic chemicals from entering the Puget Sound environment
C1.2 Promote the development and use of safer alternatives to toxic chemicals
C1.3Adopt and implement plans and control strategies to reduce pollutant releases into Puget Sound from air emissions

Prevent, Reduce, and Control Surface Runoff from Forest Lands

The Challenge

Approximately 60-65 percent of the Puget Sound basin is forested land. A significant amount of this area is being actively managed for timber production (non-national park/wilderness areas). Surface runoff from forestry, particularly forest roads, stream crossings, delivery of water from road ditches and the capturing of seeps and springs as part of road cuts, has the potential to deliver excess sediment to streams. Forest harvesting also has the potential to affect the hydrology of a watershed, by affecting evapotranspiration rates; and as a result of skid trails, yarding corridors and harvesting near unstable slopes.

In Washington State, forest practices are regulated under the Forest Practices Act, established by the legislature, and by the rules adopted by the Washington Forest Practices Board (the Board). The most recent significant change in rules was adopted in July 2001. The 2001 rules were informed by the Forests and Fish Report, which was the product of a multi-stakeholder effort to recommend improvements to forest practices that would protect water quality and the aquatic and riparian habitat associated with fish and riparian dependent amphibians on forestlands.

The forest practices program meets the requirements of Endangered Species Act (ESA) through establishing rules that are designed to meet the Forest Practices Habitat Conservation Plan (FPHCP). In addition, the forest practices program, as guided by a well funded and robust adaptive management program, was intended to bring these forested waters into compliance with state and federal water quality requirements. Through meeting the Forest Practices Habitat Conservation Plan (FPHCP) and the Clean Water Act requirements, the State of Washington seeks to provide long-term conservation of covered species by restoring and maintaining riparian habitat on non-federal forestland, meeting water quality standards and supporting an economically viable timber industry.

Climate Change

Declining snow pack and loss of natural water storage, changes in precipitation timing may likely exacerbate runoff from forests. A high priority over-arching response strategy identified in *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy (April 2012)* directly relates to runoff:

- **Safeguard fish and wildlife and protect critical ecosystem services that support human and natural systems.** This includes reduce existing stresses on fish, wildlife, plants, and ecosystems. Reducing polluted runoff improves water quality and aquatic habitat, thereby increasing the resilience of aquatic species to additional stresses from climate change.

Implementing the forest runoff strategy in the Action Agenda helps prepare for climate change.

SALMON RECOVERY

Forest Land Runoff – A Salmon Recovery Plan Priority: As described in Action Agenda Section C2, improvement in water quality is identified in the salmon recovery plan with a call to resolve uncertainty about whether the regional water quality actions address the needs of salmon. Volume I identifies general concerns related to stormwater runoff. Several watershed chapters specifically mention rural runoff from areas such as forest roads as needing to be addressed.

How these priorities are integrated: The Action Agenda contains more detailed strategies and actions to address rural runoff than the Salmon Recovery Plan. More work is needed to address rural run-off priorities as identified in the specific watershed chapters. In addition, the resolution about the effectiveness of actions still needs to be addressed.

Relationship to Recovery Targets

Management of runoff from forest lands is part of the overall effort to achieve recovery targets for freshwater quality, shellfish bed restoration, reduction of toxics in fish, and marine sediment quality.

Local Priorities

Controlling forest runoff is not specifically called out as a high priority for local integrating organizations. Hood Canal has general priorities that include implementing and monitoring the effectiveness of Forest Practices HCPs and similar agreements and USFS Northwest Forest Plan and Access and Travel Management Plans.

C4. Prevent, reduce, and control surface runoff from forest lands

C4.1 Achieve water quality standards on state and privately owned working forests through implementation of the Forest and Fish Report.

In 1999 the Forest and Fish Report included Clean Water Act (CWA) assurances granted by Washington State Department of Ecology (Ecology) with the expectation that by 2009, research and monitoring would demonstrate that water quality standards would be achieved or a trend towards that achievement identified. In 2009 Ecology found there was insufficient data and information to substantiate the assurance that water quality standards were being achieved in working forests. At the same time, Ecology also found that the Forest and Fish program, even with its challenges, creates a well-established foundation for achieving full compliance with the water quality standards. Ecology extended

CWA assurances, conditioned on achievement of 21 program milestones, with some scheduled to be completed by as late as 2019. These include:

- Support rules and funding to implement the Forest and Fish Report
- Support an adaptive management program to update rules and guidance as necessary, with particular focus on water quality-related rules
- Consistent compliance and enforcement of Forest Practices Rules
- Bring roads up to design and maintenance standards

Recent Progress

As of August 2011, 10 of the 21 program milestones have been completed. Washington State Department of Natural Resources (DNR), Ecology, and the Forests and Fish cooperators continue to make progress on completing key milestones towards maintaining CWA Assurances.

One of the main constraints to accomplishing the milestones on schedule is personnel capacity and funding limitations at DNR and other agencies and partners in the implementation of the Forest and Fish Report. The Forest Practices Program has experienced decreased funding in the last two biennial budgets, with an overall decrease of $4 million in FY 09–11 and an additional $2 million in FY 11–13 from state general funds. This represents a decrease of approximately 28 percent in state general fund appropriations, and has impacted DNR's ability to support the Adaptive Management Program (AMP), compliance monitoring, and enforcement of the Forest Practices Rules. Compounding the decreased state funding, exhaustion of federal funding from the Pacific Coastal Salmon Recovery grants occurred as of 2011.

Federal funding through the Pacific Coastal Salmon Recovery Fund supported a substantial portion of the Forest Practices AMP between 2000 and 2011. Averaging almost $5 million a biennium, and spanning a period of ten years, this funding is no longer being provided by the federal government. These funds supported the development of tools to aid implementation of the Forests and Fish Report, and in the last six years, went almost entirely to support AMP research and monitoring. This loss of funding has created a serious challenge for the Forest Practices Program to meet AMP obligations. While those funding losses have been offset somewhat by the creation of the Forests and Fish Support Account by the Washington State Legislature to support tribal and non-governmental participation in the implementation of the Forests and Fish Report, this does not completely bridge program costs associated with the AMP.

Ongoing Programs

DNR is working to complete the remaining 11 milestones on a schedule to maintain CWA assurances from Ecology. Among those remaining, a few have been a particular challenge for DNR and its cooperators to complete due to funding and staffing resource limitations. These include obtaining an independent review of the AMP, training and certification of staff and cooperators, assessing the condition of small forest landowner roads, and completing the Cooperative Monitoring, Evaluation and Research (CMER) research that drives the science-based adaptive management process. In the coming years, DNR and the Forest and Fish Cooperators will continue to work towards these milestones. The operational and procedural milestones have completion due dates by 2013, while a schedule of CMER research studies stretches out through 2019.

Near-Term Actions

C4.1 NTA 1: Forest Practices Adaptive Management Program Review. DNR and Ecology will obtain an independent performance review of the Forest Practices Adaptive Management Program (AMP).

Performance measure: DNR identifies date for the review by December 2013.

C4.1 NTA 2: Forest Practices Adaptive Management Program. DNR will work to secure long-term and dependable funding for the Forest Practices Adaptive Management Program (AMP), training, compliance monitoring, and enforcement.

Performance measure: DNR identifies date for securing a stable base by December 2013.

C4.2 Maintain forest roads and implement road abandonment plans for working forest lands subject to the Forest Practices Rules on schedule, and ensure federal forest managers meet or exceed state standards for road maintenance and abandonment on federal lands.

Forest Practices Rules include road maintenance and abandonment provisions to prevent sediment and hydrology-related impacts to public resources such as water quality and fish habitat. The rules require large forest landowners to develop and implement Road Maintenance and Abandonment Plans (RMAP) for roads within their ownership. Large forest landowners are required to have all roads within their ownership covered under a DNR-approved Road Maintenance and Abandonment Plan (RMAP) (WAC 222-24-051) by July 1, 2006, and to bring all roads into compliance with forest practices standards by October 1, 2016 (or with approved extension by 2021). This includes all roads that were constructed or last used for forest practices since 1974. An inventory and assessment of orphaned roads (i.e., forest roads and railroad grades not used for forest practices since 1974) also must be included in the RMAP.

In an effort to minimize the economic hardship on small forest landowners (also known as family forest landowners), the 2003 Washington Legislature passed a Road Maintenance and Abandonment Plan bill (HB1095) that modified the definition of "small forest landowner" and specified how the road requirements applied to small forest landowners. Small forest landowners have the option to submit a "checklist" RMAP with each forest practices application or notification, rather than to provide a plan for their entire ownership. The RMAP checklist is a brief assessment of certain characteristics of roads proposed to be used under a forest practice application, and does not provide a complete inventory of the condition of all of the landowner's forest roads. This means that specific roads on small forest landowner properties need not be brought up to current standards until they are being actively used for a forest practices activity.

To assist small forest landowners in achieving road maintenance requirements specific to fish passage, the legislature created the Family Forest Fish Passage Program (FFFPP) in 2003. FFFPP is a cost-share program that provides 75-to 100 percent of the cost of correcting fish barriers. The program is managed by three Washington State Agencies (Department of Natural Resources, Washington Department of Fish and Wildlife, and Recreation and Conservation Office).

The Federal Northwest Forest Plan has been in place since the mid-1990s and has dramatically lowered rates of timber harvest on federal lands within the range of the northern spotted owl. This has resulted in less timber revenue to support maintenance of federal forest roads. In 2000, the U.S. Forest Service Region 6 and Ecology signed a Memorandum of Agreement in which the U.S. Forest Service agreed to develop road maintenance and abandonment plans for all federal forest roads within five years (2005) and fully implement those plans within 15 years (by 2015). Yet, continued reductions in federal funding has created an estimated $300 million (2005 dollars) shortfall in the funds needed to upgrade roads to current standards, repair fish passage barriers, and decommission roads no longer needed or supportable.

In November 2010, as part of implementation guidance on national regulations for Travel Management Planning the Deputy Chief for the U.S. Forest System set a target for each National Forest to complete plans that would "right size" the federal forest road system by 2015. Each unit of the National Forest System (NFS) is to: (1) identify the minimum road system needed for travel and the protection, management and use of NFS lands, and (2) identify roads that are no longer needed to meet forest management objectives, and therefore scheduled for decommissioning. NFS expects to identify an appropriately sized and environmentally sustainable road system that is responsive to ecological, economic, and social concerns, which will include water quality effects from forest runoff. NFS staff is expected to engage the public in the process, involving a broad spectrum of interested and effected citizens, other state and federal agencies, and tribal governments.

Recent Progress

State and private forest landowners have made a significant capital commitment to protecting public resources and listed species through the RMAP requirement, as detailed in the 2010 HCP Annual Report. As of December 2010, approximately 18,475 miles have been improved to current standards, and recent reports have estimated this to be a 70+% accomplishment rate. However, DNR does not have high confidence in this number due to variable reporting methods and therefore will be compiling additional RMAP implementation data in 2011-12 to be reported in future FPHCP annual reports. There are currently 262 approved RMAPs statewide. Between 2001 and 2010, over 3,700 fish passage barriers were removed or replaced, which is about 54 percent of known fish barriers identified in RMAPs. As a result, over 1,700 miles of fish habitat were opened in streams on forestlands. In addition, over 9,000 RMAP checklists have been submitted by small forest landowners associated with the approval of forest practice applications.

As of 2010, over 193 projects were completed and up to 500 miles of stream habitat previously inaccessible to fish were opened up through the Family Forest Fish Passage Program (FFFPP). Over that same time period, the state of Washington has invested approximately $14 million in the program. For the 2011 construction season, 39 barriers are planned for correction, opening up 62 miles of habitat at a cost of approximately $3.2 million. Due to reduced funding levels from $5 million in FY 2009-2011 to $2 million in FY 2011-2013 biennium, only nine projects are planned to be completed in the 2012 construction season.

According to the FY 2010 Legacy Roads and Trails Accomplishment Report, $7.3 million was spent on Washington State's federal forest roads and trails. With this funding, 42 miles of roads were decommissioned, and 788 miles of road storm proofing and maintenance were conducted. In addition, five fish passage barriers were restored, opening a total of 12.2 miles of fish habitat. This is the greatest commitment of legacy roads and trails funding for the Pacific Northwest region in more than a decade. Unfortunately, this level of effort is insufficient to address the backlog of NFS roads system repairs.

Given that more than 80 percent of the current NFS roads system was built before 1980, and there are over 90,000 miles of forest roads just in the Pacific Northwest region, it seems unlikely this restoration effort will meet its commitment with the State of Washington to implement all necessary road maintenance and abandonment by 2015. It was estimated in the 2000 MOA that Congress (at that time) allocated less than 20 percent of the funding necessary for the United States Forest Service (USFS) to adequately maintain their roads. More recent estimates in 2005 suggest a $300 million backlog of work on forest roads in Washington alone. With 2010 marking the greatest commitment of funding in a decade, it appears that Congress will have to substantially increase funding in order to ensure road systems on federal lands do not contribute to poor water quality for salmon and people in the Puget Sound Basin or threaten downstream habitat improvements that have been made.

The effort to appropriately size the NFS road network has begun, with nine of seventeen National Forests in the Pacific Northwest region having begun the process of conducting a "Travel Analysis" to identify an appropriate road system.

Ongoing Programs

Large landowners must bring all roads into compliance with forest practices standards by October 31, 2016 (or with approved extension by 2021).

DNR will continue to assure that small forest landowner roads used for forest practices activities are brought up to forest practices standards as part of the checklist RMAP process. In addition, Forest Practices will continue to track RMAPs and checklist RMAPs submitted by small landowners, reporting progress in its annual published HCP report. DNR will report to the legislature in December 2013 on the progress of checklist RMAP implementation.

The FFFPP has more than 500 landowner-proposed repair projects that are not funded. Several hundred more barriers likely exist on these smaller forest ownerships, in addition to those already waiting for funding. However, this is not a complete inventory. Every year 50 to 100 new landowners enroll in the program. The major factor limiting progress is funding. More than 30 local community conservation organizations around the state provide project oversight and accountability, and work with the small forestland owners to ensure projects are identified and installed according to plan. Minimal state agencies staff provide the program structure, accounting, coordination and consistency. In terms of stream habitat opened up per dollar spent, FFFPP has proven to be one of the soundest investments in salmon recovery being made in Washington State.

When U.S. Forest Service received $20 million of 2010 funding for the Legacy Roads and Trails program in the Pacific Northwest region, they planned three years of projects, assuming maintenance of that budget. In fiscal year 2011, however, that budget was reduced to $8.5 million. The fiscal year 2012 budget is uncertain, but unlikely to result in greater program funding given federal budget shortfalls. In

short, a significantly more modest restoration effort can be expected in Washington State in 2011 and 2012.

All NFS units in the region are preparing plans for completion of the travel analysis by 2015. They will each identify a road network that can be reasonably maintained under current budget constraints, given management objectives, and responsive to ecological, economic and social concerns. In addition, each unit has been asked to identify the capital budget needed to bring that appropriately sized road network up to a level that can be maintained under the current budget. This will include road maintenance and abandonment needs, and fish passage issues needing correction. This capital budget needs assessment will provide an updated estimate of the true backlog of road maintenance needs on federal forestlands.

Near-Term Actions

C4.2 NTA 1: Risk Assessment of Small Forest Landowner Roads. DNR, in consultation with Ecology, will design and complete a resource risk assessment of small forest landowner roads for the delivery of sediment to waters of the state. Work with stakeholders to propose an approach to solving identified problems, and focus restoration efforts on small forest landowner lands in the Puget Sound Basin.

Performance measure: Design resource risk assessment and implementation plan by June 2014.

C4.2 NTA 2: Accelerate Family Forest Fish Passage Program Implementation. DNR, in collaboration with other agencies, will seek increased support for the Family Forest and Fish Passage Program (FFFPP) based on the resource risk assessment and prioritization and will clear the current backlog of FFFPP projects within the Puget Sound Basin. This should build on strong existing partnerships with federal agencies, such as USDA NRCS, US FWS, NOAA Fisheries, EPA, and Bonneville Power Administration, as well as outreach to private sector and nonprofit sector funding sources.

Performance measure: Additional funding secured by July 2013; Initiate cleaning of backlog and remove 75 fish passage barriers per year beginning July 2013.

C4.2 NTA 3: Fish Passage Barriers. WDFW will assess and prioritize fish passage barriers by watershed within the Puget Sound.

Performance measure: Number of watershed habitat assessments and prioritization analyses conducted.

C4.2 NTA 4: Enhance RMAP Database: DNR will continue to update the Large Landowner RMAP database to ensure tracking of progress in bringing roads up to current standards by 2016 (or 2021 with approved extension).

Performance measure: RMAP data base updated quarterly with reports from landowners.

C4.2 NTA 5: RMAP Coordination with Federal Partners. DNR will work to secure executive-level participation from U.S. Forest Service in annual RMAP coordination meetings with

landowners, WDFW, Ecology, affected tribes, NOAA-Fisheries, USFWS, affected counties, watershed councils and other interested parties within each watershed (per WAC 222-24-051(11)). Participants will discuss opportunities to provide a coordinated approach within each watershed resource inventory area by (1) prioritizing road maintenance and abandonment planning and (2) exchanging information on road maintenance and stream restoration projects.

Performance measure: By December 2013, DNR convenes 19 WRIA meetings annually and includes USFS in the meetings for WRIAs where USFS owns land.

Reduce Pressures on the Puget Sound Ecosystem from Wastewater

The Challenge

Pollution of the rivers, creeks, bays and open waters of Puget Sound comes from a variety of sources and travels along many pathways. This section focuses on the potential for pollution from wastewater collection, treatment, and disposal – the system that is designed to collect and treat used water and human waste from homes and businesses and, in some cases, wastewater from industrial processes and urban stormwater. Essentially, everything that goes down a sink or is flushed down a toilet ends up in the wastewater system. This includes not just human waste but also a wide range of household cleaning products and chemicals and personal care products.

Wastewater management involves a spectrum of approaches and technologies that can be used to effectively treat sewage in different situations. In every case, the selected approach and technology must be tailored to local site conditions and take into account such factors as development densities; capital, maintenance and operation costs; and protection of public health and water resources. Generally, wastewater is treated either through a wastewater treatment plant or through an on-site sewage system. Both types of systems are regulated and permitted by state and/or local agencies.

Wastewater treatment plants (WWTP) are centralized facilities that use sewer collection systems to serve densely developed areas; they typically discharge treated effluent to surface water. On-site sewage systems, commonly known as septic systems, are decentralized or distributed systems that serve small communities, areas of limited development, and individual properties. They are called on-site systems because they treat wastewater on or near the site where the wastewater is generated.

Both types of systems are part of the region's permanent wastewater infrastructure. There are roughly 100 WWTP that discharge to surface waters in the Puget Sound region. There are about 300 large on-site sewage systems (LOSS) and more than a half million small on-site sewage systems (OSS) in the Puget Sound basin. Wastewater treatment systems play a critical role protecting public health and water quality, but they need proper management, operation, and maintenance to ensure effective treatment and to protect the infrastructure investments.

Ten centralized Puget Sound facilities include combined sewer overflows (CSOs) as part of their sewage and stormwater system. CSOs often are located in older parts of cities. Sewage and stormwater flow through a single piping system to a sewage treatment plant. During heavy rainfall events the system can be overwhelmed and is then designed to "overflow" untreated wastewater and stormwater at specific outfalls. In some locations, these CSO outfalls have been associated with sediment contamination and other impacts. Untreated wastewater also is discharged to Puget Sound from some boats and vessels.

Strategies for reducing pressures on Puget Sound from wastewater include efforts to prevent and control pollution from on-site sewage systems, wastewater treatment plants, and boats and vessels. They also include consideration of overarching approaches to promote watershed-based and integrated approaches to better manage the region's wastewater treatment needs.

Climate Change

Reducing existing stresses on the ecosystem is an important part of climate change adaptation strategies. Strategies to reduce pressure from wastewater from OSS and treatment plants, helps implement the state climate response strategies to:

- Safeguard fish and wildlife and protect critical ecosystem services that support human and natural systems,
- Reduce the vulnerability of coastal communities, habitat, and species.

In addition, wastewater facilities can be vulnerable to climate change impacts. Extreme weather events could cause more frequent combined sewer overflow events and intrusion of seawater could damage equipment and strain. Higher water tables and increased flood events may increase corrosion of underground utilities. Siting of retrofits and new facilities will need careful consideration.

Relationship to Recovery Targets

The 2020 target for the management of OSS is to inventory all OSS, fix all failures, and be current with inspections at 95 percent of systems in marine recovery areas and other designated areas by 2020. The target also calls on local health jurisdictions to expand these areas and programs to cover 90 percent of Puget Sound's un-sewered marine shorelines by 2020. The strategies and actions are designed to help achieve the target.

Three other targets closely associated with the management of wastewater are (1) improved water quality and pollution controls to achieve a net increase of 10,800 harvestable shellfish acres; (2) ensuring human-related contributions of nitrogen do not result in more than 0.2 mg/l reductions in dissolved oxygen levels anywhere in Puget Sound by 2020; and (3) ensuring that all monitored Puget Sound beaches meet enterococcus (a pathogen associated with fecal matter) standards by 2020. Other pollution sources and management programs also directly influence progress toward these ecosystem recovery targets.

Local Priorities

Several local areas have priorities related to decentralized wastewater treatment.

Local Integrating Organization	Priorities
San Juan Islands	Tier One • Implement best management practices to reduce pollution of source wastes by residential runoff and non-point sources.

Local Integrating Organization	Priorities
	Tier Two • Ensure coordination between planning and health departments on issuance of septic permits.
Strait of Juan de Fuca	*From 19 Strategic Priorities* • Clean Water District Plans (Sequim-Dungeness Bay & Eastern Jefferson County) - Implement Sequim-Dungeness Bay and East Jefferson County Clean Water Districts projects and programs, including TMDL implementation strategy and/or on-site sewage management programs
South Sound	*From Strategic Initiative: Rural/Agricultural Runoff* • Improve Operations and Management of septic systems in all 4 counties (e.g., Henderson inlet program)
Hood Canal	*Summarized general priorities* • Identify where in the Hood Canal watershed the highest risk onsite septic systems (OSS) are located and evaluate the risk of contribution of nitrogen from OSS to Hood Canal. (Hood Canal PIC program is part of this and other actions) • Explore the current regulations related to wastewater and water quality and assess potential additional or modified local or state regulations. • Research and register low cost, low maintenance, non-proprietary retrofit of existing OSS and new OSS that will reduce nitrogen by at least 80% • Repair or upgrade of OSS that are determined to be highest risk. • Continued involvement of county/state managers/planners in the Aquatic Rehabilitation TAC to develop recommended actions to address water quality in Hood Canal. • In coordination with state agencies (WDFW, Parks, address the need for additional sanitary services at popular recreation sites around Hood Canal.
Whatcom	*From working priority list* • Implement onsite sewage system operation and maintenance programs including continued inspections of OSS, community trainings, and low interest loan programs. • Implement water quality improvement projects identified in approved Shellfish Protection District plans, including OSS operation and maintenance and agricultural BMP technical and financial assistance.

C5. Prevent, reduce, and/or eliminate pollution from decentralized wastewater treatment systems

On-site sewage systems are an essential and valuable part of Puget Sound's wastewater infrastructure. They provide a high level of treatment and great flexibility developing and using properties where construction of, or connection to, centralized sewer systems is not feasible or practical. They can be designed and configured to treat sewage in most settings. Small systems (peak design flows below 3,500

gallons per day) typically serve single family residences or combined flows from fewer than a dozen homes. The vast majority of these systems are very small. The typical design for a 3-4 bedroom home is 360-480 gallons per day, and because of water efficiency measures such as low flow showers and faucets, most of these systems operate at closer to 250 gallons per day. Large systems (peak design flows up to 100,000 gallons per day) can be engineered to treat flows from up to 370 residential connections.

Small on-site sewage systems traditionally consist of collection pipes, a septic tank, and a drainfield. In this design, the septic tank holds and separates wastewater into solid and liquid components to allow initial decomposition and treatment in an anaerobic (septic) environment. From the tank, the liquid effluent flows into the drainfield, which is generally a series of perforated pipes or molded chambers installed in suitable soil. The drainfield provides further treatment by allowing the effluent to be exposed to an oxygen-rich environment where bacteria and other microbes continue to treat contaminants. The drainfield removes and inactivates pathogens as the effluent filters through the soil layers before entering the groundwater.

There are other treatment technologies in use that are collectively referred to as "alternative systems." These systems often use devices to enhance aerobic treatment and may use filters to screen solids and pumps to pressurize and distribute the septic tank effluent more evenly over the drainfield to promote better soil treatment. Large on-site sewage systems are often engineered to include additional or other types of treatment.

When on-site sewage systems don't function properly they can pollute groundwater or, if there is a direct connection, nearby surface water. The pathogens and chemicals in sewage can make people sick, contaminate shellfish and other water resources, and disrupt ecosystem functions. Older on-site sewage systems and systems in sensitive areas often present higher risks. In addition, even properly operating systems can leach excess nutrients into Puget Sound; an issue that needs further study and action to address. Work is underway to better understand and document the sources, loadings, and impacts of nitrogen on Puget Sound and the appropriate steps to effectively address this emerging challenge.

There are many strategies for improving the region's decentralized wastewater infrastructure. The key is life-cycle management and care of on-site sewage systems, making sure they are properly sited, designed, installed, operated and maintained. Overarching strategies include (1) implementing and funding effective state and local on-site sewage programs; 2) providing low-interest loans to help homeowners repair and replace failed and malfunctioning systems; 3) documenting problem areas and pollution impacts and developing appropriate wastewater treatment solutions; and 4) improving practices, partnerships, and professional services to effectively and efficiently manage and maintain on-site sewage systems.

C5.1 Effectively manage and control pollution from on-site sewage systems.

The Washington Department of Health (DOH) administers the state rule for OSS with peak design flows below 3,500 gallons per day (Chapter 246-272A WAC). This is the vast majority of all systems in Puget Sound. Local health jurisdictions adopt and implement this rule to regulate and permit OSS at the local level. Among other requirements, the rule sets standards for siting, designing, installing, operating and

maintaining OSS. Once systems are in use, OSS owners are responsible for operating, monitoring, and maintaining their systems to make sure they function properly.

Under the state rule, the 12 Puget Sound local health jurisdictions are required to develop and carry out comprehensive plans to help ensure that systems are properly managed, with emphasis on operation and maintenance (O&M) activities and geographic areas where OSS pose an increased public health risk. The local O&M programs are designed and implemented differently in each county and are applied strategically to different types of systems, sensitive areas, and other situations (e.g., time-of-sale inspections) on the basis of public health risk and other criteria.

As part of the planning process, local health jurisdictions also are required to designate and protect marine recovery areas (Chapter 70.118A RCW). Marine recovery areas (MRAs) must be designated when the local health officer determines that existing OSS are a significant factor contributing to concerns associated with the degradation of shellfish growing areas, marine waters listed by the Department of Ecology for low-dissolved oxygen levels or fecal coliform, or marine waters where nitrogen has been identified as a contaminant of concern. The focus in marine recovery areas is to: (1) find existing failing systems and ensure that system owners make necessary repairs, and; (2) find unknown systems and ensure that they are inspected and functioning properly, and repaired if necessary.

Ongoing Programs

The state and local OSS programs are designed to regulate the safe and appropriate use of OSS to effectively treat sewage and to protect public health and water quality. Ongoing implementation of these programs includes many activities and responsibilities. Some are unique to DOH, some are unique to the local health jurisdictions, and some are shared. The work includes the following DOH performance measures: (1) Reviewing and approving local rule changes and reviewing waivers to ensure ongoing consistency with the state rule; (2) reviewing and registering proprietary products, additives, and sewage tanks for use in the state; (3) regularly updating state standards and guidance documents for alternative technologies; (4) contracting with and distributing state funds to help implement the local OSS management plans and coordinating semi-annual performance reporting; and (5) adapting OSS management plan implementation and reporting to align with and make progress toward OSS performance measures adopted for GMAP and the Puget Sound Action Agenda.

All twelve Puget Sound counties have developed local management plans and submitted them to the Department of Health for approval, and nine counties have designated one or more marine recovery areas. Based on the number of OSS systems noted in an earlier section of more than 500,000 and an annual failure rate of 1 percent, the annual need should approach 5,000. Many system repairs or replacements are financed privately or by lending institutions. Additionally, Ecology oversees funding to LHJs, which is directed to owners to support repairs; LHJs issue permits for repairs/replacements to many owners who self-finance repair work. These amount to hundreds of annual improvements and personal investments.

The GMAP program identifies two measures for OSS. First the state tracks the number of on-site sewage system repairs or replacements funded by Ecology in Puget Sound counties. The target is 39 every 6 months. Ecology passes funding to local health jurisdictions that identify the systems for repair or replacement and oversee the work. Since 2007, performance has been at or above the target, and as of December 2010, 388 systems have been repaired or replaced by local health jurisdictions through

financial assistance from Ecology. Second, the state tracks the status of OSS inventoried, inspected, and fixed in marine recovery areas and other designated sensitive areas. The target, consistent with the Puget Sound recovery goal, is to inventory all OSS, fix all failures, and be current with inspections at 95 percent in marine recovery areas and other designated areas by 2020. The target also calls on local health jurisdictions to expand these areas and programs to cover 90 percent of Puget Sound's un-sewered marine shorelines by 2020.

Near-Term Actions

C5.1 NTA 1: Effectiveness of OSS Rule. DOH, in consultation with local health jurisdictions (LHJs) and other interests, will evaluate the effectiveness of the state OSS rule, identify potential changes, and outline recommendations to the State Board of Health by December 2013.

Performance measure: Project design completed by December 2012, draft results compiled by September 2013, and recommendations completed by December 2013.

C5.1 NTA 2: OSS O&M Program Best Practices. DOH will work with LHJs to identify successes and best practices, develop common performance standards, and recommend approaches to improve core functions of local O&M programs.

Performance measure: Project design completed by December 2012, draft analysis completed by March 2014, and final analysis completed by June 2014. OSS inspection levels at 60 percent by December 2014 in designated areas.

C5.1 NTA 3: OSS Nitrogen Treatment Technologies. DOH will evaluate public domain OSS treatment technologies for nitrogen reduction and develop standards and guidance for their use if testing results indicate the technologies are effective and reliable. The evaluation will be completed by December 2014 and work on standards and guidance, if needed, will begin after that.

Performance measure: OSS installed and testing initiated by August 2012, evaluation of OSS technologies completed by June 2014, and plans for standards and guidance by December 2014.

C5.1 NTA 4: Centralized Treatment Outside UGAs. Commerce, in partnership Ecology and DOH, will identify shoreline areas outside urban growth boundaries where residential densities are great enough that it may be appropriate to extend centralized wastewater collection systems and that are in close enough proximity to centralized treatment that extension of infrastructure may be feasible. The goal of this effort is completion of design of at a least one pilot project by 2014 and construction of a least one pilot project by 2016.

Performance measure: By June 2013, Commerce, in consultation with Ecology and DOH, will produce draft criteria to identify shoreline areas outside urban growth areas that may be appropriate to extend centralized wastewater collection systems. By Nov. 2013, areas meeting those criteria will be mapped and analyzed for suitability pilot projects. By

July, 2014 design for at least one pilot project will be completed. Construction for at least one pilot project will be completed by September 2016.

C5.1 SJ 4: San Juan County OSS Program. San Juan County Health and Community Services will fully implement the On-site Sewage System (OSS) Operation and Maintenance Program Plan.

Performance measure: 100% of systems in sensitive areas in compliance and current with inspections by 2014 and 60% of alternative systems county-wide to have inspections between 2010-2014.

C5.1 WS 7: West Sound OSS repairs. Kitsap Public Health will report on the number of OSS failures repaired using funds from the Craft3 septic loan program by December 2013.

Performance measure: Number of OSS failures repaired using funds from the Craft3 septic loan program by December 2013.

C5.2 Effectively manage and control pollution from large on-site sewage systems.

DOH directly regulates and permits large on-site sewage systems (LOSS) with flows between 3,500 and 100,000 gpd (chapter 246-272B WAC). DOH adopted a revised LOSS rule in 2011. Among other changes, the expanded LOSS program consolidates all LOSS permitting authority at DOH, requires annual operating permits for all LOSS, and requires protection of public health and the environment. The rule is structured to regulate and permit LOSS in different situations ranging from newly constructed LOSS to existing LOSS that have never been documented or permitted. The revised rule includes many new requirements and approaches for siting, designing, constructing, operating, maintaining, repairing, permitting and managing LOSS.

Ongoing Programs

The overarching performance objective of the LOSS program is to regulate the systems and owners to achieve effective long-term treatment and to protect public health and water quality. The program includes a strong focus on Puget Sound. The work includes the following DOH performance measures: (1) locate, assess, and permit all LOSS with emphasis on marine recovery areas and other designated areas; (2)annually review and renew operating permits; (3) issue permits for LOSS previously permitted by Ecology as the permits expire; (4) issue permits for LOSS previously permitted by local health jurisdictions as the permits transfer to DOH; (5) work with LOSS owners as needed to address deficiencies in order to achieve adequate treatment and compliance with the rule and permit conditions; (5) develop technical guidelines and standards for LOSS design and O&M, system evaluations, document submittals, and other program activities; and (6) reset and report on the LOSS performance measure for GMAP based on the new LOSS rule and database and make progress toward the targets.

The state GMAP performance measure for LOSS addresses compliance with requirements of the revised LOSS rule adopted by DOH in 2011. By the end of 2011, DOH had identified 277 LOSS in the Puget Sound region, 263 of which were under permit. Compliance levels may drop as the new rule takes effect and all LOSS came under the program, including many previously undocumented LOSS and LOSS formerly permitted by Ecology or local health jurisdictions that are transferring to DOH.

Near-Term Actions

C5.2 WS 6 West Sound Sewer Feasibility. Kitsap Public Health together with the municipality will conduct sewer infrastructure feasibility study for sewers in areas such as Ostrich and Phinney Bay by December 2013.

Performance measure: Sewer infrastructure feasibility study conducted by December 2013.

C5.3 Improve and expand funding for on-site sewage systems and local OSS programs.

Funding for proper operation and maintenance of on-site sewage systems and for replacement of failing systems is an ongoing challenge. The work is expensive; the cost of replacing a system can be as high as $40,000.

Funding assistance currently is comprised of a variety of grant and loan programs, including a $4.2 million state program administered by the Department of Ecology to help homeowners and small businesses in the 12 Puget Sound counties repair, replace, or improve their existing systems. (See discussion of performance objectives for ongoing OSS programs, above.) Since 2007, this program has funded replacement of 388 failing systems around Puget Sound. In addition, Craft3 (formerly Enterprise Cascadia) offers low interest loans to homeowners and businesses in Jefferson, Kitsap, Mason, and Clallam Counties to repair or replace on-site sewage systems. This program, funded in part through the Department of Ecology, uses public and private resources to help owners fix or replace malfunctioning systems. From 2007 through December 2010, 245 systems were improved using this mechanism.

Other Puget Sound counties have established their own low-interest loan programs, as well. While these programs have helped, eligibility for them can be constrained by the age and location of the system, the income level of the homeowner, and other criteria. Additional and more reliable sources of funding are needed to support local O & M programs and programs to repair or replace failing on-site sewage systems.

Near-Term Actions

C5.3 NTA 1: Regional OSS Homeowner Loan Program. DOH, Ecology, and PSP will help evaluate options and support proposals to fund a unified, self-sustaining, low-interest loan program in the Puget Sound region to help OSS owners repair and replace their systems by June 2014.

Performance measure: Project design completed by August 2012, draft analysis of issues and proposed actions completed by March 2014, and final analysis completed by June 2014.

C5.3 NTA 2: Regional OSS Program Funding Source. DOH will evaluate approaches and mechanisms (e.g., a regional flush tax or sewer surcharge) to generate and distribute funds to Puget Sound counties to implement their OSS management plans and programs by June 2014.

Performance measure: Project design completed by August 2012, draft analysis of issues and proposed actions completed by March 2014, and final analysis completed by June 2014.

C5.3 NTA 3: Funding Mechanism for Local OSS Programs. DOH will work to authorize local boards of health to contract with county treasurers to collect fees via property tax statements to implement local OSS plans and programs by June 2012.

Performance measure: Bill introduced and legislation passed and signed by June 2012.

Emerging Issues and Future Opportunities

In addition to the specific ongoing program activities and near-term actions described above, there are a number of ideas for future work that might be considered to better address the Puget Sound region's wastewater treatment needs and further reduce pressures on the Puget Sound ecosystem. These ideas should be an ongoing part of the regional discussion about how to best address wastewater treatment needs in the Puget Sound basin, and may inform future funding decisions, programmatic priorities and guidance, and/or may become near-term actions in future Action Agenda cycles.

Many of these ideas have to do with exploring potential future funding to ensure local health jurisdictions can effectively oversee and administer programs for reliable operation, maintenance, repair and replacement for on-site systems. They include:

- Evaluate funding options to help local governments with projects involving OSS conversions to more centralized treatment and to decommission abandoned systems. Residences in older neighborhoods in some cities remain on OSS even though surrounding, newer neighborhoods are served by centralized wastewater treatment. It can be difficult to convert these neighborhoods to centralized treatment—often individual homeowners do not have adequate resources or incentives to work together to fund conversion, utilities have little incentive to convert older neighborhoods, and local governments do not have the resources to subsidize these efforts.
- Evaluate and discuss models and ways to engage private wastewater companies and public utilities in OSS management as pilot projects or in new working relationships.
- Explore approaches to expand funding options for LOSS.

Other ideas raise a range of issues related to targeting technical and financial assistance, considering cumulative impacts, and improving treatment technologies.

- Identify priority areas around Puget Sound needing focused technical and financial assistance to solve chronic sewage problems. Explore options to provide targeted technical and financial assistance to solve these problems.
- Revise the definition of OSS failure to account for cumulative impacts of multiple OSS. We need to address situations where the cumulative effect of pollution from OSS in a community has a significant effect on water quality, even though the individual systems do not meet the traditional definition of failure (i.e., sewage that surfaces or backs up into a structure). This may be the case, for example, where it is clear that a certain neighborhood is creating water quality impacts but no individual OSS in that area is failing.

- Objectively evaluate impacts of OSS for pollutants of concern other than fecal coliform, like nitrogen and toxic chemicals, and update regulations and management plan guidance to address these findings.
- Work with OSS industry and others to develop new, affordable and reliable technologies that reduce nutrient and fecal coliform concentrations in OSS effluent.
- Work to develop cost effective ways to effectively separate urine from wastewater.
- Develop standards of practice for OSS O&M service providers in the Puget Sound region.
- Include assessment of cumulative impacts in planning and permitting for centralized and decentralized wastewater systems in comprehensive plans. Centralized wastewater management options largely flow from the location at which the wastewater is generated—inside or outside an urban growth area; served by centralized treatment or not. Options to reduce wastewater generation through re-use of gray water, and to re-use treated water through reclaimed water projects are implemented largely on an ad hoc basis. There may be opportunities to take a more holistic approach to wastewater planning and thereby to better and more efficiently provide needed treatment and use all water resources fully. This issue also is discussed in strategy A8 on freshwater availability. In the draft Action Agenda a series of near-term actions were proposed on this issue, and comments on the NTAs were mixed, and focused on the interaction between GMA requirements and wastewater treatment planning. These ideas should continue to be considered and, ideally, ripened for inclusion into the next Action Agenda.
- Integrate climate change considerations into siting and design of new facilities and retrofits.

Target View: On-Site Sewage System Management

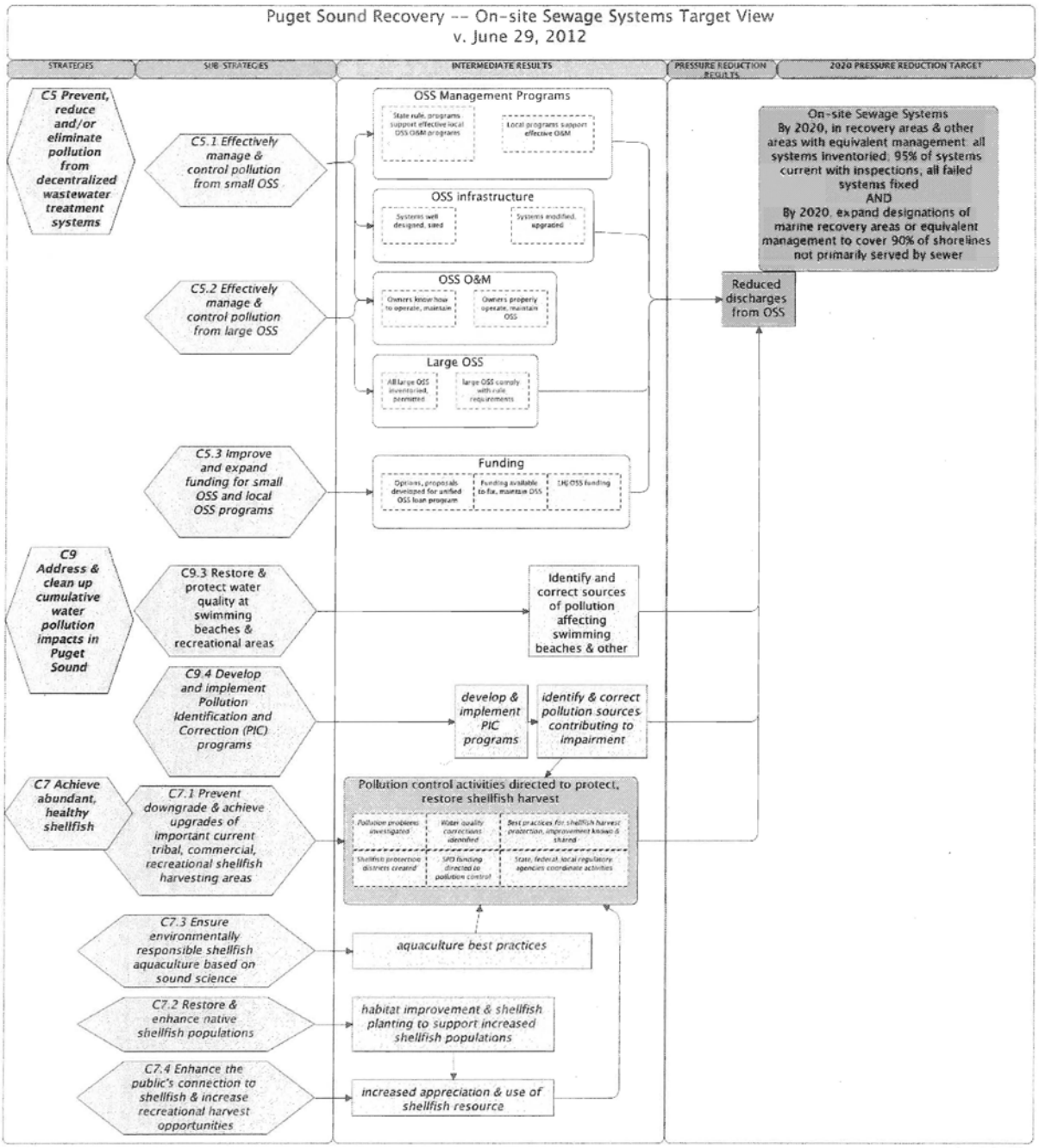
For many people, especially those in rural areas of Puget Sound, on-site sewage systems are the best option for sewage treatment. When properly designed and installed, these systems provide a high level of treatment. Proper care is the key to long-term performance of all sewage treatment systems. Older on-site systems and systems located in sensitive areas often present higher risks. With newer systems, advances in technology mean there is more need for regular maintenance to keep things working smoothly. Poorly maintained systems can break down, requiring costly repairs and polluting our prized waterways and water resources. Regular inspections help protect on-site sewage systems and Puget Sound.

The 2020 recovery target for on-site sewage system management has two components. The first is to inventory and fix all on-site sewage systems in marine recovery areas and other designated sensitive areas and to be current with inspections at 95 percent. The second part is to extend this work to cover 90 percent of Puget Sound's unsewered marine shorelines by 2020.

The Action Agenda strategies most related to achieving the recovery target for on-site sewer system management are:

- Effectively manage and control pollution from on-site sewage systems (C5.1)
- Effectively manage and control pollution from large on-site sewage systems (C5.2)
- Improve and expand funding for on-site system maintenance, repair and replacement (C5.3)
- Develop and implement local and tribal pollution identification and correction (PIC) programs (C9.4)
- Restore and protect water quality at swimming beaches and recreational areas (C9.3)
- Ensure abundant, healthy shellfish for ecosystem health and for commercial, subsistence, and recreational harvest consistent with ecosystem protection (C7.1, C7.2, C7.3, C7.4)

In the following results chain, or logic model, yellow polygons identify strategies and sub-strategies from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur and the target adopted for pressure reduction by 2020.


Puget Sound Recovery -- On-site Sewage Systems Target View
v. June 29, 2012
STRATEGIES
SHB STRATEGIES
INTERMEDIATE RESULTS
PRESSURE REDUCTION RESULTS
2020 PRESSURE REDUCTION TARGET
C5 Prevent, reduce and/or eliminate pollution from decentralized wastewater treatment systems
C5.1 Effectively manage & control pollution from small OSS
C5.2 Effectively manage & control pollution from large OSS
C5.3 Improve and expand funding for small OSS and local OSS programs
OSS Management Programs
State rule, programs support effective local OSS O&M programs
Local programs support effective O&M
OSS infrastructure
Systems well designed, sited
Systems modified, upgraded
OSS O&M
Owners know how to operate, maintain
Owners properly operate, maintain OSS
Large OSS
All large OSS inventoried, permitted
large OSS comply with rule requirements
Funding
Options, proposals developed for unified OSS loan program
Funding available to fix, maintain OSS
LHJ OSS funding
On-site Sewage Systems
By 2020, in recovery areas & other areas with equivalent management all systems inventoried, 95% of systems current with inspections, all failed systems fixed
AND
By 2020, expand designations of marine recovery areas or equivalent management to cover 90% of shorelines not primarily served by sewer
Reduced discharges from OSS
C9 Address & clean up cumulative water pollution impacts in Puget Sound
C9.3 Restore & protect water quality at swimming beaches & recreational areas
Identify and correct sources of pollution affecting swimming beaches & other
C9.4 Develop and implement Pollution Identification and Correction (PIC) programs
develop & implement PIC programs
identify & correct pollution sources contributing to impairment
C7 Achieve abundant, healthy shellfish
C7.1 Prevent downgrade & achieve upgrades of important current tribal, commercial, recreational shellfish harvesting areas
Pollution control activities directed to protect, restore shellfish harvest
Pollution problems investigated
Water quality corrections identified
Best practices for shellfish harvest protection, improvement known & shared
Shellfish protection districts created
SRF funding directed to pollution control
State, federal, local regulatory agencies coordinate activities
C7.3 Ensure environmentally responsible shellfish aquaculture based on sound science
aquaculture best practices
C7.2 Restore & enhance native shellfish populations
habitat improvement & shellfish planting to support increased shellfish populations
C7.4 Enhance the public's connection to shellfish & increase recreational harvest opportunities
increased appreciation & use of shellfish resource

C6. Prevent, reduce, and/or eliminate pollution from centralized wastewater systems

Centralized wastewater treatment facilities are regulated through National Pollution Discharge Elimination System (NPDES) permits administered by EPA and Ecology under the federal Clean Water Act and state regulations. Untreated wastewater from municipal, industrial, and government facilities contains a broad spectrum of pollutants, including nutrients and pathogens. Wastewater treatment removes or transforms many, but not all, contaminants. Depending on the amounts and types of treatment, treated wastewater can contain a variety of contaminants, including personal care products, caffeine, endocrine-mimicking chemicals, pharmaceuticals, and industrial chemicals.

Approximately 100 municipal and industrial wastewater treatment plants discharge to the marine waters of Puget Sound and the Straits of Georgia and Juan de Fuca and to rivers and other water bodies in the Puget Sound watershed. The combined daily discharge of treated wastewater to Puget Sound is over 430 million gallons per day. In addition, during wet weather events, CSOs in some older urban areas of ten Puget Sound cities sometimes discharge mixed stormwater and untreated domestic and industrial wastewater when conveyance or treatment plant capacities are exceeded.

The effectiveness of pollutant removal at treatment plans varies with the treatment technology and to some degree the age of the treatment facility. Treatment effectiveness also depends on the amount and types of contaminants in the wastewater treatment facilities receive from residents and businesses. Municipal facilities have traditionally focused on removing pathogens, biochemical oxygen demand, toxic chemicals, and suspended solids with a primary objective of protecting human health. Industrial facilities typically have systems customized to the exact composition of their wastewater and/or discharge to municipal systems after pre-treatment on site. In Puget Sound most municipal wastewater treatment plants use secondary treatment technology, and few have needed to install advanced treatment technology to meet current discharge limits. All new facilities constructed in recent years have been built with advanced treatment.

Reducing the amount of impervious surface also may reduce the frequency and extent of CSOs and Inflow and Infiltration (I&I). Implementing the stormwater actions described in Section C2 will help reduce the pressure on Puget Sound from wastewater.

Relationship to Recovery Targets

The 2020 target most associated with centralized wastewater treatment is the larger Puget Sound nutrient target—that the combination of all human sources must not contribute to dissolved oxygen depletion more than 0.2 mg/L anywhere in Puget Sound. This is similar to state water quality standards. Potential human contributions to oxygen depletion in areas of Puget Sound include wastewater treatment plant discharges, on-site wastewater systems, stormwater, and other sources. The strategies and actions are designed to help achieve this target, as well as other targets closely associated with the management of wastewater: shellfish bed recovery; eelgrass recovery; swimming beaches; toxics in fish; and marine sediment quality. As with the dissolved oxygen target, other pollution sources and management programs also directly influence progress toward these ecosystem recovery targets.

Local Priorities

Several local integrating organizations identified wastewater treatment as a high priority strategy.

Local Integrating Organization	Priorities
Strait of Juan de Fuca	*From 19 Strategic Priorities* • Carlsborg Wastewater Treatment and Water Reuse - Implement Carlsborg Urban Growth Area Wastewater Treatment and Water Reuse Strategy
South Puget Sound	*From Strategic Initiative: Urban Stormwater/Runoff* • Complete upgrade at Wastewater Treatment Plants in South Sound (LOTT, Shelton, Solo Point, Chambers)
Hood Canal	*From General priorities* • Building from experience with the Belfair wastewater treatment plant, implement existing plans to improve wastewater infrastructure in the Port Hadlock and Dosewallips areas.

C6.1 Reduce the concentrations of contaminant sources of pollution conveyed to wastewater treatment plants through education and appropriate regulations, including improving pre-treatment requirements.

Preventing sources of pollution conveyed to wastewater treatment plants will be a key part of reducing the overall threat to Puget Sound. Work in this area will rely heavily on strategies and actions related to reducing sources of toxics addressed in strategy C1 and include developing safer alternatives for chemicals in use, advancing programs to help prevent chemicals from entering the Puget Sound environment, education and technical assistance, and other strategies.

Pre-treatment programs, which are focused on working with businesses and industrial facilities that discharge wastewater to municipal treatment plants, also play an important role. These programs work to prevent the introduction of pollutants that could interfere with treatment plant processes, impact receiving water or biosolids quality, and/or threaten workers' safety. Effective implementation of the pre-treatment program plays a vital part in ensuring contaminants are not conveyed to wastewater treatment plants in amounts in excess of the plants' treatment capacity or acceptance requirements.

Emerging chemicals are a particular issue for pre-treatment standards, and are discussed in the emerging issues list, below. In addition, some commenters on the draft Action Agenda expressed concern that pre-treatment requirements, overall, are not protective enough for Puget Sound and should be reevaluated and updated, this is an issue that warrants further discussion.

Near-Term Actions

None; work will focus on implementation of ongoing programs.

C6.2 Reduce pollution loading to Puget Sound by preventing and reducing combined sewer overflows.

Combined sewer systems are wastewater collection systems designed to carry sanitary sewage (consisting of domestic, commercial, and industrial wastewater) and stormwater in a single piping system to a treatment facility. In periods of rainfall or snowmelt, total wastewater flows can exceed the capacity of the sewer collection systems and/or treatment facilities. When this occurs, the combined sewer system is designed to overflow directly to nearby streams, lakes, and harbors, discharging untreated sewage and stormwater. These overflows are called combined sewer overflows (CSOs) and can cause contribute to water and sediment quality problems.

Contaminants in CSOs can include pathogens, oxygen consuming pollutants, solids, nutrients, toxic chemicals, and floatable matter—all of which can harm the health of people, fish and wildlife. CSOs can contribute to shellfish harvesting restrictions, contaminated sediment, impairment of the aquatic habitat, and aesthetic degradation due to unsightly floating materials associated with raw sewage. Ten Puget Sound cities have combined sewage and storm collection systems.

CSO control is a vital part of the statewide effort to reduce and control stormwater discharges. CSO reduction programs are in place in 11 jurisdictions in Washington. In 1988, Ecology estimated that the average volume of untreated CSOs discharged to the state waters was 3.3 billion gallons per year. Since then, Washington has made progress in addressing this pressure, with a reduction of CSOs to less than one billion gallons in 2009.

A number of communities have been successful in controlling and reducing their CSOs completely and the remaining communities continue to make progress in CSO control. Strategies for controlling CSOs include separation, storage, or treatment of flows. More recently, "green" stormwater infrastructure (GSI) has been used alone or in concert with other control strategies as a cost effective approach for some CSO reduction projects. Many different tools, including a variety of stormwater control strategies, could be used to reduce pressures on the Puget Sound ecosystem from CSOs.

One of EPA's National Priorities for enforcement and compliance assurance for FY 2008–2010 addresses CSOs and sanitary sewer overflows (SSOs). The priority focuses on enforcement of the Clean Water Act and the codified CSO Control Policy which requires that CSO discharges to be reduced to a level that does not contribute to violations of the water quality standards.

Ecology requires that CSO discharges be controlled to an average of one discharge per year per outfall, consistent with the EPA's CSO Control Policy. As of February 2011 the following Puget Sound CSO facilities have been determined to meet this standard: Anacortes, Bellingham, Bremerton, and LOTT (in Olympia). Other facilities are under permits or compliance orders to meet the standard: Everett (estimated compliance date 2017), King County (estimated compliance date 2030), Mount Vernon (estimated compliance date 2015), Port Angeles (estimated compliance date 2015), Seattle (estimated compliance date 2025), and Snohomish County (no estimated compliance date).

Ecology's work on CSOs is focused on ensuring that facilities current in compliance, and on providing technical assistance to facilities developing compliance plans and activities to ensure they meet their compliance dates.

Near-Term Actions

C6.2 NTA 1: Integrated Municipal Stormwater and Wastewater Plans. PSP, in collaboration with Ecology, will convene a group to make recommendations about use of integrated municipal stormwater and wastewater plans to meet Clean Water Act water quality objectives. This effort will recognize the use of integrated approaches as a way to prioritize allocation of resources to achieve the greatest environmental benefit, at the earliest time, consistent with meeting Clean Water Act obligations and applicable state laws, through appropriate sequencing of work.

Performance measure: By December 2012, conduct at least one initial meeting to scope work plan; By March 2013, a work Plan approved by key partners; By December 2013, recommendations for integrated stormwater and wastewater planning and implementation made to the Leadership Council. These dates are dependent on conclusions of current 2012 negotiations. If those negotiations are still in progress by September 2012, PSP will work with the Leadership Council to set new performance milestone dates.

C6.3 Implement priority upgrades of municipal and industrial wastewater facilities.

EPA has delegated authority to Ecology to administer the Clean Water Act provisions for NPDES permits. This includes both individual permits to discharge and general permits that cover multiple dischargers in particular categories of sources (e.g., municipal stormwater permits). All wastewater treatment plants that discharge to Puget Sound have individual NPDES permits, which are highly tailored to meet water quality standards for the pollutants in the discharge.

Ecology also is responsible for establishing Total Maximum Daily Loads (TMDLs) or water cleanup plans for impaired water bodies that are identified as not meeting state water quality standards. In marine waters such as Puget Sound, TMDLs require that contributions from the combined total of human point and nonpoint sources cannot cause dissolved oxygen levels to fall below particular concentrations; where concentrations naturally fall below these levels, the combined total of all human sources cannot cause more than a 0.2 mg/L depletion at any time. Marine waters with measured concentrations below the thresholds must be assessed to determine whether human activities are contributing to the low levels or whether the low levels result from natural conditions. Through implementation of the TMDL program, Ecology can identify when and where wastewater treatment discharge limits for individual treatment plans must be lowered to achieve water quality goals; these studies also will identify areas where nonpoint sources, including contamination from on-site sewage systems and polluted runoff, may need to be reduced.

Municipal and industrial wastewater treatment plants provide a critical element of Puget Sound protection by giving us a way to manage wastewater; however, outfall discharges into Puget Sound prevent harvest from shellfish growing areas on state-owned lands, depriving the state of badly needed revenue, half of which is used to restore and protect the state's aquatic lands through the Aquatic Lands Enhancement Grant program. Closures on private tidelands also reduce income for private shellfish businesses and deprive residents of the opportunity to harvest shellfish at recreational sites. Closures associated with outfalls are required regardless of permit discharge limits and regardless of permittees compliance with permits. These closures are automatic, based simply on the presence of the outfall and the associated potential for pollution. Many large outfalls are not practical to remove or relocate, but others may be under used, no longer needed, or able to be combined with other nearby outfalls.

Ongoing Programs

To support TMDL or similar processes in Puget Sound, Ecology is carrying out a number of studies to determine how nitrogen from a variety of sources affects dissolved oxygen levels in South Puget Sound and other areas with low levels of dissolved oxygen. These studies are a critical first step in determining what will be needed to improve water quality. The results of the studies may show that human-related sources of nitrogen need to be reduced to keep South Puget Sound and other regions healthy. If reductions are needed, the study will also help determine where reductions might need to occur and what actions might be needed, such as upgrading wastewater treatment plans to advanced treatment. These studies also will identify areas where nonpoint sources, include contamination from onsite systems and polluted runoff, need to be reduced. The TMDL program and related near-term actions are described in Section C9.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs; see C9 for additional discussion of TMDLs and water cleanup plans.

C6.4 Ensure all centralized wastewater treatment plants meet discharge permit limits through compliance monitoring, technical assistance, and enforcement where needed.

NPDES permit holders, including all WWTP that discharge to Puget Sound must report compliance in Daily Monitoring Records (DMRs) submitted to Ecology. Ecology reviews these DMRs and also inspects facilities for compliance.

Ecology's goal is that all WWTP maintain compliance with permits written to meet standards for all permit limits. Consistent with this goal, Ecology recognizes WWTP for perfect performance – that is, meeting every permit condition, every day, for an entire year. In 1995 only 14 plants in Washington State were in full compliance with permit requirements; in 2010, over 100 plants were in full compliance including 40 within the Puget Sound watershed.

When violations are found, Ecology's goal is to ensure plants return to compliance quickly. EPA guidance defines a major violation as any parameter violated by a permittee for the months in a row. In that case, Ecology's permit manager initiates contact with the permittee and takes a range of action to ensure a return to compliance. Ecology may issue enforcement orders if a permittee is unable to correct the violation. Ecology's goal is to inspect major plants once a year and minor plants every two years.

One issue that gained some attention during development of this Action Agenda update is inflow and infiltration. Excess water that flows into sewer pipes from groundwater and stormwater is called infiltration and inflow, or I/I. Groundwater (infiltration) can seep into sewer pipes through holes, cracks, joint failures, and faulty connections. Stormwater (inflow) can rapidly flow into sewers via roof drain downspouts, foundation drains, storm drain cross-connections, and through holes in manhole covers. Most I/I is caused by aging infrastructure that needs maintenance or replacement. There is some evidence that a substantial portion of excess water entering conveyance lines derives from side sewers that connect individual homes and businesses to the collection system. This excess water takes up capacity during peak flows that could otherwise be used for wastewater treatment alone and generates the need to build added capacity in pipelines, treatment plants, and other wastewater facilities.

Wastewater treatment providers manage inflow and infiltration as part of the overall maintenance of the conveyance system; however where I/I derives largely from side sewers or individual homes or businesses opportunities for centralized utilities to find and repair the sources of I/I can be limited, and present funding challenges. NPDES permits do not necessarily specify a target for the percent of water delivered to treatment plants that comes from I&I rather than through wastewater. Permittees are required to report I&I in their annual reports to Ecology. I&I levels are reviewed along with any permit violations or Sanitary Sewer Overflows (SSOs). SSOs are considered spills and must be reported to Ecology. Ecology may issue a compliance order to plants that have multiple problems, and I&I controls, if appropriate, could be one of several actions required. Currently one plant in South Puget Sound is under a compliance order. Recent permits added a new requirement that permittees pressure test force mains for exfiltration. Plants that have high levels of I&I in the winter may be more likely to produce exfiltration in the summer months, and some permits stipulate that any gravity sewers close to water bodies must pressure tested once per permit cycle.

Ongoing Programs

Key Ongoing Program Activities

- Ecology, in accordance with NPDES permits issued under the Clean Water Act, will continue to work with permittees to reduce SSOs in all areas of Puget Sound, with an emphasis on Marine Recovery Areas.
- Ecology will work with permittees reduce inflow and infiltration in centralized wastewater collection systems in all areas of Puget Sound with an emphasis on watersheds with declining baseflows or watersheds closed to additional withdrawals or otherwise water stressed.
- Ecology will work with permittees to reduce exfiltration in all areas of Puget Sound with an emphasis on watersheds and marine waters where bacteria concentrations violate water quality standards.
- Ecology will complete evaluations of I/I project effectiveness in Puget Sound Basin and review evaluations from elsewhere to determine the potential effectiveness of I/I reduction programs.

Near-Term Actions

C6.4 NTA 1: Water Quality Standards Update. Ecology has initiated rule making to amend the Water Quality Standards to update and develop predictable regulatory compliance tools that address short and long-term source control programs. The proposed changes will provide predictable regulatory tools to help entities comply with existing and new source control requirements or discharge limits. The changes will allow compliance with requirements while they effectively work toward meeting permit limits and control sources of pollutants.

Performance measure: Rule Initiation: October 25, 2011; Rule Adopted: June 30, 2013.

C6.5 Promote appropriate reclaimed water projects to reduce pollutant loading to Puget Sound.

Reclaimed water is derived from domestic wastewater and small amounts of industrial process water or stormwater. The process of reclaiming water, sometimes called water recycling or water reuse, involves a highly engineered, multi-step treatment process that speeds up nature's restoration of water quality. The process provides a high-level of disinfection and reliability to assure that only water meeting stringent requirements leaves the treatment facility.

Reclaimed water can be used for a wide variety of beneficial uses such as irrigation, industrial process and cooling water, toilet flushing, dust control, construction activities, and many other non-potable uses. Reclaimed water also can be used as resource to create, restore, and enhance wetlands, recharge groundwater supplies, and increase the flows in rivers and streams. Reclaimed water is classified based on intended use. Class A reclaimed water must meet strict standards. Reclaimed water must not cause a violation of state water quality standards.

Ongoing Programs

Expansion of reclaimed water programs will be a vital part of Puget Sound recovery. In 2006 the Legislature directed Ecology to adopt a rule for reclaimed water use by 2010. Currently this rulemaking is delayed per the Governor's directive placing a moratorium on rulemaking; the earliest the rulemaking can be adopted under that moratorium is 2013. When final, the rule will provide a consistent, predictable, and efficient regulatory process. It also will encourage the generation and beneficial use of reclaimed water while preserving and protecting public health, the environment, and existing water rights.

Key Ongoing Program Activities

- Ecology will resume the Reclaimed Water Rule no earlier than 2013 or as directed by the Governor. The intent of this rule is to encourage the appropriate use of reclaimed water.
- Ecology will develop materials that describe the full range of beneficial uses for reclaimed water, best and appropriate uses, and public health issues (in consultation with DOH) to expand market demand for reclaimed water. The draft guidance document developed for the rule is on hold along with the Reclaimed Water Rule until 2013 at the earliest.

- As part of the future Reclaimed Water Rule, PSP and Ecology will develop a comprehensive outreach and education approach to promote the appropriate use of reclaimed water, including incentives for reclaimed water use where appropriate, and reduce barriers to reclaimed water projects.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

Emerging Issues and Future Opportunities

In addition to the specific ongoing program activities and near-term actions described above, there are a number of ideas for future work that might be undertaken to address the Puget Sound region's ongoing need for centralized wastewater treatment and to further reduce pressures on the Puget Sound ecosystem. These ideas should be an ongoing part of the regional discussion about how to best address wastewater treatment needs in the Puget Sound basin, and may inform future funding decisions, programmatic priorities and guidance, and/or may become near-term actions in future Action Agenda cycles. They include the following.

- Consideration of whether increasing nutrient removal requirements should be applied through the water quality based programs such as TMDL implementation, or whether Ecology should pursue a revision in secondary treatment technology standards for new treatment plants and upgrades at treatment plants that discharge to Puget Sound before all TMDLs are complete. Some stakeholders advocate requiring advanced secondary treatment (largely for nitrogen removal) and/or tertiary treatment (largely for additional chemical treatment or other forms of polishing) for all WWTPs that discharge to Puget Sound; others are concerned about making such a large investment (and thereby precluding other needed investments) without specific documentation that such treatment is needed to protect water quality.
- Better understanding and addressing other contaminants of concern. Due to new detection and sampling methods and new products and consumption patterns we are increasingly aware of chemicals that can threaten human and environmental health in effluents from wastewater treatment plants at very low concentrations. These include pharmaceuticals, personal care products, caffeine, natural hormones, and other chemicals. We should better understand where this is occurring and the impacts of these chemical in the environment and continue to refine source control and wastewater treatment, pre-treatment, and reclaimed water programs to address chemicals of concern.
- Replacement of aging infrastructure.
- Integrate climate change considerations into siting and design of new facilities and retrofits.

Improve Shellfish Health and Harvest

The Challenge

Shellfish play a significant role in the biological, cultural and historical context of Puget Sound. Healthy shellfish beds are essential to Puget Sound's ecosystem diversity and complexity. Pacific Northwest tribes have lived and harvested shellfish in Puget Sound for about 12,000 years, and archeologists have uncovered shell middens dating back as far as 5,000 years. Shellfish provide sustenance and figure prominently in tribal spiritual beliefs. In the 1850s tribal governments signed treaties with the US government relinquishing land but reserving rights to fish and harvest shellfish in usual and accustomed areas except for staked or cultivated shellfish beds.

Commercial shellfish harvesting began during the California Gold Rush era and continues today providing a significant source of jobs and economic activity in Puget Sound. Overall, Washington State leads the country in production of farmed clams, oysters and mussels with an annual value of over $107 million. Across the state, shellfish growers directly and indirectly employ over 3,200 people and provide an estimated total economic contribution of $270 million. In both Mason and Pacific counties, the commercial shellfish industry is the second largest private-sector employer, supporting more than 1,200 jobs and an estimated total annual payroll that exceeds $27 million. In Puget Sound specifically, there are about 270 recreational shellfish beaches open to harvesting. WDFW conservatively estimates that $125 shellfish harvesting trips are made each year to Puget Sound beaches, providing a net economic value of $5.4 million to the region.

In addition to the cultural, recreational, and economic contributions shellfish make in Puget Sound, they also can play a role in improving the water quality of the Sound. Shellfish filtering can improve water clarity so sunlight penetrates the depths, which can improve eelgrass and macroalgae (attached seaweed) growth. Shellfish assimilate some of what they take in and pass on the rest as digested and undigested material that settles to the bottom sediments. These filtering and recycling processes can contribute to regulating the health of nearshore ecosystems and take on more importance as human activities and related pollution increase in shoreline areas. They also provide structure to the nearshore and refuge and forage opportunities and can help remove nitrogen from the water.

A significant number of shellfish beds are closed in Puget Sound due to pollution. The pollution is from a variety of sources, but mostly from fecal bacteria from humans, livestock, and pets that gets into the water and threatens the areas where oysters, clams and other bivalve shellfish grow. Work to improve water quality to enable the re-opening of shellfish beds closed because of pollution has been ongoing for many years and has achieved considerable success, especially since 1995. Nonetheless, expanding and promoting financial incentives and programs that protect, reopen, and enhance shellfish harvest areas and that restore and enhance the native Olympia Oyster and Pinto Abalone will contribute further to local and state economies.

The significant economic contribution of the shellfish industry was a major motivating factor behind the Washington State Shellfish Initiative announced on December 9, 2011. The initiative is a convergence of

the NOAA's National Shellfish Initiative and the state's interest in promoting a critical clean water industry. The NOAA policy establishes a framework to allow sustainable domestic aquaculture to contribute to the U.S. seafood supply, support coastal communities and important commercial and recreational fisheries, and help to restore species and habitat. NOAA sees aquaculture as a critical component to meeting increasing global demand for seafood and maintaining healthy ecosystems.

The Washington Shellfish Initiative is the first of its kind in the nation. While the initiative supports Governor Gregoire's goal of a "dig-able" Puget Sound by 2020, it also encompasses the extraordinary value of shellfish resources on the coast. As envisioned, the initiative will protect and enhance a resource that is important for jobs, industry, citizens and tribes.

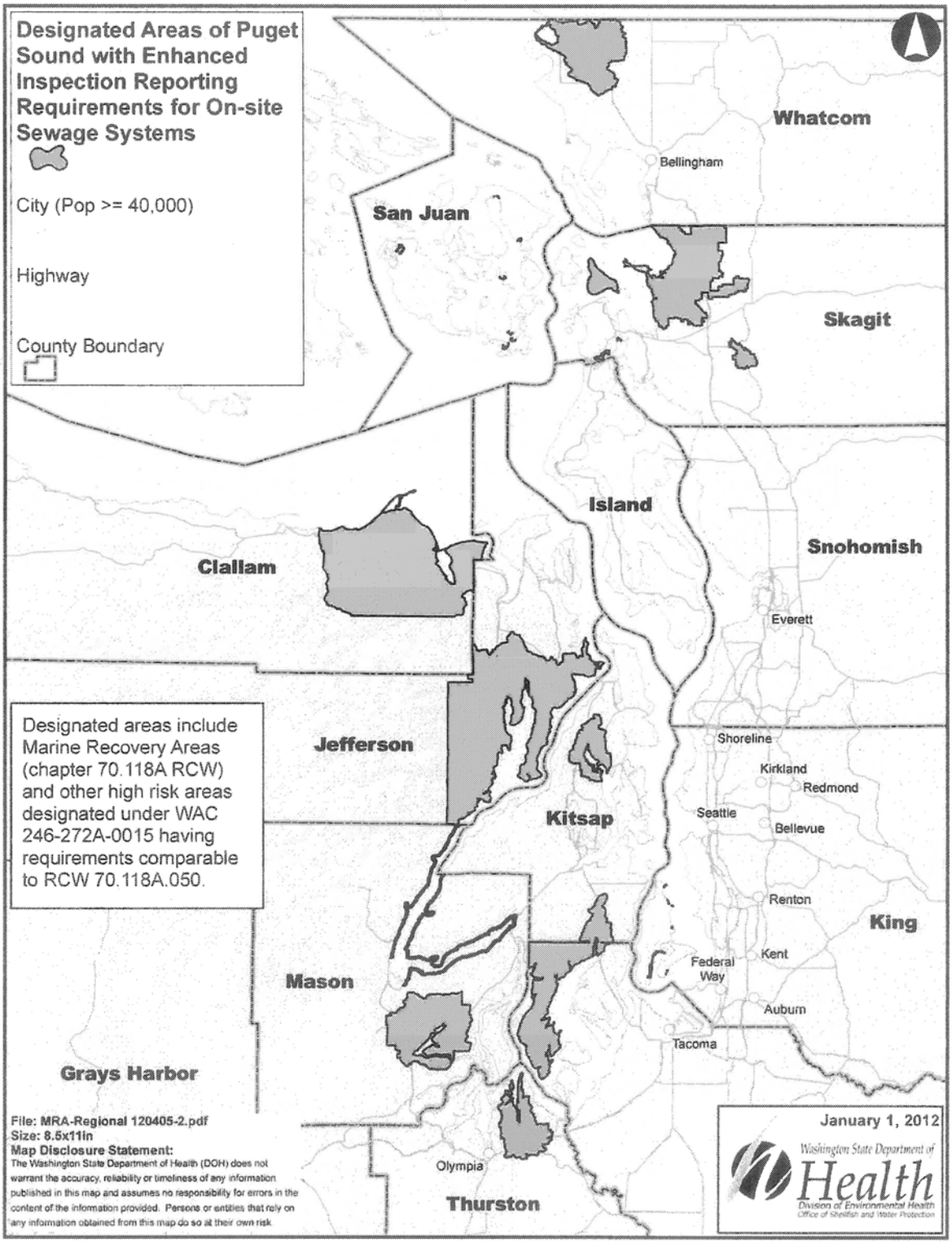
Climate Change

Increased acidity in marine waters from carbon dioxide emissions and upland runoff is threatening the aquaculture and shellfish industry. Ocean acidification is related to, but distinct from climate change, although they share a common cause, increasing carbon dioxide in the atmosphere. Ocean acidification is also a concern for harvest of wild shellfish and fish species that use marine plankton as a food source.

Adaptation strategies outlined in *Preparing for Climate Change: Washington State's Integrated Climate Response Strategy* (April 2012) include enhancing our understanding and monitoring of ocean acidification in Puget Sound and coastal waters, as well as our ability to adapt to and mitigate effects of seawater acidity on shellfish, other marine organisms, and marine ecosystems.

The Action Agenda includes support of a key action in the state response strategy: Supporting the work of newly created Blue Ribbon Panel on Ocean Acidification.

Strategies in this area focus on implementing the Washington Shellfish Initiative. The collective actions support working aquatic lands and improve water quality to protect and restore shellfish beds for human consumption. Additional strategies and actions that will contribute to the health and recovery of shellfish harvesting areas also are addressed in Sections on wastewater, stormwater, and toxics.


Designated Areas of Puget Sound with Enhanced Inspection Reporting Requirements for On-site Sewage Systems
City (Pop >= 40,000)
Highway
County Boundary
Designated areas include Marine Recovery Areas (chapter 70.118A RCW) and other high risk areas designated under WAC 246-272A-0015 having requirements comparable to RCW 70.118A.050.
Whatcom
Bellingham
San Juan
Skagit
Island
Snohomish
Everett
Clallam
Jefferson
Kitsap
Shoreline
Kirkland
Redmond
Seattle
Bellevue
Renton
King
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Federal Way
Auburn
Tacoma
Mason
Grays Harbor
Olympia
Thurston
File: MRA-Regional 120405-2.pdf
Size: 8.5x11in
Map Disclosure Statement:
The Washington State Department of Health (DOH) does not warrant the accuracy, reliability or timeliness of any information published in this map and assumes no responsibility for errors in the content of the information provided. Persons or entities that rely on any information obtained from this map do so at their own risk.
January 1, 2012
Washington State Department of Health
Division of Environmental Health
Office of Shellfish and Water Protection

Relationship to Recovery Targets

The shellfish recovery target is of a net increase of 10,800 harvestable shellfish acres from 2007 to 2020 in Puget Sound, including at least 7,000 acres where harvest is currently prohibited. The strategies and actions in this section are essential for Reopening shellfish beds and avoiding closures. In addition, management of on-site sewage systems and freshwater quality will improve conditions for shellfish and help achieve the target.

Local Priorities

Several local areas prioritize shellfish bed restoration.

Local Integrating Organization	Priorities
South Puget Sound	*From Strategic Initiative: Rural/Agricultural Runoff* • Re-open Shellfish Beds (Henderson, Burley Lagoon, Minter, Oakland Bay, and North Bay)
West Puget Sound	*Summarized from Working Priority List* • Prioritize shellfish growing areas that are closed or have the potential to close, and initiate upgrades • Resolve issues identified in Washington Department of Health report: "2009 Shoreline Survey of the Dyes Inlet Shellfish Growing Area - Ostrich and Oyster Bays Addendum." • Address bacterial contamination in freshwater streams that create closure zones at their mouths (e.g. Clear, Barker Creeks, Grover's Creek, Miller Bay)
Island Watershed	*From working list of possible priorities* • Implement shellfish protection plans within Island Watershed/County.
Stillaguamish and Snohomish Watersheds	*From working list of possible priorities* • Improve shellfish water quality and increase harvestable, upgraded shellfish acres in commercial production and use; coordinate, expand and promote financial incentives and programs for working aquatic lands that are protective of ecosystem health
Skagit	*From initial list of possible priorities* • Support the Skagit Clean Samish Initiative and continuing funding priority

C7. Ensure abundant, healthy shellfish for ecosystem health and for commercial, subsistence, and recreational harvest consistent with ecosystem protection

C7.1 Improve water quality to prevent downgrade and achieve upgrades of important current tribal, commercial and recreational shellfish harvesting areas.

Protection and improvement of water quality and control of pollution will be critical to meeting the recovery target for shellfish harvesting areas for Puget Sound.

The Department of Health monitors shellfish harvesting areas and classifies them as safe or unsafe for harvest. As of the end of 2011 the Washington State Department of Health (DOH) managed the classification of 326,000 commercial shellfish harvesting acres throughout the state, approximately 190,000 in Puget Sound. There were 252,000 acres in 'Approved' classification, 12,000 acres 'Conditionally Approved,' 300 acres with 'Restricted' classifications, and 61,000 acres with 'Prohibited' classifications (see table below).

Department of Health shellfish harvesting area classifications, as of the end of 2011 (acres)

	APPROVED	CONDITIONALLY APPROVED	RESTRICTED	PROHIBITED	TOTAL
Washington State	252,000	12,000	300	61,000	326,000
Puget Sound					190,000

Note: figures may not add up to total due to rounding.

In 2011, DOH upgraded the classification of 697 acres in five commercial shellfish areas. Over the same time, 4,960 acres were downgraded in two areas. Poor water quality in the Samish Bay (Samish River) and Pacific coast growing areas resulted in significant classification downgrades.

Over the past 30 years, DOH has downgraded the classification of about 56,000 acres and upgraded the classification of about 46,000 acres (see table below). Most of the downgrades took place between 1981 and 1995, when 45,000 acres were downgraded and 7,000 acres were upgraded. Since 1995, Health has downgraded 11,000 acres while upgrading 40,000 acres. In Puget Sound, approximately 36,000 acres – or about 19 percent of commercial and recreational shellfish beds – are closed due to pollution sources.

Department of Health shellfish harvesting area classifications, 1981 – 2011 (acres)

	1981 – 1995	1995 - 2011	TOTAL: 1981 - 2011
Area Upgrades	7,000	40,000	46,000
Area Downgrades	45,000	11,000	56,000

Note: figures may not add up to total due to rounding.

The Department of Health also lists shellfish beds that are threatened with downgrade each year. In 2011 seven areas in Puget Sound were "threatened" with a downgrade in classification: Burley Lagoon, Dyes Inlet, Filucy Bay, Padilla Bay, Pickering Passage, Port Townsend Bay, and South Skagit Bay.

Even with significant downgrades in 2011, in recent years, through efforts of state and local government, tribes, private landowners, and shellfish growers, we have had a net increase of about 1400 acres of shellfish areas reopen for harvest due to pollution control. Strategies and actions in this area are focused on capitalizing on the lessons learned from these experiences and increasing this trend.

Ongoing Programs

The Department of Health is responsible for assuring that marine water is monitored and all potential pollution sources are evaluated to ensure a safe shellfish harvest. To evaluate shellfish growing areas and protect public health, each year Health commonly collects over 10,000 marine water samples, evaluates about 125 miles of shoreline, and inspects numerous wastewater treatment plants and marinas.

Based on water quality and pollution source evaluations, Health identifies specific locations where shellfish harvest is "threatened" or "of concern" due to pollution. These areas meet the marine water quality standards; however, if pollution problems are not addressed, a downgrade is probable. Often these areas require special attention to prevent a downgrade.

Departments of Health, Ecology, Agriculture, the Partnership, the State Conservation Commission and conservation districts, Washington Sea Grant and WSU Extension, tribes, local health departments, shellfish growers and many other stakeholders work together to maintain and improve water quality to protect and restore shellfish areas. Local and tribal governments play significant roles in protecting and restoring water quality in shellfish harvesting areas. Pollution Identification and Correction Programs (PIC) are locally-driven processes focusing on specific geographic areas to find and fix nonpoint water pollution problems. PIC programs consist of a complete survey of all individual properties to identify nonpoint pollution sources, comprehensive education and outreach activities, technical assistance to homeowners, and financial incentives to encourage pollution control. These programs are widely considered one of the best approaches to protecting and reopening shellfish beds. PIC programs have been successful in reopening beds in Henderson Inlet in Thurston County, Oakland Bay in Mason County, and in several growing areas in Kitsap County where the PIC program is most developed. PIC programs are resource-intensive to accomplish all necessary aspects of the comprehensive program, but experience shows that this is necessary and effective in the long run. A major PIC effort is underway in Skagit County in Samish Bay to recover 4,000 acres of downgraded beds.

Current funding for PIC programs comes from local and tribal sources, and from state and federal grants. In 2011 and 2012 over $3M in EPA funds will be dispersed to counties to develop sustainable PIC programs; stable long-term funding and support from local and tribal governments and citizens are also necessary for these programs to continue to protect and reopen important commercial and recreational shellfish harvest areas.

When shellfish growing areas are downgraded from nonpoint source pollution, counties are required to form Shellfish Protection Districts. In order to protect important shellfish resources, counties may also voluntarily form Shellfish Protection Districts. The purpose of Shellfish Protection Districts is to bring stakeholders together under a prescribed process to identify sources of pollution, develop a plan, and then implement that plan with accountability steps identified. The district may provide a funding mechanism for local and state resources to contribute to the implementation, but the district may also have a strong education and public involvement elements to change public behavior in such areas as OSS correction, improved agricultural practices, or stormwater control. In most cases, generation of funds is required to implement a Shellfish Protection District, and often districts incorporate PIC programs as part of the restoration process.

Near-Term Actions

C7.1 NTA 1: Shellfish Best Practices Library. DOH will work with the Partnership, Ecology, the Conservation Commission, and Conservation Districts and local governments to create a best practices library or menu highlighting successful locally-driven efforts to assist in the development of shellfish protection districts, shellfish protection programs, and shellfish growing area restoration activities, such as the Henderson Inlet, Oakland Bay, and Samish Bay efforts.

Performance measure: By June 2013, complete survey of partners to identify practices used to identify and correct nonpoint pollution problems that impact shellfish growing areas (subject areas include on-site sewage systems, agricultural practices, stormwater, outreach and education monitoring). Develop best practices library by December 2013.

C7.1 NTA 2: Annual evaluation of shellfish restoration efforts. The Partnership will convene an annual meeting of the Departments of Health, Ecology, Agriculture, Conservation Commission, and EPA to evaluate restoration efforts in shellfish growing areas in Puget Sound and report the results to the region.

Performance measure: Net increase of 2,700 acres of harvestable shellfish beds, of which 1,750 should be from beds presently classified as prohibited.

C7.1 NTA 3: Pollution Control Action Team. Ecology, working with DOH, WSDA, EPA, and the Tribes will form a Pollution Control Action Team (PCAT) to respond quickly when areas are identified where water quality problems threaten shellfish areas. They will initiate community outreach and education, pollution identification, inspection, technical assistance to local agencies and landowners and finally, enforcement. The team will focus its work in priority areas and support PIC programs where they are established. The first effort will be in Drayton Harbor and Portage Bay.

Performance measure: Reduce fecal coliform loading in each priority area to upgrade the status of closed areas and prevent further degradation for those with a negative trend.

In addition, strategies and actions related to controlling pollution from runoff and wastewater described in C3, C4, C5 and C6, and to establishment of PIC programs in C9 are directly related to improving water quality and recovery of shellfish beds.

C7.2 Restore and enhance native shellfish populations.

Native shellfish restoration efforts will focus on two species: native Olympia oysters and pinto abalone.

The *Olympia oyster*, the Pacific Northwest coast's only native oyster, ranges from southeastern Alaska to Baja, California. For thousands of years, Olympia oysters provided sustenance for tribes and habitat for a host of marine organisms. Until the late 1800s, Olympia oysters were the most abundant bivalves in Puget Sound, where they occupied thousands of acres of productive, diverse habitat. Over-harvesting, sediment loads, and pollution drove the oyster to near extinction. Today, it occupies a fraction of its

former range and is a Candidate Threatened Species in Washington State and a priority species for restoration.

Pinto abalone were once widely distributed throughout the waters of British Columbia and Washington state. In recent decades, populations have undergone sharp declines. Known for their large, muscular foot and their pearlescent oval shell, pinto abalone are slow-growing, long-lived marine snails and are typically found in nearshore rocky habitats in semi-exposed or exposed coastal regions. More than 60 abalone species are found worldwide but the pinto, or northern, abalone is the only species found in Washington State, where they range from Admiralty Inlet to the San Juan Islands and the Strait of Juan de Fuca and are typically found at depths to about 20 m.

The Washington Department of Fish and Wildlife (WDFW) regularly monitors the abundance of pinto abalone at 10 index stations throughout the San Juan Archipelago. Data from surveys made in 2006 showed an overall mean abalone density of 0.04 m-2, which is well below the minimum densities for successful reproduction.

Ongoing Programs

WDFW, NOAA, tribes and many other small and large local groups are involved in native shellfish restoration. Programs focused on Olympia Oyster restoration are oriented around the Native Oyster Rebuilding Plan, which will result in restoration of 19 historic large natural oyster beds and associated local ecosystems throughout Puget Sound by 2022. Abalone programs are focused on the work needed to ensure there is adequate abalone production capacity to support restoration. DNR is involved in native shellfish restoration efforts through the aquatic leasing program and the wildstock geoduck fishery management program.

Key Ongoing Program Activities

- The Washington Department of Fish and Wildlife, in collaboration with partners such as Puget Sound Restoration Fund, shellfish growers, the Northwest Straits Commission and The Nature Conservancy, and in collaboration with individual tideland owners, tribes, Marine Resources Committees of the NWSC, Health and other state and local partners, will revise, update, and continue to implement the Native Oyster Rebuilding Plan including accelerating restoration of the Olympia oyster.
- WDFW, PSRF, Washington Sea Grant, and university researchers, and SeaDoc Society in conjunction with others will use a 3-year NOAA grant to improve wild stock abalone hatchery methods and increase production of genetically diverse and disease free juveniles for out-planting. They also will seek additional funding to staff and expand abalone hatchery capacities and to develop remote nurseries and abalone food resources, thereby improving the opportunity to build local stocks to naturally reproducing levels.

Near-Term Actions

C7.2 WS 13: West Sound Shellfish Gardening. By April 2013, Kitsap Public Health, in partnership with the Puget Sound Restoration Fund, will expand a pilot shoreline owner shellfish gardening program to at least one additional site, as an outreach tool for water quality and shoreline issues. By December 2013, the program will be expanded to include two additional sites. Concurrently, Kitsap Public Health will report on the results and

actions from PIC shoreline monitoring affecting shellfish growing areas, e.g. number of fecal sources identified and corrected.

Performance measure: Shellfish gardening pilot program expanded to one additional site by April 2013. By December, expand to two additional sites.

C7.3 Ensure environmentally responsible shellfish aquaculture based on sound science.

Intensive shellfish aquaculture can put pressure on Puget Sound and there are concerns that these activities may increase pollution, change the physical beach structure and substrate to the detriment of native species abundance and diversity, disrupt the food web, and affect other resource-based jobs such as fishing or crabbing. In particular, the effects of geoduck aquaculture on the benthic environment and fauna, food webs, water quality, and aesthetics are a concern. In 2007 the Washington Legislature passed HB 2220 to address these issues.

HB 2220 established a Shellfish Aquaculture Regulatory Committee (SARC) to advise the Department of Ecology on revisions to Chapter 173-26, Part III WAC (Shoreline Master Program Guidelines) regarding geoduck aquaculture. Effective March 2011, the Department of Ecology published provisions that require future local Shoreline Master Programs include an inventory of water quality data; known sediment contamination; existing shellfish cultivation areas and shellfish protection districts; and other data that inform the siting of aquaculture. These provisions also require local shoreline conditional use permits for new commercial geoduck aquaculture, provide guidance for permit content and administration, and ensure public and tribal notification of proposed geoduck aquaculture projects.

HB 2220 also directed Washington Sea Grant to review existing scientific information and commission scientific research, with SARC input, to examine key uncertainties related to geoduck aquaculture that have implications for the health of the Puget Sound ecosystem and the wild geoduck population. Ongoing studies include investigations of: the ecological and geochemical consequences of disturbances associated with geoduck aquaculture; cultured-wide interactions; and resilience of soft-sediment communities after geoduck harvest in Samish Bay.

In March 2010, the Washington State Legislature passed and the governor enacted a law on marine spatial planning in Puget Sound and along the Washington Coast requiring an interagency assessment and report on information related to marine spatial planning and recommendations. This report was completed in January 2011 and contains 21 recommendations related to implementing marine spatial planning in Washington, including Puget Sound. Implementation of marine spatial planning will give shellfish growers and upland owners greater certainty about where aquaculture will be permitted and further reduce the likelihood of conflicts related to aquaculture. Continuing work is needed to clarify the potential impacts of shellfish aquaculture and to help communities build consensus and collaboration on the role of shellfish aquaculture in Puget Sound.

Ongoing Programs

Key Ongoing Program Activities

- Washington Sea Grant and university researchers will complete the Geoduck Aquaculture Research Program and provide ongoing forums to share results and final reports of the three funded studies by December 2013.
- Pacific Coast Shellfish Growers Association, Pacific Shellfish Institute, World Wildlife Fund and the Food Alliance will promote and implement sustainable aquaculture standards and work with grower members to incorporate environmental codes of practice in members' sustainable aquaculture activities.
- Ecology will review any new aquaculture proposals for consistency with the Coastal Zone Management Act.

Near-Term Actions

C7.3 NTA 1: Aquaculture Shoreline Master Program Handbook. Ecology will publish an aquaculture Shoreline Master Program Handbook section with special emphasis on geoduck aquaculture and finfish net pen operations, update its aquaculture web resources to make them more comprehensive, and provide direct assistance and training to local governments on the aquaculture handbook When the final findings of the Sea Grant geoduck aquaculture research are available, Ecology will review them and other appropriate, betted sound science, to determine if amendments to WAC 173-26 are warranted.

Performance measure: Handbook complete or not; number of local governments reached through training and technical assistance.

C7.3 NTA 2: Areas Suitable for Future Shellfish Aquaculture. Ecology will coordinate with interested local governments, DNR, and stakeholders to support pre-planning and implementation of marine spatial planning and local shoreline master program updates by: gathering, compiling an ground-truthing baseline information on current aquaculture and filling data gaps and completing research to identify areas that are suitable and unsuitable for future shellfish aquaculture. Ecology will support marine spatial planning related to aquaculture by coordinating with interested local governments, DNT, and stakeholders on gathering, compiling and ground-truthing baseline information on current aquaculture and filing data gaps.

Performance measure: Mapping completed.

C7.3 NTA 3: Shellfish Model Permitting Program. The Department of Ecology will work with the Governor's Office of Regulatory Assistance (ORA) to lead and facilitate a state team to develop and implement a Model Permitting Program that ensures early and continued coordination among state and federal agencies, tribes and local governments for permitting and licensing of shellfish aquaculture.

Performance measure: By June 2012, sign operation agreement; by September 2012, identify pilots; by November 2012, establish pilot project timelines.

C7.3 NTA 4: Nitrogen Control Pilots Using Shellfish. Ecology will work with DNR, the shellfish industry and researchers to create pilot projects testing the use of mussel culture or

other suspended or beach culture to help address nitrogen pollution in sensitive areas, such as Quartermaster Harbor.

Performance measure: Two pilot projects initiated by January 2015.

C7.4 Enhance the publics' connection to shellfish and increase recreational harvest opportunities.

When the public goes to Puget Sound beaches, they want to dig shellfish that are safe to eat and swim in safe waters. Annually, tourists and residents purchase 160,000 licenses to harvest shellfish from Washington waters, providing more than $1 million in state revenues. WDFW estimates that the 125,000 shellfish harvesting trips made each year to Puget Sound beaches provide a net economic value of $5.4 million to the region. It will be important to increase this connection to shellfish and to help people understand the connections between water quality and clean, healthy shellfish beds.

Near-Term Actions

C7.4 NTA 1: Shellfish Interpretive Programs and Events. By June 2014, State Parks, in collaboration with other public, tribal and private interests, will conduct shellfish interpretive programs and events to help forge personal connections between clean, productive Puget Sound waters, the shellfish we eat, and the iconic role shellfish occupy in Washington's cultural and culinary identify.

Performance measure: By December 2012, develop interpretive concepts and action plans with partners, and identify up to three pilot program locations. By October 2013, implement and evaluate pilot shellfish interpretive programs and events at selected State Parks. By June 2014, expand programs to additional Parks, incorporating evaluation results from pilot programs.

C7.4 NTA 2: Shellfish Messages, Events, and Materials. Washington Sea Grant will partner with state and federal agencies on a planning process to develop shellfish-related messages, publicize events, and develop materials.

Performance measure: By September 2012, planning process is convened. Additional measures will be set in the future.

C7.5 Answer key shellfish safety research questions and fill information gaps.

Some obstacles to expanding shellfish harvest opportunities are lack of knowledge to better estimate risk and delineate where and when shellfish are safe to eat. Actions under this sub-strategy will assist implementing agencies to better evaluate food safety issues related to shellfish and to make better decisions on shellfish area classification and status. Research to better define collateral environmental benefits of shellfish aquaculture (like nutrient removal) is also included in this sub-strategy.

Near-Term Actions

C7.5 NTA 1: Point Source Dilution Analyses Modeling. The Departments of Ecology and Health will work cooperatively under an existing EPA grant to evaluate use of Ecology environmental models for point source dilution analyses in Health's commercial shellfish area classification program.

Performance measure: Complete modeling study by June 2014.

C7.5 NTA 2: Expand Biotoxin Monitoring. Expand biotoxin monitoring to address the marine toxin causing "Diarrhetic Shellfish Poisoning" (DSP). This involves including DSP into our Marine Biotoxin Monitoring Program. In addition, we must purchase and install special testing equipment to analyze shellfish extracts for this and other biotoxins. The instrument will also be used to develop alternate detection methods for Paralytic Shellfish Poisons (PSP) that eliminates the sacrifice of live test animals.

Performance measure: Purchase equipment and initiate monitoring by June 2012. Include DSP monitoring into the Marine Biotoxin Monitoring Program by June 2013.

C7.5 NTA 3: Water Quality and Seasonal Harvest Restrictions. DOH, in cooperation with NOAA's Northwest Fisheries Science Center, will conduct water quality studies of selected shellfish "wet storage" areas in Puget Sound to better correlate environmental conditions with potential causes of illness that seasonally restricts harvest.

Performance measure: Complete field studies to calibrate model by December 2013. Complete final model simulation report by June 2014.

C7.5 NTA 4: Ocean Acidification Blue Ribbon Panel. Ecology, as part of the Washington Shellfish Initiative, will manage the Governor appointed Blue Ribbon Panel on Ocean Acidification to develop clear, actionable recommendations on understanding, monitoring, adapting, and mitigating ocean acidification in Puget Sound and Washington waters.

Performance measure: By March 2012, convene the panel; By October 2012, submit recommendations.

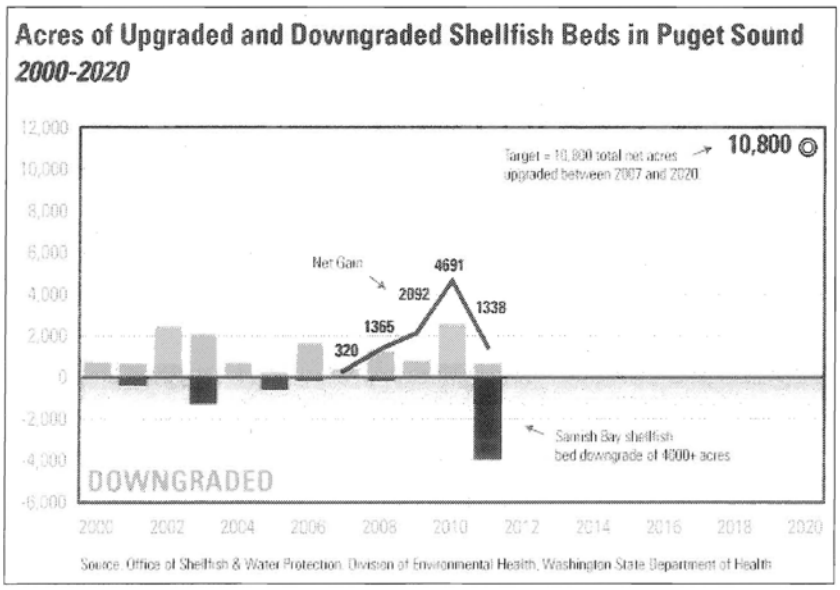
Emerging Issues and Future Opportunities

- Implementation of the Blue Ribbon Panel on Ocean Acidification recommendations.

Target View: Restoring Shellfish Beds in Puget Sound

Around Puget Sound, there are an estimated 190,000 acres of classified commercial and recreational shellfish beds. According to the State Department of Health, about 36,000 acres – approximately 19 percent – are closed due to pollution. The pollution is from a variety of sources, but mostly from fecal bacteria from humans, livestock and pets that gets into the water and threatens the areas where oysters, clams and other bivalve shellfish grow.

The 2020 recovery target for shellfish beds is a net increase of 10,800 acres of harvestable shellfish beds, of which 7,000 acres must be from beds presently classified as prohibited. The graph below illustrates recent data on the status of shellfish beds in Puget Sound, and relationship to the proposed target.



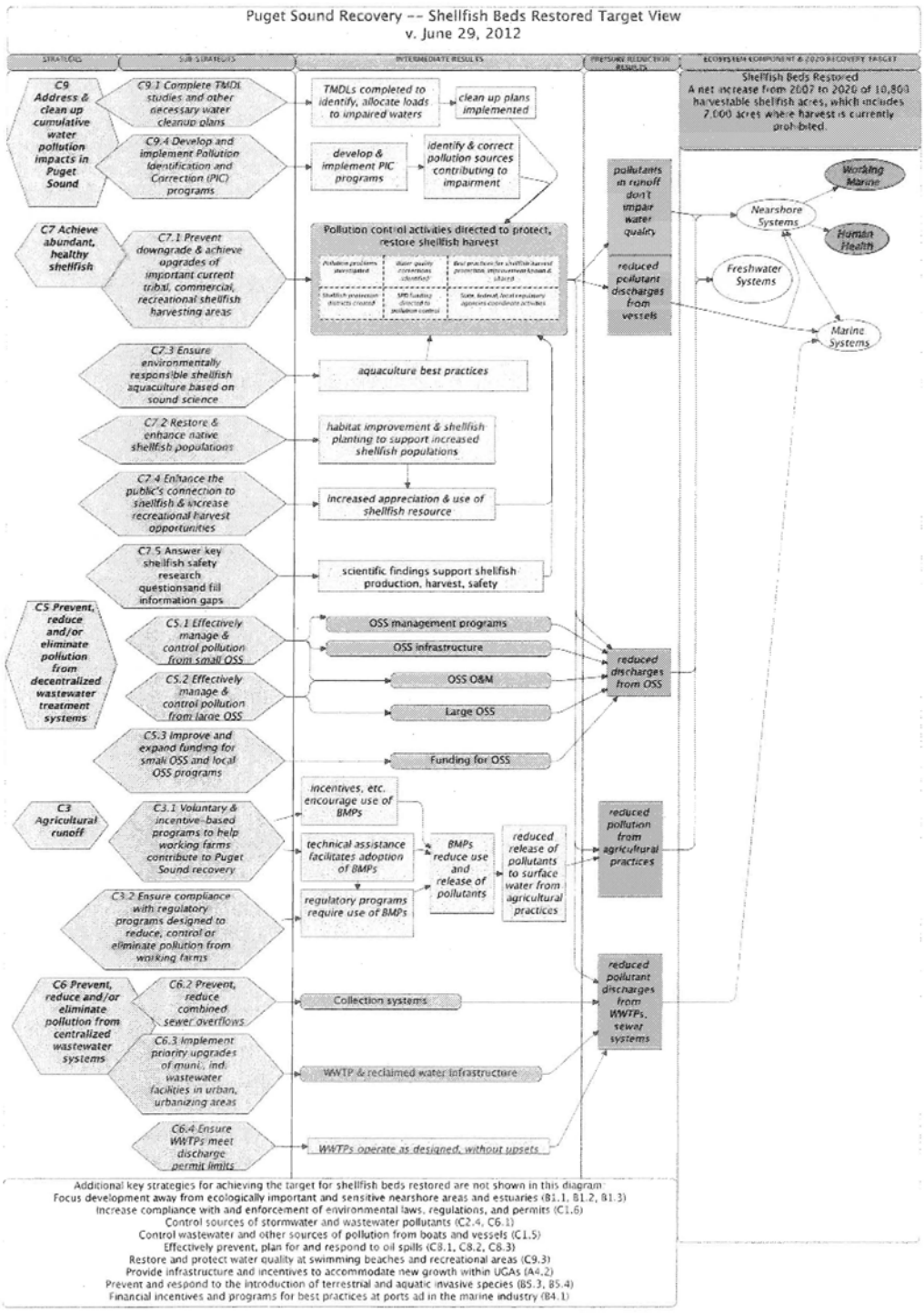
Green and red bars represent the annual upgraded and downgraded acres, respectively, while black line represents the net increase in harvestable acres of commercial and recreational shellfish beds in Puget Sound toward the 2020 goal of 10,800. Net increase is the upgraded acres in existing shellfish growing areas (or the restoration of unclassified acreage) to allow harvest, minus any downgrades in classification that prevent harvest. Downgrades of the shellfish beds are generally caused by fecal bacteria or other pollutants in the water that makes the shellfish unsafe to eat.

The Action Agenda strategies most related to achieving the shellfish bed recovery target are:

- Focus development away from ecologically important and sensitive nearshore areas and estuaries (B1.1, B1.2, B1.3)
- Ensure abundant, healthy shellfish for ecosystem health and for commercial, subsistence, and recreational harvest consistent with ecosystem protection (C7.1, C7.2, C7.4, C7.5, C7.3)
- Address and clean up cumulative water pollution impacts in Puget Sound(C9.1, C9.4, C9.3)
- Prevent, reduce, and control agricultural runoff(C3.2, C3.1)
- Prevent, reduce and/or eliminate pollution from decentralized wastewater treatment systems (C5.1, C5.2, C5.3)

- Prevent, reduce and/or eliminate pollution from centralized wastewater treatment systems (C6.2, C6.3, C6.4, C6.1)
- Prevent problems from new development (C2.4)
- Prevent, reduce, and control the sources of contaminants entering Puget Sound (C1.1, C1.6, C1.5)
- Effectively prevent, plan for and respond to oil spills (C8.1, C8.2, C8.3)
- Provide infrastructure and incentives to accommodate new and re-development within urban growth areas (A4.2)
- Prevent and respond to the introduction of terrestrial and aquatic invasive species (B5.5, B5.3)
- Use, coordinate, expand and promote financial incentives and programs for best practices at ports and in the marine industry that are protective of ecosystem health (B4.1)

In the following results chain, or logic model, yellow polygons identify strategies and sub-strategies from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery target.


Puget Sound Recovery -- Shellfish Beds Restored Target View
v. June 29, 2012
STRATEGIC
SUB-STRATEGIES
INTERMEDIATE RESULTS
PRESSURE REDUCTION RESULTS
ECOSYSTEM COMPONENT & 2020 RECOVERY TARGET
C9 Address & clean up cumulative water pollution impacts in Puget Sound
C9.1 Complete TMDL studies and other necessary water cleanup plans
C9.4 Develop and implement Pollution Identification and Correction (PIC) programs
TMDLs completed to identify, allocate loads to impaired waters
clean up plans implemented
develop & implement PIC programs
identify & correct pollution sources contributing to impairment
Shellfish Beds Restored
A net increase from 2007 to 2020 of 10,800 harvestable shellfish acres, which includes 7,000 acres where harvest is currently prohibited.
C7 Achieve abundant, healthy shellfish
C7.1 Prevent downgrade & achieve upgrades of important current tribal, commercial, recreational shellfish harvesting areas
Pollution control activities directed to protect, restore shellfish harvest
pollutants in runoff don't impair water quality
reduced pollutant discharges from vessels
Working Marine
Nearshore Systems
Human Health
Freshwater Systems
Marine Systems
C7.3 Ensure environmentally responsible shellfish aquaculture based on sound science
aquaculture best practices
C7.2 Restore & enhance native shellfish populations
habitat improvement & shellfish planting to support increased shellfish populations
C7.4 Enhance the public's connection to shellfish & increase recreational harvest opportunities
increased appreciation & use of shellfish resource
C7.5 Answer key shellfish safety research questionsand fill information gaps
scientific findings support shellfish production, harvest, safety
C5 Prevent, reduce and/or eliminate pollution from decentralized wastewater treatment systems
C5.1 Effectively manage & control pollution from small OSS
C5.2 Effectively manage & control pollution from large OSS
OSS management programs
OSS infrastructure
OSS O&M
Large OSS
reduced discharges from OSS
C5.3 Improve and expand funding for small OSS and local OSS programs
Funding for OSS
C3 Agricultural runoff
C3.1 Voluntary & incentive-based programs to help working farms contribute to Puget Sound recovery
incentives, etc. encourage use of BMPs
technical assistance facilitates adoption of BMPs
regulatory programs require use of BMPs
BMPs reduce use and release of pollutants
reduced release of pollutants to surface water from agricultural practices
reduced pollution from agricultural practices
C3.2 Ensure compliance with regulatory programs designed to reduce, control or eliminate pollution from working farms
C6 Prevent, reduce and/or eliminate pollution from centralized wastewater systems
C6.2 Prevent, reduce combined sewer overflows
Collection systems
C6.3 Implement priority upgrades of muni., ind. wastewater facilities in urban, urbanizing areas
WWTP & reclaimed water infrastructure
reduced pollutant discharges from WWTPs, sewer systems
C6.4 Ensure WWTPs meet discharge permit limits
WWTPs operate as designed, without upsets
Additional key strategies for achieving the target for shellfish beds restored are not shown in this diagram:
Focus development away from ecologically important and sensitive nearshore areas and estuaries (B1.1, B1.2, B1.3)
Increase compliance with and enforcement of environmental laws, regulations, and permits (C1.6)
Control sources of stormwater and wastewater pollutants (C2.4, C6.1)
Control wastewater and other sources of pollution from boats and vessels (C1.5)
Effectively prevent, plan for and respond to oil spills (C8.1, C8.2, C8.3)
Restore and protect water quality at swimming beaches and recreational areas (C9.3)
Provide infrastructure and incentives to accommodate new growth within UGAs (A4.2)
Prevent and respond to the introduction of terrestrial and aquatic invasive species (B5.3, B5.4)
Financial incentives and programs for best practices at ports ad in the marine industry (B4.1)

Effectively Prevent, Plan for, and Respond to Oil Spills

The Challenge

Over 20 billion gallons of oil and hazardous chemicals are transported through Washington State each year by ship, barge, pipeline, rail, and road. Organizational failure, equipment failure, and human error can all lead to unintended and potentially disastrous consequences. Oil and chemical spills can threaten Puget Sound's productive and valuable ecosystems.

These incidents can kill fish, birds, and marine animals and contaminate beaches and shellfish. All spills whether on land or water can threaten public health, safety, the environment, and ultimately damage the state's economy and quality of life.

Climate Change

The risk of vessel incidents and oil spills could increase with climate change. Increased storm frequency and severity could increase the risk of vessel incidents and oil spills, as well as reduce the ability to respond quickly. Oil dispersion, movement on shore, and fate and effects could change as a result of changing ocean temperature and chemistry, as well as onshore conditions and habitats. Strengthened prevention and response readiness are part of adaptation needs.

Relationship to Recovery Targets

Prevention of major and catastrophic oil spills (generally those of over 10,000 gallons), and ensuring a rapid, aggressive, and well coordinated effective response to all spills that do occur, contributes to achievement of virtually all the Puget Sound recovery targets. This is particularly important for achieving the target for Puget Sound resident Orcas. The National Oceanic and Atmospheric Administration (NOAA) listing document for the species identified major oil spills as the single greatest acute threat to their survival.

C8. Effectively prevent, plan for, and respond to oil spills

The 2009 Washington State Legislature (Legislature) directed the Puget Sound Partnership to provide independent advice and assessment of Washington State's oil spill programs and make recommendations for any necessary improvements. To that end, the Legislature recommended the appointment of a special advisory body with statewide representation. As a result, the Partnership's Leadership Council (Leadership Council) authorized the formation of the Cross Partnership Oil Spill Work Group (Work Group) in summer 2010.

That broadly based stakeholder work group met for three full days during September and October 2010. At the conclusion of the third day, the group adopted four recommendations by consensus of the attending members. The Leadership Council passed Resolution 2010-04 on November 19, 2010 supporting the four work group recommendations.

Ongoing Programs

Engrossed Second Substitute House Bill 1186 (E2SHB 1186) was signed into law by Governor Gregoire in April 2011. Each of the four original work group recommendations was represented in the legislation and/or final state budget. In a letter to the, Director of the Washington State Department of Ecology (Ecology), Governor Gregoire requested that the state oil spill programs continue to work closely with PSP and the work group during rulemaking for HB 1186. As a result, the 2012-2013 Action Agenda includes strategies and actions to facilitate and track completion of two rulemakings.

In addition, the 2011 Washington State Legislature called for PSP and the Cross Partnership Work Group to continue their efforts to independently assess the state's oil spill programs during the 2011–2013 biennium. To that end, the work group met in May 2011 to establish the following consensus priorities for future work:

- Use of risk assessments to develop measures to reduce the risk of major oil spills
- Enhance transboundary coordination and marine safety in our shared waters with Canada
- Support the involvement of the state and local governments at tabletop oil spill drills

These priorities provide the foundation from which PSP, Ecology, and Washington Department of Fish and Wildlife (WDFW) developed the sub-strategies and near-term actions identified below.

Key Ongoing Program Activities

- Strengthen marine safety standards in our shared waters with Canada by consulting with industry, federal agencies, tribes and others.
- Report on deployments of the industry-funded emergency response tug at Neah Bay.
- Engage the Puget Sound Partnership's Oil Spill Work Group in the short-term work priorities described above.
- Continue U.S. Environmental Protection Agency's (EPA) and Ecology's Spill Prevention Control and Countermeasures Programs under the Clean Water Act.

Local Priorities

Local Integrating Organization	Priorities
San Juan Islands	*Tier 1 Strategies* • Work with the Puget Sound Partnership on oil spill prevention and readiness programs within Puget Sound and with Canada. • Maintain local oil spill readiness and response programs in alignment with a regional readiness and response program.
Strait of Juan de Fuca	*Top Priorities*

Local Integrating Organization	Priorities
	• Oil Spill Prevention, Preparedness, and Response – Implement and promote improvements in oil spill prevention, preparedness, and response programs, policies, or capabilities for the benefit of the Strait of Juan de Fuca and adjacent waters.
South Sound	*Strategic Initiative: Urban Stormwater/ Runoff* • Oil spill response preparation and training
Whatcom	*Strategies in Development* • Improve spill response capabilities in Lake Whatcom watershed and marinas and ports as identified.
Stillaguamish-Snohomish Watershed	*Strategies under Discussion* • Implement the MRC's tiered recommendations for Snohomish County oil spill response and prevention • By 2014 orchestrate local, state, and federal response to mitigate unintended damages from spill response related impacts to intertidal habitats (in the Port Susan MSA)

C8.1 Prevent and reduce the risk of oil spills.

While the relative rarity of major spills and catastrophic has not led to obvious complacency by industry or a lack of vigilance by government, two decades of success has led to limited funding for State Programs to systematically analyze regional and industry-specific patterns in oil spill risk by regulated industries which would allow for subsequent targeting of prevention efforts. This funding shortage is a particularly concern considering the dramatic increase in ship and crude oil traffic that is projected to occur over the next 10 years. . Ongoing changes in marine transportation patterns, including the substantial increase in crude oil exportation from Vancouver, BC, and the proposed Gateway Pacific Terminal at Cherry Point in northern Puget Sound, increase the risk of major spills to Washington's marine waters.

Ecology's Spills Program 2009–2015 Strategic Plan for its oil spill program identifies "improving marine safety by emphasizing a risk-based approach" as one of its five strategic initiatives. The first recommendation in the joint report by Ecology and the Partnership on lessons learned from the 2011 National Commission on the Deepwater Horizon spill is to "complete a rigorous risk analysis on higher risk industry sectors to ensure that there is an appropriate level of investment reducing the risk of oil spills." The following near-term actions are necessary for Ecology and the broader spills community to fulfill legislation direction, accomplish Ecology's strategic plan and implement the Cross Partnership Oil Spill Work Group's recommendations.

Near-Term Actions

C8.1 NTA 1: Traffic and Incident Trends. Ecology will assess trends in ship traffic, vessel incidents and incident notifications for use in targeting inspections and setting standards.

Performance measure: Ecology presents concise report to the Cross PSP Oil Spill Work Group by July 2013.

C8.1 NTA 2: Evaluate Risk Assessments for Update Needs. Ecology will evaluate existing Puget Sound marine transportation oil spill risk assessments, identify any gaps in marine safety and work with experts to develop and apply appropriate risk reduction measures.

Performance measure: Gaps identified by Ecology, PSP, technical consultant and/or Cross Partnership Oil Spill Work Group.

C8.1 SJI 1: SJI Marine Manager Workshop. San Juan Marine Resources Committee will convene 20 agencies and non-governmental organizations responsible for oil spill prevention and readiness at the 2012 Marine Manager Workshop, including participation from the local, state, federal, and Canadian organizations. Workshop outcomes will include a list of agreed upon recommendations for oil spill prevention.

Performance measure: Local jurisdictions will consider adopting highest priority recommendations within their authority by 2014.

C8.2 Strengthen and integrate spill response readiness of the state, tribes, and local government.

In 2010 the Cross Partnership Oil Spill Work Group recommended the state's participation in tabletop and worst case oil spill drills be restored to make the oil spill response system more robust. The Work Group recognized that the response system is enhanced when spill responders sharpen their technical skills and build trust in one another by practicing in drills together. Given the rarity of major spills requiring a Unified Command, and the recent reduction in the participation of state and local governments in drills due to budget cuts, some relationships and expertise has deteriorated over time. The following NTAs seek to strengthen those relationships and the effectiveness of actual response actions.

Ongoing Programs

Key Ongoing Program Activities

- Support an appropriate level of tabletop drill participation by Ecology and local government.
- Support the involvement of local government in Northwest Area Committee meetings and updates of the Area Contingency Plan.

Near-Term Actions

C8.2 STRT 2: Straits Spill Prevention, Preparedness, and Response. Implement and promote improvements in oil spill prevention, preparedness, and response programs and capabilities for the benefit of the Strait of Juan de Fuca and adjacent waters.
a. Improve transboundary coordination on oil spills
b. Establish Vessel of Opportunity Program in Neah Bay
c. Expand oil spill drills along Strait of Juan de Fuca and Coast

Performance measure: In sequence: (a) Ensure 1+ CANUSPAC exercise is conducted and incorporates transboundary movement of personnel and/or equipment; (b) Vessel of Opportunity established in Neah Bay by July 2014 or referenced in contingency plans approved by April 2014; (c) Strait ERN participates in worst case or deployment drill planning process.

C8.3 Respond to spills and seek restoration using the best available science and technology.

The Cross Partnership Work Group's overarching recommendation was to improve the state's response capacity by requiring the regulated community to have timely access to the best achievable technology and training necessary to safely, promptly and properly respond to a worst-case oil spill. The following NTAs support implementation of legislative direction under HB 1186, Ecology's rulemaking efforts, and strengthen coordination with Canada during transboundary spills.

The 2011 National Commission's Report on the Deepwater Horizon Spill generally recommended that restoration decisions be based on transparent, independent science and also provide compensation for poorly understood marine impacts. In addition, it recommended that long-term monitoring of affected resources take place for years following catastrophic spills. This NTA seeks to promote studies and initiatives that can be enlisted before, during or after a spill to better ensure that appropriate natural resource damage compensation is realized and public resources are properly restored.

Ongoing Programs

Key Ongoing Program Activity

- Implement Ecology's recommendations from the Pacific States/BC Oil Spill Task Force transboundary report.

Near-Term Actions

C8.3 NTA 1: WAC 173-182 Revision to Achieve Protection from Spills. Revise WAC 173-182 to conform with HB1186 from the 2011 session, requiring the best achievable protection from the impacts of oil spills, and ensure implementation and enforcement of updated oil spill regulations.

Performance measure: Complete rulemaking by Dec 2012.

C8.3 NTA 2: Increase Natural Resource Damage Assessment Values. Revise WAC 173-183 to conform with HB1186 from the 2011 session, requiring Natural Resource Damage Assessment values be increased.

Performance measure: Complete rulemaking by Dec 2012.

C8.3 NTA 3: Identify Species and Locations at Risk in Spills. WDFW will establish planning efforts for coordinated, scientific collection of ephemeral data by local and regional entities for key species and locations at risk in oil spills to enhance response and NRDAR.

Performance measure: Number of ephemeral data plans developed for areas or facilities in high risk locations. Relevant training or preparation completed once the plan is in place.

C8.3 SJI 2: Island Oil Spill Association Spill Readiness and Response. Islands Oil Spill Association (IOSA) will maintain local oil spill readiness and response programs through 2014. Identify remaining local response needs at the 2012 Marine Managers Workshop and consider these, along with a funding and action plan, as part of the workshop recommendations.

Performance measure: To be determined.

Emerging Issues and Future Opportunities

The forthcoming Washington State *Integrated Climate Response Strategy* calls for revising oil spill geographic response plans to account for changes in shorelines, river conditions, and environmental conditions caused by climate change. These revisions should include geographic specific response strategies based on risk assessments and considerations of changes in infrastructure and logistical support.

Address and Clean Up Cumulative Water Pollution Impacts in Puget Sound

The Challenge

Water pollution in the marine waters and freshwater of Puget Sound comes from the introduction of toxic chemicals, pathogens, nutrients, and suspended sediments. These contaminants can harm aquatic life and pose health and safe problems in seafood, public water supplies, and beaches. There are many contaminated sites within and near Puget Sound that have resulted from past and ongoing releases of pollutants into the environment.

Water quality data indicate that the region's marine and fresh waters continue to have pollution challenges, but cleanup efforts have made some improvements.

- The Department of Ecology's Long Term Ambient Monitoring Program tracks water quality in 14 major rivers in Puget Sound using a Water Quality Index, which evaluates common pollutants such as temperature, bacteria, and dissolved oxygen, but not toxic pollutants. The Index shows that conventional water quality pollution has made small general improvements since 1995, but a majority of freshwater monitoring locations do not have good water quality (see chart).

Rivers Meeting Goals	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
Duckabush	93	95	94	90	74	94	89	85	88	96	86	89
Elwha	86	88	83	76	73	74	86	67	66	81	81	78
Skokomish	95	95	94	85	70	67	92	89	89	94	86	87
Snohomish	92	91	89	81	74	75	89	75	81	85	76	83

Borderline Rivers	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
Cedar	87	76	60	78	72	84	81	79	79	81	77	78
Upper Skagit	87	86	59	85	64	81	84	75	75	81	56	76
Lower Skagit	89	91	71	76	61	73	77	77	75	76	74	76
Deschutes	62	72	70	73	61	83	88	88	83	76	74	75
Nisqually	40	60	79	79	69	71	74	75	91	74	83	72

Rivers Not Meeting Goals	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
Green	82	73	66	67	75	49	72	68	60	69	63	68
Nooksack	65	68	58	57	52	54	61	51	60	69	56	59
Puyallup	60	58	57	55	51	58	59	58	61	49	62	57
Samish	86	75	32	49	34	71	67	74	59	80	63	63
Stillaguamish	81	60	44	72	55	67	71	69	75	75	71	67

Note: The Water Quality Index (WQI) is an aggregation of monthly measurements of typical water pollutants reported on a scale of 1 to 100. A higher number indicates better quality. An index score of 80 or above indicates that water quality is generally meeting our goals; between 70 and 80 is considered "fair" or "borderline;" 40-70 is failing to meet water quality goals and less than 40 is "poor."

Source: River and Stream Ambient Monitoring Program, Washington State Department of Ecology

Figure 1: Annual Water Quality Index (WQI) Scores at Freshwater Monitoring Locations, 2000–2010

- Ecology's 2008 water quality assessment identifies 501 different rivers and streams in the Puget Sound basin that require clean up plans (TMDLs). Some waterbodies have multiple segments listed and many segments are listed for more than one pollutant. Ecology's 2008 list included a total of 1,272 Puget Sound river and stream impairments (individual segment and parameter combinations). Bacteria (398 listings), dissolved oxygen (392), and temperature (341) are the most frequently occurring impairments of Puget Sound rivers and streams. Impairments occur in rivers and streams each of the 19 water resource inventory areas (WRIAs) in the Puget Sound basin. More than 60 percent of the total number of listings for Puget Sound rivers and streams are in five watersheds: Nooksack (238 listings), Kitsap (160), Cedar/Sammamish (154), Duwamish-Green (131), and Lower Skagit-Samish (113).
- Ecology's 2008 water quality assessment identifies an additional 129 impairments to Puget Sound lakes. Approximately one-half of these listings relate to toxic chemical contamination. These 67 toxics-related impairments of lakes combined with 24 toxics-related listings for Puget Sound rivers and streams indicate that toxic chemicals are the fourth most common type of impairment in Puget Sound freshwaters.
- Almost half of routinely monitored beaches in Puget Sound (50–70 beaches) consistently met water quality standards every year from 2004–2010, and another third met standards every year except for one or two years. Pollution sources have been addressed at several beaches since 2004, and two permanent beach closures were lifted in Island County in 2008. Despite these efforts, problems remain. In 2010, 26 percent of monitored beaches in Puget Sound failed to meet water quality standards and thus were unsafe for swimming.
- Ecology has been working to clean up 1,580 toxic-contaminated sites located within a half-mile of Puget Sound, including 150 contaminated sediment sites. As of December 2011, 664 of these sites have been cleaned up or reported as cleaned up by Ecology, potentially responsible parties, and other entities.
- In urban bays and harbors in Puget Sound, marine sediment quality data indicate mixed trends over time. Ecology's Urban Waters Initiative represents a major effort to reduce toxics entering urban bays and prevent re-contamination of sediments at cleanup sites including Elliott Bay and the Lower Duwamish in Seattle and Commencement Bay in Tacoma. Marine Sediment Chemistry Index (SCI) scores have improved in Elliott Bay and Commencement Bay, but declined in Bellingham Bay and Bainbridge Basin from 1997–99 to 2007–10. The recent SCI scores for the Bainbridge Basin and Bellingham Bay just meet the target score of 93.3, but the scores for Elliott Bay and Commencement Bay are still below the target score.[20] The SCI score for Bellingham Bay does not reflect sediment cleanup efforts that commenced after this sampling was conducted.

Climate Change

Reducing existing stresses on the ecosystem is an important part of climate change adaptation strategies. Strategies to reduce pressure from cumulative water pollution, helps implement the state climate response strategies to:

- Safeguard fish and wildlife and protect critical ecosystem services that support human and natural systems,
- Reduce the vulnerability of coastal communities, habitat, and species

[20] Ecology's Marine Sediment Monitoring Program data, as reported in the Puget Sound Partnership's target setting brief sheet (March 23, 2011), www.mypugetsound.net/directory-ilistings/documents/doc_download/83-toxics-in-sediments-target-setting-briefsheet-3-23-11-final.html.

Future sea level rise will need to be considered in the prioritization, design, and post-project maintenance of clean-up sites near the shoreline.

This strategy is focused on efforts to correct water quality and sediment quality problems related to toxic chemicals, nutrients, and pathogens by diagnostic studies and targeted cleanup activities. Implementing corrective actions to clean up impaired marine and fresh waters is essential for reducing the harm from pollution in the Puget Sound ecosystem. Sub-strategies in this section include completing total maximum daily load (TMDL) studies that serve as water column cleanup plans for water bodies, completing Cleanup Action Plans to restore and clean up contaminated upland and sediment sites within and near Puget Sound, addressing water quality issues at swimming beaches and recreational areas, implementing local pollution identification and correction programs, and developing a long-term effectiveness monitoring program for water quality improvement efforts.

Many of the sub-strategies presented here are important components of programs to address water quality problems that might be caused by pollution from urban runoff, wastewater discharge, and agricultural and forest runoff. Other strategies in priority C deal with efforts to reduce the release of chemicals to the environment and to control pathways by which pollutants are delivered to Puget Sound waters.

Relationship to Recovery Targets

2020 targets related to dissolved oxygen reductions of more than 0.2 mg/L, all monitored Puget Sound beaches meet marine water quality standards for bacteria, all Puget Sound regions and bays show minimal impact from toxic chemicals in sediment, and decreases in the number of impaired waters in Puget Sound freshwaters depend, in part, on clean up strategies and actions. These strategies also help achieve targets for shellfish beds restored, toxics in fish, water insects in freshwater, eelgrass, herring, and orcas.

Local Priorities

Several local areas identified priorities related to clean up.

Local Integrating Organization	Priorities
South Central	*Top Priorities* • Restore and protect Local Toxics Control Account funding under the Model Toxics Control Account (MTCA) for local toxics cleanup activities.
Strait of Juan de Fuca	*From 19 Strategic Priorities* • Clean Water District Plans (Sequim-Dungeness Bay & Eastern Jefferson County) - Implement Sequim-Dungeness Bay and East Jefferson County Clean Water Districts projects and programs, including TMDL implementation strategy and/or on-site sewage management programs • Landfill Assessments, Closure, and Remediation - Assess,, close, and remediate, where necessary, solid waste landfills within the Strait of

Local Integrating Organization	Priorities
	Juan de Fuca Action Area • Port Angeles Harbor Ecosystem Recovery - Clean up and restore Port Angeles Harbor and waterfront
South Puget Sound	*From Strategic Initiative: Urban Stormwater/ Runoff* • Urban Total Maximum Daily Loads (TMDLs) • Complete and Implement Deschutes TMDL • Implement Oakland Bay TMDL *From Strategic Initiative: Rural/Agricultural Runoff* • Implement South Puget Sound Dissolved Oxygen Study • Totten/Skookum TMDL *From Strategic Initiative: Salmon Recovery/Habitat Restoration* • Clean up Budd Inlet Industrial Pollution
Hood Canal	*Top Priority* • Phase I of a regional Hood Canal Pollution Identification and Correction program is in progress to determine the needs for a comprehensive regional program. *Examples from general priorities* • Improve planning for and services of/between rural communities; • Improve financial and technical assistance programs aimed at fostering voluntary stewardship and improving re/development standards
West Puget Sound	*From working priority list* • Expand PIC programs in Kitsap & Pierce Counties • Utilize PIC methodology for addressing sewage from failing septic systems to improve water quality and protect public health
Whatcom	*From working priority list* • Implement Nooksack River TMDL

C9. Address and clean up cumulative water pollution impacts in Puget Sound

C9.1 Complete Total Maximum Daily Load (TMDL) studies and other necessary water cleanup plans for Puget Sound to set pollution discharge limits and determine response strategies to address water quality impairments.

In Washington State, the Department of Ecology administers the water quality improvement program known as the Total Maximum Daily Load (TMDL) process under Section 303(d) of the Clean Water Act. TMDLs establish limits on pollutants that can be discharged to water bodies. For impaired waters, TMDLs serve as water cleanup plans, articulating the sources of pollution, how much pollution needs to be reduced to meet water quality standards, pollution-reduction targets, and strategies to control the pollution. The TMDL process is the primary regulatory program that EPA and Ecology use to protect and

restore water bodies from the cumulative impacts of multiple sources of pollution, including point and non-point sources.

Common water quality parameters evaluated in TMDLs include dissolved oxygen and the nutrients responsible for reducing available oxygen, suspended solids, temperature, metals, pesticides, and other toxic chemicals and pollutants, all of which can harm aquatic organisms and their habitat. One of the important cumulative effects of pollution from multiple sources is reductions in the availability of oxygen in the water, known as dissolved oxygen. When an excess amount of nitrogen, phosphorus, and/or other nutrients enters a water body, it can result in a condition of depleted oxygen levels known as hypoxia that causes stress to the environment depending on the severity and duration of the event. In Puget Sound, there are chronic hypoxia zones including areas of Hood Canal, Budd Inlet, and Sequim Bay.

This sub-strategy helps ensure that Puget Sound marine and fresh waters support aquatic life and provide for other beneficial uses by ensuring that Ecology implements its responsibilities to develop and implement TMDLs so that pollution sources are identified and corrective actions are taken to address problems. These efforts to implement water cleanup plans to improve water quality in specific water bodies through the TMDL process complement the source-specific strategies discussed elsewhere in the Action Agenda. In particular, strategies to control the sources and pathways that excess nutrients and toxic chemicals enter Puget Sound include toxics source reduction (C1), stormwater runoff (C2), agricultural runoff (C3), and wastewater (C5 and C6) strategies. These strategies outline particular requirements, best management practices, assistance, enforcement, and education efforts to reduce sources of toxic pollutants, pathogens, nutrients, and other contributors to water quality issues in Puget Sound and its watersheds.

Ongoing Programs

Ecology and EPA's water quality programs are key ongoing programs that advance this sub-strategy to address water quality impairments in Puget Sound. These include the programs to develop and implement TMDL studies for dissolved oxygen, temperature, suspended solids, and other water quality contaminants; state and federal water quality financial assistance programs; and state and local non-point source control programs. Puget Sound-specific funding to advance this sub-strategy may be available from the Pathogens Lead Organization grant award from EPA to DOH and Ecology and the Toxics and Nutrients Lead Organization grant award from EPA to Ecology.

Overall, there is a backlog of TMDLs needing to be completed, and Ecology is also in the process of prioritizing future TMDL studies and implementation plans. Ecology's ongoing TMDL development and implementation activities in Puget Sound include the following:

TMDL Development (Continuing work to complete a TMDL)

- Bacteria TMDLs for Sinclair-Dyes Inlets and Liberty Bay
- Dissolved Oxygen TMDL for Clark's Creek
- Temperature TMDLs for Cranberry, Johns, Mill, and Soos Creeks
- pH TMDL for White River
- Multi-parameter TMDL for Deschutes River/Budd Inlet

TMDL Implementation (Ongoing staff support for implementation plan activities for a completed TMDL)

- Bacteria TMDLs for Henderson Inlet Watershed, Puyallup River, Skokomish River, Nisqually/McAllister Creek, Oakland Bay, South Prairie Creek, Lower Skagit River Watershed, Samish Basin, Union River, North Creek, Swamp Creek, Piper's Creek, Issaquah Creek Basin, Little Bear Creek, and Fauntleroy Creek
- Temperature TMDLs for Upper White River, Skagit River, Snoqualmie River, Green River, and Newaukum Creek
- Phosphorus TMDLs for Campbell and Erie Lakes, Lake Sammamish, Lake Ballinger, Cottage Lake, Lake Sawyer, and Fenwick Lake
- Water bodies with multiple TMDLs:
    - Bacteria and temperature TMDLs for tributaries to Totten, Eld, and Skookum Inlets
    - Multi-parameter and temperature TMDLs for Stillaguamish River
    - Multi-parameter and bacteria TMDLs for Snoqualmie River
    - Biological oxygen demand and ammonia TMDLs for Snohomish River estuary and bacteria TMDL for Snohomish River tributaries
- Bacteria, dissolved oxygen, and temperature TMDLs for the Bear-Evans watershed

Other Studies

- South Puget Sound Dissolved Oxygen Study (The resulsts from the study will determine if a TMDL, or other action, is needed.)
- Quartermaster Harbor Dissolved Oxygen Study (Ecology is evaluating available data and modeling to determine whether a TMDL is needed to address the dissolved oxygen impairment.)

Key Ongoing Program Activities

- Ecology will continue ongoing work to complete TMDL assessments for high-priority water bodies in Puget Sound watersheds. Ecology also will continue to support implementation plan activities for completed TMDLs for Puget Sound and adjacent watersheds.
- Ecology will complete the South Sound Dissolved Oxygen Study by August 2012. If the study shows that something needs to be done to protect dissolved oxygen levels in South Puget Sound, Ecology will initiate a plan to improve water quality. Ecology will complete the Puget Sound Dissolved Oxygen Model in 2012, which will identify any other areas of concern in Puget Sound.
- Ecology will accelerate other ongoing efforts, including prioritizing watersheds needing TMDLs, to identify areas where enhanced wastewater treatment may be needed. In Puget Sound, results from TMDLs and water cleanup plans for Budd Inlet/Deschutes River will be available in 2013.
- The Hood Canal Aquatic Rehabilitation Program is working to address the human contributions to low dissolved oxygen problems in Hood Canal, using the scientific findings from the Hood Canal Dissolved Oxygen Program and others, to develop and advance corrective actions.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

C9.2 Clean up contaminated sites within and near Puget Sound.

This sub-strategy helps reduce the risk to humans and the Puget Sound ecosystem from toxic chemicals by cleaning up contaminated sites, focusing on contaminated sediment in the nearshore and contaminated upland sites near marine and freshwater. Sediment sites are contaminated with chemicals that have built up over time. These pollutants can enter the food chain and contaminate fish, shellfish, seals, orcas, and humans that eat the fish and shellfish. Sediment sites also contain contaminants that harm or kill the benthic community affecting the aquatic ecosystem and food sources of other animals. Contaminated sites along Puget Sound shorelines and in upland areas of watersheds also contribute to pollution in Puget Sound, since stormwater runoff from those sites can contain toxic chemicals and contaminants can leach into groundwater. Several regulatory programs govern the cleanup of contaminated sites, including the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, known as Superfund) for cleanup of hazardous waste sites and the Resource Conservation and Recovery Act (RCRA) governing the management and disposal of wastes, as well as the state cleanup program administered under the Model Toxics Control Act (MTCA) and the state Sediment Management Standards. Ecology is the primary regulatory agency that oversees sediment and upland cleanup efforts. Washington DNR, as the land manager, works cooperatively with Ecology on cleanup of state-owned aquatic lands.

Cleanup activities are made more effective and efficient by efforts to (1) integrate with source control (e.g., in agency water quality programs) to facilitate and protect investments in cleanup, and (2) link cleanup activities and habitat restoration efforts. This linkage can be accomplished through Shoreline Management Act (SMA) restoration plans, Natural Resource Damage Assessment actions, and Water Resource Inventory Area (WRIA) restoration actions. However, there are significant barriers to optimally integrating source control, cleanup, and restoration activities—for example, source control efforts on private property (e.g., private pipes that connect to sewer systems) tend to be limited, funding is very limited for SMA and WRIA activities (among other agency programs), and NRDA trustees can be resistant to accept habitat related to cleanup sites as creditable habitat for NRDA purposes.

The January 2012 draft Washington Integrated Climate Change Response Strategy includes the recommendation to incorporate future sea level rise in the prioritization, design, and post-project maintenance of shoreline toxic cleanup sites.

Since 1988, a total of 664 contaminated sites (both upland and sediment sites) have been cleaned up within a half mile of Puget Sound, including over 100 since the Puget Sound Initiative began in 2006. A specific emphasis has been placed on contaminated sediment sites in Puget Sound. Forty-four percent of the known contaminated sediment sites in Puget Sound have been cleaned up or reported cleaned up and 41 percent of contaminated sediment sites are in the process of being cleaned up.[21] One hundred percent of publicly funded toxic site cleanups are currently on schedule, exceeding the 90 percent target. The number of cleanups that are completed each year has been declining over time, however. One contributor to this decline may be the reduced availability of private-sector funding to voluntarily clean up sites; another factor may be that sites have become more complex.

One of the ways that contaminated sediment can be managed for cleanup and maintenance dredging is through the appropriate disposal of dredged material. Dredging supports site cleanup activities or other purposes, such as navigation and maritime commerce. The Washington Dredged Materials

[21] Information provided by Ecology Toxics Cleanup Program, September 2011.

Management Program, an interagency program of the U.S. Army Corps of Engineers (Seattle District), EPA Region 10, Ecology, and Washington DNR, works to facilitate navigation and marine commerce while also protecting the aquatic environment. DNR manages and monitors 12 aquatic land disposal sites for dredged materials on state-owned aquatic land, including eight in Puget Sound and the Strait of Juan de Fuca. Statewide, annual volumes of dredged material disposal range from 120,000 cubic yards to over 1.5 million cubic yards. The program implements sediment sampling, chemical and biological testing, and test interpretation to evaluate the suitability of dredged material before approving it for in-water disposal.

Ongoing Programs

Major ongoing programs related to this sub-strategy include Ecology's Toxics Cleanup Program and EPA's cleanup programs including Superfund and RCRA. These programs include targeted work within the Puget Sound basin as well as base program cleanup activities that occur elsewhere around the state and nation. Funding for contaminated site cleanup comes from the federal Superfund program, the State and Local Toxics Control Accounts established by state law, and responsible parties. Efforts are underway to update the fish consumption rate used for state cleanups MCTA; this will result in changes to sediment cleanup and other standards.

One of initiatives highlighted in EPA's 2011–15 Strategic Plan is an Urban Waters effort in which the cleanup and reuse of contaminated land in urban watersheds is coordinated with regional water quality improvement efforts including TMDLs, CSO long term control plans, and green infrastructure to reduce stormwater pollution, thereby connecting source-control efforts with cleanup and restoration efforts. Ecology's Urban Waters Initiative, which originated with $2.7 million in funding from the State Legislature in 2007, focuses specifically on addressing the contamination of three major urban waters—the Lower Duwamish and Commencement Bay in Puget Sound, as well as the Spokane River. Federal, state, tribal, and local cleanup activities are also occurring throughout the Puget Sound region, including major cleanup locations in Bellingham, Bremerton, and Elliott Bay and the Lower Duwamish Waterway in the Seattle area. In Bellingham Bay, for example, a partnership of 15 federal, state, tribal, and local stakeholders are working to expedite sediment cleanup, source control, and habitat restoration for cleanup sites around the bay through the Bellingham Bay Demonstration Pilot organized by Ecology in 1996. Ecology has also identified a series of "priority bays" for accelerated cleanup and restoration efforts for the Puget Sound Initiative, these include:

- Anacortes Area (Fidalgo/Padilla Bays)
- Budd Inlet
- Dumas Bay
- Everett Area (Port Gardner Bay)
- Oakland Bay
- Port Angeles Bay
- Port Gamble Bay

In recent years, funding set aside for the State and Local Toxics Control Accounts to support remediation and related activities has also been used to support other causes related to the general fund. For the 2011–13 fiscal biennium, for example, the state legislature specified that the Local Toxics Control Account could be used for shoreline update grants and actions for reducing public exposure to toxic air pollution; this means that there has been less money remaining to support site cleanup activities.

Key Ongoing Program Activities

- Performance measures for EPA include number of remedial action projects completed at Superfund National Priority List sites, number of Superfund remedial site assessments completed, number of brownfields properties cleaned up using brownfields funding (and other brownfields measures), and RCRA cleanup measures such as control migration of contaminated groundwater and complete construction of final remedies.
- Ecology continually evaluates reported contaminated sites and their priority for cleanup and restoration around Puget Sound. This includes an initial investigation and an assessment to determine the contaminated site's hazard ranking. As appropriate, Ecology will initiate cleanup planning, implementation, and monitoring activities for those contaminated areas as funding and resources are available.
- Ecology will continue to work with other organizations clean up and and restore contaminated sites located within one-half mile of Puget Sound. This includes the following "priority bays" for the Puget Sound Initiative: Anacortes Area (Fidalgo/Padilla Bays), Budd Inlet, Dumas Bay, Everett Area (Port Gardner Bay), Oakland Bay, Port Angeles Bay, and Port Gamble Bay. It also includes the following other major Puget Sound cleanup locations: Bellingham Bay, Bremerton area (Port Washington Narrows), Elliott Bay, and Lower Duwamish Waterway. Ecology will consult with DNR regarding cleanup activities on state-owned aquatic lands. Ecology will also ensure that these and other cleanup sites within the Puget Sound area have post-construction monitoring plans in place that provide data on the effectiveness of the cleanup remedy.
- Maintain adequate funding to assure continued, timely cleanup and remediation of toxic sites. Assure that funding to Ecology provides an appropriate level of state match to approved Remedial Action Grant projects and that the LTCA is protected for its intended statutory purposes.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

C9.3 Restore and protect water quality at swimming beaches and recreational areas.

Swimming in water contaminated with pathogens and other pollutants can cause illness in humans, as can contact with contaminated water through water-based recreational activities such as surfing, paddle boarding, kayaking, kite boarding, and scuba diving. Water at beaches can be contaminated by fecal matter, which can contain harmful bacteria, parasites, and viruses. Sources of contamination vary and include improperly disposed diapers or animal waste, stormwater runoff containing human or animal waste, malfunctioning septic systems or sewage treatment plants, CSOs, and wildlife (issues with agricultural runoff, stormwater pollution, on-site sewage systems, and centralized wastewater treatment systems are discussed in strategies C3–C6). Marine waters can be contaminated through pollution carried by freshwater streams as well as through other pathways. While swimming beaches are most often used by bathers during warmer months of the year, other popular water-based recreational activities like surfing, scuba diving, and kite boarding occur throughout the year in Puget Sound. As noted in the Challenge section, 26 percent of monitored marine beaches in Puget Sound failed to meet water quality standards in 2010, and others have failed to meet the standards in some of the last few years.

Additional funding is needed to create and implement a freshwater swimming beach monitoring and notification program in the Puget Sound region. Today, only six of 39 counties throughout the state monitor bacteria at freshwater swimming beaches. These locally-funded programs provide information to the public regarding health at public swimming beaches. Over the past few years, cities and counties have discontinued these programs due to lack of funding.

Ongoing Programs

Ecology's and EPA's water quality programs, including the programs to develop and implement TMDL studies, state and federal water quality financial assistance programs, and state and local non-point source control programs are key ongoing programs that advance this sub-strategy. Under the TMDL program, Ecology completes a Water Quality Assessment for EPA every two years that produces a list of water bodies (called a 303[d] list) that do not meet water quality standards. In 2010, this assessment focused on marine waters, and in 2012 the assessment will focus on fresh water. The DOH- and Ecology-administered BEACH program, as noted above, is the primary state program for monitoring and notification of water quality contamination at marine beaches.

Beach Environmental Assessment, Communication, & Health Program

Ecology and DOH jointly administer the Beach Environmental Assessment, Communication, & Health (BEACH) program to protect people who enjoy Washington's saltwater beaches. The BEACH program monitors marine beaches for fecal bacteria, notifies the public when the results are high, and educates the public on how to avoid getting sick from playing in saltwater. There is no comparable statewide program for freshwater beaches; however, local public health agencies may have their own programs for freshwater areas. This sub-strategy helps ensure that swimming and other contact recreational activities in both marine and fresh waters in Puget Sound does not pose risks to human health. It provides for corrective actions to address pollution problems that cause swimming beaches and other contact recreation areas to not meet water quality standards for pathogens or other forms of contamination.

Near-Term Actions

C9.3 NTA 1: Freshwater Swimming Beach Program. By 2014, Ecology and DOH will develop a proposal to coordinate a monitoring and notification freshwater swimming beach program for the Puget Sound region.

Performance measure: To be determined.

C9.3 NTA 2: Correct Pollution Problems at Marine Beaches. Ecology and DOH will develop a plan to conduct pollution source surveys and correct pollution problems at marine beaches used for swimming, surfing, diving and other recreational uses. Ecology and DOH will coordinate with local, state and tribal programs that address point source and nonpoint source pollution to assure that activities are not duplicative

Performance measure: A priority list will be developed and 10 shoreline surveys completed by June 30, 2013 and 10 additional shoreline surveys completed by June 30, 2014.

In addition, near-term actions to address wastewater pollution, a key source of contamination of swimming beaches, are discussed in strategies C5–C6. Sub-strategies C9.1 (covering TMDLs) and C9.4 (covering local and tribal pollution identification and control programs) also are very important for addressing water quality and public health issues at swimming beaches and recreational areas.

C9.4 Develop and implement local and tribal pollution identification and correction programs.

Local agencies and tribes across Puget Sound implement pollution identification and correction (PIC) programs to determine the causes and sources of nonpoint water pollution in specific geographical areas, and to take corrective actions to address the pollution sources, such as outreach and education, technical assistance, incentives for best management practices, and enforcement. For example, the Kitsap County Health District's PIC program, which is funded by the County's Surface and Stormwater Management program and grants from Ecology, developed a 2010 priority area work list to identify priority PIC project locations to address bacterial water pollution, thereby protecting public health, protecting shellfish resources, and restoring surface water quality. This sub-strategy helps ensure that Puget Sound marine and freshwaters support aquatic life and provide for other beneficial uses by ensuring that pollution sources are identified and corrective actions are taken to address problems. These activities are closely associated with state requirements for local health jurisdictions to carry out comprehensive plans to ensure that on-site sewage systems are properly managed to protect public health and sensitive waters; sub-strategies and actions related to on-site sewage systems are further discussed in strategy C5.

Ongoing Programs

With funding from EPA available from November 2011 through September 2014, DOH and Ecology are offering grants to county governments, local health jurisdictions, and tribal governments adjacent to Puget Sound to establish or enhance PIC programs to identify and address pathogen and nutrient pollution from a variety of nonpoint sources, including on-site sewage systems, farm animals, pets, sewage from boats, and stormwater runoff. Although this grant opportunity is focused on pathogens, PIC programs can also be an important way that local communities can monitor and protect against other pollutants, including toxic chemicals. The goal with federal funding of PIC programs is support for the establishment and/or enhancement of programs that can eventually be sustainable programs that integrate across various local water quality programs, interests, and concerns. Local and tribal water quality improvement programs funded from utility fees, Ecology and EPA's water quality programs, and other water quality financial assistance may have similar objectives of identifying and addressing water pollution issues.

Key Ongoing Program Activities

- Local jurisdictions and tribes will establish or enhance PIC programs to identify and address pathogen, nutrient, and toxic pollution problems in specific geographical areas that may arise from a variety of sources, including on-site sewage systems, stormwater runoff, agricultural sources, and other nonpoint sources. Grant funding available through 2014 can help these agencies to design programs that integrate across multiple local water quality interests.
- Ecology will continue to provide guidance and financial assistance to local governments to establish and carry out PIC programs.

Near-Term Actions

C9.4 NTA 1: Pollution Identification and Correction Programs. DOH and Ecology will administer EPA grants to help counties and tribes set up sustainable programs to identify and correct nonpoint pollution sources to improve and protect water quality in shellfish growing areas and at marine swimming beaches. These sustainable programs will have ongoing monitoring to identify pollution sources and assess effectiveness of efforts, a local sustainable funding source, and a compliance assurance component.

Performance measure: Award PIC funds and distribute Agricultural BMP funds to at least six Puget Sound counties by July 2012. Metric for each program will be individually set to reflect targets for numbers of BMPs implemented and maintained and systems repaired to address water quality.

C9.4 HC 3: Hood Canal PIC Program. By April 2014, HCCC will complete Phase I of a regional Hood Canal Pollution Identification and Correction program to determine the needs for a comprehensive regional program and advance funding proposal(s) for implementation. The program will provide information about the sources of pollution, including failing septic systems.

Performance measure: April 2014, complete Phase 1. Results of this Phase I approach will allow development and implement of the regional program during Phase II slated for 2014 and beyond.

C9.4 WS 8: West Sound Septic System Repairs Using PIC. Kitsap Public Health will report on the number of failing septic systems identified using PIC methodology, the number repaired and associated improvements in water quality by December 2013.

Performance measure: Number of failing septic systems identified using PIC methodology, the number repaired and associated improvements in water quality by December 2013.

Emerging Issues and Future Opportunities

Specific longer-term activities to address Puget Sound water quality impairments that were identified during the Action Agenda update process include the following:

- **Microplastics**. There is increasing evidence of plastic pollution in Puget Sound marine and nearshore areas.[22] Plastics have the potential to strangle marine wildlife. Mammals, birds, and fish also ingest small microplastics and the toxics they contain. The Strait ERN for the Strait Action Area has identified a priority action led by the Port Townsend Marine Science Center for microplastics (as part of a "toxic source reduction programs" priority strategy). Ecology will work with the Port Townsend Marine Science Center and other partners to continue to assemble information on plastics pollution and microplastics, including any data specific to Puget Sound, and will recommend actions to (1) better understand the threats to Puget Sound, and then (2) address the highest priority problems.

[22] Since 2006, the Port Townsend Marine Science Center, with funding from a 2007 grant from Ecology, has led a Plastics Project examining plastics contamination in the Puget Sound region; this has included a sampling effort at over 30 beaches in 12 counties and a gull bolus study.

- **Incentives and Binding Mechanisms for Reducing Pollution from Non-point Sources.** Ecology, EPA, and local organizations will confer on possible incentives and/or binding mechanisms for ensuring that non-point pollutant reductions strategies called for in TMDLs are actually implemented for high priority TMDLs.
- **Dredged Materials Management.** The Dredged Materials Management Program (DNR, Ecology, EPA Region 10, and U.S. Army Corps of Engineers Seattle District) will continue to update standards, sampling and analysis protocols, and risk assessment procedures based on best available science through the Sediment Management Annual Review Meetings. Stakeholders have identified the need for additional analysis of dioxins in disposed material.
- **Interagency Coordination.** Ecology, DNR, WDFW, and other agencies will seek to remove barriers and conflicts between programs with similar goals—including the MTCA and NRDA cleanup programs and the SMA and WRIA restoration efforts—to facilitate improved integration of habitat restoration and cleanup activities in and near Puget Sound. This will include examining whether NRDA credits can be more easily obtained for work completed under other restoration programs.
- **Local Funding**. State & local agencies should collaborate to develop sufficient, stable funding for local governments to implement PIC programs, implement actions called for in TMDLs, and undertake other efforts to improve water quality.
- **Cleanup Program Evaluation and Improvements**. Stakeholders have suggested (1) an analysis of how interim cleanups have been used in the past, including whether they have slowed or sped up the pace of entire cleanup, and/or have influenced the cleanup decision and (2) evaluating how to better implement public participation and include all stakeholders in the early stages of clean ups.
- **Viruses in Wastewater Discharges**. The Department of Health will evaluate the application of male specific coliphage (MSC) for use in the management of shellfish harvest areas affected by raw or partially untreated sewage discharges from wastewater treatment plants or community sewage collection systems. This supplements work by the US Food and Drug Administration to develop a reliable viral risk indicator and to evaluate if virus uptake and persistence are different in Puget Sound than other areas of the country. This research could help better evaluate when to open shellfish harvest sites after a transient pollution event and to better delineate Prohibited areas where there is chronic pollution. In addition, this research could help better understand the efficiency of various wastewater treatment systems to inactivate/remove enteric viruses prior to discharge.
- **Predict Pathogens to Protect Public Health**. The Department of Health will use their 2012-2013 Hershman Fellow to assist the University of Washington and NOAA's Northwest Fisheries Science Center to identify environmental criteria to develop and implement a predictive model for Vibrio *parahaemolyticus*, a naturally occurring bacteria that can make people sick from eating raw oysters. The model would help us take action where problems occur and ultimately prevent illnesses.
- Future sea level rise should be considered in the prioritization, design, and post-project maintenance of clean-up sites near the shoreline.

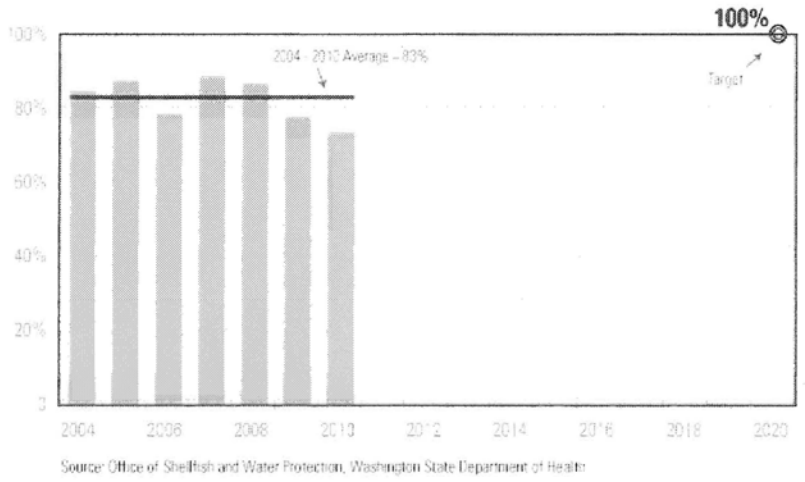
Target View: Swimming Beaches

The 2020 target for swimming beaches is that all monitored beaches meet standards for a type of fecal bacteria called enterococcus. Fecal bacteria are found in human and animal waste. These contaminants can enter the water through a variety of means, including leaky or inadequate septic systems, wastewater treatment overflows, boat and vessel discharges, and stormwater contaminated by pet and animal waste. Controlling these sources of pollution is the key to improving water quality at swimming beaches.

Luckily, many of Puget Sound's swimming beaches already meet high standards for clean water – almost half of routinely monitored beaches consistently met the standards between 2004 and 2010; another third met the standard except for one or two years. At the same time, there is room for improvement. In any given year from 2004 - 2010, 7 to 15 beaches failed to meet standards, resulting in the issuance of health advisories to the public.

Percent of Monitored Swimming Beaches Meeting Water Quality Standards

Annual, 2004-2020



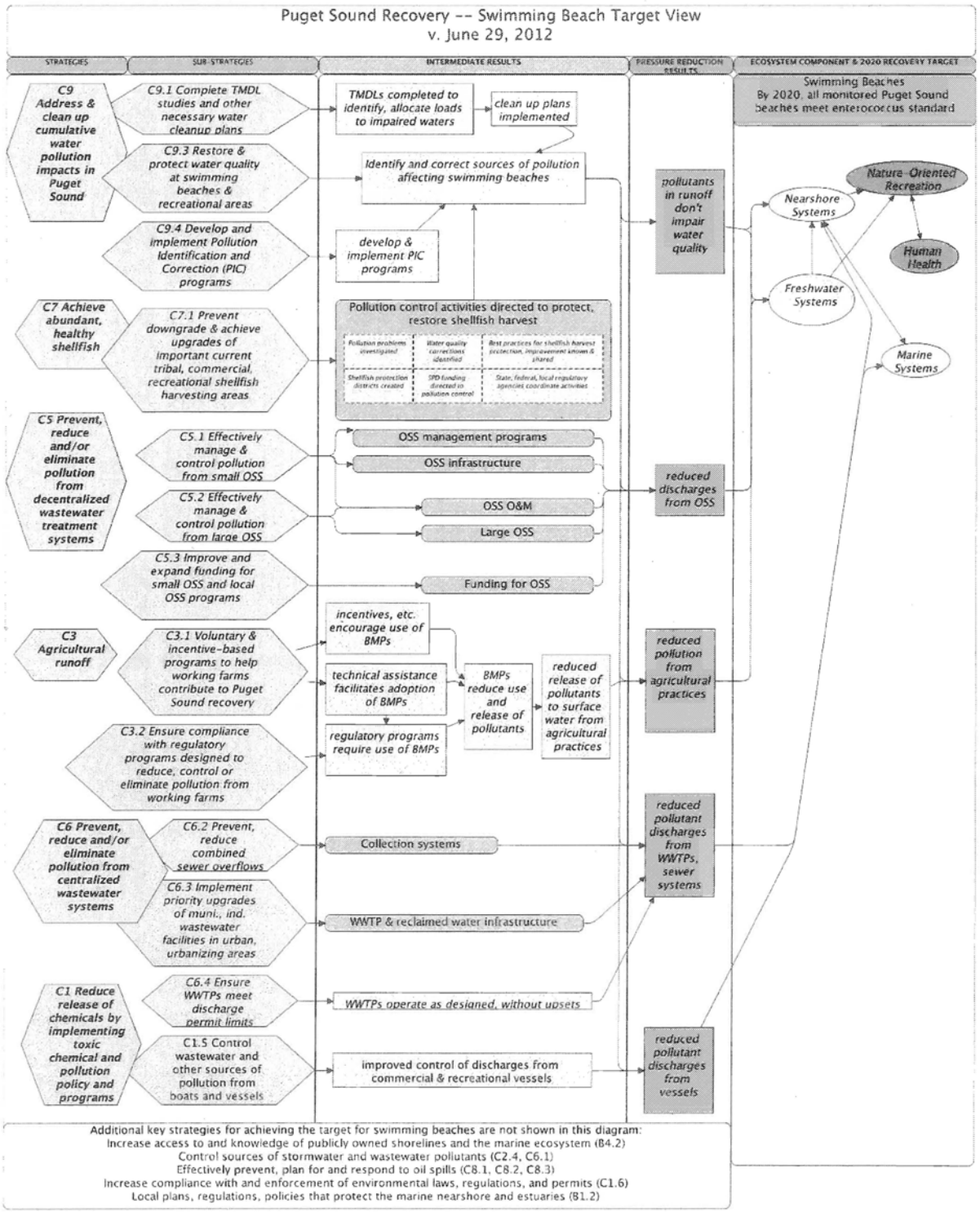
Source: Office of Shellfish and Water Protection, Washington State Department of Health

Percent of Puget Sound marine swimming beaches meeting water quality standards for healthy human use, allowing for one exception per swimming season. In general, samples are collected weekly. The basic measure is for enterococcus, but fecal coliform bacteria and E. coli are also sampled if warranted.

Many strategies and actions will work together to better control pollution and thereby improve water quality at swimming beaches. The basic chain of events is to identify sources and potential sources of pollution to swimming beaches, assess these sources and improve the consistency and efficacy of pollution controls which will, in turn, improve water quality. Key strategies and actions related to this work include:

- Address and clean up cumulative water pollution impacts in Puget Sound (C9.1, C9.3, C9.4)
- Increase access to and knowledge of publicly owned Puget Sound shorelines and the marine ecosystem (B4.2)
- Prevent problems from new development (C2.4)
- Prevent, reduce, and control agricultural runoff (C3.2, C3.1)
- Prevent, reduce and/or eliminate pollution from decentralized wastewater treatment systems (C5.2, C5.3, C5.1)
- Prevent, reduce and/or eliminate pollution from centralized wastewater treatment systems (C6.2, C6.4, C6.3, C6.1)
- Effectively prevent, plan for and respond to oil spills (C8.1, C8.2, C8.3)
- Prevent, reduce, and control the sources of contaminants entering Puget Sound (C1.6, C1.5)
- Support local governments to adopt and implement plans, regulations, and policies that protect the marine nearshore and estuaries, and incorporate climate change forecasts (B1.2)
- Improve water quality to prevent downgrade and achieve upgrades of important current tribal, commercial and recreational shellfish harvesting areas (C7.1)

The results chain, or logic model, below illustrates how strategies and sub-strategies lead to water quality improvements at swimming beaches. The yellow polygons identify strategies and sub-strategies from the Action Agenda that we believe will contribute significantly towards meeting the swimming beach target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery target.


Puget Sound Recovery -- Swimming Beach Target View
v. June 29, 2012
STRATEGIES
SUB-STRATEGIES
INTERMEDIATE RESULTS
PRESSURE REDUCTION RESULTS
ECOSYSTEM COMPONENT & 2020 RECOVERY TARGET
Swimming Beaches
By 2020, all monitored Puget Sound beaches meet enterococcus standard
C9 Address & clean up cumulative water pollution impacts in Puget Sound
C9.1 Complete TMDL studies and other necessary water cleanup plans
C9.3 Restore & protect water quality at swimming beaches & recreational areas
C9.4 Develop and implement Pollution Identification and Correction (PIC) programs
TMDLs completed to identify, allocate loads to impaired waters
clean up plans implemented
Identify and correct sources of pollution affecting swimming beaches
develop & implement PIC programs
pollutants in runoff don't impair water quality
Nature-Oriented Recreation
Nearshore Systems
Human Health
Freshwater Systems
Marine Systems
C7 Achieve abundant, healthy shellfish
C7.1 Prevent downgrade & achieve upgrades of important current tribal, commercial, recreational shellfish harvesting areas
Pollution control activities directed to protect, restore shellfish harvest
Pollution problems investigated
Water quality corrections identified
Best practices for shellfish harvest protection, improvement known & shared
Shellfish protection districts created
SPD funding directed to pollution control
State, federal, local regulatory agencies coordinate activities
C5 Prevent, reduce and/or eliminate pollution from decentralized wastewater treatment systems
C5.1 Effectively manage & control pollution from small OSS
C5.2 Effectively manage & control pollution from large OSS
C5.3 Improve and expand funding for small OSS and local OSS programs
OSS management programs
OSS infrastructure
OSS O&M
Large OSS
Funding for OSS
reduced discharges from OSS
C3 Agricultural runoff
C3.1 Voluntary & incentive-based programs to help working farms contribute to Puget Sound recovery
C3.2 Ensure compliance with regulatory programs designed to reduce, control or eliminate pollution from working farms
incentives, etc. encourage use of BMPs
technical assistance facilitates adoption of BMPs
regulatory programs require use of BMPs
BMPs reduce use and release of pollutants
reduced release of pollutants to surface water from agricultural practices
reduced pollution from agricultural practices
C6 Prevent, reduce and/or eliminate pollution from centralized wastewater systems
C6.2 Prevent, reduce combined sewer overflows
C6.3 Implement priority upgrades of muni., ind. wastewater facilities in urban, urbanizing areas
Collection systems
WWTP & reclaimed water infrastructure
reduced pollutant discharges from WWTPs, sewer systems
C1 Reduce release of chemicals by implementing toxic chemical and pollution policy and programs
C6.4 Ensure WWTPs meet discharge permit limits
C1.5 Control wastewater and other sources of pollution from boats and vessels
WWTPs operate as designed, without upsets
improved control of discharges from commercial & recreational vessels
reduced pollutant discharges from vessels
Additional key strategies for achieving the target for swimming beaches are not shown in this diagram:
Increase access to and knowledge of publicly owned shorelines and the marine ecosystem (B4.2)
Control sources of stormwater and wastewater pollutants (C2.4, C6.1)
Effectively prevent, plan for and respond to oil spills (C8.1, C8.2, C8.3)
Increase compliance with and enforcement of environmental laws, regulations, and permits (C1.6)
Local plans, regulations, policies that protect the marine nearshore and estuaries (B1.2)

Target View: Fresh Water Quality

Clean water is vital to people and key to healthy fish and wildlife populations. But when our rivers and streams pick up pollutants, toxic contaminants, or excessive sediments and nutrients, it not only affects the health of our watersheds, but impacts our marine waters, swimming beaches, and shellfish beds as well. Our fresh waters should be safe for drinking and swimming, able to support farms, fish, and wildlife, and not harm our beaches, shellfish beds, or marine waters.

Walk along a small stream or creek in the region, and on the rocks and sediments of the streambed you may find a lively community of aquatic insect larvae, snails, and other small invertebrates. These small creatures thrive in clean, cool waters and form a critical part of the aquatic food chain. But this unique biological community is sensitive to many things, including pollution and runoff from agricultural and developed lands, reduced water levels and high temperatures in the summer, and the clearing of trees and vegetation along streambanks. Scientists often measure the condition of the aquatic community as an indicator of overall water quality and stream health.

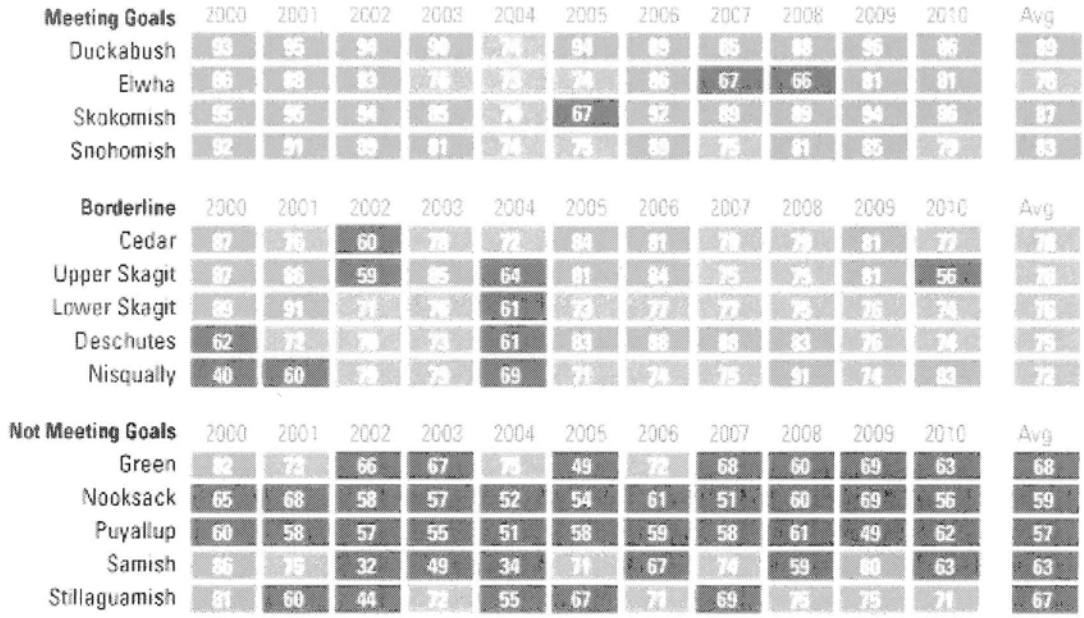
Three 2020 recovery targets were established for fresh water quality:

- At least half of all monitored streams should score 80 or above on the fresh water quality index
- Reduce the number of "impaired" waters
- Protect (i.e. allow no degradation of) any small streams that are currently ranked "excellent" for biological condition, and improve water quality in streams ranked "fair" so their average scores become "good"

Scientists who monitor our streams and rivers have developed an index of fresh water quality. A score of 80 or higher (out of 100) indicates that water quality is generally meeting our goals for sediments, nutrients, temperature, dissolved oxygen, fecal coliform bacteria, and other conventional pollutants (the index does not address toxic contaminants for a number of technical reasons). In general, fresh water quality index scores for the major rivers in Puget Sound have slowly improved since the index was first established in 1995 and now average in the mid-70's range. Scores in small urban streams are lower.

Water Quality Index

Annual, 2000-2010



Source: River and Stream Ambient Monitoring Program, Washington State Department of Ecology

The Water Quality Index (WQI) is an aggregation of monthly measurements of typical water pollutants reported on a scale of 1 to 100. A higher number indicates better quality. An index score of 80 or above indicates that water quality is generally meeting our goals; between 70 and 80 is considered "fair" or "borderline"; 40-70 is failing to meet water quality goals and less than 40 is "poor".

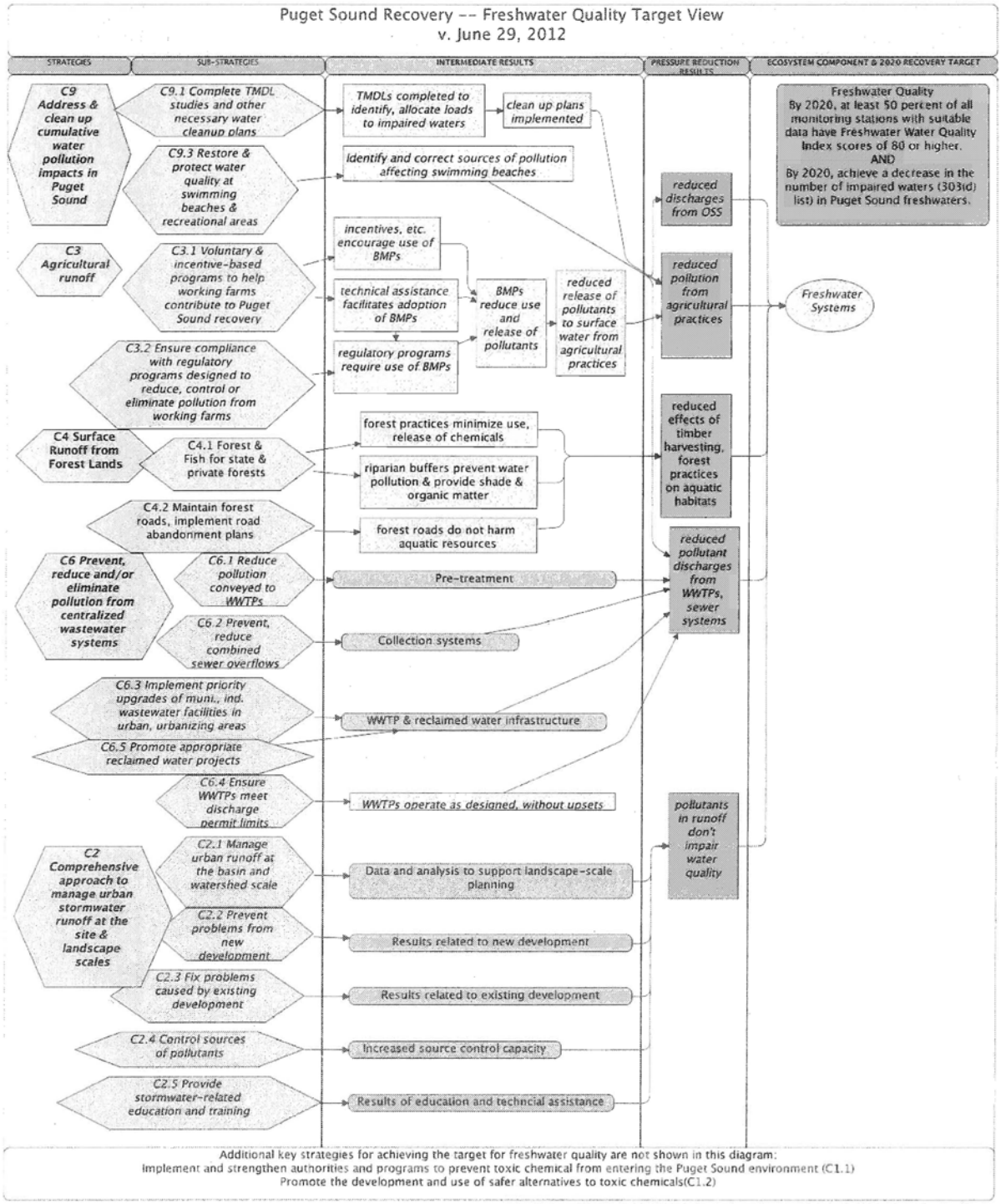
Stations meeting water quality goals are all in the relatively undeveloped Olympic Peninsula (except for the Snohomish River). Stations not meeting water quality goals tend to be in watersheds with more people and more agricultural development.

The Action Agenda strategies most related to the fresh water quality target are:

- Prevent, reduce, and control agricultural runoff (C3.2, C3.1)
- Prevent, reduce, and control surface runoff from forest lands (C4.2, C4.1)
- Prevent, reduce and/or eliminate pollution from centralized wastewater treatment systems (C6.1, C6.2, C6.4, C6.3, C6.5)
- Address and clean up cumulative water pollution impacts in Puget Sound (C9.3, C9.1)
- Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales (C2.5, C2.4, C2.1, C2.3, C2.2)
- Prevent, reduce, and control the sources of contaminants entering Puget Sound (C1.1, C1.2)

The results chain, or logic model, below illustrates how strategies and sub-strategies lead to fresh water quality improvements. The yellow polygons identify strategies and sub-strategies from the Action Agenda that we believe will contribute significantly towards meeting the fresh water target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals

show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery target.



Target View: Marine Sediment Quality

In a healthy, well-functioning estuary, marine sediments support an important and healthy biological community. But in Puget Sound and many estuaries around the world, sediments have become contaminated with toxic chemicals from industrial discharges, contaminated run-off from urban streets and roads, discharges from wastewater treatment plants, agricultural and forest chemicals carried down rivers and streams, oil spills, and even chemicals carried long-distances through the atmosphere that eventually fall out of the sky with our rain. As the forests around Puget Sound have been logged, streams and rivers channelized, and towns and cities built up, the amount, rate, and quality of sediment deposited into Puget Sound has changed dramatically.

A functioning, resilient ecosystem includes sediment quality that supports functioning, healthy communities of sediment dwelling invertebrates. The 2020 recovery target for marine sediment quality is:

By 2020, all Puget Sound regions and bays should:

- Have sediment chemistry measures reflecting "minimum exposure", as defined by having a Sediment Chemistry Index (SCI) score of >93.3.
- Have combined measures of sediment chemistry, toxicity, and the health of bottom-dwelling marine life (i.e, the benthos) reflecting "unimpacted" conditions, as defined by having a Sediment Quality Triad Index (SQTI) score of >83.
- Have no chemistry measurements exceeding the Sediment Quality Standard values set in Washington State

All eight regions of Puget Sound monitored from 1997-2009 demonstrated minimum exposure to toxic chemicals in sediment. Four of eight regions demonstrated unimpacted benthic invertebrate communities. The other four regions demonstrated likely impacted communities; the target for "unimpacted" benthos in all regions is not met.

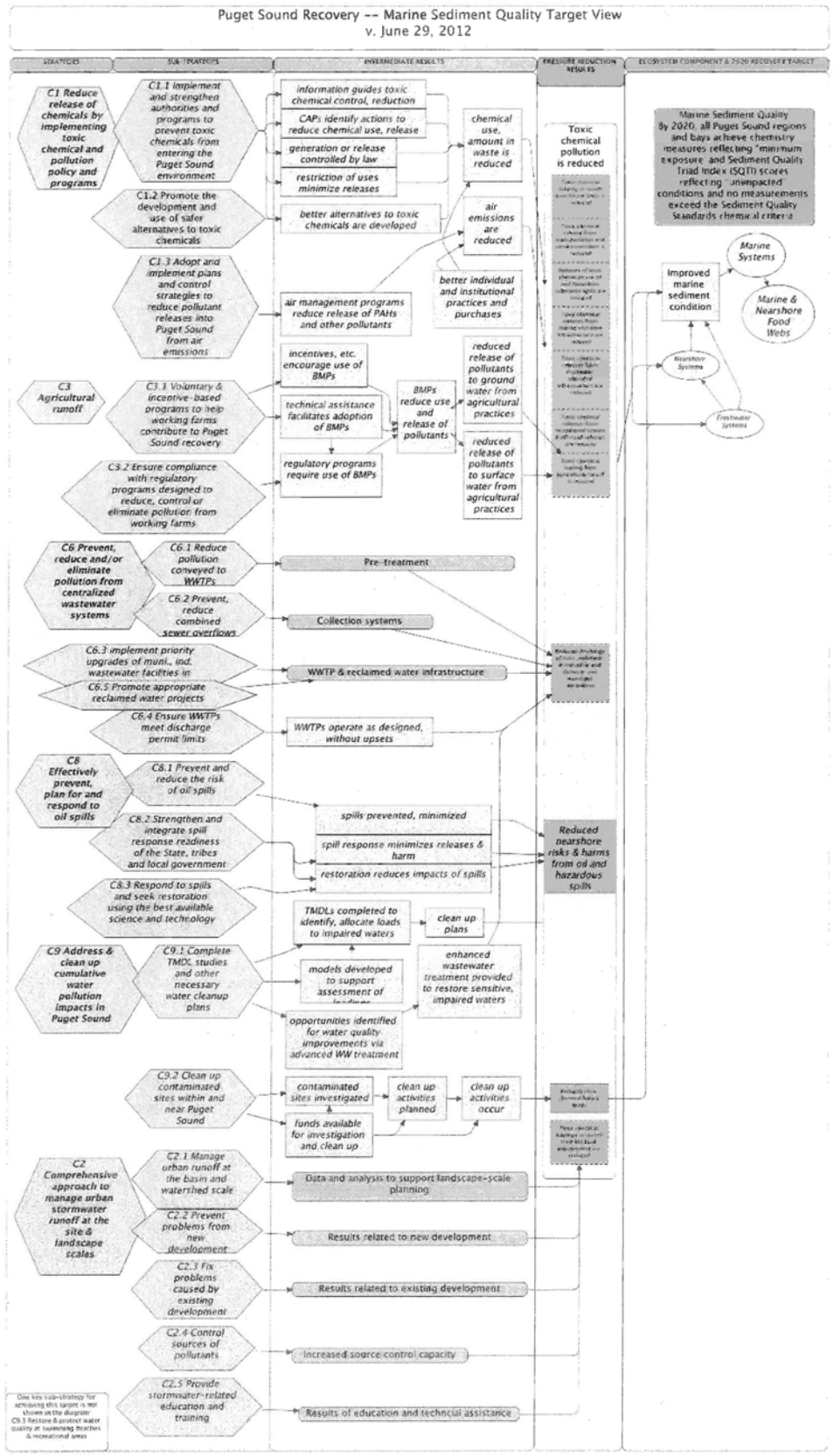
Two of four Puget Sound urban bays monitored from 1998-2010 demonstrated minimum exposure to toxic chemicals in sediment. The other two urban bays that have been monitored showed improving chemistry index scores but low levels of exposure. Benthic community results are available for only three urban bays: One appears unimpacted, one has likely impacted communities and the third is on the border of unimpacted-likely impacted. According to both chemistry and benthos measures, the targets are not met in all urban bays.

The Action Agenda strategies related to achieving the recovery target for marine sediment quality are:

- Prevent reduce, and control the sources of contaminants entering Puget Sound (C1.3, C1.1, C1.2)
- Prevent, reduce, and control agricultural runoff (C3.1, C3.2)

- Prevent, reduce and/or eliminate pollution from centralized wastewater systems (C6.1, C6.2, C6.4, C6.3, C6.5)
- Effectively prevent, plan for and respond to oil spills (C8.1, C8.2, C8.3)
- Address and clean up cumulative water pollution impacts in Puget Sound (C9.2, C9.1, C9.3)
- Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales (C2.5, C2.4, C2.1, C2.3, C2.2)

In the following results chain, or logic model, yellow polygons identify strategies and sub-strategies from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery targets.


Puget Sound Recovery -- Marine Sediment Quality Target View
v. June 29, 2012
STRATEGIES
SUB-STRATEGIES
INTERMEDIATE RESULTS
PRESSURE REDUCTION RESULTS
ECOSYSTEM COMPONENT & 2020 RECOVERY TARGET
C1 Reduce release of chemicals by implementing toxic chemical and pollution policy and programs
C1.1 Implement and strengthen authorities and programs to prevent toxic chemicals from entering the Puget Sound environment
C1.2 Promote the development and use of safer alternatives to toxic chemicals
C1.3 Adopt and implement plans and control strategies to reduce pollutant releases into Puget Sound from air emissions
information guides toxic chemical control, reduction
CAPs identify actions to reduce chemical use, release
generation or release controlled by law
restriction of uses minimize releases
better alternatives to toxic chemicals are developed
air management programs reduce release of PAHs and other pollutants
chemical use, amount in waste is reduced
air emissions are reduced
better individual and institutional practices and purchases
Toxic chemical pollution is reduced
Marine Sediment Quality By 2020, all Puget Sound regions and bays achieve chemistry measures reflecting "minimum exposure" and Sediment Quality Triad Index (SQTI) scores reflecting "unimpacted" conditions and no measurements exceed the Sediment Quality Standards chemical criteria
Improved marine sediment condition
Marine Systems
Marine & Nearshore Food Webs
Nearshore Systems
Freshwater Systems
C3 Agricultural runoff
C3.1 Voluntary & incentive-based programs to help working farms contribute to Puget Sound recovery
C3.2 Ensure compliance with regulatory programs designed to reduce, control or eliminate pollution from working farms
incentives, etc. encourage use of BMPs
technical assistance facilitates adoption of BMPs
regulatory programs require use of BMPs
BMPs reduce use and release of pollutants
reduced release of pollutants to ground water from agricultural practices
reduced release of pollutants to surface water from agricultural practices
C6 Prevent, reduce and/or eliminate pollution from centralized wastewater systems
C6.1 Reduce pollution conveyed to WWTPs
C6.2 Prevent, reduce combined sewer overflows
C6.3 Implement priority upgrades of muni., ind. wastewater facilities in
C6.5 Promote appropriate reclaimed water projects
C6.4 Ensure WWTPs meet discharge permit limits
Pre-treatment
Collection systems
WWTP & reclaimed water infrastructure
WWTPs operate as designed, without upsets
C8 Effectively prevent, plan for and respond to oil spills
C8.1 Prevent and reduce the risk of oil spills
C8.2 Strengthen and integrate spill response readiness of the State, tribes and local government
C8.3 Respond to spills and seek restoration using the best available science and technology
spills prevented, minimized
spill response minimizes releases & harm
restoration reduces impacts of spills
Reduced nearshore risks & harms from oil and hazardous spills
C9 Address & clean up cumulative water pollution impacts in Puget Sound
C9.1 Complete TMDL studies and other necessary water cleanup plans
C9.2 Clean up contaminated sites within and near Puget Sound
TMDLs completed to identify, allocate loads to impaired waters
clean up plans
models developed to support assessment of
enhanced wastewater treatment provided to restore sensitive, impaired waters
opportunities identified for water quality improvements via advanced WW treatment
contaminated sites investigated
clean up activities planned
clean up activities occur
funds available for investigation and clean up
C2 Comprehensive approach to manage urban stormwater runoff at the site & landscape scales
C2.1 Manage urban runoff at the basin and watershed scale
C2.2 Prevent problems from new development
C2.3 Fix problems caused by existing development
C2.4 Control sources of pollutants
C2.5 Provide stormwater-related education and training
Data and analysis to support landscape-scale planning
Results related to new development
Results related to existing development
Increased source control capacity
Results of education and technical assistance
One key sub-strategy for achieving this target is not shown on the diagram: C9.3 Restore & protect water quality at swimming beaches & recreational areas

Target View: Toxics in Fish

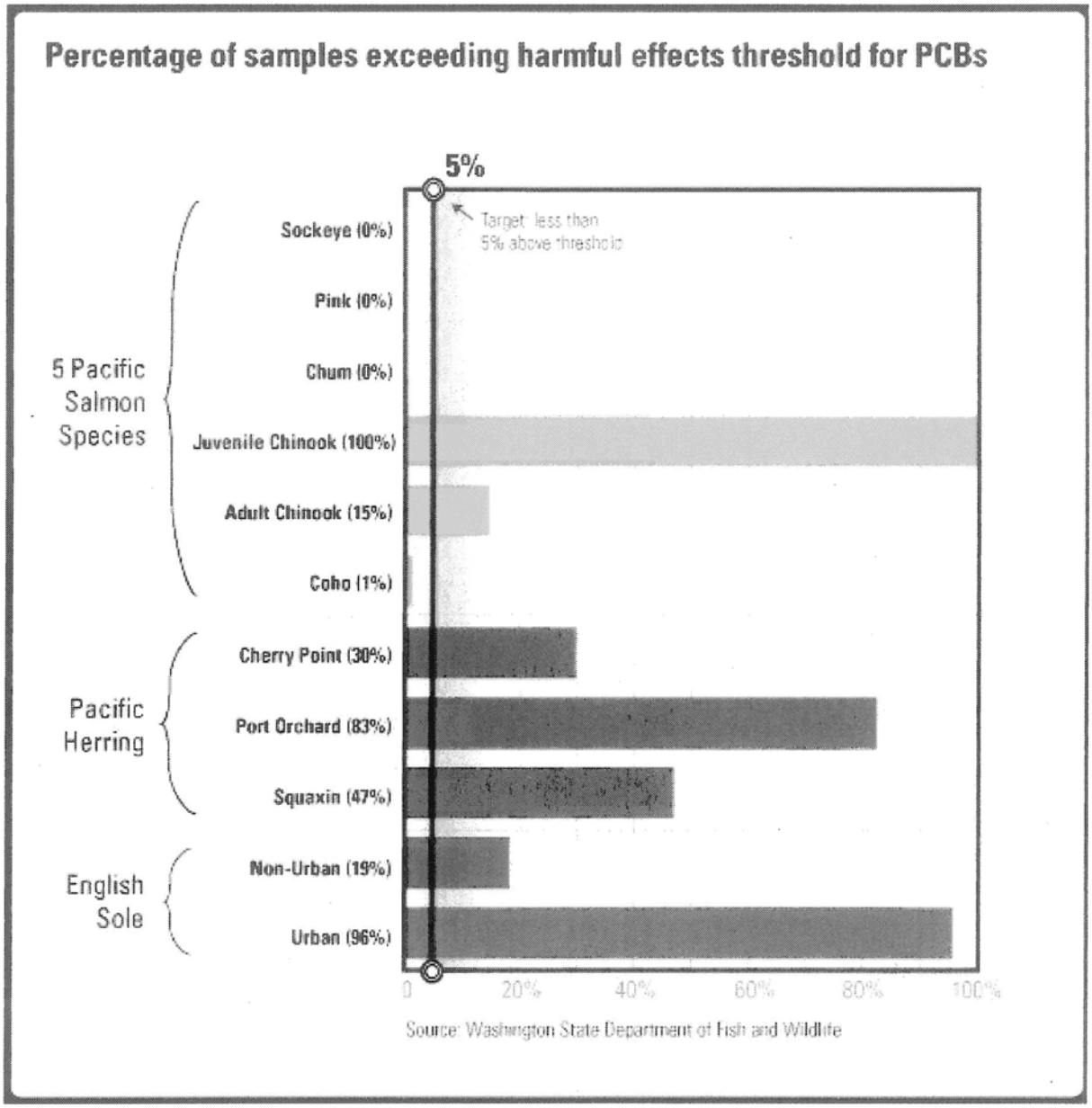
Toxic pollutants in Puget Sound bays, rivers and streams can show up in native fish, causing them to become diseased and posing a health threat to humans if consumed. One of the most worrisome pollutants in the Puget Sound ecosystem is a group of chemicals called PCBs (polychlorinated biphenyls). Concern over these chemicals in Puget Sound is high because they are toxic, they last for a long time in the ecosystem, and their levels increase in predators as the chemicals move up the food chain. Measuring these pollutants in fish tissues tells us whether present-day levels are harmful to the fish or the predators that consume them, and whether they are safe for us to eat.

PCBs were originally used in many industrial applications, but many of these uses were banned in the US in the 1970s. Although PCB levels have decreased in some fish since then, they remain high in certain areas and species. In Puget Sound, PCBs are high in bottom fish that live near urban or industrial areas with contaminated sediments. Surprisingly, PCBs are also high in many species from Puget Sound's pelagic, or open-water food web, including herring, salmon, seals, and orcas. Exposure to PCBs may be harming these species, and concern for human health from this contamination has led the Washington Department of Health to issue consumption advisories for some Puget Sound salmon and bottom fish. Scientists have been tracking PCBs and other chemicals in Puget Sound fish since 1989, and have established threshold limits for these chemicals in fish tissues. These thresholds provide a guideline for the level of toxic chemicals that fish can tolerate, before they become diseased or show other harmful effects, or that presents elevated levels of risk to humans consuming these fish.

There is a suite of individual targets that together comprise the recovery target for toxics in fish. They are:

- Reducing levels of PCBs and related compounds in salmon, herring, and English sole (a bottom-dwelling flatfish) below:
    - a threshold related to fish health, and
    - a threshold related to human health.
- Reducing concentrations of two other classes of toxic contaminants (abbreviated as PAHs and EDCs), in herring and English sole below several different thresholds for harmful effects in fish.

Current data on contaminants in Puget Sound fish is displayed in the graph below.



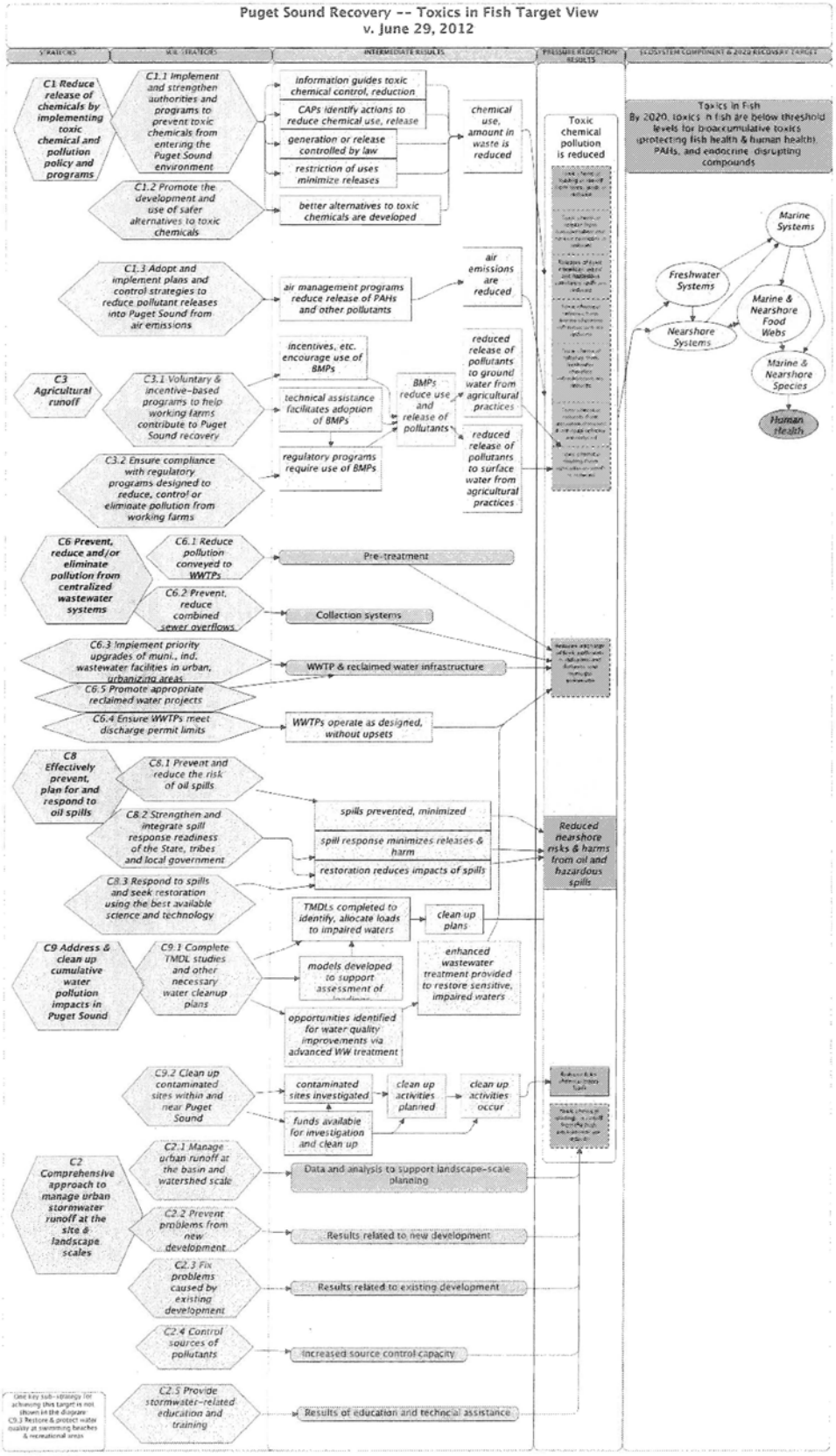
Average concentration of PCBs as a summation of congeners, compared to a tissue threshold of 2400 ng PCBs/g lipid. English sole data from 2007, 2009, n=137; herring data from 2007-2010, n=70; Coho data from 2006, 2008, n=86; adult Chinook data from 2003, 2004, n=48; juvenile Chinook data from 2010, n=5; pink, chum, and sockeye salmon data from 2003, 2004, n=5 each.

The Action Agenda strategies most related to achieving the recovery target for toxics in fish are:

- Prevent, reduce, and control the sources of contaminants entering Puget Sound (C1.3, C1.1, C1.2)
- Prevent, reduce, and control agricultural runoff (C3.1, C3.2)
- Prevent, reduce and/or eliminate pollution from centralized wastewater systems (C6.1, C6.2, C6.4, C6.3, C6.5)
- Effectively prevent, plan for and respond to oil spills (C8.1, C8.2, C8.3)

- Address and clean up cumulative water pollution impacts in Puget Sound (C9.2, C9.1, C9.3)
- Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales (C2.5, C2.4, C2.1, C2.3, C2.2)

In the following results chain, or logic model, yellow polygons identify strategies and sub-strategies from the Action Agenda that we believe will contribute significantly towards meeting the target. Arrows to the blue boxes describe the intermediate results the strategies and actions are expected to achieve. The purple boxes show the reduced pressure on the ecosystem that is expected to occur, the green ovals show the areas of the ecosystem where the change will be observed, and the dark green square shows the recovery target.


Puget Sound Recovery -- Toxics in Fish Target View
v. June 29, 2012
STRATEGIES
SUB-STRATEGIES
INTERMEDIATE RESULTS
PRESSURE REDUCTION RESULTS
ECOSYSTEM COMPONENT & 2020 RECOVERY TARGET
C1 Reduce release of chemicals by implementing toxic chemical and pollution policy and programs
C1.1 Implement and strengthen authorities and programs to prevent toxic chemicals from entering the Puget Sound environment
C1.2 Promote the development and use of safer alternatives to toxic chemicals
information guides toxic chemical control, reduction
CAPs identify actions to reduce chemical use, release
generation or release controlled by law
restriction of uses minimize releases
better alternatives to toxic chemicals are developed
chemical use, amount in waste is reduced
C1.3 Adopt and implement plans and control strategies to reduce pollutant releases into Puget Sound from air emissions
air management programs reduce release of PAHs and other pollutants
air emissions are reduced
C3 Agricultural runoff
C3.1 Voluntary & incentive-based programs to help working farms contribute to Puget Sound recovery
C3.2 Ensure compliance with regulatory programs designed to reduce, control or eliminate pollution from working farms
incentives, etc. encourage use of BMPs
technical assistance facilitates adoption of BMPs
regulatory programs require use of BMPs
BMPs reduce use and release of pollutants
reduced release of pollutants to ground water from agricultural practices
reduced release of pollutants to surface water from agricultural practices
C6 Prevent, reduce and/or eliminate pollution from centralized wastewater systems
C6.1 Reduce pollution conveyed to WWTPs
C6.2 Prevent, reduce combined sewer overflows
C6.3 Implement priority upgrades of muni., ind. wastewater facilities in urban, urbanizing areas
C6.5 Promote appropriate reclaimed water projects
C6.4 Ensure WWTPs meet discharge permit limits
Pre-treatment
Collection systems
WWTP & reclaimed water infrastructure
WWTPs operate as designed, without upsets
C8 Effectively prevent, plan for and respond to oil spills
C8.1 Prevent and reduce the risk of oil spills
C8.2 Strengthen and integrate spill response readiness of the State, tribes and local government
C8.3 Respond to spills and seek restoration using the best available science and technology
spills prevented, minimized
spill response minimizes releases & harm
restoration reduces impacts of spills
Reduced nearshore risks & harms from oil and hazardous spills
C9 Address & clean up cumulative water pollution impacts in Puget Sound
C9.1 Complete TMDL studies and other necessary water cleanup plans
TMDLs completed to identify, allocate loads to impaired waters
clean up plans
models developed to support assessment of
enhanced wastewater treatment provided to restore sensitive, impaired waters
opportunities identified for water quality improvements via advanced WW treatment
C9.2 Clean up contaminated sites within and near Puget Sound
contaminated sites investigated
clean up activities planned
clean up activities occur
funds available for investigation and clean up
C2 Comprehensive approach to manage urban stormwater runoff at the site & landscape scales
C2.1 Manage urban runoff at the basin and watershed scale
C2.2 Prevent problems from new development
C2.3 Fix problems caused by existing development
C2.4 Control sources of pollutants
C2.5 Provide stormwater-related education and training
Data and analysis to support landscape-scale planning
Results related to new development
Results related to existing development
increased source control capacity
Results of education and technical assistance
Toxic chemical pollution is reduced
Toxics in Fish
By 2020, toxics in fish are below threshold levels for bioaccumulative toxics (protecting fish health & human health), PAHs, and endocrine disrupting compounds
Marine Systems
Freshwater Systems
Marine & Nearshore Food Webs
Nearshore Systems
Marine & Nearshore Species
Human Health

STRATEGIES AND ACTIONS TO RECOVER PUGET SOUND TO HEALTH

D: STRATEGIC LEADERSHIP AND COLLABORATION

« Cover photo: Creative Commons, courtesy of Nancy_Regan on Flickr.

Backbone for Recovery and Protection of Puget Sound

Ecosystem recovery and long-term protection is a responsibility shared by government agencies, tribes, business and private sector interest groups, non-governmental organizations and citizens. Successful collective action by the tremendous number of involved organizations and individuals in our region requires dedicated and ongoing coordination. Elements of necessary coordination include: creating and maintaining a common agenda, shared measurement and reporting of progress, continuous and coordinated communication regarding the challenge and solutions and, of course, political support and funding.

The Puget Sound Partnership, working with its many partners, leads tasks that are critical for steering technical work, fostering changes in practice, and generating public support for recovery of Puget Sound. These include (1) setting ecosystem targets, (2) identifying priority actions to achieve these targets, (3) providing credible technical solutions, (4) building the resource and fiscal capacity of government agencies and private sector interests, and (5) measuring outcomes to ensure accountability and success.

This chapter describes seven over-arching strategies that are essential to the recovery effort.

- **D1** – Leadership frameworks and funding priorities;
- **D2** –Strategic, collaborative partnerships;
- **D3** –Performance management;
- **D4** –Science and monitoring;
- **D5** –Changing practices and behaviors;
- **D6** –Issue awareness and understanding;
- **D7** –Social and institutional infrastructure.

Provide Leadership

D1. Provide the leadership frameworks to guide the Puget Sound recovery effort and set action and funding priorities

D1.1 Provide backbone support for the recovery effort and management conference.

Recovery of Puget Sound is a collective, long-term endeavor that requires focused and dedicated leadership. Building and maintaining strategic partnerships and collaboration are critical to the success of Puget Sound recovery.

Successful collective efforts require a dedicated backbone organization. PSP fulfills this key role for the region. It provides leadership to advance the vision and promise put forth by the Governor and legislature, builds and nurtures strategic coalitions tribes, local, state, and federal agencies, private partners and citizens, convenes regional and transboundary partners to set priorities and share information, avoids duplicative and inconsistent actions and spending, and provides transparent reporting to decision-makers and the public on recovery progress. As part of the National Estuary Program, the Puget Sound Partnership is designated to lead the overall Management Conference. For more information on the Management Conference, see Appendix B - *Puget Sound National Estuary Program Management Conference Overview*.

Ongoing Programs

Key Ongoing Program Activities

- PSP administers the statutorily-required Partnership boards: the Leadership Council is the decision-making body for the recovery effort; the Ecosystem Coordination Board provides strategic advice to the Leadership Council and Science Panel; the Science Panel leads the region in providing scientific direction and policy to guide regional decision-making; the Salmon Recovery Council provides policy direction on the regional effort to recover salmon; as well as a statutorily assigned Oil Spill Workgroup.
- Partners participate on PSP boards and related sub-committees.
- PSP maintains communications and operating resources to facilitate the work of boards, partners and implementers; highlight progress and challenges related to the recovery effort; provide timely access to relevant information; and an effective working nexus with staff, partners and programs.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D1.2 Maintain and update the Action Agenda as the shared recovery plan.

The Action Agenda a recovery plan that is shared by all of our partners in the region. By statute, the strategies and actions are updated on a two-year cycle, and the overall Action Agenda is modified as needed. PSP provides oversight and technical support to the development and adaption of the Action Agenda, including facilitating substantial input from partners and the public.

Ongoing Programs

Key Ongoing Program Activities

- PSP leads the regional effort to update the Action Agenda, track implementation progress for Near-Term Actions, and provide feedback regarding changes to strategies and actions based upon the adaptive management process. Many of the ongoing activities under Performance Management and Science and Monitoring (Sections D3 and D4, respectively) relate to the implementation of the adaptive management process.

Near-Term Actions

D1.2 NTA 1: Establish Interim Milestones for Targets. PSP will lead a collaborative effort to establish interim milestones for all 19 ecosystem recovery targets that describe expected results for incremental progress toward the adopted targets or for key steps in the critical path. In 2012 and 2013 PSP staff and boards will engage partners to establish milestones that parties agree will inspire meaningful contributions to ecosystem recovery and can be used to evaluate progress toward the 2020 ecosystem recovery targets.

Performance measure: In July 2012, confer with ECB regarding design of the process and composition of workgroups. August, 2012, confer with Leadership Council regarding schedule and process. October 2012, initiate interim milestone review process. 25% complete by February 2013; 50% complete by June 2013; 75% complete by September 2013; 100% complete by November 2013.

D1.2 NTA 2: RCW 90.71.370(4)(b) Program Review. Consistent with RCW 90.71.370 (4), the Partnership, in consultation with appropriate state and local agencies, will review programs (identified in RCW 90.71.370(4)(b)) that fund activities that contribute to Action Agenda implementation. The Partnership will make recommendations to the Governor and Legislature regarding program changes, including proposed legislation to implement the recommendation. The scope of review will include: evaluating types of projects and funding levels, contribution of the program to meeting Vital Sign targets, funding criteria that emphasizes Action Agenda priorities in decision-making, and assessment of ways to make programs and funding approaches more strategic in implementing the Action Agenda. The report to Governor and Legislature completed by June 2014.

Performance measure: Leadership Council initiates review (August 2012), ECB develops comprehensive strategy (December 2012), ECB identifies cost effectiveness pilot

programs (March 2013), Leadership Council 2nd annual review (June 2013), ECB receives draft pilot program study results (September 2013), Leadership Council receives draft report (January 2013), Report to Governor and legislature (June 2014).

D1.2 NTA 3: **Alignment with Strategic Initiatives. PSP will align agency resources and effort with implementation of the strategic initiatives.**

Performance measure: In October 2012 PSP will report to the Leadership Council on progress and plans to align agency efforts and resources with strategic initiatives.

Support and Build Partnerships

D2. Support and build strategic, collaborative partnerships

Effective partner relationships are essential for achieving a shared vision of recovery and working through challenging issues. This strategy highlights three important areas of broad collaboration - that differ from the issue-specific collaboration described in Sections A–C and the Funding Section. A description of PSP-related collaborative structures and partnerships is included in Appendix B - *Puget Sound National Estuary Program Management Conference Overview.*

D2.1 Advance the coordination of local recovery actions via local integrating organizations.

Many locally-based groups exist for salmon recovery, marine resource conservation through the Northwest Straits Initiative, watershed management (RCW 90.82) and protection, and water quality. In any given area, there are many local groups working on recovery-related activities, and these groups are often not adequately connected to each other. The Partnership is working with local interests to better coordinate implementing partners, and create a more effective and collaborative approach to clarify local priorities, accomplish identified work, address problems, and provide technical support.

The Partnership's authorizing statute (RCW 90.71.260) created seven Action Areas to help organize regional recovery work. In areas such as Hood Canal and the Strait of Juan de Fuca, the Action Area is a useful scale for defining working boundaries. In other cases, the defined Action Area has proven to be too geographically large, or too diverse - and a smaller-scale, watershed-based approach has evolved. These scales are illustrated by the formation of Local Integrating Organizations (LIOs) described below.

The 2008 Action Agenda called for improved coordination of local implementation. In response, the Partnership worked with local partners and developed a network of local integrating organizations (LIOs). LIOs are coordinating bodies that integrate and support the work of various entities in each Action Area. LIOs provide an effective mechanism for local partners to prioritize actions and implement the Action Agenda at the local scale. The LIOs also provide input to the update of the Action Agenda, establish local priorities, coordinate implementation, and track progress. As of April 2012, eight LIOs have been established or are in the final stages of formation. Two additional LIOs are anticipated.

Ongoing Programs

Key Ongoing Program Activities

- PSP staff oversees, provides, and manages grants to support LIOs.
- PSP is continuing to work to create two additional LIOs in 2012.
- PSP staff provides regional guidance and assistance to LIOs in their work to develop and implement locally-based strategic plans for Action Agenda implementation, including developing lists of priority local actions.

- PSP recognizes and relies upon the LIO structure for information exchange, local content for the Action Agenda, and soliciting feedback.
- Each LIO maintains an ongoing work program. Local priorities are summarized in the Action Agenda profiles with priority actions also listed by topic area in the Action Agenda.
- Continuing local or sub-regional efforts such the Northwest Straits Initiative and others that also participate in the LIO process.

All groups are working on next steps for priority setting, defining near-term actions, and implementation. A few local Integrating Organizations identified priorities for themselves. Specifically identified are:

Local Integrating Organization	Priorities
Strait of Juan de Fuca	*From 19 Strategic Priorities* • Local Recovery Capacity - Build local capacity of the Strait ERN and its active member organizations to strategically plan, collaborate, and coordinate; obtain funding; update, manage, and implement programs and projects; and enforce local codes and ordinances throughout the Strait Action Area • Climate Change Mitigation, Adaption, and Implementation of Programs and Plans - Account for the effects of climate change by appropriately mitigating or adapting projects, programs, local ordinances, and regulations. Enable Strait ERN member organizations to implement local climate change programs and plans.
Hood Canal	*High Priority* • In coordination with a number of partners, HCCC will complete its Integrated Watershed Management Plan (IWMP) by June 30, 2013. Based on critical, high priority strategies and actions identified in the IWMP, HCCC will develop Local Near-Term Actions for incorporation into the Action Agenda. • By June 30, 2013, HCCC will convene a climate change symposium to identify unique vulnerabilities and potential adaptation strategies for the Hood Canal Action Area. Based on results of this symposium, HCCC will identify high priority adaptation strategies.
Whatcom	*From working priority list* • Build and/or support institutional capacity to implement priority actions identified in approved plans. This strategy includes identifying opportunities to leverage funding through partnerships, and continuing to investigate and identify funding strategies for priority actions. • Integrate natural resources decision-making at the decision-maker and policy levels, and provide local input to Puget Sound Partnership planning efforts through the LIO structure.

Near-Term Actions

D2.1 HC 1: HCCC Integrated Watershed Management Plan. In coordination with a number of partners, HCCC will complete its Integrated Watershed Management Plan (IWMP) by June 30, 2013. Based on critical, high priority strategies and actions identified in the IWMP, HCCC will develop Local Near-Term Actions for incorporation into the Action Agenda.

Performance measure: Plan complete by June 30, 2013. Based on critical, high priority strategies and actions identified in the IWMP, HCCC will develop Local Near-Term Actions for incorporation into the Action Agenda.

D2.1 HC 5: HCCC Climate Change Symposium. By June 30, 2013, HCCC will convene a climate change symposium to identify unique vulnerabilities and potential adaptation strategies for the Hood Canal Action Area. Based on results of this symposium, HCCC will identify high priority adaptation strategies.

Performance measure: Convene symposium by June 2013. Based on results of this symposium, HCCC will identify high priority adaptation strategies.

D2.2 Build and maintain collaborative partnerships with tribes to identify and advance recovery actions.

The State and Tribes recognize that, while each government is ultimately responsible for making its own decisions and taking actions within its legal authority and fiscal constraints, through mutual efforts at communication and consultation we can, as individual governments, take steps that move us toward a common goal in a coordinated and cooperative manner. In order to achieve our common goals, the Tribes and the Partnership have developed the Partnership Tribal Co-management Council (PTCC). PTCC is convened at least quarterly.

Near Term Actions

D2.2 NTA 1: Tribal Habitat Priorities. PSP will identify work plans and propose future updates to the Action Agenda to address priority work in the Tribal Habitat Priorities on page 93 of the Action Agenda.

Performance measure: By October 2012 convene at PTCC meeting and review a specialized report card based on the Tribal Habitat Priorities. By December 2012 present a work plan to identify and address outstanding issues of concern to the Leadership Council.

Implement Performance Management

D3. Implement performance management

Implement a transparent performance management system that tracks and reports progress in achieving ecosystem recovery targets, identifies barriers, and finds solutions to adaptively manage recovery.

The Partnership is responsible for designing and implementing a performance management system for Puget Sound. The system must include (1) tracking Action Agenda implementation; (2) establishing a financial accountability system to track expenditures for the Action Agenda as well as collective regional expenditures on Puget Sound; and most importantly (3) reporting progress in achieving outcomes as measured by attainment of interim and long term ecosystem targets.

D3.1 Work collaboratively to track and report on implementation performance.

The Partnership coordinates the effort of partners responsible for components of the Action Agenda to track and report on the achievement of milestones, outputs and expenditures.

Ongoing Programs

Key Ongoing Program Activities

- PSP coordinates progress reporting on near-term actions.
- PSP collects, analyzes and reports data on implementation to the Leadership Council, Governor and Legislature.
- PSP reviews progress with the Leadership Council to identify obstacles and make adjustments to near-term actions and programs as appropriate.

Near-Term Actions

No near-term actions. Work is focused on implementation of ongoing programs.

D3.2 Work collaboratively to report on recovery progress.

The Partnership works collaboratively with monitoring partners to track and report progress in attaining interim and long-term recovery targets. The Partnership manages the Dashboard of Vital Signs, an electronic application on the PSP website that illustrates established targets related to Puget Sound's health. It provides measures that partners and the general public can undertake to contribute to that effort. The Dashboard will be updated annually.

The Partnership also is responsible for preparing the biennial "State of the Sound" report which requires collaboration with partners to assess and describe implementation progress, ecosystem status and recovery expenditures. In addition, the Partnership plays a leadership role in reporting progress to the U.S. EPA National Estuary Program on the ongoing work in the region and achievements under the EPA grants programs.

Ongoing Programs

Key Ongoing Program Activities

- PSP maintains and updates the Dashboard of Vital Signs. Several targets are still under review and will be added to the Dashboard during the biennium.
- PSP produces the "State of the Sound" on a two-year cycle designed to influence the next Action Agenda and report to the Legislature on action and funding needs for the region (next due in November 2012).
- PSP participates in the Governor's Puget Sound Government Management, Accountability and Performance (GMAP) forum.
- PSP provides staff reports to the Leadership Council related to the implementation of the Action Agenda.
- PSP reports to EPA through the FEATS and NEPORT programs.

Near-Term Actions

D3.2 NTA 1: Best Practices Forums. PSP, in collaboration with Washington Sea Grant and the Local Integrating Organizations, will convene semi-annual forums involving local practitioners, stewardship groups and local project managers to share best practices on project implementation, monitoring and performance measurement. The first of the forums will begin by December 2012. Subsequent forums will provide an opportunity to share standardized monitoring techniques and protocols as well as other topics identified by participants that would assist them in implementing and evaluating projects.

Performance measure: Convene semi-annual forums (March 2013; September 2013, March 2014, September 2014); Add participants to the base of practitioners by 20% year on year.

Coordinate and Advance Science and Monitoring

D4. Coordinate and advance science and monitoring

Convene and facilitate the implementation of a strategic science and regional monitoring program that improves decisions about how to restore and protect Puget Sound. Monitoring is a critical part of ecosystem recovery.

The overall objective of the Science Program is to inform and continually improve the scientific basis for decisions of Partners and policy-makers on how to protect and restore Puget Sound. The Partnership's science and monitoring team supports the Science Panel and Monitoring Steering Committee in enlisting the assistance of the Puget Sound scientific community in the work of the regional effort and communicating findings and implications. Science Program staff work closely with the Performance Management team in assessing the region's overall progress in attaining the targets that have been set and describing the status of the recovery effort.

This strategy focuses specifically on the Partnership's role in science and monitoring over the next two years. Science and monitoring are shared efforts and resources. In the future, this strategy could be expanded to more fully cover partner science activities.

D4.1 Oversee strategic planning for Puget Sound recovery science.

The Puget Sound Partnership with the guidance Science Panel leads the technical steps identified in the Partnership's Open Standards adaptive management process for strategic planning and prioritization, including identifying key ecosystem components, drivers and pressures on the ecosystem, assessing linkages and risks and assisting in setting of targets for reducing risks and pressures. Strategic planning can occur in both the near-term, two-year horizon, as well as longer timeframes.

Ongoing Programs

Key Ongoing Program Activities

- Updating the Biennial Science Work Plan on a two-year cycle in conjunction with the Action Agenda. The Biennial Science Work Plan is the mechanism by which the Puget Sound Partnership and its partners identify, prioritize and direct monitoring, research, support of decisions, and funding to focus on the key scientific uncertainties that are hindering political or technical actions to recover and protect Puget Sound.

Near-Term Actions

D4.1 NTA 1: Adaptive Framework and Cycle. Develop the PSP adaptive management framework and technical tools to assist in the steps of the adaptive management cycle.

Performance measure: By December 2012, publish technical memorandum describing PSP's adaptive management framework; By December 2012, publish technical memorandum describing methods of assessing pressures on the Puget Sound ecosystem.

D4.1.1 Continue to build an accessible, peer-reviewed base of scientific knowledge about ecosystem status, effectiveness of recovery strategies and actions and ecosystem indicators provides policy-relevant information for decision makers.

The Puget Sound Partnership with the oversight of the Science Panel and collaboration with the Puget Sound Institute works to build the scientific knowledge to inform decision-making and to update and revise the Action Agenda. This includes setting expectations for the quality of the work; preparing key technical documents, reports, and peer-reviewed publications based on that work; and coordinating with the Puget Sound Institute at the University of Washington Tacoma to develop a web-based compendium of research and information for policy makers and stakeholders. In addition, the Partnership strives to learn from the experiences of other ecosystem restoration programs, as well as share lessons learned.

Science Program staff support the Science Panel to provide synthesis of scientific findings and effectively communicate these findings to the Puget Sound Management Conference.

Ongoing Programs

Key Ongoing Program Activities

- Building the Puget Sound Partnership Technical Memorandum Series
- Publishing and updating the Puget Sound Science Update.
- Producing the Biennial Science Work Plan and participation in the formulation of the "State of the Sound" document.
- Overseeing peer review of technical documents and products.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D4.1.2 Maintain and expand a network of scientific expertise for informing decision makers.

A key role of the Partnership is to build and catalyze capacity for scientific efforts by convening, coordinating and enlisting the Puget Sound scientific community (agencies, tribal nations, universities, citizen groups) in implementing a strategic science program. The responsibilities for this biennium

include enlisting the scientific community in reviewing ecosystem indicators, analysis of ecosystem targets, and assessment of pressures on the ecosystem.

Ongoing Programs

Key Ongoing Program Activities

- Facilitating collaboration among the members of the Science Panel, Puget Sound Institute, Nearshore Science Team, Recovery Implementation Technical Team, and other regional partners, including Canada.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D4.2 Implement a coordinated, integrated ecosystem monitoring program.

The Partnership is required by statute to implement and coordinate a Puget Sound assessment and monitoring program. The purpose of the Puget Sound Ecosystem Monitoring Program (PSEMP) is to coordinate and integrate the work of existing and future monitoring efforts to determine the status and trends of key components and indicators of the health of the Puget Sound, and to inform subsequent decisions about whether recovery actions have been effective. Monitoring is the mechanism that provides the actual data required to both target and track the effectiveness of the actions recommended in this Action Agenda. Monitoring also allows the Partner agencies to improve (adapt) management actions at both local and regional scales, and it provides an on-going and objective record of the condition, status, and changes over time of key ecosystem components and attributes – including the environmental indicators and recovery targets adopted by the Leadership Council.

The monitoring program is structured to engage a broad range of partners via the Monitoring Steering Committee and the organization and facilitation of topical work groups. The monitoring program relies primarily on existing efforts as the building blocks for a coordinated program. Decision-making for monitoring rests with the Monitoring Steering Committee and is responsive to the Leadership Council. The Science Panel provides independent review and critique of the program. More information on the monitoring program activities can be found at https://sites.google.com/a/psemp.org/psemp/.

D4.2.1 Coordinate committees and the process of developing monitoring plans.

PSP staff is responsible for coordinating and supporting the complex, multi-partner effort around monitoring for Puget Sound. The Monitoring Program coordinates the work of existing and future monitoring efforts to assess the effectiveness of recovery action, evaluate progress towards ecosystem recovery and inform decision-making through adaptive management to achieve the goals of the Action Agenda. This task involves leveraging existing resources at the local and regional levels.

Ongoing Programs

Key Ongoing Program Activities

- Staffing committees and topical workgroups
- Ensuring that there is a consistent approach to assessing monitoring gaps and priorities, and development of monitoring plans.
- Facilitating communication among committees and between the Science Panel and PSP decision-making bodies.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D4.2.2 Lead efforts to coordinate, compile, manage, analyze, and report data on indicators to support the Partnership's adaptive management plan.

This task is intended to enhance the programmatic approach to monitoring ecosystem health to better integrate data collection on ecosystem indicators and pressure reduction targets, analysis, and interpretation with performance management and decision-making systems.

The Partnership relies on federal, tribal, state agency, local government, and other partners for collecting and reporting data. Many of these ongoing monitoring programs have faced serious declines in program funding.

Ongoing Programs

Key Ongoing Program Activities

- Work with partners to provide data for the Dashboard of Vital Signs
- Work with partners to increase the quality and efficiency of data collection and analysis
- Work with partners to refine efforts to report on the effects of key actions and suites of actions
- Collaborate with partners and other PSP teams in the drafting of the " State of the Sound report"
- Continue existing monitoring efforts by partners in Puget Sound

Near-Term Actions

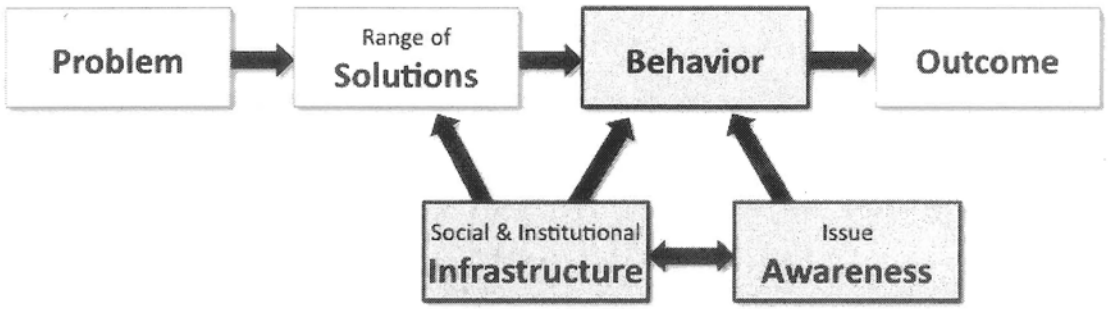
None; work in the near-term will focus on implementation of ongoing programs.

Promote Stewardship

Stewardship of Puget Sound resources by the region's 4.5 million residents is critical to the long-term recovery and protection of Puget Sound. Cumulative impact from these millions of individuals and their daily actions can both positively and negatively affect the ecosystem. Public engagement and stewardship strategies foster broad-scale actions to address polluted water, degraded land and habitat, and imperiled species.

The regional approach to public stewardship of Puget Sound is an integrated three-pronged strategy:

- **Changing Practices and Behaviors**
- **Building Issue Awareness and Understanding**
- **Changing Social and Institutional Infrastructure**



Changing practices and behaviors (D5) of individuals can reduce or eliminate negative cumulative effects on ecosystem resources. This may occur through one-time action or through shifts in lifelong habits. It may involve participating in a community effort or adopting different practices at home.

Issue awareness and understanding (D6) is needed among individuals and groups who have the capacity to institute and sustain desired changes. Issue awareness can support beneficial practices and behaviors. It can also promote the social and institutional infrastructure needed to achieve these changes.

Social and institutional infrastructure (D7) provides the interpersonal, service and communication networks we rely on to enable change. It includes the social processes and procedures (e.g., services, utilities, regulations) that influence and support the way people function every day. These structures affect the range of available solutions, and provide the foundation to support both awareness-building and targeted behavior change efforts.

This integrated strategy challenges those working to recover the Puget Sound ecosystem to go beyond traditional approaches to education, public information, and behavior change. It calls for a deeper understanding, including formative research, of the practices we need to influence and the specific

audiences, motivators, and barriers behind those practices. It encourages innovation, challenges assumptions, and seeks clear chains of reproducible results.

Local Priorities

Stewardship is important in local areas. Several local integrating organizations call out priorities for stewardship. The San Juan Islands LIO has Tier One strategies to provide information and work with landowners regarding the importance of retaining and restoring native vegetation, trees and ground cover and geologic processes. The Strait of Juan de Fuca calls for supporting the Strait ECO Net in their 19 Strategic Priorities.

Across Puget Sound exists a broad and dedicated range of organizations engaged in stewardship-building activities and programs. The regional strategy described in this section works with and through a coalition of over 600 organizations which includes place-based facilities like museums, aquariums, parks and environmental learning centers; conservation and environmental organizations; cities, counties, tribes, state and federal agencies; conservation districts, health districts and schools, stream teams, watershed groups and many others.

D5. Cultivate broad-scale stewardship practices and behaviors among Puget Sound residents that benefit Puget Sound

Program evaluation and social science repeatedly find that awareness of a problem often does not produce desired behavior change. We cannot rely on education alone to reliably bring about the kind of broad-scale stewardship needed to recover Puget Sound.

Behavior change methods like social marketing, incentive programs, and persuasive framing of choices can foster beneficial behaviors and discourage detrimental ones. These methods have been used effectively in health and disease-prevention programs for decades. These methods are now being applied to Puget Sound ecosystem recovery.

Ongoing Programs

Key Ongoing Program Activities

- PSP, Lead Organizations, and local partners are identifying priority BMPs based on Action Agenda prioritization, problem severity, problem frequency, availability of and confidence in science, and ability to influence change. These priority BMPs are then used to focus and guide regional behavior change programs, grants, other resources, and local program development.
- Local implementers and Lead Organizations are ensuring—through formative research, strategy development and critical evaluation—that local stewardship programs are science-based and measurably effective in achieving identified behavior change outcomes.
- Local implementers are conducting behavior change programs that advance BMPs related to infiltration, pollution reduction, habitat improvement, forest cover, soil development, critical area protection, shoreline function and other priority issues.
- PSP is implementing a grant program to support regional and local emphasis on priority BMPs.

D5.1 **Prioritize targeted stewardship issues, actions and audiences based on (1) problem severity, (2) problem frequency, (3) availability of and confidence in science (natural and social) behind the problem, and (4) ability to influence change.**

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D5.2 **Collaboratively develop and promote science-based targeted communications and behavior change strategies across the region.**

Near-Term Actions

D5.2 NTA 1: Strategic Social Marketing Frameworks. PSP works with partners to develop strategic social marketing frameworks to support Soundwide behavior change initiatives by conducting, synthesizing and disseminating formative research relative to the adoption of specific priority practices.

Performance measure: Formative research on at least two practices is underway by June 2012; research on at least eight practices complete by December 2013. Social marketing framework guidance on two BMPs disseminated to partners by December 2012; on all eight by June 2014.

D5.3 **Enable and encourage residents to take informed stewardship actions addressing infiltration, pollution reduction, habitat improvement, forest cover, soil development, critical areas, reductions in shoreline armoring, and specific actions identified in sub-strategy D5.1.**

Near-Term Actions

D5.3 NTA 1: BMPs for Stewardship and Tree Planting. In 2012, PSP and partners analyze two priority BMPs as early-action initiatives: (1) residential pesticide reduction/elimination, and (2) tree planting, canopy cover and soil health, as identified in STORM's Tier 2 BMPs. If warranted, regional behavior change strategies would be developed and launched for implementation with local partners.

Performance measure: 1) Formative research on residential pesticides is completed by August 2012. If initiative is warranted, pilot program would be launched by December 2012 and evaluation will be underway by April 2013. 2) Formative research on tree planting, canopy cover, and soil health is completed by December 2012; Program strategy developed by March 2013; Grants and contracts to fund work issued by June 2013; evaluation underway by December 2013.

D5.4 **Improve effectiveness of local and regional awareness-building and behavior change programs through vetted messages, proven strategies and outcome-based evaluation. Guide partners in use of formative research and diffusion of priority BMPs.**

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D5.5 **Enhance resources to sustain and expand effective behavior change and volunteer programs that support Action Agenda priorities and that have demonstrated, measurable outcomes.**

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D5.6 **Create a repository of market, social, and audience research to support stewardship work. Include research and data from local, state, and federal governments, nonprofit, and private sector sources. Synthesize and disseminate to partners.**

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D5.7 **Review practices and issues that require solutions beyond the Puget Sound region such as automotive, manufacturing and distribution of toxins, and pharmaceutical waste management. Develop strategies and partnerships outside the Puget Sound region to address issues.**

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D6. Build issue awareness and understanding to increase public support and engagement in recovery actions

Polls show that a majority of residents are not aware that Puget Sound is in trouble. This lack of awareness limits support for Puget Sound recovery and the public's willingness to change contributing behaviors. Increasing public awareness of ecosystem problems and solutions is an essential component of Puget Sound recovery.

While we cannot rely on public awareness alone to promote changes in behavior, it can be an early step in the process of behavior change. Broad public awareness also fosters improved civic processes, engages citizens in government, and enables public officials to make well-informed decisions on resource issues.

Issue awareness in this context falls into three categories: (1) broad public awareness of issues and solutions, (2) targeted awareness—among specific audiences or sectors of people—of actions required to address specific problems, and (3) awareness among key decision-makers of the role stewardship programs play in the overall recovery effort.

Ongoing Programs

Key Ongoing Program Activities

- PSP, STORM, and Ecology continue to implement the Puget Sound Starts Here regional media effort to complement and support local campaign efforts. This work includes both traditional media (broadcast and cable television, radio, online ads) and social media (social networking, alternative media, web-based and mobile technologies). Partners are incorporating Puget Sound Starts Here campaign messages and brand into locally-targeted communications to increase issue relevance and local identity.
- Partners are implementing locally-based programs that build public understanding of Puget Sound's health, status, threats, and impacting activities. Programs connect individual actions to the overall ecosystem, link residents with resources and90 engagement opportunities, and inspire action.
- PSP, STORM and ECO-Net are providing technical support to and among partners including collaborative development and dissemination of tested, vetted messages and communications resources.
- PSP and other funders are implementing grant programs to support local and regional targeted awareness programs. Support is directed to proven and measurably effective programs that address priority issues and audiences. Funding is also designed to stimulate innovation, collaboration, and connections with new audiences to advance recovery efforts.

D6.1 **Implement a long-term, highly visible, coordinated public-awareness effort using the Puget Sound Starts Here brand to increase public understanding of Puget Sound's health, status, and threats. Conduct regionally-scaled communications to provide a foundation for local communications efforts. Conduct locally-scaled communications to engage residents in local issues and recovery efforts.**

Near-Term Actions

D6.1 NTA 1: Phase 2 of *Puget Sound Starts Here*. PSP and partners implement Phase 2 of *Puget Sound Starts Here* campaign. PSP, STORM and Ecology ensure that messages reflect the demography, regional identity, and issues facing the Puget Sound.

Performance measure: Mass media content developed by November 2012; Web and social media developed and launched by October 2012; Television media launched by

May 2013. Campaign achieves 50% brand awareness among Puget Sound's 4.5 million residents by July 2015.

D6.2 Incorporate and expand Puget Sound related content in diverse delivery settings (e.g., recreation, education institutions, local government, neighborhood and community groups, nonprofit organizations, businesses). Connect residents with public engagement and volunteer programs.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D6.3 Incorporate Puget Sound place-based content into K-12 curricula throughout the Puget Sound region. Connect schools with technical assistance, inquiry-based learning opportunities, and community resources. Implement student service projects connected to ecosystem recovery. Link schools to organizations with structured volunteer opportunities.

Near-Term Actions

D6.3 NTA 1: K-12 Curricula. Pacific Education Institute integrates Puget Sound into the K-12 curricula of at least 20 school districts by working with curriculum directors and school leaders.

Performance measure: Schools are connected with community resources so that over half of the school districts in Puget Sound have place-based education programs by 2014.

D6.4 Foster a long-term sense of place among Puget Sound residents. Encourage direct experiences with Puget Sound's aquatic and terrestrial resources through recreation, informal learning, and public access sites.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D6.5 Build awareness of stewardship-building efforts among elected officials, executive staff, funders, resource managers, and others with resource allocation ability. Emphasize program roles, needs, relationship with other Action Agenda strategies and program outcomes.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D7. Build social and institutional infrastructure that supports stewardship behaviors and removes barriers

Social and institutional infrastructure strongly influences the ability of residents to make and sustain changes in behavior. "Social Infrastructure" consists of the social connections and frameworks that enable society to function. Referred to in social science as "Social Capital," it consists of the bonds that connect individuals within groups, and the bridges that connect those groups to each other. Social capital correlates to a society's ability to solve complex problems. As such, social capital is a key part of the infrastructure needed to recover and maintain Puget Sound's health.

Whereas social infrastructure consists of the social networks upon which people rely, "Institutional Infrastructure" consists of processes, procedures, and physical tools. Whether public or private, large or small, elements of institutional infrastructure can enable, motivate, or impede desired actions or behaviors.

For example:

- The ability of community restoration groups to replant shoreline buffers depends on an infrastructure of native plant nurseries.
- The ability of farmers to better manage animal waste may be aided by alternate disposal options.
- The ability of builders to construct Low Impact Development may be impeded by outdated municipal engineering design and development standards.

Ongoing Programs

Key Ongoing Program Activities

- Local organizations actively collaborate to increase consistency and coverage, share knowledge and resources, and enhance effectiveness of individual programs. Partners use and enhance existing social, informational and institutional infrastructure to expand partnerships and implement effective, efficient strategies.
- PSP provides training for partners on effective tools and techniques for behavior change programs, such as social marketing, diffusion, program development, new technologies, and program evaluation.
- PSP and other funders provide financial support to local and regional stewardship efforts. The funding promotes innovation, regional program alignment, collaboration, implementation of targeted strategies, and audience expansion.
- PSP and partners develop and disseminate portfolios of vetted outreach content and tools for use by local organizations in their programs.

- PSP and local partners maintain and enhance the ECO-Net to build and strengthen relationships among Puget Sound organizations working on social strategies, and support their respective programs.
- Maintain and enhance tools such as MyPugetSound.net to support effective partner collaboration.

D7.1 Apply appropriate social science to Puget Sound recovery to increase clarity and effectiveness of targeted actions, audiences, opportunities, strategies, and evaluation metrics.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D7.2 Build capacity among partner organizations to advance priority stewardship actions. Provide technical support and training to advance program effectiveness, evaluation, and support of Action Agenda priorities.

Near-Term Actions

D7.2 NTA 1: Behavior Change Program Guidance. PSP provides uniform guidance for partners conducting behavior change programs to (1) enhance priority practices, (2) ensure that programs intended to address these priority practices are based on proven methods, (3) incorporate the necessary formative research to help programs achieve desired outcomes, and (4) incorporate effective evaluation strategies.

Performance measure: Guidance and policies for Model Stewardship Program Grants developed by September 2012; Non-grant guidance for partners developed by December 2012

D7.3 Maintain centralized capacity to sustain and enhance the regional Puget Sound Starts Here campaign.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D7.4 Provide public information conduits connecting individuals to local activities, resources and decision-making processes—including cost-share programs, technical assistance, volunteer experiences and ways to engage in civic structures and processes.

Near-Term Actions

D7.4 NTA 1: Citizen Action Training School. PSP and grantee(s) establish a Citizen Action Training School to 1) build awareness of Puget Sound issues and related governmental structures and processes, and 2) increase citizen participation in local, state and federal decision-making processes affecting Puget Sound.

Performance measure: Program launched by December 2012. By July 2015, six iterations of the program completed; a minimum of 150 community leaders trained; 7,500 hours invested in resulting community projects; and written curricula on effective civic engagement disseminated for ECO Net member use.

D7.5 Enhance strategic networks and tools that support stewardship partners and outcomes; including ECO-Net, STORM, The Northwest Straits Initiative and Marine Resource Committees, tribes, municipalities not covered by stormwater permits, public agencies, funders, universities, NGOs and others.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

D7.6 Work regionally and locally to remove implementation barriers (e.g., physical, economic, regulatory, enforcement, policy), and enable and incentivize adoption of stewardship actions.

Near-Term Actions

None; work in the near-term will focus on implementation of ongoing programs.

STRATEGIES AND ACTIONS TO RECOVER PUGET SOUND TO HEALTH

E: FUNDING STRATEGY

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Action Agenda Funding Strategy

In order to achieve the recovery of Puget Sound by 2020, increased financial capacity to implement priority ongoing and new actions in the Action Agenda is required. Increased capacity can be achieved through new sources of funding, using existing funding more strategically and efficiently, and through the development of innovative, market-based programs. The goal of the funding strategy is to develop and secure stable and diverse funding sources of funding to implement Action Agenda priorities.

Federal, state, local, and tribal governments currently generate a significant portion of the money being spent on recovery efforts. Other significant sources of funding include private foundations, businesses and individuals. Several market-based mechanisms to achieve recovery goals are also being experimented with in the Puget Sound region; these include transfer of development rights programs, ecosystem services markets, and in-lieu-fee compensatory mitigation programs.

In addition, several subject specific funding strategies are identified other parts of the Action Agenda. For example, Onsite Sewer Systems and salmon recovery have unique funding requirements that need bolstering. Those actions are also cross-walked into this section to see the full package of funding actions together.

Recovery actions, both ongoing and new, need funding. Those working on specific issue and program areas covered by the Action Agenda have identified the need for more, stable, and even dedicated sources of funding unique to their interest. Examples include, but are not limited to salmon recovery including watershed groups, Soundwide stewardship, outreach and behavior change, stormwater control and invasive species prevention and eradication, and SoundCorps. The Partnership is focused on developing an overall funding strategy rather than creating multiple, new dedicated funding sources.

In fall 2011, the Leadership Council requested that a subcommittee of the ECB evaluate funding strategies to implement priority recovery actions. The Funding Committee has been meeting since December 2011. Its work plan included evaluating a funding strategy for each of the strategic initiatives. Those strategies will include an evaluation of existing expenditures, an assessment of financial need, and proposals on how to fill identified gaps. The proposals will draw from the funding strategies listed in this section. The ECB will report its findings and recommendations to the leadership council later in 2012. In addition, the ECB subcommittee will need to consider how the funding strategy local implementation.

Local Priorities

Secure and stable funding is priority for members in all local implementing organizations. The South Central Action Area caucus group identified specific funding strategy related priorities. Two key themes include:

- A more concerted effort to effectively advocate for federal and state funding (including preserving current funding) for salmon recovery. In addition, there is a need for an integrated funding strategy for Puget Sound with salmon recovery and stormwater as central elements. The strategy should also be aligned with land use and regulatory changes
- To successfully advocate for state and federal funding for stormwater investments in Puget Sound, there needs to be a more refined assessment of total need and priorities across the region for retrofits, operation and maintenance, and source control.

In addition, a top priority is to restore and protect Local Toxics Control Account funding under the Model Toxics Control Account (MTCA) for local toxics cleanup activities.

E1.1 Maintain and enhance federal funding for implementation of Action Agenda priorities.

The federal government provides a significant source of funding for implementation of priorities in the Action Agenda. This is accomplished through direct funding of federal agencies to engage in protection and restoration activities, sub awards and grants to support and match the work of non-federal partners, including PSP, other state agencies, tribes and others.

Ongoing Programs

- Engagement in annual budget development and appropriation process to maintain funding levels for important Puget Sound related programs including the EPA Geographic Programs for Puget Sound, National Estuary Program Base Grants, NOAA's Restoration Center, NOAA Pacific Coast Salmon Recovery Fund grant programs, and programs administered by USFWS, USGS, NPS, Coast Guard, DOD, USACE, USFS, NRCS, FEMA, FHA, FTA, and other federal agencies who lead work related to Puget Sound recovery.
- Annual federal funding prioritization process with state agencies.
- Funding for nearshore restoration and protection via the: completion of the USACE Puget Sound Nearshore Ecosystem Restoration Project's General Investigation in preparation for a Water Resources Development Act reauthorization process, implementation of early action nearshore restoration projects within the USACE Puget Sound and Adjacent Waters Construction Program and other federal agency match for WA's Estuarine and Salmon Restoration Program.
- Maintain focus on passage of the Puget Sound Recovery Act.

Near-Term Actions

E1.1 NTA 1: Puget Sound Recovery Act Passage. PSP to continue work with Washington, coastal and other key delegation staff to encourage passage of the Puget Sound Recovery Act by December 30, 2014.

Performance measure: If not passed during 112th session of Congress: By February 2013 meet with key Washington delegation members to ensure House and Senate champions have been secured for bill in the 113th session; Meet with House and Senate champions, pertinent committee members on a quarterly or more frequent basis, as needed, to provide information and gain updates on progress for passage: By March 2014 testify and provide information to Congress for committee hearings.

E1.1 NTA 2: Pacific Coast Salmon Recovery Funds. PSP, in collaboration with the Salmon Recovery Council, will craft and lead outreach strategy to increase Pacific Coast Salmon Recovery Funds with goal of securing federal match towards goal of fully funding the Puget Sound Chinook Salmon Recovery plan at $120M per year by December 2014.

Performance measure: By October 2012, hold 2 meetings and briefings with key decision-makers within federal government to influence federal FY13 appropriations and FY14 budget formulation to increase federal share towards meeting $120M per year funding target. By October 2013, provide 2 briefings and in-state field visits with key decision-makers within the federal government to provide status of update to the Puget Sound Chinook Recovery Plan funding estimate and ways to incorporate into federal FY15 budget process.

SALMON RECOVERY

Salmon Recovery Plan Priorities: When the Chinook Plan was completed in 2005 the estimated annual investment for the first ten years was $120 million for Chinook and Bull Trout for capital and some non-capital actions. The investment rate has consistently been less than half of this estimated need. The Summer Chum plan also estimated a need of $136 million for the first ten years for capital and non-capital actions. In addition, there is minimal funding for the programmatic capacity of stakeholders to continue their engagement in locally led salmon recovery actions.

How these priorities are integrated: The annual investment rate has consistently been less than half of the estimated need for salmon recovery with recent decreases to the federal Pacific Coast Salmon Recovery Fund and other programs causing delays in implementation of the Salmon Recovery Plan and related Action Agenda's ongoing projects and programs. Near-Term Action A6.1 NTA 1 is to secure the annual amount required to fully implement the approved Puget Sound Chinook Salmon Recovery Plan investment of $120 million. Near-Term Action A6.4 NTA 1 is designed to bolster support for the Lead Entity and associated partner programs. These two investment strategy will be developed as part of the overall Puget Sound recovery funding strategy. The Puget Sound Funding strategy also includes actions to renew and increase the Pacific Coast Salmon Recovery Fund and the Puget Sound Acquisition and Restoration Fund.

E1.2 Focus federal agency budgets and national programs on Action Agenda priorities.

Federal agencies have many existing programs that are funded on an annual basis that could be focused on implementation of priorities in the Action Agenda. Creating a focus for this type of program on Puget Sound recovery actions could direct existing funds for national programs in this region without the need for increasing funding through an act of Congress.

Ongoing Programs

- Annual federal funding prioritization process with state agencies.
- Recommendations to federal agencies for priority actions to include in federal agency budget requests focusing on EPA, Department of Interior agencies, NMFS, NRCS, U.S Forest Service, the Army Corps of Engineers, and Department of Defense (DoD).
- Use results from the collaborations with LIOs and stakeholders to cultivate high priority projects that can achieve multiple benefits for recovery and are successful in garnering funds from national programs.

Near-Term Actions

E1.2 NTA 1: Farm Bill and Water Quality: PSP will work with NRCS and Partners to identify and increase funding to Puget Sound through the Farm Bill to improve water pollution prevention efforts and habitat protection and restoration efforts in rural areas in this

biennium. Partners will also develop a system to identify and track both the need and completed requests for these programs in the NRCS PRISM database.

Performance measure: Meet with federal and state partners twice a year to direct partner funds to strategic areas; Follow up and facilitate if needed the efficient allocation of funds to on-the-ground efforts of the agricultural community with a target to allocate funds in each calendar year.

E1.2 NTA 2: DoD Readiness and Environmental Protection. PSP to convene at least three meetings with DoD installations by March 2013. These meetings will focus on strategic planning and outreach with public officials and local stakeholders in support of DoD (Navy base Kitsap and JBLM) and state, federal and NGO partners collaborating on habitat and funding needs with goals of expanding the DoD Readiness and Environmental Protection Initiative (REPI) within Puget Sound. The goal of this work is to protect and restore increased ecosystem function that are related to the ability of DoD entities to accomplish their missions, preserve native biodiversity, and advance species recovery.

Performance measure: By August 2012 outreach materials will be crafted by PSP and USFWS that delineate timelines, priority actions for proactively addressing encroachment related to potential ESA listings and funding strategy for resourcing an Integrated Conservation Team to focus on species recovery while abating restrictions to JBLM and the South Sound's economic development. By July 2013 convene at least 3 meetings with Navy, agencies and NGO partners collaborating on Hood Canal to share criteria for each entity's decision-making, prioritize and align acquisition needs and document acquisition and funding strategies for REPI, matching funding and other sources.

E1.3 Maintain, enhance, and focus state funding for implementation of Action Agenda priorities.

Significant portions of state natural resource agency budgets are directed to implementation of priorities in the Action Agenda. The Partnership is required by statute to review state agencies' budgets and make recommendations, if necessary, to align budgets with priorities in the Action Agenda. In addition, the state makes significant annual investments in capital projects that contribute to Puget Sound recovery including wastewater treatment plants, stormwater retrofits, nearshore and salmon habitat restoration and protection projects.

The South Central Puget Sound Local Integrating Organization established a priority theme about stormwater investments: To successfully advocate for state and federal funding for stormwater investments in Puget Sound, there needs to be a more refined assessment of total need and priorities across the region for retrofits, operation and maintenance, and source control.

Ongoing Programs

- Implementation of statutory requirements by PSP including:
  - Aligning and prioritizing state agency budget requests and proposed cuts with priorities in the Action Agenda for use by OFM and the legislature.
  - Alignment of grant criteria and project selection with priorities in the Action Agenda.
- Work with state agencies to develop natural resource agency budget proposals, based on priorities in the Action Agenda.

Near-Term Actions

E1.3 NTA 1: Stormwater Priorities. PSP and Ecology work with partners to increase funding through Section 319(h) Nonpoint Source Grants, Clean Water State Revolving Fund, and Ecology Performance Partnership Grants to address stormwater priorities by April 2014.

Performance measure: By January 2014 use data from the Stormwater Needs Assessment and the ECB Funding committee to craft funding strategy and outreach materials to inform decision-makers about the priorities, amounts and types of state and federal government investments required to help share the burden of costs so that we can adequately address the scope of stormwater problems and meet related 2020 ecosystem recovery targets.

E1.3 NTA 2: Puget Sound Acquisition and Restoration Fund. PSP, in collaboration with the Salmon Recovery Council, will craft and lead an outreach strategy to renew and increase Washington state's Puget Sound Acquisition and Restoration Fund with goal of securing state match towards goal of fully funding the Puget Sound Chinook Salmon Recovery plan at $120M per year by December 2014.

Performance measure: By October 2012 hold 2 meetings and briefings or field visits with key decision makers to educate them about Puget Sound acquisition and restoration opportunities and the funding levels needed to do the work.

E1.3 NTA 3: State Funding. PSP will work closely with state, local and private partners to pursue state legislation or other mechanisms to provide adequate funding for critical water quality including OSS management and habitat protection and restoration programs through June 2014.

Performance measure: Proposal complete by August 2012 to be included in Governor's 2013–15 Biennial Budget request; Proposal enacted by Legislature in the 2013–15 Biennial Budget

E1.4 Maintain and enhance local funding for implementation of Action Agenda priorities.

Local governments and special purpose districts account for a significant portion of funds spent on critical activities that contribute to Puget Sound Recovery. Examples include funding spent on wastewater treatment and stormwater pollution control, and habitat acquisition and restoration. Local

governments should be supported and incentivized to increase funding to address local priorities that are also Puget Sound recovery priorities.

Ongoing Programs

Implementation of pollution prevention, habitat protection and restoration, and other recovery-related activities by local governments using locally generated funds from utility rates, fees, assessments, and other funding mechanisms available to local governments.

Near-Term Actions

E1.4 NTA 1: Local Funding Mechanism. PSP, working with the ECB funding committee, will lead the development of a legislative strategy by October 2012 to adopt a funding mechanism, which local governments around the Sound could elect to use to address Puget Sound recovery priorities.

Performance measure: PSP to convene a subcommittee of the ECB to form the coalition and develop a work plan that uses data on costs for Action Agenda implementation, funding gaps and will result in new proposals to fill funding gaps and efficiently use current financial resources. (October 2012); PSP, ECB and coalition members review funding needs for an integrated package of stormwater, habitat, flooding and erosion control and other water quality investments needed to carry out the Puget Sound recovery priorities and make recommendations regarding the establishment of additional funding mechanisms (consider scale, capacity of different mechanisms). Review and recommendations should build on research and recommendations from Central Puget Sound WRIAs regarding watershed-based funding mechanisms. The Executive Director of PSP should present recommendations to the Leadership Council in June 2012. (June 2012); Build support for and introduce any legislation recommended in June 2012 in the 2013 legislative session by November 2012.

E1.4 NTA 2: Rate Study of Special Purpose Districts. PSP will conduct a rate study of local special purpose districts to determine the relative amounts being raised by local governments to address recovery priorities compared to total potential that could be raised using existing funding mechanisms.

Performance measure: Report complete and submitted to the LC with recommendations by December 2012.

E1.5 Develop opportunities for private sector and philanthropic funding for implementation of Action Agenda priorities.

The private sector, including individuals, businesses, and philanthropies, recognizes the benefit of a healthy Puget Sound to a healthy economy. Businesses and private landowners are also faced with addressing certain recovery priorities such as controlling polluted runoff from private property. Opportunities should be provided for the private sector to invest in Puget Sound recovery. Opportunities for forming public/private partnerships to address priority issues should also be considered.

Near-Term Actions

E1.5 NTA 1: Coordination with Philanthropic Community. PSP will coordinate with the philanthropic community to encourage collaboration on implementation of highest priority actions in the Action Agenda by June 2014.

Performance measure: Hold two meetings per year with major philanthropic donors through June 2014 to provide outreach about Puget Sound priorities and progress, philanthropic needs and roles of partners.

E1.6 Develop and implement market-based mechanisms for implementation of priorities in the Action Agenda.

Significant amounts of money are currently spent on environmental mitigation related to growth and development in the region. Ecosystem structure and function continues to be degraded by land conversion in part due to a higher-than-acceptable rate of failure of mitigation projects.

In addition, property owners in rural areas are often faced with converting working resource lands such as forests and farms into more intensive uses such as residential. Environmental, aesthetic, and economic value is thereby lost. Ecosystem markets have the potential to compensate rural landowners for values that they provide by maintaining their lands in rural resource uses.

Ongoing Programs

- PSRC, Commerce, local governments, and PSP are working on the development of a transfer of development rights program in the central Puget Sound area. See Sections A. 3.
- The Partnership is involved with fostering in-lieu-fee compensatory mitigation projects in Hood Canal, and Pierce, King and Thurston Counties. Those programs should all be approved by December 2012. Support for the programs should continue through program adoption. See more detail in Section A1.4.

Near-Term Actions

E1.6 NTA 1: Compensatory Mitigation Programs. PSP to provide assistance, where necessary, on the development of in-lieu-fee (ILF) compensatory mitigation programs in Hood Canal, Pierce County and Thurston County. HCCC is working with partners in this process and will be in position to implement high priority actions from the ILF for 2013 and beyond. PSP will work with HCCC to track implementation progress and achievement of outcomes.

Performance measure: Complete ILF Mitigation Program by June 2012. HCCC, working with its partners in this process will be in position to implement high priority actions from the ILF for 2013 and beyond. Pierce County and Thurston County programs adopted by December 30, 2012.

Compensatory mitigation is also addressed in A1.4 HC 2, which is the Hood Canal Coordinating Council's in-lieu fee effort.

Funding Actions Identified in Other Sections of the Action Agenda

A2.1 NTA 1: Community Forestry Conservation Act. DNR will work with Congress to encourage passage of the Community Forestry Conservation Act (HR 1982 and S 1105 of the 112th Congress), which would enable non-profit conservation organizations to use bonds to purchase private working forests for long-term environmental and economic sustainable management by 2013.

A2.1 NTA 4: Funding Mechanism for Properties at Imminent Risk of Conversion. PSP will work with the ECB funding committee to consider the development of a funding mechanism to rapidly acquire properties with high ecological value and imminent risk of conversion by 2013.

A3.1 NTA 2: Landowner Incentives for TDRs and Ecosystem Markets. Ecology and Commerce, in coordination with DNR and the State Conservation Commission, will provide technical support and fund local projects to identify and implement landowner incentives, including TDRs and ecosystem services markets.

A3.1 NTA 3: Forest Watershed Services. DNR will support pilot market transactions for delivery of watershed services from private forest landowners to downstream water beneficiaries in at least the Snohomish and Nisqually watersheds.

A5.4 NTA 2: Ag Land Ecosystem Services Markets. By December 2013, the State Conservation Commission, working with Conservation Districts and Watershed Groups and counties will have three pilot projects underway that demonstrate ecosystem services markets associated with flood hazard prevention and agricultural lands in floodplains.

A6. 1 NTA 1: Secure Annual Chinook Investment. PSP, in collaboration with the Salmon Recovery Council, will secure the annual investment as required to fully implement the approved Puget Sound Chinook Salmon Recovery Plan, and work to align that funding in support of the highest priority protection and restoration projects as identified by salmon recovery lead entities. This investment strategy will be developed as part of the overall Puget Sound recovery funding strategy.

A6.5 NTA 1: Lead Entity and Partner Funding Strategy. By December 2013, PSP in collaboration with the Salmon Recovery Council and RCO, will identify a funding strategy and approach to support salmon recovery lead entities and the associated partner programs essential to implementing the salmon and steelhead recovery.

C4.1 NTA 2: Forest Practices Adaptive Management Program. DNR will work to secure long-term and dependable funding for the Forest Practices Adaptive Management Program (AMP), training, compliance monitoring, and enforcement.

C5.3 NTA 1: Regional OSS Homeowner Loan Program. DOH, Ecology, and PSP will help evaluate options and support proposals to fund a unified, self-sustaining, low-interest loan

program in the Puget Sound region to help OSS owners repair and replace their systems by June 2014.

C5.3 NTA 2: Regional OSS Program Funding Source. DOH will evaluate approaches and mechanisms (e.g., a regional flush tax or sewer surcharge) to generate and distribute funds to Puget Sound counties to implement their OSS management plans and programs by June 2014.

C5.3 NTA 3: Funding Mechanism for Local OSS Programs. DOH will work to authorize local boards of health to contract with county treasurers to collect fees via property tax statements to implement local OSS plans and programs by June 2012.

Emerging Issues and Future Opportunities

Securing and stabilizing funding will be an ongoing need. Work that will need continued development and other ideas suggested during the Action Agenda update process that could be considered include:

- Continuing to build on private and philanthropic partnerships.
- Allocation between local watershed areas.
- Adding criteria to state and federal grant programs to prioritize projects that encourage compact growth patterns, density and redevelopment, and rural lands protection.
- Establishing a center to organize and stimulate conservation markets for resource lands.
- Changing state law to allow cities to use enterprise funds for retrofitting streets for stormwater improvements and water crossing structures that currently disrupt ecosystem processes.
- Prioritization of restoration projects over protection projects by funders.
- Addressing match requirements and local government or NGO funding constraints.

SECTION 4:

HOW LOCAL AREAS ARE WORKING TO PROTECT AND RECOVER PUGET SOUND

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How Are Local Areas Working to Protect and Recover Puget Sound?

Puget Sound is a vast and beautiful region that is extremely diverse. The unique attributes of Puget Sound have created highly variable conditions in climate, habitat types, and species from alpine forests to the depths of the marine waters, and have contributed to the diverse communities of people that call it home. This section of the Action Agenda is focused on outlining the differences across the Puget Sound region and providing detailed descriptions of the process and outcome of identifying and prioritizing strategies and actions that are tailored to local conditions and goals.

Background on the Local Integration Concept

The Puget Sound Action Agenda is a strategy for cleaning up, restoring and protecting Puget Sound by 2020. The Action Agenda integrates existing basin-wide and watershed scale plans. Groups sponsoring or administering local watershed and nearshore programs - including but not limited to local governments, tribes, private sector entities, watershed planning units, watershed councils, shellfish protection districts, conservation districts, regional fishery enhancement groups, marine resource committees (including those working with the Northwest Straits Commission), and watershed lead entities - are working to implement the Action Agenda. However, closer cooperation and further integration is needed to inform local implementation priorities and approaches. Local integrating organizations, also referred to as LIOs, provide a mechanism for the Puget Sound Partnership to work directly, in a coordinated way, with local communities to help prioritize actions and implement the Action Agenda. LIOs are part of the Puget Sound Management Conference and relate directly to the Leadership Council.

The action area profiles in the Action Agenda recognize the different features of each action area, the major local ecosystem benefits and threats, and the local implementation priorities and strategies that both mirror the basin-wide priorities and yet address local conditions and issues. Within Puget Sound there are separate programs for water quality, water quantity, land use, shoreline protection, toxics cleanup, aquaculture management, and other environmental protection activities. Since the 2008 iteration of the Action Agenda, local communities continue to refine local protection and restoration strategies and priorities, integrate local actions and prepare to inform the update of the Action Agenda. The actions identified through this process are important elements of the Action Agenda and reflect the work and partnerships of local implementers. LIOs are expected to update and refine their local strategies and near term actions as new information becomes available or as implementation strategies advance their work. These changes are captured in the updates to the Action Agenda.

How Local Integrating Organizations are Formed

Local integrating organizations are recognized by the Leadership Council that have:

- Strong support from the local community and are broadly inclusive
- Strong capacity to execute roles, responsibilities, and the necessary scope of work.

Local governments and tribes were invited to consult with each other and with groups sponsoring or administering watershed and nearshore programs to evaluate options for organizing a local integrating group. In some cases, an existing organization was supported to undertake this role. In other cases, a new organization was formed.

After consulting locally, tribes and local governments from respective areas made a joint recommendation regarding local coordination and integration approaches. The recommendations identified a proposed LIO, fiscal agent and geographic scope. Based on the local recommendation and Partnership staff analysis, the Leadership Council decided whether to recognize the proposed LIO and its proposed approach and geography. To date, the Leadership Council has recognized eight LIOs:

- Strait of Juan de Fuca: Strait Ecosystem Recovery Network
- Hood Canal: Hood Canal Coordinating Council
- South Sound: Alliance for a Healthy South Sound
- South Central: South Central Puget Sound Caucus Group
- Island County/Watershed LIO
- Stillaguamish and Snohomish Watersheds: Executive Steering Committee
- Whatcom: Consolidated WRIA 1 Policy Boards
- San Juan Islands: San Juan Action Agenda Oversight Group

The Leadership Council will consider additional LIO proposals, as they are developed, for the remaining areas of Puget Sound.

Vision for Local Integrating Organizations

Local integrating organizations have been formed to help bolster consensus and momentum around locally relevant Puget Sound recovery actions. They are a coordinating body, helping to integrate and advance efforts from various entities in each action area. They are formed to help identify leverage points and create increased opportunity for Puget Sound recovery locally. Local integrating organizations also serve an advisory function for the Puget Sound Partnership by identifying recommendations on local priorities for funding decision and consideration. LIOs advance the specific actions necessary for achieving the high level Puget Sound strategies of habitat protection, restoration and pollutant reduction. More specifically,

- Local integrating organizations enable communities to develop and own a dynamic decision making process, to guide implementation of Action Agenda priorities including restoration, protection and pollutant reduction, and to prioritize local actions for investment.
- Local strategies and systems are connected with basin-wide Action Agenda strategies and

regional performance management and monitoring systems through the Local Integrating Organization. LIO operations contribute toward the development and implementation of local priorities in the Action Agenda.

Local integrating organizations, by design, represent the perspectives of many different actors within their local areas that hold implementation responsibilities in different ecosystem scale and watershed scale plans. These actors include, but are not limited to, local governments, tribes, private sector entities, watershed planning units, watershed councils, shellfish protection districts, conservation districts, regional fishery enhancement groups, marine resource committees (including those working with the Northwest Straits Commission) nearshore groups, and watershed lead entities, all working to implement the Action Agenda.

Funding the Local Integrating Organizations

The Puget Sound Partnership will fund local integrating organizations for organizational capacity to complete the following activities:

- Maintain, Organize, Facilitate and Administer a Local Integrating Organization
- Updating Local Action Agenda strategies and local near term actions
- Identify, coordinate implementation of local priorities
- Performance management

The Action Areas and Local Integrating Organizations

The legislation that created the Puget Sound Partnership established seven geographic action areas around the Sound to address and tackle problems specific to those areas:

- Hood Canal
- North Central Puget Sound (locally called West Puget Sound)
- San Juan/Whatcom (now covered as two separate areas)
- South Central Puget Sound
- South Puget Sound
- Strait of Juan de Fuca
- Whidbey (now covered as three separate areas)

While the action area concept is useful for sharing information and working to implement the Action Agenda and priority local actions, the Partnership has taken the concept a step further. Since 2008, local areas have been working toward both a structure and an approach to implement, as well as integrate, local community efforts to advance the Action Agenda. The Partnership has nearly completed the formation of Local Integrating Organizations (LIOs) that are organized at a scale that makes the most sense for Action Agenda implementation. In some areas around the Puget Sound, this has led an action area (e.g. Hood Canal, Strait of Juan de Fuca, South Central, and South Sound) to become a LIO. In other areas (e.g. Whatcom and San Juan) a different geography was determined to be more useful. The Partnership is continuing to work with those areas where local communities are still deciding how and what a LIO looks like.

LIOs are a coordinating body that includes local jurisdictions, tribes, and implementing groups. The purpose is to identify locally relevant strategies and actions to implement the Action Agenda and accomplish the sound-wide objectives.

As of April 2012, LIOs have been formed for:

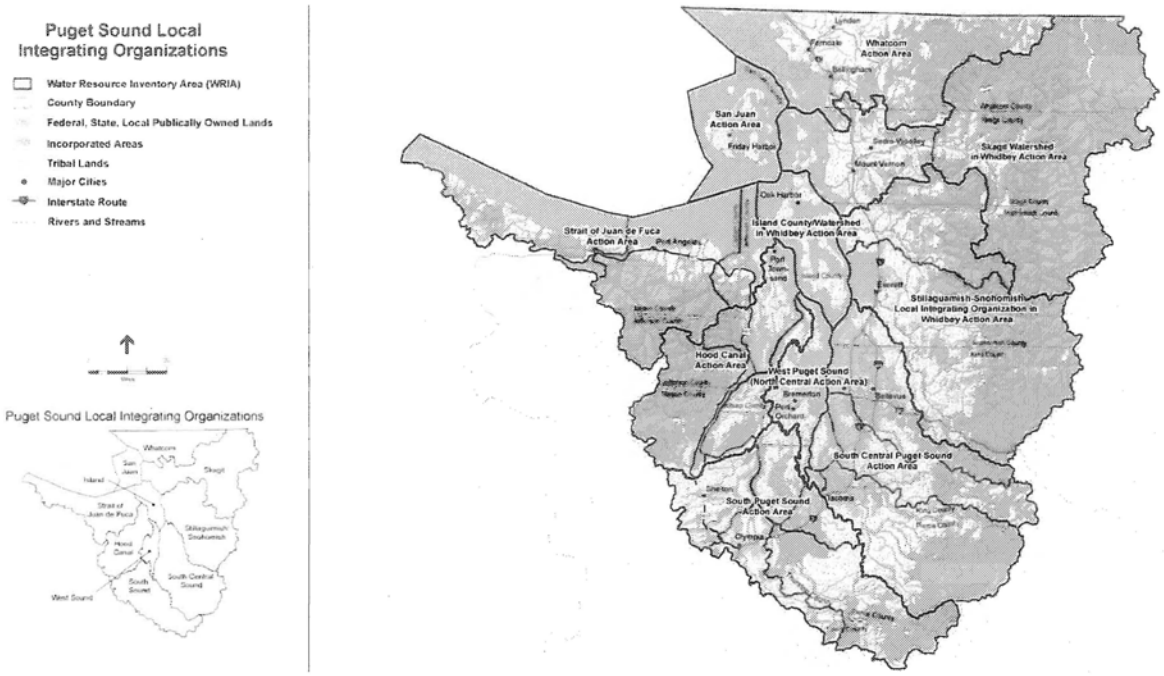
- Strait of Juan de Fuca: Strait Ecosystem Recovery Network
- Hood Canal: Hood Canal Coordinating Council
- South Sound: Alliance for a Healthy South Sound
- South Central: South Central Puget Sound Caucus Group
- Island County/Watershed LIO
- Stillaguamish and Snohomish Watersheds: Executive Steering Committee
- Whatcom: Consolidated WRIA 1 Policy Boards
- San Juan Islands: San Juan Action Agenda Oversight Group

Each LIO has different membership. Example members include salmon recovery watershed groups, marine resource committees, tribes, local governments, local utilities, farming interests, environmental interests and others. Composition of each group is included in their profile in the Action Agenda.

Those areas that are still in formation are:

- West Sound (North Central): (West Sound Watersheds Council assisting with profile)
- Skagit Watershed

Each area has many distinctive local features and communities. These differences are due to physical and biological conditions such as geology, rainfall, habitat for plants and animals, and the history of the people who have lived there. Each corner of Puget Sound also has its own set of issues and constraints. For example, the South Puget Sound and Hood Canal action areas are world-renowned shellfish growing areas. The areas are also subject to poor water circulation and high nutrient inputs that result in low dissolved oxygen conditions and can lead to massive fish kills. The Strait of Juan de Fuca Action Area, Whatcom County, and other rural areas struggle to retain working forests and productive agricultural lands in the face of increased development pressure. Water supply is a critical issue in the eastern Strait of Juan de Fuca and the San Juan Islands. The Whidbey Action Area contains three of the top five salmon-producing rivers in Puget Sound – the Skagit, Snohomish, and Stillaguamish; here the drastic modification to the river deltas and estuaries is particularly problematic for salmon recovery. The South Central Puget Sound Action Area contains the ports of Seattle and Tacoma, is home to approximately 3 million residents, and is the heart of the Puget Sound economy. In the South Central and the West Sound, many ecosystem challenges result from shoreline armoring, transportation infrastructure, stormwater runoff, and other urban issues – yet these areas have important nearshore habitat for migrating salmon and other species.



Action Area and Local Integrating Organization Profiles

Crafting solutions to the pressures facing Puget Sound must occur with the input and cooperation of the local people who have detailed knowledge of the problems, must implement the solutions, and will carefully monitor the success. The LIO's, including the remaining two in formation, have helped to update the Action Agenda by more clearly articulating local information, priorities, and actions.

Each of the local area descriptions that follow includes a narrative profile and map that summarizes the geography and unique ecosystem characteristics and assets of the area, an overview and status update of the local Action Agenda process and the local implementation structure, a list of key threats to and pressures on local ecosystem health, as well as information on local relationship to the Soundwide Recovery Targets, and provides a list of references and additional resources. In addition, many of the descriptions include detailed information on local priority strategies and near-term actions.[23] All areas agree that implementation of the funding strategy is needed to support local recovery efforts, and this need will be discussed by the ECB funding committee. In addition, common outreach messages are a key to understanding in all communities. Over the next two years, each local area will continue to move forward in defining priorities, implementing actions, and contributing to a cleaner, more vibrant, and community oriented Puget Sound.

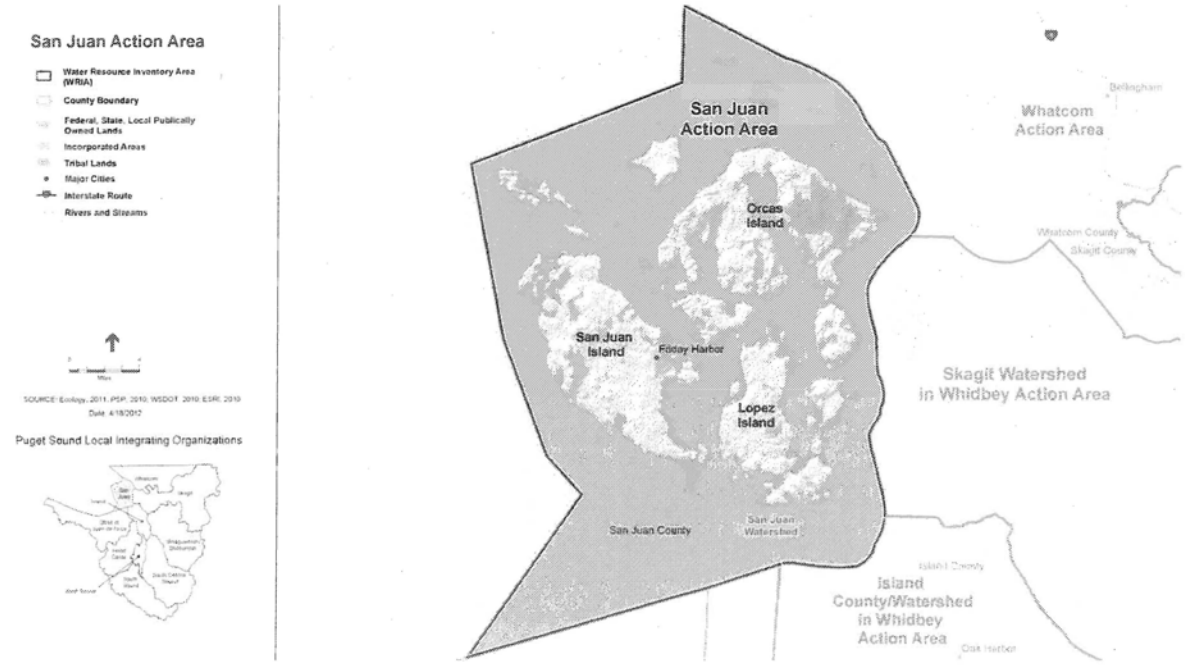
[23] Each area is at a unique point in the process of identifying their priorities and contribution to the Action Agenda. See the text box on p.24 for an overview of the current status of each area as it relates to Action Agenda engagement.

The Action Agenda in the San Juan Islands

Profile

Located at the nexus of the Strait of Juan de Fuca, the Georgia Strait, and Puget Sound, the 428 separate islands (at high tide) that make up San Juan County are considered by many to be the crown jewels of Puget Sound. San Juan County has the smallest land mass of any county in Washington State, but with 408 miles of marine shoreline, has more than any other county in the contiguous United States.

Geologically, the San Juan Islands are distinctly different from mainland Washington and Vancouver Island, and are dominated by bedrock and thinner glacial deposits relative to other parts of Puget Sound. Their unique location in the crossroads of the Salish Sea gives the San Juan Islands a wide diversity of flora and fauna. High-energy tidal flows and turbulent mixing throughout the Islands' channels are dominated by the surface outflows from the Strait of Georgia and the deep water inflow from offshore Pacific waters. The Islands' straits and channels link the Strait of Georgia to the Strait of Juan de Fuca, and to a lesser extent to Puget Sound. These water sources mix and contribute to the distribution of nutrients, plankton, sediment, and pollutants throughout the Islands, creating a marine environment unique to the San Juan Islands. This environment includes not only turbulent straits and channels but also some quiet and protected bays.



San Juan County is affected by the "rainshadow" of the Olympic Mountains, and receives 20 to 30 inches of annual rainfall, with significant variation of rainfall patterns among the island's microclimates. There are no major rivers on the San Juan Islands, but several small creeks flow on a year-round basis. Additionally, the Fraser River in British Columbia influences the temperature and sedimentation in San Juan County waters. Only one percent of the land is paved, and 61 percent is forested. Lakes and freshwater wetlands cover over seven percent of the landscape.

The economy of the San Juan Islands has shifted along with the culture, technology, and natural resources in the region. The Salish Peoples' fishing activities were sustainable for generations, and traditional knowledge includes areas where salmon skirted the Orcas Island shoreline as vast runs returned to the Fraser and Skagit rivers. The Coast Salish also knew where to find the best clam, mussel, and oyster beds near shore for ready harvest in season.

Agriculture, logging, fishing, and lime kiln operations later became the main economic drivers for the islands. In the late nineteenth century, the economy boomed with fruit, canned salmon and peas, and lime exports to the mainland. These industries began to collapse as mainland infrastructure improved and it became cheaper to deliver goods overland from the eastern part of the state rather than across waters. It also became much easier to can or freeze and ship salmon from the mainland, contributing to the decline of the fishing industry and associated canning operations by the mid-1900s. The cannery in Friday Harbor was canning peas when it closed in 1966.

Today, the San Juan Islands are an extremely popular summer destination, and the number of residents swells from 15,769 who live there year-round to approximately double that in the summer. In addition, over 750,000 visitors camp, moor, or stay in area lodging. Most of the county is rural, with 75 percent of the population living outside the "urban" areas of Friday Harbor, Eastsound, and Lopez Village. Over the past decade, population growth in the islands has been high, with a growth rate of 12 percent from 2000 to 2010. There are 5,700 shoreline parcels in San Juan County, of which approximately 50 percent have already been developed. Some islands have no public access and few accommodate automobiles. Public access to the water is extremely limited on many islands.

The current economy is driven by residential and commercial construction, tourism and government (including schools). Tourism is highly dependent on the clean marine and fresh water, spectacular views, and opportunities for boating, bird watching, whale watching and cycling. These characteristics are also highly valued by the residents and second home-owners that make the San Juan Islands their home. There is significant marine oriented commerce including marinas, fishing, boat building and repair. Representative marine education and research from organizations include the University of Washington Friday Harbor Labs, SeaDoc Society, and

Notable Accomplishments

Seven acres of coastal salt marsh and two acres of a tidal lagoon have been restored in San Juan County.

Eleven miles of surf smelt and sandlance habitat in the San Juans has been documented.

All feederbluffs, eelgrass, kelp, forage fish, and shoreline modifications in San Juan County have been documented.

Tidal inundation to Cascade Creek was restored with a new Buck Bay Bridge.

The Spring Street Rain Garden demonstration project was installed.

Seattle Pacific University marine labs. High quality shellfish farming occurs in San Juan County and there is a growing sustainable agricultural movement. The islands are important to the cultural heritage of the coastal Salish tribes that retain treaty reserved right to hunt, fish and gather, and are attached to many cultural heritage sites.

Unique Ecosystem Characteristics and Assets

Public involvement in the stewardship of the San Juan Islands is considered by area residents to be one of their foremost ecosystem assets. There are many government and non-governmental efforts devoted to protecting this important natural resource. The San Juan Preservation Trust is the oldest private land trust in Washington State. The San Juan County Land Bank protects natural areas and is the only county-based land bank in the state. In 2007, the San Juan County Council adopted the San Juan County Marine Stewardship Area Plan, the culmination of three years of effort by the San Juan Marine Resources Committee, with contributions from numerous scientists, technical advisors, resource managers, community leaders, business owners, and citizens. The Marine Stewardship Area Plan is intended to sustain the many services that the ecosystem provides for county citizens, fish and wildlife, and the economics of the County.

Example assets include sustainable tourism, commercial and recreational fisheries for clams, crab and spot prawns, and clean beaches and waters. There are currently no beaches in the San Juan Islands that are closed to swimming. However, public beaches are periodically closed to shellfish harvest due to a naturally-occurring marine biotoxin which can cause paralytic shellfish poisoning. Protected upland areas are located at Moran State Park, San Juan Historical National Park, Turtleback Mountain, Lopez Hill, University of Washington Preserves at Friday Harbor Labs and on Shaw Island, and the National Wildlife Refuge with sites throughout the islands. Yellow Island, protected by the Nature Conservancy, contains an intact prairie, a unique ecological feature on a small island that is approximately one acre in size. Marine resource protection areas include the Marine Preserve, National Wildlife Refuge, Bottomfish Recovery Zone, Whalewatch Exclusion Zone, and Sensitive Eelgrass Area.

The location of the San Juan Islands makes them a way-station for all 22 migrating populations of Puget Sound Chinook salmon as both juveniles and adults. Additionally, Sockeye, Pink, Chum and Coho salmon, Kokanee, Steelhead, and Rainbow and Coastal cutthroat trout have been documented in the County. The San Juan Islands support outmigrating juvenile salmon including: Chinook, Coho, Chum and Pink, and stocks from the Fraser River, Puget Sound and east and west coast Vancouver Island and the Strait of Georgia. Although most of the streams in San Juan County are small and do not support salmon, a small number of Coho have recently been reported spawning in Cascade Creek and possibly other streams on Orcas Island, and a few creeks support cutthroat and introduced runs of Chum.

San Juan County provides excellent habitat for juvenile and adult salmon with over 5,000 acres of tidal wetlands, inter- and sub-tidal flats, eelgrass meadows along the shorelines and in the bays, and kelp beds. Tidal wetlands are highly valued due to their relative scarcity. At least 80 miles of potential forage fish spawning beaches are present. Eelgrass is found on 20 percent of all shorelines, and the San Juans contain one-third of all of the kelp in Puget Sound. Pacific surf smelt and sandlance have been documented on 11 miles of all shorelines. The geology has created habitat conditions for rockfish that are not replicated anywhere else in Puget Sound. Approximately 74 percent of the shallow dominant rocky reef habitat in Puget Sound, comprised of boulder fields, rocky ledges and outcroppings, is found in the San Juan Archipelago.

Local Action Agenda Process

The San Juan Action Agenda Oversight Group (AAOG), the local integrating organization (LIO) for the area, developed a Prioritization Framework to guide the update to the local Action Agenda. The framework formed the basis of update work from January-October of 2011. The group used the 2008 San Juan Action Agenda as a starting point, identifying key gaps in the original profile. A workshop was held to link pressures on the ecosystem to ecosystem benefits in the San Juans. Local ecosystem benefits included most, but not all, Soundwide Recovery Targets. Linkages were used to rate pressures based on the scope, severity, and irreversibility of the impact on each ecosystem benefit. Ratings guided the selection of pressures with a "high" threat. Strategies and near-term actions were then refined from the 2008 profile that – at minimum – addressed the highest ranked pressures, considering both feasibility and potential impact. Development of these priority pressures and strategies involved regular meetings of the Action Agenda Oversight Group committees (described below), and included presentations before the San Juan County Council. In October 2011, the Action Agenda Oversight Group co-hosted a public open house on the San Juan Inter-Island Ferry, seeking feedback on the priority near-term actions.

Key Threats/Pressures

The San Juan Action Agenda Oversight Group identified the following three key pressures on the San Juan ecosystems:

- Major oil spills;
- Runoff from the built environment (including septic systems); and
- Shoreline development (including armoring).

Opportunities, Priorities, and Near-Term Actions

The San Juan Action Agenda Oversight Group identified seven priority (Tier 1) strategies and ten near-term actions to address three key pressures on the San Juan ecosystems. The priority strategies were honed from a more comprehensive list of strategies that were all considered important in addressing the local pressures. Furthermore, the San Juan Action Agenda Oversight Group recognizes that in order to be most successful, many of the strategies will need to be implemented together, which is the approach that will be taken at the local level. The strategies are listed below (in no particular order), and will guide the local near-term actions.

Strategies and near-term actions represent agreements between the County and represented tribes at the time this plan was developed. To be implemented, several near-term actions indicated below will require additional outside funding and local policy decisions, which must be weighed against opportunity costs. Funding needs as of February 2012 are specified per action.

PRESSURE ON THE ECOSYSTEM	TIER 1 STRATEGY	TIER 1 NEAR-TERM ACTION*	ESTIMATED COST THROUGH 2014 ($TOTAL & $GAP)
Major Oil Spills	Work with the Puget Sound Partnership on oil spill prevention and readiness programs within Puget Sound and with Canada.	San Juan Marine Resources Committee will convene 20 agencies and non-governmental organizations responsible for oil spill prevention and readiness at the 2012 Marine Manager Workshop, including participation from the local, state, federal, and Canadian organizations. Workshop outcomes will include a list of agreed upon recommendations for oil spill prevention. Local jurisdictions will consider adopting highest priority recommendations within their authority by 2014.	**Fundraising occurs annually.** Total Cost: $11,782 Gap: $0 *Note: Funding is provided through grants. Cost does not include in-kind support of meeting attendees, including Marine Resources Committee (MRC) members.*
	Maintain local oil spill readiness and response programs in alignment with a regional readiness and response program.	Islands Oil Spill Association (IOSA) will maintain local oil spill readiness and response programs through 2014. Identify remaining local response needs at the 2012 Marine Managers Workshop and consider these, along with a funding and action plan, as part of the workshop recommendations.	**Fundraising occurs annually** Total Cost: ~$250,000 *Note: Costs are dependent on spill activity.*
Runoff from the Built Environment (including septic systems)	Create effective compliance mechanisms for stormwater.	San Juan County Community Development and Planning Department (CDPD) and the Town of Friday Harbor will improve stormwater permit review process with pre-disturbance site review and follow-up site visits to 50 percent of properties permitted between 2012-2014.	**Funded through 2013:** Total Cost: ~$27,500 Gap: ~$7,500 (County). *Note: Funding includes Town and County. County Funded for $15,000 out of current fees. The Town is funded at ~$5,000.*
	Implement best management practices to reduce pollution of source wastes by residential runoff and non-point sources.	San Juan County Health and Community Services will fully implement the On-site Sewage System (OSS) Operation and Maintenance Program Plan, with a goal of 100 percent of systems in sensitive areas in compliance and current with inspections by 2014 and 60 percent of alternative systems county-wide to have inspections between 2010-2014.	**Partially funded** Total Cost: ~$700,000-$800,000 Gap: ~$481,000-$582,000 *Note: Current funding includes federal and state grants through 2013 and local fees*

PRESSURE ON THE ECOSYSTEM	TIER 1 STRATEGY	TIER 1 NEAR-TERM ACTION*	ESTIMATED COST THROUGH 2014 ($TOTAL & $GAP)
		San Juan County Public Works will convene CDPD, Department of Health and Community Services (DHCS), and the San Juan Islands Conservation District (CD) to identify and coordinate best management practices for stormwater, on-site septic systems, and animal wastes with community participation by 2013. CDPD, DHCS, CD, and the Town of Friday Harbor will publicize information by the second quarter of 2014 at the DHCS, CDPD, and Town permit counters and associated websites, with a goal to target 100 percent of applicants by the end of 2014. San Juan County will provide for identified best management practices in County Code by 2014.	**Partially funded** Total Cost: $60,000-$62,500 Gap: $5,000-$7,500 *Note: Funding gap is for publicizing technical assistance materials*
		San Juan County Public Works Stormwater Utility will lead and work jointly with the Stormwater Committee, the Water Resources Committee, the Marine Resources Committee, and the Town of Friday Harbor to implement an annual strategic monitoring plan by 2013 to measure levels of fecals, heavy metals, POPs, and PAHs in priority basins. In the first year post-implementation, monitor 100percent of priority basins, with monitoring actions ongoing after 2014.	**Funded at a minimum level (for priority basins)** Total Cost: $250,000+ Gap: *Additional costs dependent on level of testing desired.*
Shoreline Development (including shoreline armoring)	Provide information and work with landowners regarding the importance of retaining and restoring native vegetation, trees and ground cover and geologic processes.	San Juan CDPD and the Town of Friday Harbor will make ongoing technical assistance (best management practices) available on-site to 100 percent of permit applicants, with a goal of 75 percent of customers avoiding hard armoring or otherwise implementing soft armoring techniques by 2014. This work will leverage the effort underway via EPA grant funding and shoreline workshops coordinated by Friends of the San Juans, San Juan Islands Conservation District, and Washington Sea Grant.	**Fully funded for County and Town through 2013** (pending grant approval) Total Cost: $63,000 (County and Town) *Note: Costs for the Town of Friday Harbor are ~$1,000. Funding plan beyond 2013 is in development.*

	Improve on compliance and enforcement capacity.	San Juan CDPD and the Town of Friday Harbor will provide capacity for technical assistance related to compliance with environmental regulations by 2013.	**Fully funded for County through 2013** *Note: See related action above*
	Identify and implement shoreline protection tools including land preservation via acquisition and conservation easements, restoration, and protection of marine areas consistent with treaty rights.	San Juan County Lead Entity for Salmon Recovery will target funding to highest Tier I salmon recovery projects between 2012-2014, as listed in the San Juan Salmon Recovery three-year work plan for WRIA 2. Projects include acquisition and conservation easements, protection and restoration actions.	**Partially funded** $720,000 available. *Note: Total costs through 2014 will be project-dependent and available beginning in 2013.*
		San Juan County Lead Entity for Salmon Recovery will identify priority habitats for acquisition by 2013 in updates to the Salmon Recovery strategy, and will lead acquisition of, or establishment of conversation easements for 25 percent of priority habitat shoreline miles with willing sellers/owners by 2014.	**Partially funded** $308,650 available *Note: Total costs will be clarified in updates to strategy by 2013.*

Following is a list of "Tier 2" strategies and accompanying draft actions. The San Juan Action Agenda Oversight Group identified these strategies and actions as important for local recovery of Puget Sound as part of the Action Agenda, and are recommended for consideration immediately after Tier 1 strategies and actions have been implemented. Some Tier 2 actions are being pursued at this time, while others may be developed and implemented as additional funding and/or capacity is available and consideration is given to public comment and opportunity costs.

PRESSURE ON THE ECOSYSTEM	TIER 2 STRATEGY	TIER 2 ACTION
Major Oil Spills	Work with the Puget Sound Partnership on oil spill prevention and readiness programs within Puget Sound and with Canada. (Same as Tier 1 above)	• Gather information on pollutant levels in beach sediments, as baseline data for potential oil spill impacts (freeze samples to avoid upfront payment for chemical analysis). • Emphasize risk-based analyses to improve marine safety. (Vessel traffic risk analysis) • Work with Islands Trust on Oil Spill readiness, prevention, and response priorities

PRESSURE ON THE ECOSYSTEM	TIER 2 STRATEGY	TIER 2 ACTION
	Maintain local oil spill readiness and response programs in alignment with a regional readiness and response program. (Same as Tier 1 above)	• Update Geographic Response Plan with most current data from salmon recovery assessments • Support Coast Guard Re-Authorization Act • Incorporate current readiness and response program into the vessel of opportunity program
Runoff from the Built Environment (including septic systems)	Restore native vegetation, trees, and ground cover.	• *Specific actions will be developed and implemented as additional funding and/or capacity is available and consideration is given to public comment and opportunity costs.*
	Provide information to landowners about pollutants around the home and farm and provide information on proper storage and care.	• *Specific actions will be developed and implemented as additional funding and/or capacity is available and consideration is given to public comment and opportunity costs.*
	Encourage Low Impact Development for new development and retrofits.	• *Specific actions will be developed and* • *implemented as additional funding and/or capacity is available and consideration is given to public comment and opportunity costs.*
	Provide information and work with the public regarding Low Impact Development (LID) so they can implement LID on their own properties, including farms.	• *Specific actions will be developed and implemented as additional funding and/or capacity is available and consideration is given to public comment and opportunity costs.*
	Ensure coordination between planning and health departments on issuance of septic permits.	• *Specific actions will be developed and implemented as additional funding and/or capacity is available and consideration is given to public comment and opportunity costs.*
	Implement San Juan Marine Stewardship Area Monitoring Plan, including the Stormwater Monitoring Plan.	• *Specific actions will be developed and implemented as additional funding and/or capacity is available and consideration is given to public comment and opportunity costs.*
Shoreline Development (including shoreline armoring)	Identify and implement shoreline protection tools including land preservation via acquisition and conservation easements, restoration, and protection of marine areas consistent with treaty rights. (Same as Tier 1 above)	• Implement the Green Shores for Homes program

PRESSURE ON THE ECOSYSTEM	TIER 2 STRATEGY	TIER 2 ACTION
	Provide convenient landowner access to technical assistance for maintaining views, shoreline access, and ecological function of the shoreline.	• *Specific actions will be developed and implemented as additional funding and/or capacity is available and consideration is given to public comment and opportunity costs.*
	Shoreline regulatory strategy (update Critical Areas Ordinance (CAO) and Shoreline Management Program (SMP)).	• *Specific actions will be developed and implemented as additional funding and/or capacity is available and consideration is given to public comment and opportunity costs.*
	Implement San Juan Marine Stewardship Area Monitoring Plan.	• *Specific actions will be developed and implemented as additional funding and/or capacity is available and consideration is given to public comment and opportunity costs.*

Link to Recovery Targets

By addressing, at minimum, three of the highest-priority pressures in the San Juans, the Action Agenda Oversight Group expects improvements or protective actions for several Soundwide Recovery Targets. For instance, prevention of major oil spills will prevent further degradation of all or nearly all of the targets related to marine or marine nearshore areas. Near-term actions around runoff from the built environment (including septic systems) are also designed to protect water quality and improve management of on-site sewage systems. Restorative actions and technical assistance to homeowners in the shoreline could result in positive improvements in the amount of shoreline armoring. Overall, the group anticipates benefits to the following targets:

- Eelgrass
- Estuaries
- Marine Sediment Quality
- Orcas
- Pacific Herring
- Shellfish Beds
- Swimming Beaches
- Toxics in Fish
- Wild Chinook Salmon
- Freshwater Water Quality
- Management of On-Site Sewage Systems
- Insects in Small Streams
- Shoreline armoring

Local Implementation Structure

The Action Agenda Oversight Group first convened in July of 2010 and actively participated in the update of the San Juan Action Agenda. The Implementation Committee met monthly between October 2010 and November 2011, including a half-day workshop in May. All meetings were held in Friday Harbor. The Accountability Oversight Committee met four times between January and September of 2011 to discuss the recommendations of the Implementation Committee, with meetings alternating between Friday Harbor and Anacortes.

Participants in the process included the following:

- Accountability Oversight Committee
  - San Juan County Council
  - Lummi Nation
  - Swinomish Tribe
  - Tulalip Tribes
- Implementation Committee
  - Marine Resources Committee
  - Salmon Recovery Lead Entity
  - Director of Planning
  - Director of Public Works
  - Director of Environmental Health
  - Water Resources Committee (Community Representative)
  - Tulalip Tribes
  - Lummi Natural Resources Department
  - Swinomish Tribe
  - Conservation District
  - Friday Harbor Laboratories
  - San Juan Stewardship Network/ECO Net
  - Town of Friday Harbor

IMPLEMENTATION COORDINATION IN THE SAN JUAN ISLANDS

The San Juan Action Agenda Oversight Group (AAOG) is the Local Integrating Organization (LIO) for the San Juan geography, and was officially recognized by the Puget Sound Partnership's Leadership Council in June of 2010.

The Accountability Oversight Committee serves as the executive body for the AAOG, and consists of County Council, tribal, and ex-officio Puget Sound Partnership representatives.

The Implementation Committee consists of staff and volunteers from organizations helping to implement the local Action Agenda. This group provides recommendations to the Accountability Oversight Committee.

References and Additional Resources

Garrigues, R. S.& Litman, T.1990. Lopez Island Test/Observation Well Completion Report. http://www.ecy.wa.gov/pubs/oftr9003.pdf

National Oceanic and Atmospheric Administration. 19 January 2007. Puget Sound Salmon Recovery Plan. Available online at: http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/PS-Recovery-Plan.cfm

San Juan County Best Available Science for Critical Areas. March 2008. Available online at: http://sanjuanco.com/cdp/Docs/CAO/SJBASChapterI_3_19_08.pdf

San Juan County Best Available Science Synthesis. January 2011. Available online at: http://sanjuanco.com/cdp/docs/CAO/BAS_Synthesis_2011-01-13.pdf

San Juan County Marine Resources Committee. 27 June 2011. Draft San Juan County Marine Stewardship Area Monitoring Plan and Strategy. Available online at: http://www.sjcmrc.org/uploads/Monitoringpdfs/MonPlanJun2011forweb.pdf

San Juan County Marine Resources Committee. 2 July 2007. San Juan County Marine Stewardship Area Plan. Available online at: http://www.sjcmrc.org/uploads/pdf/MSA%20plan%2002-Jul-2007%20Final.pdf

San Juan County Watershed Management Committee. April 2000. San Juan County Watershed Management Action Plan and Characterization Report. Available online at: http://www.sanjuanco.com/health/wtrshdpln/part1toc.html

San Juan Initiative. Available online at: http://www.sanjuaninitiative.org/

San Juan Islands Scenic Byway Corridor Management Plan. 2012, in prep. Sections of the plan are posted at: http://www.visitsanjuans.com/scenicbyway/

Town of Friday Harbor Shoreline Master Program Update. Available online at: http://www.fridayharbor.org/SMP/smp.htm

Town of Friday Harbor Water Conservation Plan. Available online at: http://www.fridayharbor.org/town%20documents/water_conservation_plan.htm

Watershed Resource Inventory Area (WRIA) 2. June 2005. San Juan County Salmon Recovery Chapter - Puget Sound Shared Strategy Plan. Available online at: http://www.sharedsalmonstrategy.org/plan/vol2.htm

http://www.sanjuanco.com/Planning/docs/CompPlan/SectionA_2010-04.doc.pdf

http://sanjuanco.com/health/wtrshdpln/part2chap2.html

http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/upload/Ch5_SanJuan.pdf

http://sanjuanco.com/health/wtrshdpln/part2chap2.html

http://www.co.san-juan.wa.us/health/wtrshdpln/part2chap3.html

http://www.historylink.org/index.cfm?DisplayPage=output.cfm&File_Id=2629

http://www.sjcmrc.org/uploads/pdf/MSA%20plan%2002-Jul-2007%20Final.pdf

http://www.tpchd.org/files/library/3f99dac18661fbba.pdf

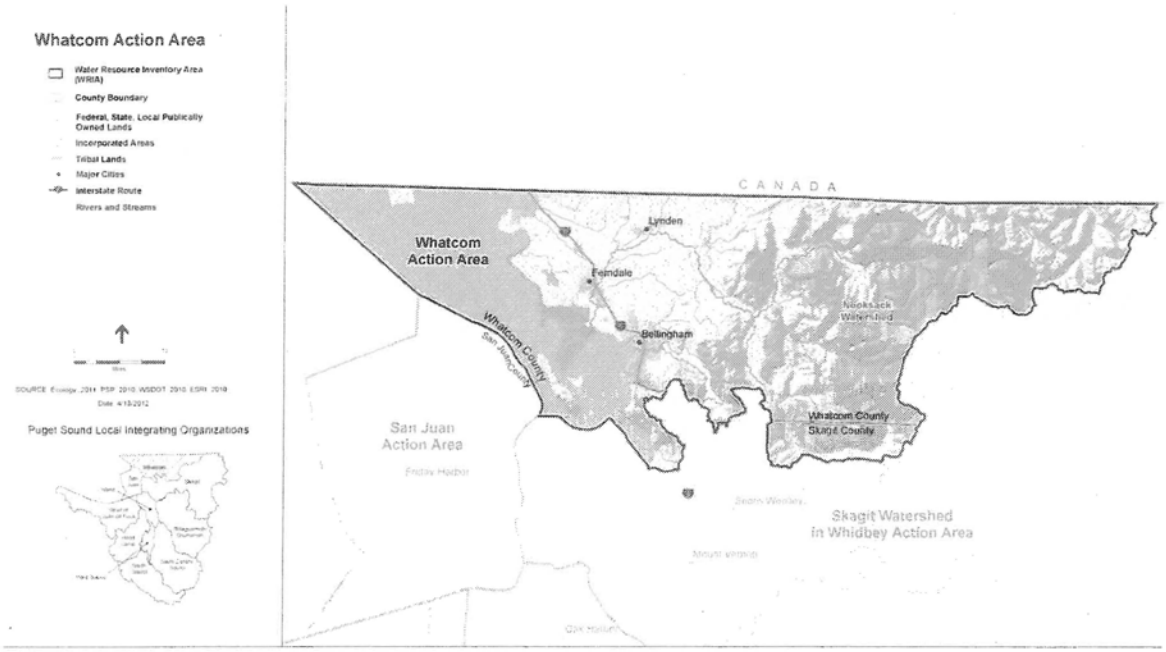
http://wildliferecreation.org/our-campaigns/wwrp-projects/counties/San%20Juan_county

http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/washington/placesweprotect/yellow-island.xml

The Action Agenda in Whatcom County and WRIA 1

Profile

The Nooksack Watershed (Water Resource Inventory Area (WRIA) 1) is located at the northwest corner of Washington State and encompasses the northeast corner of Puget Sound. WRIA 1 covers 1,410 square miles, largely in Whatcom County, but extends 21 square miles into Skagit County and 147 square miles in British Columbia, Canada. It is one of two Action Areas with streams crossing the international boundary with Canada. The Nooksack River, the watershed's namesake, originates from glaciers on Mount Shuksan in North Cascade National Park and Mount Baker, the highest point in the watershed at 10,778 feet, which is located in the Mount Baker – Snoqualmie National Forest. From the headwaters, the Nooksack River flows westerly through forest and farm land and past small cities to reach sea level at Bellingham Bay. Mount Baker is an active volcano and one of the snowiest places on earth. In 1999 the Mount Baker Ski Area set a world record with 95 feet of total snowfall in a single season. Yet despite some banner years for skiers, the many glaciers on Mount Baker have generally been in rapid retreat since the 1980s. Spring and early summer snowmelt feed the three forks that combine to form the mainstem Nooksack River near Deming while glacial meltwater continues to feed two of the three branches, the North and Middle Forks, from mid-summer to early fall once the snowmelt is complete. Rainfall and ground water each contribute flow to the Nooksack River and are the primary sources of flow for the lowland tributaries and independent coastal streams.



The Nooksack River has three main forks – the North Fork, Middle Fork, and South Fork. Other major river systems in WRIA 1 include the Lummi River, Dakota Creek and other independent coastal streams, and tributaries to the Fraser River in Canada including the Sumas River. Fishtrap and Bertrand Creeks are tributaries to the Nooksack River and both originate in British Columbia. There are more than 3,000 total miles of freshwater courses, including streams, rivers, lakes, ponds and wetlands, as well as 155 miles of marine shoreline in Whatcom County.

The Whatcom County portion of WRIA 1 is home to over 200,000 residents, with approximately 81,000 living in the City of Bellingham. Whatcom County is located between two major metro areas, Vancouver, BC supporting over two million people 30 miles north of the County and King/Snohomish Counties including the cities of Everett and Seattle also supporting over two million people living 60 to 100 miles south of the County.

Approximately 85,300 acres, or 11 percent, of Whatcom County land is designated for agricultural use although agricultural production occurs on more than 140,000 acres. This land-base supports robust dairy, berry, and seed potato production. Whatcom County's dairy industry ranks second out of 34 dairy-producing counties in the state and is in the top five percent of dairy production nationwide with farm gate value of $190 million dollars per year. Half of the 103,000 milk cows in Puget Sound are in Whatcom County. The County also produces more than 65 percent of the nation's raspberries, with an estimated value of $65 million in 2011. Other major crops include strawberries, blueberries, greenhouse and nursery items, poultry, eggs, and seed potatoes. Approximately nine percent of Whatcom County's land use is agriculture, while 82 percent of the land is considered forest and rural. Cities and urban growth areas account for seven percent of the land use. Other land uses consist of mining, industrial, and commercial development. There are two refineries and an aluminum smelter operating in the Cherry Point area. Deep water access at Cherry point is a factor in future industrial activity at Cherry Point including the proposed coal transport facility. The proposed facility would accommodate Panamax (65,000 to 85,000 tons) and Capesize (160,000-180,000 tons) vessels at this deep-draft facility. Western Washington University, the Port of Bellingham, and traditional commercial forestry and fishing also contribute to the region's economy. The former pulp mill site on Bellingham Bay is in the process of redevelopment from a heavy industrial site to a mixed use waterfront with parks, businesses, and public moorage that will be linked to downtown Bellingham, while portions of the Whatcom Waterway are reserved for deepwater commercial use.

The reservation lands of the Nooksack Tribe are located primarily along and in the vicinity of the Nooksack River and its tributaries. The Lummi Indian Nation lands include the Lummi and Sandy Point peninsulas, Portage Island, and associated tidelands. The Nooksack River flows through the Lummi Reservation as it discharges into Bellingham Bay. Both tribes exercise treaty rights to fish, hunt, and gather throughout the Nooksack watershed and the adjoining marine areas of WRIA 1. Shellfish harvest is an important activity for local tribes and a major commercial industry for the region. Commercial, ceremonial, and subsistence harvest of salmon in both marine and freshwater habitats are of particular importance to Lummi Nation and Nooksack Indian Tribe members. Recreational shellfish harvest is an active pursuit by area residents and recreational visitors at Semiahmoo Spit, Birch Bay, and Chuckanut Bay.

The relatively shallow depths of Birch Bay result in warm water temperatures and increased recreational activities in the summer. Of all Washington State Parks, Birch Bay State Park was the most visited for recreational shellfish harvesting in 2009. Lake Whatcom, another popular recreational and residential area, is also the drinking water reservoir for Bellingham and parts of Whatcom County. Winter

recreation enthusiasts rely on the proximity to the Mount Baker Ski Area for easy access to snow sports. The residents of, and visitors to, Whatcom County, university students, tribal citizens, and pioneer descendents place a high value on the diverse environment and economy of Whatcom County. There is active participation in marine resource committees, watershed councils, and education and restoration programs related to the continued health of the ecosystem.

Unique Ecosystem Characteristics and Assets

Mount Baker has been a landmark since humans first began to navigate and explore this corner of Puget Sound, and the abundant snowfields provide water and electricity for communities in Puget Sound. In addition to the striking natural beauty of Whatcom County, the region supports habitat types from alpine headwaters to tidal bays, along with farming, fishing, and forestry operations. This area sustains every native Pacific salmonid species, and includes unusual types such as riverine sockeye salmon and even-year pink. The Chinook populations in the North, Middle and South Forks of the Nooksack River have distinct genetic and timing traits that are considered to be crucial in retaining the diversity and viability of threatened Puget Sound Chinook salmon overall. All of the salmon species depend on the nearshore habitats for food and shelter as they adjust between freshwater and saltwater.

The marine shorelines of Whatcom County produce surf smelt, sand lance, and anchovy, along with other fish and shellfish species. Birch Bay, Chuckanut Bay, and Lummi Island have recreational shellfish harvesting. Drayton Harbor, Lummi Bay, and Portage Bay have tribal and commercial shellfish growing areas, while Alden Bank offers shallow offshore habitat for isolated populations of geoduck, sea urchins, and clams. Several of these areas are currently prohibited, conditionally approved, or threatened for shellfish harvest due to poor water quality. The Cherry Point area was historically the most highly productive area for herring in Puget Sound, producing an estimated 32 percent of all the known herring spawning in the Sound, prior to a precipitous decline of 94 percent from 1973 to 2000.

Natural features and human activities have made Whatcom County an important area for migratory waterfowl, raptors, and other birds. The nearshore areas have abundant food sources for marine birds; and the floodplains, wetlands, and agricultural fields provide forage areas. Birch Bay is designated as a "Shoreline of Statewide Significance," the only marine shoreline in Whatcom County with this designation. Greater Bellingham Bay, including Chuckanut and Portage bays, Drayton Harbor, Semiahmoo Spit, and Birch Bay are portions of the Pacific Flyway and are stopovers for the migratory birds' flight path between the Fraser River estuary and Skagit Bay.

Local Action Agenda Process

The Local Integrating Organization (LIO) for the Whatcom Action Area is a function of the existing integrated governance structure for WRIA 1 program management (Figure 1, Local Implementation Structure section). A Whatcom LIO team that will support implementation of local action agenda priorities within the existing integrated governance structure will be established as part of the LIO coordination work plan and grant funding recently approved by the WRIA 1 Management Team and Puget Sound Partnership (February 2012). The LIO implementation team will support the work identified in the LIO work plan, which includes completing a local update to the Puget Sound Action Agenda that identifies sequence and relative priorities of actions, resource needs, responsible party for implementing actions, and timelines. The local update will be submitted under the process that the

Puget Sound Partnership Leadership Council establishes for the local Action Agenda updates being prepared by LIOs that are still evolving.

As an initial step, the WRIA 1 Management Team and watershed planning and salmon recovery staff teams and other interested individuals worked to synthesize existing strategies and actions being implemented locally that address Puget Sound Action Agenda priorities, and establish linkages to Puget Sound Partnership recovery targets. The information presented in this March 2012 profile represents those efforts and is the basis for the LIO implementation team's continued work. A prioritization of the strategies and actions will be the work of the LIO work team that is in process of forming.

Key Threats/Pressures

At this time, the LIO has identified 15 regional pressures using the Puget Sound Partnership categories and explanations. In the summary table below, the pressures are listed alphabetically and organized geographically by aggregated watershed areas. The pressures are organized geographically because of the unique characteristics and land uses within WRIA 1. The table is a summary of a more detailed table of pressures and processes that will be used to sequence and prioritize local strategies as part of the previously referenced LIO work plan. Additional vetting and prioritizing of the pressures will occur as part of the LIO work plan. The aggregated watersheds are consistent with the aggregations in the WRIA 1 *2010 State of the Watershed Report*.

	GEOGRAPHIC AREAS/AGGREGATED WATERSHEDS						
Key Pressures	**Nooksack Forks Watersheds**	**Lower Nooksack Watersheds**	**Coastal North Watersheds** *includes adjacent marine waters*	**Coastal West Watersheds** *includes adjacent marine waters*	**Coastal South Watersheds** *includes adjacent marine waters*	**Lake Whatcom Watersheds**	**Sumas River Watersheds**
Agriculture, Livestock Grazing; Agricultural Runoff	x	x	x	x			x
Aquatic Animal Harvesting *(includes threat of illegal fishing)*	x	x	x	x	x	x	x
Culverts	x	x	x	x	x	x	x
Dams	x						
Freshwater Levees/Floodgates (*includes outlet dam)*	x	x				x	
Freshwater Shoreline Infrastructure (*armoring, docks, bulkheads, other overwater structures)*	x	x				x	
Industrial, Domestic and Municipal Wastewater	x	x	x	x	x	x	x
Invasive Species	x	x	x	x	x	x	x
Marine Shoreline Infrastructure (*armoring, docks, bulkheads, other overwater structures)*			x	x	x		
Oil and Hazardous Material Spills (*includes pipelines/tanker trucks/trains/marinas/ports*)	x	x	x	x	x	x	x
Recreational Activities	x	x	x	x	x	x	x

Key Pressures	GEOGRAPHIC AREAS/AGGREGATED WATERSHEDS						
	Nooksack Forks Watersheds	Lower Nooksack Watersheds	Coastal North Watersheds *includes adjacent marine waters*	Coastal West Watersheds *includes adjacent marine waters*	Coastal South Watersheds *includes adjacent marine waters*	Lake Whatcom Watersheds	Sumas River Watersheds
Residential and Commercial Development; Runoff from Built Environment (Unmanaged Runoff)	x	x	x	x	x	x	x
Timber Production (*includes Lummi Reservation*)	x		x	x	x	x	x
Transportation and Service Corridors (in WRIA 1 includes rail, roadways, ports, marinas, ferry terminal, border crossings, pipelines)	x	x	x	x	x	x	x
Water Withdrawals/ Diversions	x	x	x	x	x	x	x

Opportunities, Priorities, and Near-Term Actions

A significant amount of work is underway across WRIA 1 to advance habitat protection, habitat restoration, reduction of pollution, resolution of instream flow and out of stream water use, infrastructure development and maintenance, and port development. The strategies listed below reflect the work that is underway, and were synthesized from existing planning documents, strategic plans, and annual work plans that WRIA 1 organizations and entities are implementing. The next step in the LIO process will be to sequence, establish relative priorities, identify near-term actions, resource needs, and timelines. The strategies are grouped by categories as listed in the Draft 2011 Puget Sound Action Agenda, and are a summary of a detailed WRIA 1 cross-walk spreadsheet of strategies to Action Agenda sub-strategies that is available online. The strategies listed will be further vetted, refined, and prioritized as part of the LIO work plan. The detailed spreadsheet that is available online will be the tool used by the LIO to complete the prioritization tasks.

Upland and Terrestrial

- Continue updating and implementing local Critical Areas Ordinance (CAO), Growth Management Act (GMA), Shoreline Management Plan (SMP), Comprehensive Flood Hazard Management Plan (CFHMP), and National Flood Insurance Program (NFIP).
- Continue implementing, enforcing, and monitoring land use measures adopted for watersheds with designated overlay zones.
- Continue to identify key areas for preservation through voluntary conservation easements, acquisitions, and/or other means.
- Continue implementing *WRIA 1 Salmonid Recovery Plan* key actions.
- Implement habitat restoration projects.
- Manage invasive plant species.
- Investigate and manage invasive aquatic species in Lake Whatcom.
- Monitor the effects of forest practices on watershed processes and stream sedimentation and temperature changes.
- Limit forest and farm conversions to other uses such as residential, commercial, or industrial uses.

- Continue implementing *WRIA 1 Watershed Management Plan-Phase 1*
- Implement instream flow restoration projects

Marine and Nearshore

- Continue implementing local CAO, GMA, and SMP plans
- Continue implementing, enforcing, and monitoring land use measures adopted for watersheds with designated overlay zones
- Continue to identify key areas for preservation through conservation easements, acquisitions, and/or other means.
- Continue implementing the *WRIA 1 Salmonid Recovery Plan*
- Continue implementing the *WRIA 1 Watershed Management Plan-Phase 1*
- Complete a nearshore and estuary strategic plan for assessment, restoration, and protection projects that includes a conceptual model of habitat connectivity for purposes of prioritizing projects, and that is coordinated with other planning efforts (e.g., Salmon Recovery, Shoreline Management)
- Coordinate/collaborate with Port of Bellingham and City of Bellingham on restoration projects and opportunities for public access in context with the waterfront redevelopment
- Implement habitat restoration projects
- Complete/implement the Cherry Point Aquatic Reserve management plan
- Continue implementing the Bellingham Bay Pilot Project
- Establish and implement the Northern Chuckanut Bay Shellfish Recovery Plan
- Continue implementing the Shellfish Protection District Plans (includes Drayton Harbor, Portage Bay, and Birch Bay)

Pollution Reduction

- Provide technical and cost share assistance to landowners for CREP and other agricultural best management practice (BMP) assistance programs
- Implement National Pollutant Discharge Elimination System (NPDES) municipal and industrial permits
- Continue implementing comprehensive stormwater management plans
- Continue implementing and improving regulatory compliance and enforcement for reduction of nutrient and pathogen loading
- Implement onsite sewage system operation and maintenance programs including continued inspections of on-site septic systems (OSS), community trainings, and low interest loan programs.
- Implement water quality improvement projects identified in approved Shellfish Protection District plans including OSS operation and maintenance and agricultural BMP technical and financial assistance.
- Improve spill response capabilities in Lake Whatcom watershed and marinas and ports as identified.
- Coordinate and support implementation of education and outreach plans associated with urban landscapes (potential impacts and best management practices to address impacts).
- Provide technical and cost share assistance to woodlot owners to develop conservation plans
- Limit forest and farm conversions
- Enforce forest practices
- Implement Nooksack River total maximum daily load (TMDL)

Strategic Leadership and Collaboration

- Coordinate and implement comprehensive monitoring programs as part of the adaptive management element of approved plans
- Work cooperatively to identify research and monitoring needs to fill data gaps associated with marine and freshwater ecosystems.
- Continue working locally and regionally with British Columbia on transboundary issues including water quality, water quantity, and fish habitat.
- Continue to work cooperatively with farming community to maintain the agricultural base including investigating a natural resource marketplace, implementing agriculture strategic plan, and prepare and implement conservation plans
- Build and/or support institutional capacity to implement priority actions identified in approved plans. This strategy includes identifying opportunities to leverage funding through partnerships, and continuing to investigate and identify funding strategies for priority actions.
- Integrate natural resources decision making at the decision-maker and policy levels, and provide local input to Puget Sound Partnership planning efforts through the LIO structure.
- Implement Lower Nooksack Strategy including preparing water budget to support water resource management, initiating an update to the Coordinated Water System Plan that includes out of stream water uses, and continue monitoring stream flow at key stations identified through the WRIA 1 watershed management project.

The WRIA 1's working document that crosswalks the draft strategies with the August 16, 2011 draft Action Agenda strategies is available online at:
http://www.mypugetsound.net/index.php?option=com_docman&task=cat_view&gid=321&Itemid=238

Link to Recovery Targets

The Nooksack Watershed is critically important to accomplishing the regional recovery targets. There are many activities in WRIA 1 that will contribute to regional recovery targets. The table below summarizes linkages between local strategies and Puget Sound Partnership recovery targets. Further vetting and linkages of local priorities with regional targets will be a focus of the Whatcom LIO in 2012.[24]

PUGET SOUND RECOVERY TARGETS	LOCAL STRATEGIES
Onsite Sewage Systems	• Implement onsite sewage system operation and maintenance programs including continued inspections of OSS, community trainings, and low interest loan programs. • Implement water quality improvement projects identified in approved Shellfish Protection District plans including OSS operation and maintenance and agricultural BMP technical and financial assistance. • Continue implementing and improving regulatory enforcement and compliance for reduction of nutrient and pathogen loading.
Swimming Beaches	• Continue implementing and improving regulatory enforcement and compliance for reduction of nutrient and pathogen loading.
Shellfish Beds	• Establish and implement Northern Chuckanut Bay Shellfish Recovery Plan. • Continue implementing Shellfish Protection District Plans.

[24] See WRIA 1's working document that crosswalks the draft strategies with the August 16, 2011 draft Action Agenda strategies available online at http://www.mypugetsound.net/index.php?option=com_docman&task=cat_view&gid=321&Itemid=238

PUGET SOUND RECOVERY TARGETS	LOCAL STRATEGIES
	• Implement water quality improvement projects identified in approved Shellfish Protection District plans including OSS operation and maintenance and agricultural BMP technical and financial assistance. • Implement Nooksack River TMDL. • Continue implementing, enforcing, and monitoring land use measures adopted for watersheds with designated overlay zones.
Chinook	• Continue implementing *WRIA 1 Salmonid Recovery Plan* key actions. • Continue to identify key areas for preservation through voluntary conservation easements, acquisitions, and/or other means. • Implement habitat restoration projects. • Work cooperatively to identify research and monitoring needs to fill data gaps associated with marine and freshwater ecosystems. • Ensure forest practices are enforced. • Harvest and hatchery programs. • Land use programs.
Pacific Herring	• Complete and implement the Cherry Point Aquatic Reserve management plan. • Work cooperatively to identify research and monitoring needs to fill data gaps associated with marine and freshwater ecosystems.
Shoreline Armoring	• Continue implementing SMP. • Continue implementing CAO. • Implement levee setback and/or riprap removal/replacement projects. • Collaborate with Port of Bellingham and City of Bellingham on restoration projects and opportunities for public access in context with the waterfront redevelopment. • Complete a nearshore and estuary strategic plan for assessment, restoration, and protection projects that includes a conceptual model of habitat connectivity for purposes of prioritizing projects, and that is coordinated with other planning efforts (e.g., Salmon Recovery, Shoreline Management).
Eelgrass	• Work cooperatively to identify research and monitoring needs to fill data gaps associated with marine and freshwater ecosystems. • Complete and implement the Cherry Point Aquatic Reserve management plan.
Land Cover and Land Development	• Continue updating and implementing local CAO, GMA, SMP, and NFIP plans. • Continue implementing, enforcing, and monitoring land use measures adopted for watersheds with designated overlay zones. • Limit forest and farm conversions. • Coordinate and support implementation of education and outreach plans associated with urban landscapes (potential impacts and best management practices to address impacts). • Provide technical and cost share assistance to woodlot owners to develop conservation plans.
Flood Plains	• Implement key actions of CFHMP that benefit habitat including levee lowering or setback, riprap removal or replacement projects, and flood overflow corridors. • Review and condition flood plain development to be consistent with the FEMA biological opinion. • Continue implementing key actions in *WRIA 1 Salmonid Recovery Plan.* • Continue implementing CAO and SMP.
Estuaries	• Continue implementing SMP. • Complete a nearshore and estuary strategic plan for assessment, restoration, and protection projects that includes a conceptual model of habitat connectivity for

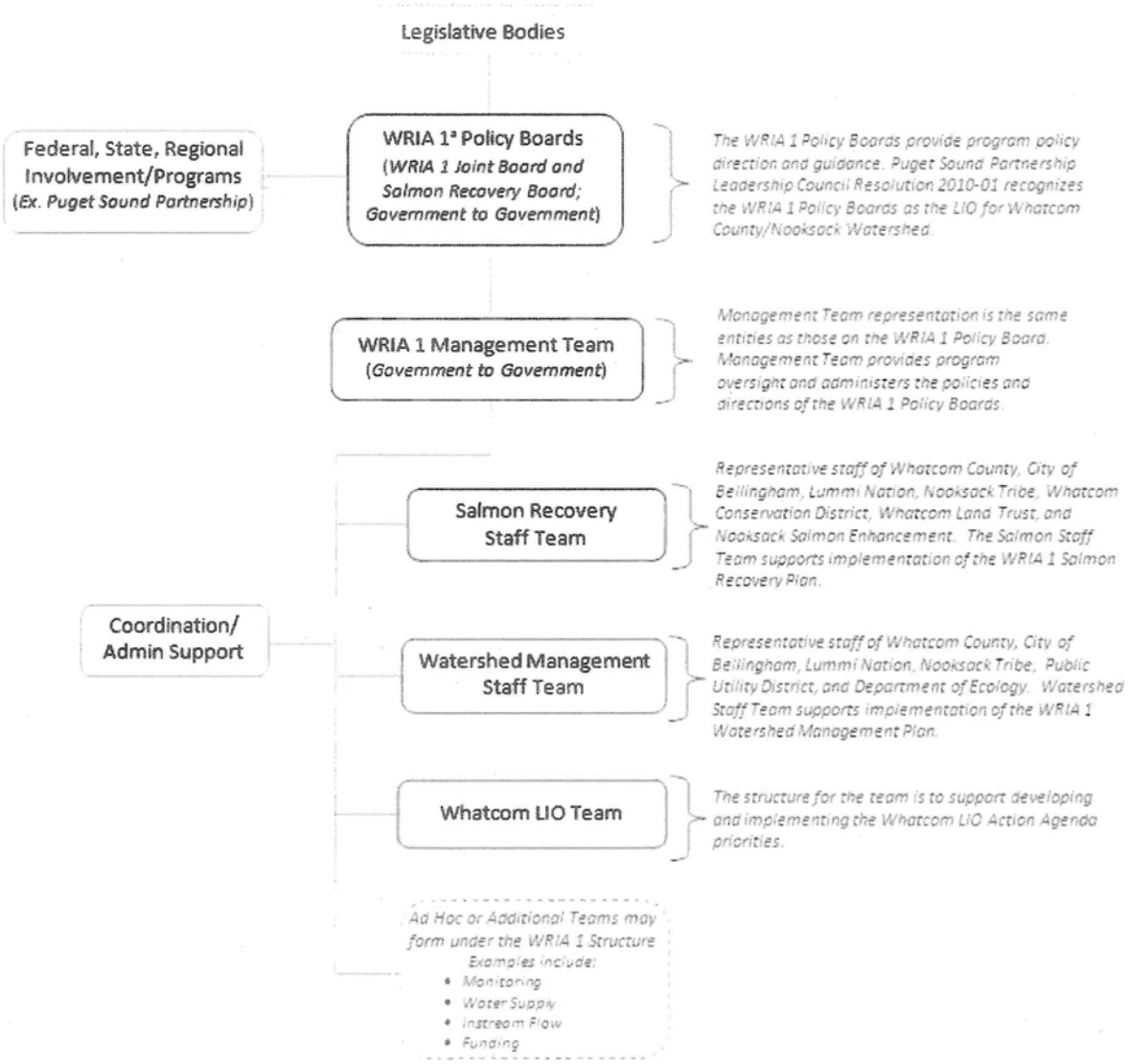
PUGET SOUND RECOVERY TARGETS	LOCAL STRATEGIES
	purposes of prioritizing projects, and that is coordinated with other planning efforts (e.g., Salmon Recovery, Shoreline Management). • Work cooperatively to identify research and monitoring needs to fill data gaps associated with marine and freshwater ecosystems. • Analyze alternative and implement lower Nooksack river and estuary restoration projects. • Implement coastal stream estuary restoration projects.
Summer Stream Flows	• Continue negotiating instream flow recommendations. • Implement instream flow restoration projects. • Implement Lower Nooksack Strategy including preparing water budget to support water resource management, initiating an update to the Coordinated Water System Plan that includes out of stream water uses, and continue monitoring stream flow at key stations identified through the WRIA 1 watershed management project.
Water Quality (FW/MW)	• Manage invasive plant species. • Provide technical and cost share assistance to landowners for CREP and other agricultural BMP assistance programs. • Implement NPDES municipal and industrial permits. • Continue implementing comprehensive stormwater management plans. • Continue implementing and improving regulatory compliance and enforcement for reduction of nutrient and pathogen loading. • Implement water quality improvement projects identified in approved Shellfish Protection District plans. • Investigate and manage invasive aquatic species in Lake Whatcom. • Improve spill response capabilities in Lake Whatcom watershed and marinas and ports as identified. • Coordinate and support implementation of education and outreach plans associated with urban landscapes (potential impacts and best management practices to address impacts). • Provide technical and cost share assistance to woodlot owners to develop conservation plans. • Implement Nooksack River TMDL. • Complete and implement the South Fork temperature TMDL. • Coordinate and implement comprehensive monitoring programs as part of the adaptive management element of approved plans. • Work cooperatively to identify research and monitoring needs to fill data gaps associated with marine and freshwater ecosystems including the Cherry Point development.
Marine Sediment Quality	• Continue implementing Bellingham Bay Pilot Project. • Work cooperatively to identify research and monitoring needs to fill data gaps associated with marine and freshwater ecosystems.
Toxics in Fish	• Continue implementing Bellingham Bay Pilot Project. • Work cooperatively to identify research and monitoring needs to fill data gaps associated with marine and freshwater ecosystems.

Local Implementation Structure

The WRIA 1 Policy Boards are the local integrating organization (LIO) for the Nooksack Watershed and Whatcom County geography, and were officially recognized by the Puget Sound Partnership's Leadership Council in November of 2010. The integrated governance structure for WRIA 1 as depicted in Figure 1 was an existing structure prior to accepting the function of the LIO. Under this structure, the WRIA 1 Policy Boards provide policy direction and guidance for integrated programs and are supported by the WRIA 1 Management Team and program implementation teams (i.e., Watershed Staff Team and Salmon Recovery Staff Team work on watershed plan and salmon recovery plan implementation, respectively). Further work is underway to develop the role and activities of the implementation team (temporarily identified as the Whatcom LIO Team in Figure 1). The LIO work plan and grant received in February 2012 will support the work to develop the implementation team and its roles and responsibilities.

Figure 1.

Whatcom Area Local Integrating Organization



References and Additional Resources

City of Bellingham, Environmental Programs
http://www.cob.org/services/environment/index.aspx

City of Blaine, Water Conservation Programs
http://www.cityofblaine.com/index.aspx?NID=383

City of Everson Planning Documents
http://www.ci.everson.wa.us/COEPublicationsDoc.html

City of Ferndale, State of Schell Creek Watershed
http://www.cityofferndale.org/story.php?sid=1539

City of Lynden Shoreline Management Program
http://www.lyndenwa.org/?page_id=86

City of Nooksack Shoreline Master Plan Update
http://www.cityofnooksack.com/projects.htm

City of Sumas Shoreline Master Plan Update
http://cityofsumas.homestead.com/Current-Projects.html

Lake Whatcom Watershed Management
http://www.lakewhatcom.whatcomcounty.org/home

Lummi Nation Natural Resources Programs
http://lnnr.lummi-nsn.gov/LummiWebsite/

Marine Resources Committee Whatcom County Programs
http://www.whatcom-mrc.whatcomcounty.org/MRC/index.htm#

Nooksack Salmon Enhancement Association
http://www.n-sea.org/

Nooksack Tribe Natural Resources Programs
http://nooksackindiantribe.org/departments/natural-resources/

Northwest Economic Council Whatcom County - Whatcom County Economic Strategy:
http://www.nwecon.org/resources/economic-strategy

Northwest Straits Whatcom MRC
http://www.nwstraits.org/MRCs/MRC-Info-Meetings/Whatcom.aspx

Port of Bellingham Environmental Programs
http://www.portofbellingham.com/index.aspx?nid=92

Public Utility District No. 1 Natural Resource Programs
http://www.pudwhatcom.org/services

ReSources' North Sound Baykeeper Program
http://www.re-sources.org/programs/baykeeper

Washington State Department of Ecology Programs
http://www.ecy.wa.gov/ecyhome.html

Washington State Department of Fish and Wildlife Programs
http://wdfw.wa.gov/

Whatcom Conservation District Programs
http://www.whatcomcd.org/programs

Whatcom County Natural Resources Special Projects and Shoreline Management Program
http://www.co.whatcom.wa.us/pds/naturalresources/specialprojects.jsp

Whatcom Farm Friends
http://www.wcfarmfriends.com/go/site/1579/

Whatcom Land Trust
http://www.whatcomlandtrust.org/

Whatcom Watersheds Information Network Programs
http://whatcomwin.org/index.html

WRIA 1 2010 State of the Watershed Report
http://wria1project.whatcomcounty.org/56.aspx

WRIA 1 Salmonid Recovery Plan
http://whatcomsalmon.whatcomcounty.org/action-processes-recoveryplan.html
(*The WRIA 1 Salmon Recovery website is being updated and will be launched spring 2012*)

WRIA 1 Watershed Management Plan-Phase 1
http://wria1project.whatcomcounty.org/Resource-Library/Guiding-Documents-And-Plans/64.aspx

WSU Whatcom County Extension Environmental Programs and Services
http://whatcom.wsu.edu/environ/environment.htm

Profile Text References

https://fortress.wa.gov/esd/employmentdata/reports-publications/regional-reports/county-profiles/whatcom-county-profile

http://wria1project.whatcomcounty.org/About-The-Watershed/Agriculture/32.aspx

http://seattletimes.nwsource.com/html/localnews/2004085609_mill21m.html

http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/upload/Ch5_Nooksack.pdf

http://www.accessgenealogy.com/native/washington/lummi_indian_tribe_location.htm

http://whatcomshellfish.whatcomcounty.org/

http://www.birchbay.net/

http://www.co.whatcom.wa.us/publicworks/water/lakewhatcom.jsp

http://whatcom.kulshan.com/Washington/Whatcom%20County/Mt.%20Baker%20Snoqualmie%20National%20Forest/Outdoors/Mt.%20Baker%20Ski%20Area.htm

http://www.co.whatcom.wa.us/publicworks/water/marine.jsp

http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/upload/Ch5_Nooksack.pdf

http://www.pugetsoundnearshore.org/technical_papers/marine_fish.pdf

http://www.co.whatcom.wa.us/publicworks/water/marine.jsp

http://www.conservationnw.org/wildlife-habitat/cherry-point-herring

http://www.bellingham.org/activities/bird-watching/

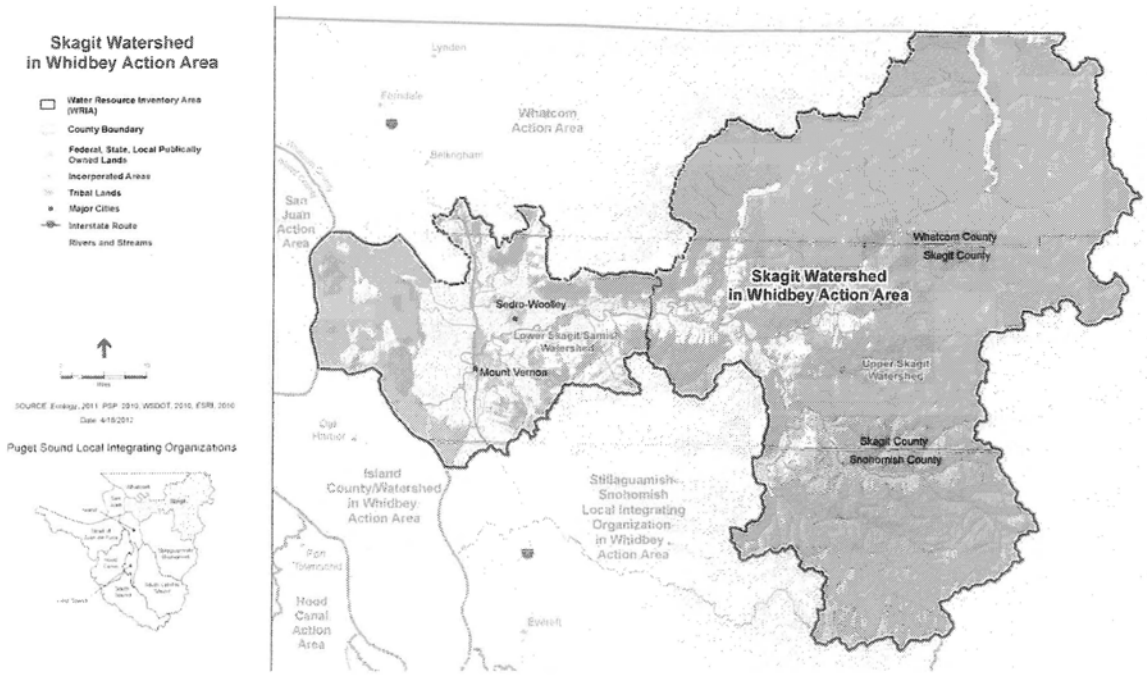
http://www.whatcomcounty.us/pds/pdf/planning/projects/birchbay/finalplan/i-6shore.pdf

The Action Agenda in the Skagit Watershed

Profile

The largest watershed in Puget Sound, the Skagit system, begins in Canada and flows through the rugged Cascades down into low-lying valleys, draining into Skagit Bay. The rich soils of the river's broad delta support the region's most productive farmlands appreciated not only for their crops of berries, potatoes, and organic vegetables, but especially renowned for their bright fields of daffodils and tulips. The Upper Skagit River Valley is a favored wintering area for bald eagles. This impressive gathering of bald eagles, one of the four largest in the contiguous 48 states, coincides with the spawning runs of chum salmon on the Skagit River.

The Skagit Watershed is a fertile center of productivity for high-profile members of the ecosystem's food web including salmon, whales, herring, eagles, and people. Foremost among Puget Sound rivers in volume and length, the Skagit system has 2,989 identified streams totaling approximately 4,540 linear miles. Fed by glaciers on Mount Baker and Glacier Peak, the Skagit has a different seasonal flow pattern from the other major river systems in the area. The Samish River, a smaller drainage comprised of mostly lower elevation terrain, enters Samish Bay and is part of the greater Skagit Watershed (Water



Resource Inventory Areas (WRIAs) 3 and 4). The upper river is home to the region's only major complex of dams. Seattle City Light's dams are located above natural salmon barriers. Puget Sound Energy's two Baker dams obstruct anadromous fish from historic habitat and inundated Baker Lake, a natural lake critical to Baker River sockeye. Today, fish passage facilities built and operated by Puget Sound Energy allow migration of Sockeye and Coho salmon, and bull trout into the Shannon and Baker Reservoirs.

Also in the Skagit, the Cascade, Sauk, and Suiattle rivers are designated as Wild and Scenic, placing them among the largest undammed river systems remaining in the Pacific Northwest. The designation includes 158.5 miles within the Skagit Watershed. The Skagit Wild and Scenic River designation begins just east of the town of Sedro-Woolley, extending to Bacon Creek near the boundary of the Ross Lake National Recreation Area in the North Cascades National Park Service Complex.

The Skagit Delta contains large concentrations of wintering waterfowl, shorebirds, and raptors. A significant portion of an entire Trumpeter Swan population winters at the site, as well as the entire population of gray-bellied Brant, a subpopulation of Brant geese. Birdwatchers flock to the area in early spring to catch the inspiring sight of hundreds of snow geese rising off the fields in graceful waves. The estuarine and intertidal ecosystems are critical habitat for salmon, other marine fish, and wintering raptors and waterfowl.

Unique Ecosystem Characteristics and Assets

Once dependent on traditional Northwest economic sectors such as agriculture, fishing, and wood products, Skagit County has diversified – tourism, international trade, and specialized manufacturing now comprise the bulk the Skagit Valley economy. Skagit County also has ports and refineries, making it an important location for the petroleum industry. Although the economy has continued to diversify, fishing for salmon, crab, and shellfish remain an important commercial and recreational activity. Fishing is also a cultural focus and important source of food for the Swinomish, Sauk-Suiattle, Upper Skagit, and Samish tribes. The Swinomish, Sauk-Suiattle, and Upper Skagit tribes all have reservation lands located in the watershed. Major cities and towns in the Skagit Watershed include Mount Vernon, Anacortes, La Conner, Edison, Bow, Conway, Burlington, Sedro-Woolley, Lyman, Hamilton, Concrete, Rockport, Marblemount, and Newhalem.

Agriculture is still the major land use category in the river delta areas of the Skagit Watershed. Today the Skagit Delta is often referred to as, "The Agricultural Heartland of Western Washington" and encompasses approximately 70,000 acres. The agricultural industry generates approximately $500 million annually in revenue and provides a unique landscape. The Skagit delta farming community also has developed a high level of cooperation to allow rotation for major cultivated crops.[25]

Recreation and tourism are also important economic sectors, with opportunities for float trips, eagle watching, kayaking, camping, hunting, and backpacking. There are several designated wilderness areas. The North Cascades National Park and the Ross Lake National Recreation Area protect the headwaters of the Whidbey Basin,[26] while extensive areas of public and private forest, as well as several popular state parks, provide habitat protection and allow for low impact outdoor recreation. Forestland dominates the upper mountainous portions of the Skagit Watershed, with more than half in the Mount

[25] Additional information about the agricultural industry provided by the Skagit Conservation District can be accessed at: http://www.mypugetsound.net/index.php?option=com_docman&task=cat_view&gid=184&Itemid=238

[26] The Partnership's enabling legislation designates, the Skagit, Island, and Stillaguamish and Snohomish basins as one Action Area called the Whidbey Basin Action Area. A map of the Whidbey Basin Action Area can be found at the end of this chapter.

Baker-Snoqualmie National Forest or in state-owned forests managed by Washington Department of Natural Resources.

Local Action Agenda Process

The work to develop an updated Action Agenda in the Skagit Watershed is in its nascent stages. At this time, the Skagit Watershed does not have a unified convening forum such as a local integrating organization (LIO). There have been initial discussions to develop this group; however, at this time, there is not a functional entity that can hold the update and content of the Action Agenda in a substantive way. The timeline for this effort is dependent upon the interest within the Skagit Watershed.

Due to the lack of a unified forum to organize information in a meaningful way that reflects local priorities and actions, the content presented below on pressures and strategies, sub-strategies, and near-term actions of this profile reflects a *starting point* from which to work. This profile is intended to capture comments and ideas received to date, but the information not been synthesized or advanced to develop actual strategies and actions. More work is needed to be further articulate how the Action Agenda will be implemented within the Skagit Watershed. Readers should consider this profile a tool to capture the dialogue to date regarding what should be incorporated into a local plan for the Skagit Watershed in order to recover the Puget Sound.

In the Skagit Watershed, there has been a tremendous amount of work to identify priorities through existing processes such as the Salmon Recovery Plan and municipal planning documents. A starting list of information is included in the 'References and Additional Resources' section. This resource section, combined with the initial conversations captured below, provides a starting point to develop a local Action Agenda for the Skagit water.

Key Threats/Pressures

At this time, all the pressures and associated sub-categories as defined in the regional taxonomy are deemed relevant to the Skagit Watershed. Further discussion about the relative level of threat and what pressures are most prevalent is still necessary. The following is the list of pressures for further discussion:

- Agriculture and Aquaculture (and all sub-categories)
- Energy production and mining (there is disagreement locally about whether this constitutes a pressure in the Skagit)
- Natural System Modifications (and all sub-categories)
- Biological Resource Use (and both sub-categories)
- Human Intrusions and Disturbance (military exercise sub-category has disagreement)
- Transportation and Service Corridors
- Residential and Commercial Development
- Pollution (and sub-categories)

- Invasive and other Problematic Species
- Climate Change[27]

Changes in climate alter how the ecological systems across the watershed work and how, in turn, the pressures on those systems act. The following information from the Skagit Climate Science Consortium provides an overview of how the Skagit Watershed is experiencing changes and the types of categories to consider in the future conversations around the strategies and actions for implementing the Action Agenda in the Skagit.

The climate of the Pacific Northwest (PNW) has changed in measurable ways since the beginning of the 1900's. These changes have had important impacts in the Skagit watershed. For example, glaciers monitored by long-term studies have receded by about 50 percent and summer stream flows have dropped by up to 30 percent in streams with significant glacier coverage. Inter-annual snowpack has declined on the order of 50 percent in the Cascades since 1950, due to the combined effects of warming and loss of winter and spring precipitation. Water temperatures are rising and the average winter snowline has risen about 650 feet -- markedly increasing the effective size of the basin that captures winter rainfall and produces runoff during floods.

These changes alter such things as the timing of water availability, the magnitude and frequency of flooding, water supply availability and treatment needs, and many other factors affecting people and the PNW's ecosystems. Scientists project that many current trends will continue and intensify as a direct result of increasing greenhouse gas emissions in the 21st century. Research and current data suggest that the decisions necessary to protect human infrastructure and systems, and the natural environment, will require considering a future unlike the past; one where a dynamic and changing landscape becomes the norm.

Coping with a non-stationary environment will require new approaches to the management of human and natural systems, including extensive use of model simulations as a replacement for historical records, more and increasingly sophisticated monitoring, and planning over much longer time horizons (e.g. a century rather than 20 years). New approaches for building consensus in the face of uncertain and rapidly changing conditions will be needed to identify effective adaptation strategies and initiate new policies to cope with both short and long-term climate change impacts. As the landscape changes beneath and around our communities impacts to human and natural systems will increasingly become interwoven.

Climate scientists in the Skagit expect to see a continuation of existing trends in many areas:

- Decreases in summer rainfall
- Wetter springs and falls
- Increases in flood frequency and magnitude
- Lower summer flows and increased duration of low flows
- Changes in the timing of water availability
- Decreases in snowpack and continued and eventual disappearance of glaciers
- Changes in the abundance and distribution of plants, fish, and wildlife
- Increases in sediment loads and changing distribution

[27] Information on the type of pressures associated with Climate Change is continuing to be clarified through the work of Skagit Climate Science Consortium. Preliminary information is included in the pressure text around climate change per the work of the Consortium.

- Increases in sea level and storm surges
- Increased vegetation disturbance due to fire, insects, and disease

The following steps are designed to help the Skagit community determine where to focus additional research or data gathering exercises and move down a problem-solving path. Step 1) Answer the question. Step 2) Determine how significant the problem is in a relevant timeframe for the decision-maker and the interest at hand (e.g. ecological or human systems). Step 3) Determine what steps are necessary to identify and implement adaptation strategies to reduce risk.

Flooding

- Will flood risks increase in the Skagit basin in response to rising temperatures and increasing winter rainfall?
- Will the seasonality of floods change due to earlier storms or loss of snowpack?
- Are dams located where they can help mitigate increased flood flows?
- What will be the combined effects of increasing peak flows, sea level rise, groundwater flooding and channel infilling from increased sedimentation?

Water Supply

- Are water supply infrastructure, including wells and facilities in the floodplain threatened by sea level rise or increasing flood risk?
- Are treatment facilities able to handle predicted increases in turbidity levels?
- Will water supply be impacted by decreasing summer flows?
- Will changes in precipitation, including increased fall precipitation and lower summer rain-fall, affect supply?
- Will groundwater wells benefit from increased fall precipitation more or suffer from lower contributions from snow and decreased summer rainfall?

Drainage

- Will increased sea level rise or sediment deposition from the rivers impact drainage for farmland?
- Will sea level rise impact drainage either through complete loss of drainage capabilities or reduction in drainage duration?
- Will increases in fall and winter rainfall and changes in water table height impact drainage?

Habitat Restoration

- Will increases in sediment affect restoration efforts?
- Will increased sea levels affect restoration efforts?
- Will shifts in timing or magnitude of the peak flows affect restoration effort? Will low summer flows affect your restoration effort?
- Will ecosystem scale changes impact the species and processes you are seeking to restore?
- Will increases in air and water temperatures affect your restoration effort?
- Will dam management mitigate increases in peak and low flows or impact sediment regimes that may impact your habitat restoration?

Water Quality

- Will projected reductions in summer flows impact your National Pollutant Discharge Elimination System (NPDES) permitting or meeting total maximum daily load (TMDL) requirements?

- Will lowered summer flows and increases in water temperature result increasing low dissolved oxygen levels and algal blooms?
- Will turbidity levels increase?

The following opportunities, priorities and near-term actions can be considered within the context of changes to climate in the near and long term. Future conversations within the Skagit Watershed can provide the opportunity to further refine how to do this work.

Opportunities, Priorities, and Near-Term Actions

Further work is needed to finalize the specific strategies, sub-strategies, and near-term actions, as well as to prioritize work in the Skagit Watershed. The tables below were built through the feedback received by entities within the Skagit Watershed. The tables should be considered a "working document" that captures ideas to date. The 'notes' column in the first table reflects the comments received about the strategies so that readers can understand the existing dialogue around these strategies. At this time, there are no agreed-upon strategies nor near-term actions in the two tables below. Instead, these two tables will be used to advance the dialogue in the Skagit Watershed around key contributions within the Skagit Watershed for Puget Sound recovery.

PRELIMINARY STRATEGY IDEAS FROM THE 2008 SKAGIT STRATEGY/ACTIONS TAKEN FROM THE WHIDBEY BASIN PROFILE AND INITIAL 2011 DRAFT UPDATES*	PRELIMINARY IDEAS ON NEAR-TERM ACTIONS	PRELIMINARY IDEAS ON RELATIVE PRIORITY OF STRATEGY (LOW, MEDIUM, HIGH)	CLARIFYING NOTES AND COMMENTS FROM SKAGIT WATERSHED REVIEWERS
Protect and Restore Terrestrial and Freshwater Ecosystems			Comment: Question 1, Page 3 states that the number of acres in farms is a measure of the health of Puget Sound. This ill-defined target and benchmark are not a meaningful measure of how well we are protecting Puget Sound. Should be linked to the number of acres of farmland where water quality is not compromised as a result of farming activity. Also applies to Priority A and to Sections A.2 and A.4 Comment: Need to also consider and acknowledge that farmland plays a role buffering more intensive urban/commercial/industrial land uses. Working lands need to be acknowledged and brought into the Puget Sound discussion
Smart Growth, Development, Land Use and Land Protection.			
Focus land development away		High	Comment: This is locally controlled;

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from ecologically important and sensitive areas			nothing about mitigation
Adopt clearing and grading ordinances throughout Whidbey Basin			
Review and apply recommendations of the Envision Skagit 2060 project		High	Comment: Need to specify which recommendations
Protect and restore native riparian forests along streams			Comment: Source: Salmon Recovery Plan
Protect, restore, and maintain fish passage at road culverts and tide gates			Comment: Source: Salmon Recovery Plan Comment: There are other cooperative efforts that work to advance this strategy, including TFI & DFI
Include Section 106 streamlining			
Protect and steward ecologically sensitive rural lands			
	Ensure that protection actions maintain funding priority.	High	Comment: In this economic downturn funding discussions & money seem to be leaning towards restoration however cost-benefit studies clearly show coordinated and systematic land protection pays off. Can't lose sight of this due to current economic climate- need to evaluate long term cost-benefit. Funding for stewardship or community systems for stewardship need to be included in protection costs and analysis. Protection is only meaningful if in perpetuity with a funded stewardship system (whether fee land protection or conservation easement). Comment: Should also include farmland protection.
Continue funding for CREP program and other voluntary agricultural stewardship programs			Comment: This is not specific to farming and it is not really clear how to identify ecologically sensitive or what stewardship means exactly. If they are

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			degraded, will they be restored? How will they be integrated with ecological objectives? Distinctions should be made between those farming practices that support ecological objectives and those that do not. Comment 2: CREP is specific to agricultural lands. Comment 3: Consider embracing Malcom Gladwell's tipping point approach: it is the little things that over time achieve big outcomes (e.g. hedge rows, buffer strips, etc.). It doesn't have to all be 100 foot buffers.
Support conservation markets and incentives programs for agricultural lands			
Update shoreline management plans and CAOs	To be done within the next 2 years	High	
Strategy around supporting agriculture in the context of having drainage, fish passage, marsh reclamation, and riparian issues done in a way that recovers salmon and a healthy Puget Sound			Comment: Efforts to distinguish farms lands worthy of protected status from those that should not be included should recognize operators who have committed to sustainable practices that consider both land and water resources jointly. Clear benchmarks by which to measure farmland integration with ecological values should be developed and utilized. Comment: Comment number 1 assumes that farmland has no value other than what it can be converted to.
Encourage compact regional growth patterns and create dense and attractive communities			
Work with Skagit County code to develop zoning rules that are compatible with restoration and protection			Comment: Code allowing the subdivision of parcels in order to create substandard lots specifically for the protection of sensitive land would be helpful

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			Comment: State requires protection of agricultural lands of long-term commercial significance in addition to other critical areas. Under the Growth Management Act, these prime farmlands are to be preserved for production of food and agricultural products for future generations. The Supreme Court also affirmed that land use activities which substantially interfere with maintaining and enhancing the farm industry, and have negative impacts on designated agricultural lands are prohibited.
Review and apply recommendations of the Envision Skagit 2060 project		High	
Adopt the Shared Strategy recommendations for protecting and preserving agricultural lands in the Puget Sound region			
Watershed Characterization process should be clarified: Who will do the characterization and what level of resolution will be developed?			
Protect and restore floodplain function		high	Comment: Nothing about flood hazard management plans in spreadsheet; the only recommended actions are to implement large scale floodplain restoration projects. Elements that include protection measures should be included. Comment: What about the role of farmland preservation? What about flood easements?
	Action around flood hazard mitigation plan		
Implement large-scale	Action around		Comment: Natural process-based

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floodplain projects to remove bank armoring, re-connect side channels and provide mainstem rivers with ability to migrate and create diverse instream habitat	FEMA NFIP rule		restoration should be prioritized. Costs of restoration need to be project life costs and include evolving design, monitoring and management including costs of possible impact to other landowners. Indemnification of landowners and insurance will help people to sign on to these projects.
Add protection strategy			Comment: Protection strategy should include a provision to prevent any new floodplain isolation or reduction in floodplain function. The impacts of climate change will likely exacerbate flooding issues creating a push for more flood protection infrastructure. Incentive programs could be established that identify alternatives to traditional flood protection strategies. These could include structure relocation or structure modification to increase flood resistance.
Restore Key Terrestrial and Freshwater Habitats.			
	Implement the projects identified in the Middle Skagit Project (Skagit Watershed Council)		
	Several projects identified in the Middle Skagit project are implementable in the next two years.	Medium	
Implementation and maintenance of key restoration projects for upland and freshwater ecosystems			
	Participate in knotweed removal efforts (Skagit Fisheries Enhancement	Medium	

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	Group)		
Sustain Freshwater Availability for Instream and Human Uses.			
Instream flow protection and enhancement			
Implement flow rules and programs in all basins		High	Comment: A6 includes implementing flow rules and programs, upgrade flow rules in Skagit basins, and protect intact mainstem rivers. There is nothing specific about the list of water critical basins and there is nothing about the Samish.
Upgrade flow rules in Skagit basins / Flow rules adopted and implemented for the Skagit Basin			Comment: It is unclear what upgrade flow rules in the Skagit basin is intended to do.
Protect intact mainstream rivers		High	Comment: Likely one of the best long-term solutions for the cost
Promote and fund programs that invest in public and private water use efficiency projects			
Groundwater protection and management			
Protect and Recover Salmon.			Comment: Broadening the salmon recovery effort to not only focus on Chinook would be more aligned with the goal of restoring ecosystems and fish restoration in general.
Protect and Recover Salmon			
Implement Salmon Recovery three-year work plan (WRIAs 3, 4); meet restoration targets set in the salmon recovery plans / The regional habitat protection decision making framework promoted here is inconsistent with the basis upon which watershed-specific Chinook Recovery Plans were developed. It is unclear what is being proposed- more details are needed regarding who will be making decisions and the			

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scope of their authority.			
Create and implement actions to monitor and adaptively mange salmon recovery work	Finish the AMM RITT template for the Skagit.	High	
Plan for the recovery of steelhead in the Skagit and Samish basins.	Review Skagit Plan for gaps in planned actions		Comment: May need more nearshore work identified.
Support Lead Entity program	Writing of the Puget Sound Steelhead recovery plan should at least be well underway within 2 years.		
Support/implement fish passage projects			
Protect and Recover other Native Terrestrial and Freshwater Species.			
Implementation of other plans in a coordinated way and maintenance and enhancement of biodiversity			
Implementation of Northern Pacific Coast Regional Shorebird Management Plan. United States Shorebird Conservation Plan, Pacific Coast Joint Venture North American Waterfowl Management Plan And North American Waterbird Conservation Plan, Oregon Spotted Frog program (WDFW)	Communicate with WDFW wildlife program to learn of other plans being implemented and developed		
Clarify process associated with Watershed Characterization, including what level of resolution used			Comment: Links to a Regional Strategy
Invasive species prevention and response			
Participate in knotweed removal efforts (Skagit Fisheries Enhancement Group)			Comment: There are groups other than the Enhancement Group working on knotweed removal
Participate in WDFWs Zebra Mussel prevention program			

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Fill Key Science and Information Gaps for Terrestrial and Freshwater (see content in the Science Table below).			
Include scientific references to support assertions made regarding threats to Puget Sound.			
Strategies and actions to flow from the Biennial Science Work Plan effort			
Protect and Restore Marine and Marine Nearshore Ecosystems			
Nearshore Growth, Working Waterfronts, and Marine Protection.			Comment: Nothing about fish passage in the spreadsheet.
Protection of marine and nearshore ecosystems that still function well			Comment: Need to strengthen connection with Puget Sound health. Comment: Mitigation practices and techniques need to be updated and consistently applied whenever permission is required from natural resources protection agencies (WDFW, Ecology, Corps, etc.)
Complete and implement Shoreline Master Program updates on schedule; implement restoration components of shoreline management plans			
Evaluate need to protect ecosystem processes and quality of life needs when considering tidal energy projects		High	Comment: Concern that we may get ahead of ourselves here before we know how these impact natural processes and habitat.
Protect Padilla, Skagit and Fidalgo Bays eelgrass beds			Comment: Need a funding source to contact private owners and purchase tidelands and then return these to public ownership (DNR etc) with a conservation easement or other protection mechanism on them.

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			Comment: Need to identify areas.
Protect unique spawning areas and bird habitat		High	Comment: Need for a co-ordination of all the various datasets, maps and plans into one useable and accessible source.
Re-visit WDFW rules allowing the construction of bulkheads to protect single family residents			Comment: Current code does not allow the denial of an application for building a bulkhead to protect a single family dwelling. Comment: WDFW does have the ability to require mitigation for bulkheads. If mitigation is applied properly new bulkheads would not create a net loss in habitat.
Support economic viability of working waterfronts to help maintain ecosystem function and sustain quality of life			Comment: Working waterfronts intermixed with a good level of connected community access will draw largest support
Note: B2 is about supporting economic viability of waterfronts. Also does not get at the health of Puget Sound ecosystem			
Promote public access and use of waterfronts and marine systems			Comment: Need more of this- public access is currently very limited and with population growth in the region it will be needed.
Restore Marine and Marine Nearshore Areas.			
Implement and maintain priority ecosystem restoration projects marine and marine nearshore ecosystems.			Comment: This is a challenging issue to address but needs to be figured out. Addressing this problem on a project by project basis is inefficient and often not successful. There needs to be a coordinated effort that applies a global view of the issues and that identifies threats and benefits to all parties involved.
Complete large scale estuary restoration projects in the Skagit,	Skagit Counties Freestad Lake project is ready to be started.		Comment: Need to repeatedly tell community about the cost-benefit of these projects. Currently seen by many citizens as costly or interfering with

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	WDFW/Ecology lands in Padilla bay need to be revisited for restoration opportunity.		agriculture without clear understanding of the long-term benefits. Need to show how sea-level rise will factor into estuary restoration project planning. Comment: This Action Agenda statement fails to consider the existence of variable real world examples of large scale estuarine restoration projects that have already been implemented and are currently being monitored. The action item should take a more aggressive stance and work to ensure support for robust monitoring strategies, and subsequent implementation at all large scale estuarine restoration projects Comment: Need real accountability and need to publically process existing restoration sites
Prioritize and strategically remove derelict gear			
Support and promote implementation of the Skagit Delta Tidegates and Fish Initiative Agreement			
Protect and Recover Native Marine Species.			
Protect and recover marine and nearshore species			
Invasive species prevention and response			
Continue local efforts to identify and eradicate invasive species impairing habitat		High	Comment: Needs to be systematic and science-based.
Fill Key Science and Information Gaps for Marine and Nearshore (See content in Science Table below).		High	Comment: Need to co-ordinate all the data and plans into one place. Data may be good but it is in multiple plans and data sets.
Strategies and actions to flow from the BSWP effort			
Prevent and Reduce Toxic			

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Loadings into Puget Sound.			
Implement toxic chemical and pollution policy and programs to reduce release of chemicals.		High	
Participate in WDFWs Ballast inspection program			
Implement and clean-up activities to reduce pollution			Comment: Air quality continues to be neglected in strategy document
Implement Watershed Management Plans addressing temperature, dissolved oxygen, mercury, and bacteria impairments			
Evaluate low dissolved oxygen levels in Saratoga Passage, and Possession Sound, and develop and implement strategy to address low dissolved oxygen levels if necessary (using lessons learned in Hood Canal)			
Protect clean air / protect air quality			
Control and Manage Stormwater.			
Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales			
Implement NPDES permits			
Use and increase site-appropriate LID techniques to manage for future planned growth			
Begin stormwater retrofits in dense urban areas		High	
Support the Skagit Clean Samish Initiative and continuing funding priority			
Prevent Pathogen and Nutrient Loadings into Puget Sound.			
Control and manage pollution from decentralized wastewater treatment			

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including large and small on-site systems			
Support local efforts to identify and control sources of pollution		High	
Control and manage pollution from centralized wastewater management			
Comprehensive approaches to rethink wastewater control and management			
Control and manage pollution from discharges of wastewater from boats and vessels			
Participate in WDFWs Ballast inspection program			
Agricultural and forest runoff			
Support TDR/PDR programs /Support Shared Strategy recommendations for providing more state and federal funding for PDR programs to keep farmland in farming.			Comment: Need to do economic studies to ensure TDR & PDR programs get us where we need to go. If agriculture is not a long-term viable industry in the area where a program takes place, we may end up with lots of acres of invasives in the future and/or the conservation easements will be challenged and undone. To avoid this, conservation easements need to allow for open space and habitat uses if agriculture is no longer viable or as a secondary use. Groups that manage TDR and PDR programs should have transparent systems and funds to monitor and enforce these. TDR and PDR should bring cost of ag land down so affordable. Focus needs to be on maintaining viability of ag in the area as a priority since a robust ag industry is really what will keep the ag land in place in the long run. Comment: Concern about the comment above and whether this is asking the agricultural community to,

PRELIMINARY STRATEGY IDEAS FROM THE 2008 SKAGIT STRATEGY/ACTIONS TAKEN FROM THE WHIDBEY BASIN PROFILE AND INITIAL 2011 DRAFT UPDATES*	PRELIMINARY IDEAS ON NEAR-TERM ACTIONS	PRELIMINARY IDEAS ON RELATIVE PRIORITY OF STRATEGY (LOW, MEDIUM, HIGH)	CLARIFYING NOTES AND COMMENTS FROM SKAGIT WATERSHED REVIEWERS
			"prove" through some sort of economic analysis and scientific evaluation that the industry will be around for the next 100 years.
Provide support for technical assistance and cost-share programs for small farms and commercial agriculture to improve and integrate agricultural nutrient management		High	
Integrate small farms into current programs		High	Comment: Provide opportunities/programs that enable new farmers to establish viable businesses. Such programs exist at WSU extensions but they are small and could be expanded upon. There are many federal programs that aid folks interested in small scale farming. Opportunities and programs could also be provided to help current farmers change their business model to one that is economically beneficial to the farmer as well as beneficial to the ecosystem. These might include organic farming or biointensive farm practices. Comment: It should be recognized that this sector is most often not eligible for typical USDA programs. Needs additional financial support.
Keep livestock out of streams			
Participate in the Skagit County Voluntary Stewardship Program	Local and State committees will be forming in the near future to create planning documents a programs.		
Shellfish bed restoration			Comment: Attention must be paid to toxic conditions found in some growing areas such that conditions are improved to the point that

PRELIMINARY STRATEGY IDEAS FROM THE 2008 SKAGIT STRATEGY/ACTIONS TAKEN FROM THE WHIDBEY BASIN PROFILE AND INITIAL 2011 DRAFT UPDATES*	PRELIMINARY IDEAS ON NEAR-TERM ACTIONS	PRELIMINARY IDEAS ON RELATIVE PRIORITY OF STRATEGY (LOW, MEDIUM, HIGH)	CLARIFYING NOTES AND COMMENTS FROM SKAGIT WATERSHED REVIEWERS
			consumption of fish and shellfish at rates common to tribal Communities will not jeopardize health. There is no provision for truly examining the connections between human health and the environment. An element should be added to the plan to address this.
Implement shellfish protection plans			Comment: Not clear what is in these plans or if the 10,000 acres is relevant. Comment: Consider testing the shellfish meat itself and not merely water quality
Participate in the Clean Samish Initiative		High	
Oil spill prevention, readiness and response			
Fill Key Science and Information Gaps			
Strategies and actions to flow from the BSWP effort			
Sustain, Coordinate, and Adapt Puget Sound Recovery Efforts			
Capacity Building and Coordination / D1 includes working collaboratively with farming community, TFI, and alt futures project. The TFI, DFI and Alt Futures processes lack substance and resource related goals and objectives. This strategy should speak to specific programs and partnerships that seek cohesion with ecological outcomes.			Comment: D1 includes working collaboratively with farming community, TFI, and alt futures project. These processes have shown little resource benefit and are largely focused on addressing mitigation requirements for agriculture activities that continue to damage resource values (DFI & TFI). References to these should be removed or revised to strengthen Ag community obligation to go beyond mitigation and start helping to restore and recover the Puget Sound. Regulations should be put in place to insure the water quality standards are met on streams flowing through agricultural lands.; Other than nutrient runoff and supporting collaborative efforts there are no

PRELIMINARY STRATEGY IDEAS FROM THE 2008 SKAGIT STRATEGY/ACTIONS TAKEN FROM THE WHIDBEY BASIN PROFILE AND INITIAL 2011 DRAFT UPDATES*	PRELIMINARY IDEAS ON NEAR-TERM ACTIONS	PRELIMINARY IDEAS ON RELATIVE PRIORITY OF STRATEGY (LOW, MEDIUM, HIGH)	CLARIFYING NOTES AND COMMENTS FROM SKAGIT WATERSHED REVIEWERS
			specific agenda items, and nothing related specifically to drainage, fish passage, marsh reclamation, or riparian issues. Nothing about lead entities in spreadsheet. Comment: Concern with the above comment in terms of tone and information. There are many projects on agricultural land that have been completed to help in the restoration and recovery of Puget Sound.
Building and sustaining cooperative partnerships			This strategy should speak to specific programs and projects that seek cohesion with ecological outcomes
Support integration of species recovery, water quality, aquatic reserve and natural resource management plans, shoreline master programs, and Marine Resource Committee strategies; start with salmon recovery, MRC, and water management plans			
Continue to work cooperatively with farming community to develop a coordinated restoration strategy that balances the needs of agriculture and fish		High	
Support engagement of salmon recovery watershed groups with the Skagit County Agricultural Advisory Boards and other farming groups			Comment: Add a salmon and shellfish advisory board to the County infrastructure. Comment: Believe that this has already been done.
Support collaborative efforts to negotiate the Skagit Delta Tidegates and Fish Initiative / negotiation complete	Support implementation of the Skagit Delta Tidegates and Fish Initiative Final Agreement		
Sustain recent collaborative efforts to identify protection			

PRELIMINARY STRATEGY IDEAS FROM THE 2008 SKAGIT STRATEGY/ACTIONS TAKEN FROM THE WHIDBEY BASIN PROFILE AND INITIAL 2011 DRAFT UPDATES*	PRELIMINARY IDEAS ON NEAR-TERM ACTIONS	PRELIMINARY IDEAS ON RELATIVE PRIORITY OF STRATEGY (LOW, MEDIUM, HIGH)	CLARIFYING NOTES AND COMMENTS FROM SKAGIT WATERSHED REVIEWERS
and restoration opportunities in the Skagit watershed			
Implement Skagit Alternatives Futures Project results; expand project as warranted; integrate and coordinate project with other Skagit community efforts / Implement Envision Skagit 2060 results; expand project as warranted; integrate and coordinate project with other Skagit community efforts			Skagit Alternate Futures is now called Envision Skagit
Tribes are treated as the formal governments they are. Government to government discussions, especially as co-manager roles with regard to fisheries.			No, language is not assertive nor well placed. PSP has shown some disregard for this relationship
Implement a process that is bottom up, based on a locally-driven effort.			
Sustain recent collaborative efforts by Ducks Unlimited and regional agricultural interests to initiate the "Preserving Farmland, Waterfowl and Coastal Estuaries in North Puget Sound" program.			
Continue to endorse implementation of the Skagit Delta Drainage and Fish Initiative - Maintenance Plans			
Funding strategies			
			Need to flesh out the details of this strategy
Social and institutional infrastructure			
Use climate change science to inform strategies and actions			The Skagit Climate Science Consortium identified a series of questions intended to guide discussions within the Skagit Watershed on how address management decisions, keeping in mind the related climate change impacts. This list of questions can is

PRELIMINARY STRATEGY IDEAS FROM THE 2008 SKAGIT STRATEGY/ACTIONS TAKEN FROM THE WHIDBEY BASIN PROFILE AND INITIAL 2011 DRAFT UPDATES*	PRELIMINARY IDEAS ON NEAR-TERM ACTIONS	PRELIMINARY IDEAS ON RELATIVE PRIORITY OF STRATEGY (LOW, MEDIUM, HIGH)	CLARIFYING NOTES AND COMMENTS FROM SKAGIT WATERSHED REVIEWERS
			above in the pressure section
Add in strategy around Section 106 streamlining re: restoration projects			
Increase public awareness and understanding			
Implement STORM group recommendations			
Cultivate broad-scale practices and behaviors			
Fill key science and information gaps *(See Science Table below)*			
Develop strategies that allow multiple goals to be addressed concurrently.			Comment: The Action Agenda has set out a very ambitious recovery agenda with a wide variety of goals and indicators. In order to make significant advancement that can be measured, initiatives or strategies that cut across goals or indicators should be prioritized. These will provide efficiencies and help to garner funds from more sources as budgets are tightened. Examples of cross-cutting strategies may be floodplain restoration that is critical for salmon recovery and flood protection. Farmland improvements that help to preserve farmland, restore riparian habitat for salmon and decrease runoff from agricultural production.
Analyze strategies and specific actions to ensure that they are not contradictory to other goals.			Comment: The goals and targets of the Action Agenda are so diverse, some may be in conflict if not carefully implemented and designed. Approaches that integrate goals will help to reduce the probability of conflict.

*Skagit developed this list of local strategies within the context of an early draft outline of regional strategies and sub-strategies. Since this list of local strategies was compiled, the regional strategy outline changed. As such, the order and wording may not match what is currently in the Action Agenda. Once the local area has completed their prioritization process, the final list of local strategies will be cross-walked with the most current regional strategies.

Scientific Questions:

STRATEGY CATEGORY	DRAFT KEY UNCERTAINTIES	DRAFT SCIENCE NEED
Protect and Restore Terrestrial and Freshwater Ecosystems	Amount of hardscaping and threshold point for significant impairment of watershed health and function; Juvenile fish use of freshwater habitat	Need to combine all the data and plans and existing science into one useable source; Which fish use which freshwater habitats and at what densities. This will help determine restoration priorities and trajectories
Protect and Restore Marine and Marine Nearshore Ecosystems		Need to combine all the data and plans and existing science into one useable source
Reduce and Control the Sources of Pollution to Puget Sound	Effect of agricultural runoff	Need to know if agricultural runoff is affecting aquatic ecosystems and organisms. With this information we can determine what agricultural management practices are needed to protect aquatic resources. Include in investigation the information already being tracked.
Sustain, Coordinate, and Adapt Puget Sound Recovery Efforts	Steelhead populations, life history and habitat use	Need to combine all data and plans and existing science into one useable source; Need to know about steelhead in order to plan for their recovery.
	Incorporate scientific references to support information associated with threats to Puget Sound	Evaluate the contribution made by restoration thus far and how much more will be needed. Methods and metrics need to be updated or provided to allow the evaluation and monitoring needs to be conducted to test the methods.
	Need further information about the use of 'acres in farms' as a measure of the health of Puget Sound. This comes from Question 1, Page 3 in 2008 AA	
	Uncertainty, or lack of description, about the connection between toxicity, fish consumption, and human health	
	Need regional habitat protection strategy that is consistent with the Salmon Recovery Plan	
	Need for monitoring of estuarine projects	
	Question around mitigation banking at the regional scale	
	Need clear benchmarks re: farmland integration with ecological values	
Changes in Climate and Associated Implications	The Skagit River delta is a significant natural and human resource. Under projected sea level rise scenarios the fate of the Skagit Delta becomes increasingly uncertain, and understanding the fundamental balance	Studies are needed to: a. Estimate the effects of climate change on bedload regime and the fate and transport of suspended sediments in the Skagit mainstem, estuary, delta,

STRATEGY CATEGORY	DRAFT KEY UNCERTAINTIES	DRAFT SCIENCE NEED
	between rising sea levels and increasing sediment loading becomes a crucial need.	and Puget Sound b. Effects of climate change on turbidity c. Identification of key sediment storage areas
	Low flows are of utmost importance to humans and ecosystems. Rapidly changing glaciers, snowpack and groundwater resources will all influence low flows. More information on glaciers is needed to inform dam management, salmon and bull trout restoration efforts and water supply decisions.	Studies are needed to: a. Update and extend the Skagit glacier inventory b. Model glacier run-off processes and model future impacts c. Estimate groundwater impacts in the Skagit lowlands
	Skagit floodplain management is imperative to human and ecosystem communities. Flood magnitude and frequency is projected to increase dramatically in the Skagit River. Flood managers need access to better tools to help them understand future scenarios and plan for flood mitigation approaches that also improves ecosystem resiliency.	Studies are needed to: Provide inundation maps and associated vulnerability assessments for the combined effects of sea level rise and increasing flood risks projected for the 21st century.
	As peak and low flows are changing, water temperatures are increasing and monitoring of water quality and ecosystem impacts becomes increasingly important. Scientists are predicting changes in dissolved oxygen, temperature, and salinity that have important impacts on TMDLs, ecosystem health and water quality. Biogeophysical models can be used to predict these changes, but sufficient data is rarely available to evaluate these tools.	Studies are needed to: Monitor estuarial circulation impacts to water temperature, salinity, and nutrients due to changes in air temperature and river flow.
	Habitat restoration has been put forward as a primary strategy to build resiliency in the ecosystem. In this context it is critical to understand the impacts of a changing climate on species of interest. These include primary production, forage fish (herring), anadromous fish (salmon), terrestrial and marine mammals, birds, etc.	Studies are needed to: Spatially predict which estuarine and nearshore vegetative species can thrive where under different climate scenarios. This is completed through niche modeling as a means to estimate changes in nearshore habitat.
		Evaluate the delta for the affect of sea level rise on the viability of agriculture.

Relationship to Recovery Targets

The entities within the Skagit Watershed that provided feedback feel that it is critically important to accomplish the regional recovery targets. At this time however, there is no specific information on where or how recovery targets are being addressed in the Skagit Watershed.

References and Additional Resources

The following list of references and additional resources is a starting point for additional work to organize and identify the strategies and actions most relevant in the Skagit Watershed. This is not intended to be a comprehensive list. Additionally, many key resources are not available online.

Puget Sound Salmon Recovery Plan, Skagit Chapter. Available online at: http://www.psp.wa.gov/SR_map.php

Skagit County Planning Documents, including but not limited to the Critical Area Ordinance, Shoreline Master Program, Sub-Area Plans, and Flood Management. Available online at: http://www.skagitcounty.net/Common/asp/default.asp?d=PlanningAndPermit&c=General&p=main.htm

Snohomish County. Surface Water and Planning. Available online at: http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SWM/ and http://www1.co.snohomish.wa.us/Departments/PDS/default.htm

Whatcom County. Surface Water and Planning. Available online at: http://www.co.whatcom.wa.us/publicworks/index.jsp and http://www.co.whatcom.wa.us/pds/index.jsp

Skagit Watershed Council Information and Links. Available online at: http://www.skagitwatershed.org/ and http://www.skagitwatershed.org/Links.aspx

Seattle City Light. Information Available online at: http://www.seattle.gov/light/

Swinomish Indian Tribal Community. Information Available online at: http://www.swinomish.org/

Sauk-Suiattle Indian Tribe. Information Available online at: http://www.sauk-suiattle.com/

Upper Skagit Indian Tribe.

Samish Indian Nation. Information Available online at: http://www.samishtribe.nsn.us/

Town of Darrington. Information available online at: http://town.darrington.wa.us/

City of Mount Vernon Planning Documents, including but not limited to Critical Area Ordinance, Master Plan, and Land Use Development Projects. Available online at: http://www.ci.mount-vernon.wa.us/community_and_economic_development

City of Burlington Planning Documents, including but not limited to Flood Management and Shoreline Master Plan Update. Available online at: http://www.ci.burlington.wa.us/page.asp_Q_navigationid_E_317

Town of La Conner Planning Documents, including but not limited to Comprehensive Plan and Shoreline Master Plan. Available online at: http://www.townoflaconner.org/planning-permits-codes.cfm

City of Anacortes Documents, including but not limited to Comprehensive Plan and Shoreline Master Plan. Available online at: http://www.cityofanacortes.org/planning.htm

Forest Service, Mt. Baker-Snoqualmie Forest. Information Available online at: http://www.fs.usda.gov/mbs

National Park Service, North Cascade Parks Complex. Information Available online at: http://www.nps.gov/noca/index.htm

Department of Ecology Water Quality TMDLs. Available online at: http://www.ecy.wa.gov/programs/wq/tmdl/TMDLsbyWria/tmdl-wria03.html

Department of Ecology Watershed Management. Available online at: http://www.ecy.wa.gov/programs/eap/wrias/Planning/03-04.html

Skagit Climate Consortium. Information Available online at: http://www.skagitclimatescience.org/

Skagit Environmental Endowment Commissioner. Information Available online at: http://skagiteec.org

Skagit River History Project. Information Available online at: http://www.skagitriverhistory.com

Profile Text References

http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/upload/Ch5_Skagit.pdf

http://hwsconnect.ekosystem.us/Project/280/10306

http://www.rivers.gov/wsr-skagit.html

http://skagitcounty.net/common/asp/default.asp?d=Home&c=General&p=about.htm

http://washington.hometownlocator.com/wa/skagit/

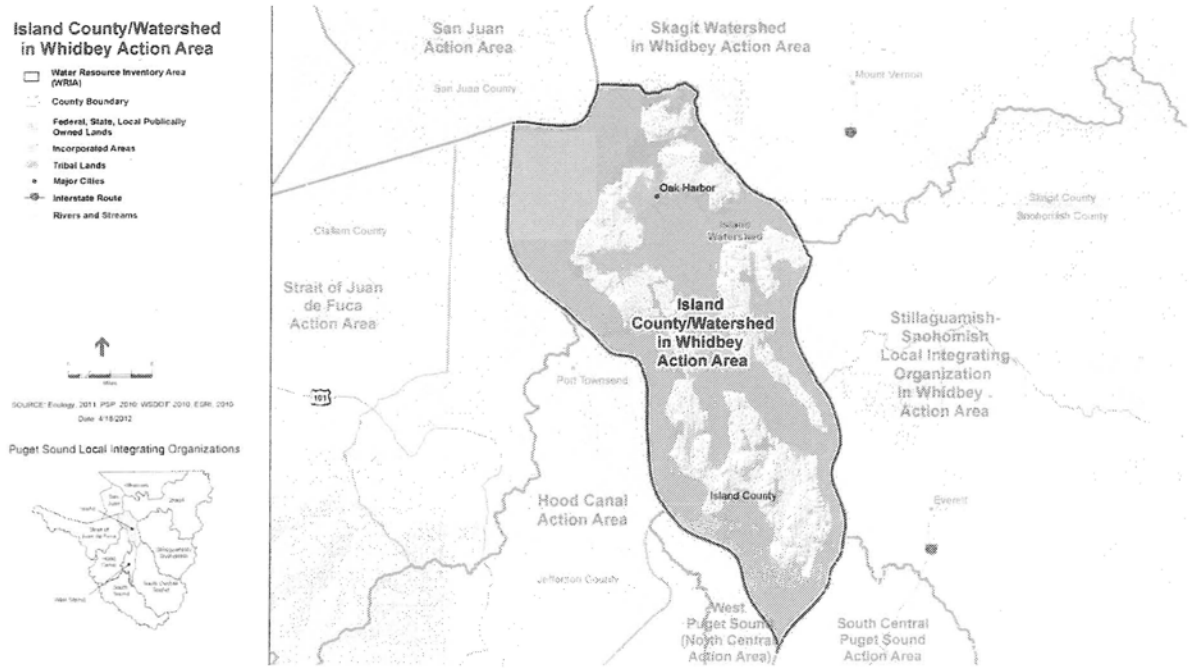
http://www.skagitonians.org/spf-at-work.cfm

http://www.gorp.com/parks-guide/travel-ta-ross-lake-national-recreation-area-washington-sidwcmdev_068279.html

The Action Agenda in the Island County/Watershed

Profile

Located in the neck of Puget Sound, Island County is off the western shores of Skagit and Snohomish counties, and the eastern shore of Kitsap County. Island County is home to Whidbey and Camano Islands and also includes Kalamut, Minor, Deception, Baby, Ben Ure, Strawberry and Smith islands. Sightseers from around the world flock to Deception Pass Bridge to witness one of the Northwest's marine wonders. The 182-foot high bridge spans the drama of Deception Pass where powerful tides push strong currents through a narrow channel connecting the Strait of Juan de Fuca to Saratoga Passage. The bridge connects Whidbey Island to the mainland via Fidalgo Island to the north; and the south end and connects via the mainland at the south end by the Clinton-Mukilteo ferry, which has the highest ridership of the WA state ferry system. Camano Island connects by bridge to the mainland at Stanwood in Snohomish County. The environment and resources in Island watershed and the surrounding marine waters continue to support the long term cultural and economic viability of local tribes.



There are a number of State Parks in Island County, including those on Whidbey Island and Cama Beach on Camano Island. Whidbey Island also contains the Ebey's Landing National Historical Reserve of the National Park Service; and the Smith & Minor Islands Aquatic Reserve lies off the West side of North

Whidbey. At the request of the Island County Marine Resources Committee, the County Board of Commissioners in 2003 designated the waters of Admiralty Inlet, Saratoga Passage and Port Susan as educational "marine stewardship areas". Already a popular place for outdoor enthusiasts, the County is continuing to develop a system of trails on Whidbey Island for hiking, biking and horseback riders. A water trail for kayaks and other small vessels without motors has been and continues to be developed by state and community partners. Some hardy souls go for sail boarding, and wet-suited surfers and divers have their favorite spots.

Camano Island is an unincorporated area, part of the Stanwood School District. Whidbey Island includes the incorporated cities/towns of Oak Harbor, Coupeville and Langley, and has 3 school districts, 3 Port Districts, 2 Park & Recreation Districts. There are also several Diking & Drainage Districts. Island County employment is primarily associated with the Naval Air Station Whidbey Island, near Oak Harbor, which employs around 10,000 workers and constitutes approximately 88 percent of all economic activity. Other significant employers within the remaining 12 percent of economic activity include Nichols Brother Boat Builders, Whidbey Telecom, Whidbey Island Bank, and Island County government in the County seat of Coupeville. While the population is increasingly retired people, many workers commute to Boeing's Paine Field plant, and others use high-speed Internet connections to reach their markets. Tourism is also important to the local economy. The population in Island County is projected to increase 32 percent by 2020.

Unique Ecosystem Characteristics and Assets

The proximity of Island County to numerous rivers and their delta environments provides critically valuable nearshore habitat for migrating juvenile salmonids as well as for their prey, forage fish. Much of the shoreline offers periodic enclosed refuges in moderate and high energy locations. Much of the shoreline includes beach areas and eelgrass meadows ideal for forage fish. The biological communities and physical habitat provide important support to nearby salmonid refugia and nursery grounds, which are also important habitat for Endangered Species Act (ESA) listed Chinook salmon, Orca whale and bull trout. The complex network of shoreline features include shoreline processes that demonstrate that feeder bluff and nearshore sediment transit areas are critical to the complex web processes supporting habitats and biological diversity.

Other important fish species in Island County include multiple species of salmon, Pacific hake, rockfish, Pacific cod, and herring. It is also an important migratory area for marine mammals. A small group of gray whales spend spring and summer feeding on ghost shrimp and tubeworms on beaches on southern Whidbey and Camano islands and the east side of Port Susan. The giant Pacific octopus is also found in the Whidbey Basin (as well as other portions of Puget Sound); these animals attain an average length of 16 feet and weight of 110 pounds. Active shellfish culture takes place throughout the inside of Whidbey Island and Samish Bay for usual and accustomed, commercial and recreational use of mussels, clams, and oysters. Commercial and recreational fisheries occur for shrimp and Dungeness crab throughout the basin. Important marine bird populations reside on area islands, including a population of over 1000 pigeon guillemots.

Chinook populations that originate in watersheds throughout southern and central parts of Puget Sound depend on shoreline and nearshore areas in Island County for refuge and feeding as juveniles head out to the ocean and as adults returning to spawn. Juvenile salmon feed on forage fish, insects and other food in the nearshore to grow big and strong enough to weather the ocean conditions they will face as

adults. Forage fish are an important link in the marine food web because they transfer energy between primary and secondary producers, such as plankton, to top predators such as seabirds and larger fish. Suitable beaches in Island County are historic spawning habitats for two types of forage fish—sand lance and smelt—while a third, herring spawn directly onto the lush vegetation in the many intertidal eelgrass beds.

Island County has over 200 miles of freshwater and saltwater shorelines that are both privately and publicly owned. Nearly 80 percent of the parcels that make up the county's shore miles are developed or slated for residential development. Approximately 25 percent of the shoreline has been modified (WA DNR Shore Zone data), and more than 60% of the county's coastal lagoons have been isolated from natural tidal processes. Of the remaining identified high-value shoreline areas, many, including Arrowhead Marsh, Harrington and Race Lagoons are held under private ownership. Working with and creating incentives for private landowners will be vital for future shoreline habitat protection and restoration.

Several collaborative efforts have been made to protect some of the critical nearshore habitat. The northern portion of Port Susan is owned by The Nature Conservancy and is one of the largest privately owned marine nature preserves in the world. Island County has designated the entire western portion of Port Susan as a marine stewardship area. Several other land trusts and conservancy organizations are working to protect habitat and farmland in the action area. Island County also has 57 publicly owned beaches and 22 privately owned beaches that allow some public use. In recent years, Naval Air Station Whidbey Island has undertaken tidal lagoon restoration activities in Crescent Harbor.

Further discussion on the overall critical nature of Island County's ecosystem can be found in local governing documents and plans such as the Salmon Recovery Plan, Shoreline Master Plan and others. It is not the intent or the place for this profile to repeat all of the vital facts contained on those documents. The goal of the profile is to link all items in this profile's 'Opportunities, Priorities and Near-Term Actions' section to their underlying facts and documented support as shown through dozens of locally adopted plans and other documents.

Local Action Agenda Process

A tailored three-step process was developed for the Island Local Integrating Organization (LIO) to help facilitate updating the local strategies to the Action Agenda. This was developed to be a quick and flexible process given the fact that the LIO was newly established and has yet to develop detailed operating procedures, working priorities, or staffing. The steps were as follows:

1) Watershed groups (e.g. Water Resource Advisory Committee, Marine Resources Committee, etc.) and other organizations/representatives (e.g. cities, tribes, ports, etc.) worked to revise strategies based on 2008 Action Agenda information.
2) The Policy Development Committee (PDC) group of the LIO reviewed the information submitted over two meetings, came to a common understanding, and provided recommended strategies to the Executive Committee.
3) The Executive Committee approved the strategies and submitted them to PSP for inclusion in the draft Action Agenda.

The Island LIO currently has over 60 draft strategies under consideration for the next Action Agenda update. Identifying and prioritizing strategies and actions will be the focus of the LIO over the next year.

Key Threats/Pressures in Island County/Watershed

In 2008 the Whidbey Action Area identified the following threats/pressures to the ecosystem. Further work has not been completed in Island watershed to identify whether there have been changes in threats (more or fewer) since 2008. It is a near-term goal of the Island LIO to update this area of knowledge.

Threats identified include:

Habitat alteration

- **Marine/estuary**: Loss of estuary tidal marsh and habitat connectivity, with more than 80% of the Snohomish, approximately 75 percent of the Skagit, and 85 percent of the Stillaguamish estuaries diked, cutting off tidal marshes and
- **Shorelines**: Development along lake shorelines, reduced habitat availability and heterogeneity, increased nitrification, increased invasive species and toxic algal blooms
- **Marine nearshore**: 38 percent of marine shoreline is armored; there are over 5,000 overwater structures; and 5.6 miles of railroad grade; disconnected feeder bluffs and pocket estuaries, development in sensitive areas
- **Freshwater**: Increased development near lakes and creeks results in altered basin hydrology and degraded habitat
- **Uplands**: Loss of working farms and forests through conversion to residential or other development has resulted in altered basin hydrology and degraded habitat;

Pollution

- **Toxics**: Groundwater has been contaminated leaching from past industrial development
- **Bacterial pollution**: 48 percent of impaired surface waters are the result of bacterial pollution; there have been shellfish harvest closures in Holmes Harbor, Penn Cove, Oak Harbor, Crescent Harbor, and Port Susan Bay (current closures can be verified on DOH website)
- **Nutrient loading**: Contributes to eutrophication and naturally occurring low dissolved oxygen concentrations in Penn Cove, Saratoga Passage, Possession Sound; dissolved oxygen and temperature concerns found in streams
- **Surface water runoff impacts**: Pollutant and sediment loading from urban stormwater and agricultural runoff; emerging pre-spawn fish mortality concern

Freshwater resources

- Limited water availability for people, farms, and fish: Low summer flows in Water Resource Inventory Area (WRIA) 6;
- Altered magnitude, frequency and duration of peak flow events in WRIA 6
- Alteration of surface hydrology: alterations for flows
- Increased freshwater demand from more people, resulting in decreased aquifer levels, saltwater intrusion, and decreased groundwater discharge

Invasive species

- Potential negative ecological impacts on native populations: for example Japanese knotweed and Spartina

Artificial propagation

- Salmon production has potential negative ecological and genetic impacts on natural populations and other hatchery populations; Shellfish production: not identified as a local issue

Harvest

- Fishing and bycatch, logging, and hunting practices: Fishing and poaching; other local pressures need to be identified

Localized climate change impacts

- **Sea level rise**: potential for significant change and loss of pocket estuarine habitat; significant loss of beaches; risk of salt water intrusion; potential loss of floodplain capacity from diking
- **Changes in hydrology** due to reduced forest cover

Other

- Increase in the area's population
- Toxic algal blooms in lake systems

Opportunities, Priorities, and Near-Term Actions

The Island PDC identified over 60 draft strategies, while the Island LIO has been working to establish operating procedures and guidelines. As such, these strategies reflect the best thinking of the LIO to date but will be further refined and vetted as the organization continues to hold discussions and conversation relating to sequencing and prioritizing strategies. The Island LIO has not yet identified Near-Term Actions (NTAs) associated with these strategies. Those actions will flow from the sequencing/prioritization conversations planned for later in 2012.

Further, the Island LIO acknowledges that there are likely many more science needs for the local area, however, given the time constraints the LIO did not identify a full suite of needs. This will be further refined over the coming year. Finally, the Island LIO recognizes the importance of education, behavior change and general community engagement in taking 'actions' that begin to remediate the scope of the current Island LIO 'agenda' of work to be done. In this way, outreach activities (as an example) may be standalone tasks or may be included specifically in another action that is includes outreach as part of a larger project. Types of work that may be found in larger projects or found alone include, but are not limited to, issue awareness and understanding, as well as changing practices and behaviors.

* NOTE: Previously, pre-2012 Island Watershed strategies were developed within the context of the regional strategies and sub-strategies, as they existed at that time. Since the time that the Island strategies were submitted, however, the content of the regional strategies has changed. Because these were part of the list originally developed those initial regional strategies remain in this profile, as they are still being considered by Island LIO. Since that time action areas have been reorganized and this document now refers to and represents Island County, a different area and scope than used before this document.

Draft 2011 Island Action Area Strategy/Actions

Protect and Restore Terrestrial and Freshwater Ecosystems

Focus land development away from ecologically important and sensitive areas*

- Pass ordinances that develop incentives and increase the use of site-appropriate LID techniques to manage for future planned growth
- Modify planning/development plans to maintain/increase forest cover, create riparian corridor continuity, and reduce impervious surfaces.
- Support work and fund local partners to preserve ecologically important land.
- Support the implementation and enforcement of local plans, policies and regulations.

Protect and steward ecologically sensitive rural lands*

- Identify, protect and restore important spawning and nesting areas and critical habitat for birds and other wildlife.
- Encourage retention of native vegetation as part of clearing and grading ordinances throughout Whidbey Basin and protect ecosystem functions.
- Provide technical assistance to landowners to support working forests and farms in accordance with local regulations.
- Provide support for technical assistance and cost-share programs for small farms and commercial agriculture to improve and integrate agricultural nutrient management.
- Integrate small farms into community programs.
- Continue to work cooperatively with farming community to develop a coordinated restoration strategy that balances the needs of agriculture and fish.
- Support Transfer of Development Rights, Purchase of Development Rights, Public Benefit Rating System, and other incentive programs.
- Work with existing businesses to promote economic vitality and environmental stewardship.

Encourage compact regional growth patterns and create dense and attractive communities.*

- Develop/support private land protection opportunities (programs such as Shore Stewards/Public Benefit Rating System/Conservation Easements)

Protect and restore floodplain function*

- *For Island Watershed most floodplains occur along the marine shorelines. See B section for shoreline strategies*

Implement and maintain freshwater and upland restoration projects*

- Invest in and implement the Salmon Recovery Adaptive Management Plan in Island Watershed.
- Increase restoration efforts in Island County by providing incentives and removing obstacles for stewardship.
- Implement the Island County Groundwater Management Plan.
- Address fish passage, and increase available rearing and spawning habitat within Island Watershed.
- Broaden local volunteer organizations like Whidbey Watershed Stewards, the Marine Resource Committee or Beach Watchers to work in upland habitat areas.

Instream flow protection and enhancement*

- Assess and monitor infiltration and runoff for streams in Island Watershed.

- Ensure appropriate buffers are being applied to all streams within Island Watershed.
- Provide incentives for protecting forest lands and wetlands that feed into streams.

Groundwater protection and management*

- Ensure ground water protection as 72 percent of Island County residents rely on ground water as their drinking water source.
- Identify and protect forest lands in aquifer recharge areas.
- Protect sole source aquifers for drinking water based on the Groundwater Resources Management Plan.

Protect and Recover Salmon*

- Implement the Island Watershed/ WRIA 6 Salmon Recovery three-year work plan.
- Support engagement of salmon recovery watershed groups.
- Engage farming interests in salmon recovery within Island Watershed.
- Identify and put in known and presumed salmon spawning and rearing habitat into the Critical Area Ordinances.
- Educate and inform residents about Island Watershed/County's function in Salmon Recovery and harvest activities.

Implementation of other plans in a coordinated way and maintenance and enhancement of biodiversity*

- Complete physical and biological stream surveys within Island Watershed.
- Fund and develop a combined biodiversity planning effort to assist with the comprehensive plan amendment and long range planning for Island County.
- Assess where natural habitats could be converted and identify protection opportunities.

Invasive species prevention and response*

- Continue local efforts to identify and eradicate invasive species impairing habitat within Island Watershed.
- Educate home owners about identifying and managing invasive species.
- Identify invasive species and the vectors for introduction and coordinate with responsible agencies to eradicate invasive species impairing habitat.
- Coordinate and provide funding for identification and eradication of invasive species.

Strategies and actions to flow from the Biennial Science Work Plan effort

- *At this point no science gaps have been discussed or identified. However, over the course of the next year, Island LIO is expecting to facilitate broader process to identify and sequence (prioritize) additional strategies, near-term actions, and science gaps.*

Protect and Restore Marine and Marine Nearshore Ecosystems

Protection of marine and nearshore ecosystems that still function well*

- Update Fish and Wildlife Habitat Conservation Areas of the Critical Area Ordinance in Island County as an element of the Shoreline Management Program (SMP) update.
- Work with neighboring watersheds to develop a Whidbey Basin Nearshore restoration and protection coordination effort.
- Protect unique and important rare plant communities or critical saltwater habitats.
- Protect important spawning areas, forage fish beaches, and bird habitat.

- Evaluate the need to protect ecosystem processes and quality of life when considering tidal energy projects and ecosystem services provided.
- Complete Shoreline Master Program updates within Island Watershed on schedule.
- Support and fund economic research aimed at creating property owner incentives.
- Provide targeted funding for restoration projects identified in Shoreline Master Programs.
- Implement protection of prioritized nearshore/marine habitats.
- Assess where natural habitats could be converted and identify protection opportunities.
- Through regulatory process, ensure new shoreline armoring occurs only to protect existing critical infrastructure.
- Create incentive program for landowners to remove existing bulkheads or replace them with soft shore armoring.
- Seek funding to increase code compliance monitoring.
- Develop program to provide assistance to shoreline land owners for ecologically sound land development.

Support economic viability of working waterfronts to help maintain ecosystem function and sustain quality of life*

- Provide economic development grants for job-creating green development along shorelines which is consistent with adopted SMPs.

Promote public access and use of waterfronts and marine systems*

- Provide funding for public access projects identified in SMPs.
- Identify priority locations for public access projects.

Improve shellfish health and harvest*

- Develop a strategy related to improving shellfish health and harvest. Most improvements in this will be related to water quality. (See section C)
- Implement shellfish protection plans within Island Watershed/County.

Implement and maintain priority ecosystem restoration projects marine and marine nearshore ecosystems.*

- Prioritize and strategically remove derelict fishing gear.
- Educate residents on how to prevent fishing gear loss.

Protect and recover marine and nearshore species

- Develop recovery plans for targeted marine species including but not limited to forage fish and rockfish.

Invasive species prevention and response*

- Continue local efforts to identify and eradicate invasive species impairing habitat.
- Identify invasive species and the vectors for introduction and coordinate with responsible agencies to eradicate invasive species impairing habitat.
- Educate public about identifying and managing invasive species.
- Coordinate and provide funding for identification and eradication of invasive species.

Strategies and actions to flow from the BSWP effort

- Establish baseline data for marine and nearshore needs.
- Understand cumulative impacts of marine and nearshore development.

Reduce and Control the Sources of Pollution to Puget Sound

Implement toxic chemical and pollution policy and programs to reduce release of chemicals*

- Continue local efforts to identify and eradicate toxins that are impairing water quality conditions.
- Implement local plans addressing temperature, dissolved oxygen, mercury, and bacteria impairments that improve impaired waterways including those listed on the 303d list.
- Implement projects to eradicate water quality exceedences to federal or state standards.
- Implement a Pharmaceuticals and Personal Care Products Take-Back Program that uses local pharmacies and local police as identified in the Water Resources Advisory Committee non-point plan and recommendations.

Implement clean-up activities to reduce pollution*

Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales*

- Implement National Pollution Discharge Elimination System (NPDES) permits.
- Begin stormwater retrofits in urbanizing areas within Island Watershed.
- Implement storm water management for dense rural shoreline development areas.
- Research and implement economic incentives for reducing stormwater runoff, such as credits, or reduced stormwater fees.

Control and manage pollution from decentralized wastewater treatment including large and small on-site systems*

- Support local efforts to identify and control sources of pollution from on-site sewage systems.

Control and manage pollution from centralized wastewater management*

Comprehensive approaches for revised wastewater control and management*

- Encourage innovate efforts to treat, reduce, and reuse municipal/community waste water.
- Support updates to local public treatment systems, including grant funding.

Control and manage pollution from discharges of wastewater from boats and vessels*

- Implement Best Management Practices relating to marinas and other boat activity spots within Island Watershed.

Agricultural and Forest Runoff*

Effectively prevent, plan for and respond to oil spills *

Strategies and actions to flow from the BSWP effort

- Support efforts to estimate/calculate the amount of impervious surface within Island Watershed to better inform land use planning and other efforts.

Sustain, Coordinate, and Adapt Puget Sound Recovery Efforts

Building and sustaining cooperative partnerships*

- *See A8 and A5 strategies above.*

Funding strategies*

Social and Institutional Infrastructure*

Issue awareness and understanding*

Changing practices and behaviors*

Fill key science and information gap*

Local Implementation Structure

The Island LIO is comprised of Island County/Watershed (WRIA 6). The LIO builds upon existing committees and watershed groups and has an Executive Committee, the Policy Development Committee that holds representatives from local entities.

IMPLEMENTATION COORDINATION IN ISLAND COUNTY/WATERSHED

The Executive Committee makes all decisions of the ILIO and sets strategic policy direction, establishes priorities and funding concepts.

The Policy Development Committee provides recommendations on strategic direction, priority setting, funding concepts and other issues within WRIA 6 of interest to the EC. This process furthers the performance management systems of Island County and other ILIO members.

Island County groups *are working to implement plans and identify and sequence priority actions under their purview. This work will continue to inform the priorities of the LIO.*

The Executive Committee includes representatives from the following entities.

- Island County Council of Governments (COG)
  - Island County Commissioner District 1
  - Island County Commissioner District 2
  - Island County Commissioner District 3
  - City of Langley – Mayor
  - Town of Coupeville – Mayor
  - City of Oak Harbor – Mayor
  - Port District of Coupeville – Port Commissioner – (as appointed by commissioners)
  - Port District of South Whidbey – Port Commissioner – (as appointed by commissioners)
- Participating Local Tribal Governments:
  - Tulalip Tribes – (to be determined)
  - Swinomish Tribe – (to be determined)

The Policy Development Committee members include representatives from:

- Island County Public Health
- Island County Public Works
- Island County Planning and Community Development
- City of Oak Harbor
- City of Langley
- Town of Coupeville
- Tulalip Tribes
- Swinomish Tribe (via Skagit River System Cooperative)
- Island County Marine Resource Committee (MRC)

- Island County Water Resource Advisory Committee (WRAC)
- WRIA 6 Salmon Recovery Lead Entity
- Business/Ports
- Whidbey EcoNet (education/outreach)

The Island LIO will be informed by the work of local and regional groups d County and technical advisors and is charged with maintaining the sustainable use of water resources while protecting habitat, environment and human health. The Island LIO may also consult with other groups, such as Water and Sewer Districts, Shellfish Protection Districts and Diking Districts, as well as coordinate with other LIOs.

References and Additional Resources

Shared Strategy for Puget Sound watershed profile (http://sharedsalmonstrategy.org)

http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/upload/Ch5_Island.pdf

http://www.islandweb.org/recreation.php

http://www.sharedsalmonstrategy.org/watersheds/watershed-island.htm

http://www.whidbeycamanoislands.com/outdoor_adventure/scuba/

http://clccharter.org/kurt1/Oceans%20at%20Risk/Giant%20Pacific%20Octopus.html

http://www.pigeonguillemot.org/

http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/upload/Ch2_Chinook.pdf

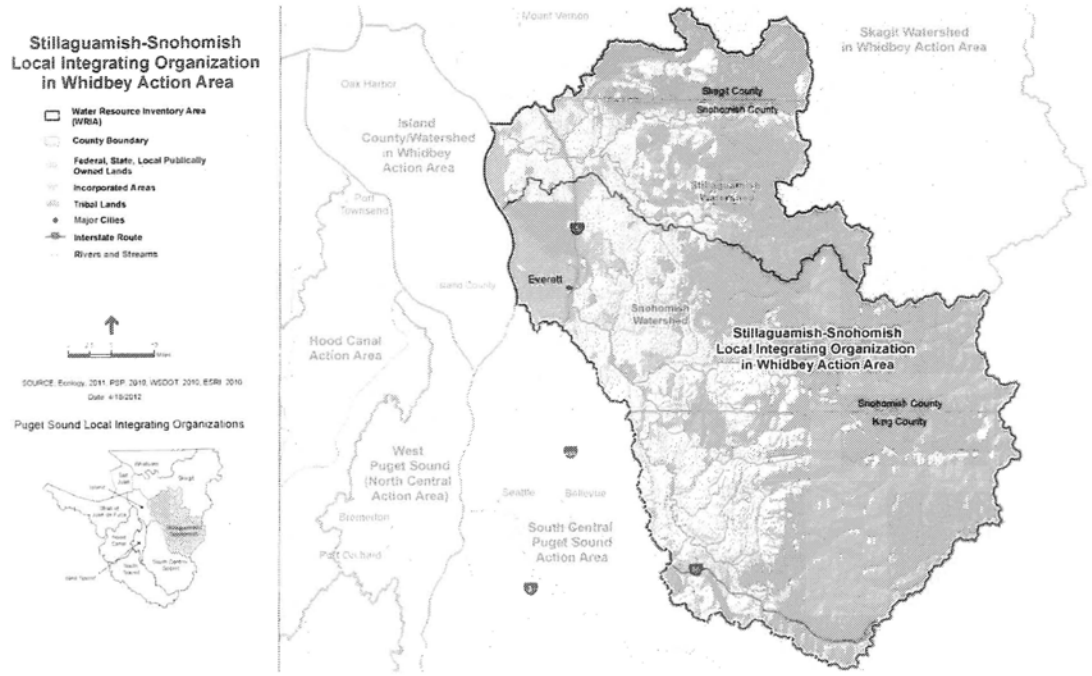
http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/washington/placesweprotect/portsusanbay_08.pdf

The Action Agenda in the Stillaguamish and Snohomish Watersheds

Profile

Snohomish River Watershed

The Snohomish River Basin in east central Puget Sound has long been known for its enviable quality of life characterized by attractive job opportunities, fertile agricultural lands and extensive timber resources, diverse outdoor recreation, extensive areas of public land, and abundant natural resources extending from Puget Sound to the Cascade crest. The basin's varied topography ranges from low, rolling terrain next to tidewater to the steep Cascade Mountains along the eastern border. The watershed lies in two counties—Snohomish and King—and covers an area of 1,856 square miles with over 1,700 identified rivers and tributaries. The Snohomish Basin is one of the fastest growing areas in Puget Sound with projected population growth of 59 percent from 2000 to 2030.



The Snohomish River empties into Puget Sound north of Everett, the region's third largest city and a major industrial and commercial center that includes the Port of Everett. Some of the best farmlands

remaining in Western Washington flank the Snohomish and the lower portions of its two major tributaries, the Skykomish and Snoqualmie Rivers. Forest lands and wilderness cover 74 percent of the basin; five percent is agricultural. Urbanization is concentrated near the estuary.

The estuary, where the nutrient rich waters of the Snohomish River come in contact with the saltwater of Possession Sound is home to at least 350 different kinds of birds and countless varieties of mammals and plants call this special place home, including blue heron, eagles, osprey, salmon, seals, and otter. It benefits people by acting as a natural filter that cleans water before it passes into the Sound and also slows floodwaters. In addition, a myriad of streams and creeks in the upper reaches of Puget Sound's second largest watershed flow through abundant forestlands and wilderness. This includes the popular Alpine Lakes and Wild Sky Wilderness Areas.

The Snohomish Basin has a long history of broad collaboration on issues ranging from flood protection to integrating mitigation and restoration needs in the Snohomish River Estuary. In recent years, this collaboration has extended to more robustly including farming interests and marine resources and needs to extend into water quality and protection issues.

Stillaguamish Watershed

The Stillaguamish Watershed drains roughly 700 square miles of Snohomish and Skagit Counties. The mainstream of the Stillaguamish River is formed by the North and South Forks, which descend from the foothills of the Cascades to a confluence at Arlington and flow westerly into Port Susan and South Skagit Bay. Spanning northern Snohomish and southern Skagit counties, major cities within the watershed include Arlington, Granite Falls, and Stanwood.

Staples of the early Western Washington economy, forestry and farming are still major players in the Stillaguamish watershed, where steep, lush forest slopes and a broad soil-rich delta provide ideal growing conditions. A unique characteristic of the Stillaguamish basin is its low level of commercial development along the I-5 corridor. It is one of the few largely undeveloped rural areas adjacent to major urban centers in Puget Sound. Residents in the basin feel a strong sense of community and pride in their area. Its rural nature provides a significant opportunity to protect key salmon habitat and restore or enhance properly functioning conditions.

The Stillaguamish watershed is home to an early collaborative effort to address watershed health called the Stillaguamish Watershed Council (formerly the Stillaguamish Implementation Review Committee). Local stakeholders, including Snohomish County, the Tulalip and Stillaguamish Tribes, farmers, forest land owners, citizens and local agency representatives committed in 1990 to take actions to improve water quality. Major public landholdings are managed by the US Forest Service, Washington State Department of Natural Resources, and Snohomish County. The Stillaguamish supports two of Puget Sound's twenty-two threatened populations of Chinook salmon. Land use in the portion of the watershed inhabited by salmon is 61 percent forestry, 22 percent rural residential, 15 percent agricultural, and two percent urban.

Stillaguamish and Snohomish Watersheds

The Stillaguamish and Snohomish watersheds combined are dominated by forestlands particularly in the upper mountainous portions of the region, with more than half in the Mount Baker-Snoqualmie National Forest or in state-owned forests managed by Washington Department of Natural Resources. The watersheds have close to 75 percent forestland use. Although much of the land is in public ownership, and is protected from residential development, there is still a significant risk of conversion to residential development on privately held lands. In the Snoqualmie watershed, for example, there are more than 500 forested parcels totaling more than 20,000 acres in the rural area at risk of being subdivided and developed. Recreation and tourism are important economic sectors in both watersheds, with opportunities for float trips, fishing, eagle watching, kayaking, camping, hunting, and backpacking. There are seven designated wilderness areas within the Whidbey Basin,[28] of which the Stillaguamish and Snohomish watersheds are an integral part, and several popular state parks, all which provide habitat protection and allow for outdoor recreation opportunities.

Unique Ecosystem Characteristics and Assets

The fifth largest freshwater system in Puget Sound is the Stillaguamish River, which drops from an elevation of 6,854 feet on Three Fingers Mountain to sea level at Port Susan and Skagit Bay. The Skagit River combined with the Snohomish and Stillaguamish Rivers has the largest freshwater influence from within the Puget Sound (excluding the Fraser River). The Snohomish River basin has the most returning Coho spawners between the Columbia River and the Canadian border, and produces 25 to 50 percent of all Coho in Puget Sound. Further, the Skykomish Chinook population has the highest abundance target in the Puget Sound Evolutionarily Significant Unit. Juvenile salmon from many rivers in Puget Sound use the pocket estuaries and nearshore areas of the Whidbey Basin to forage and rear as they adapt to saltwater conditions. Port Susan is the southernmost critical biodiversity area in Puget Sound (labeled a biodiversity hotspot by The Nature Conservancy and other environmental organizations). The region is also a major producer of forage fish such as herring, sand lance, and surf smelt. Eelgrass beds the Snohomish River delta area are among the largest found in Puget Sound, providing important spawning and forage habitat for forage fish, salmon, and other species. Upper reaches of the Stillaguamish and Snohomish systems support numerous resident and overwintering populations of eagles and other raptors.

Local Action Agenda Process

The Snohomish and Stillaguamish watersheds are working to develop a local process that will provide a forum for organizations to collaborate on and coordinate initiatives and strategies to advance the Action Agenda. The local integrating organization was only recently created. One of the first actions the Local Integrating Organization (LIO) will take is to revisit the local profile and identify a process to update the strategies, action and to develop near-term actions as well as to sequence and prioritize work that needs to be advanced. To develop the current draft, an Ad Hoc group that acted in place of a formal LIO during the summer and fall of 2011. This group identified over 100 draft strategies. These strategies reflect the best thinking of those individuals and agencies currently engaged in implementation of the Snohomish and Stillaguamish ecosystem recovery. This work will need to be further refined and vetted

[28] In the 2008 Action Agenda update, the Skagit, Island, and Stillaguamish and Snohomish Action Areas comprised one Action Area called the Whidbey Basin Action Area. A map of the Whidbey Basin Action Area can be found at the end of this chapter.

through the newly formed LIO over the next year. The Stillaguamish and Snohomish area has not yet identified near-term actions associated with these strategies. Those actions will flow from the sequencing/prioritization conversations. The Snohomish and Stillaguamish contributors also recognize and acknowledge that more local science needs exist, and the development of the full suite of local science needs is yet to be done; however, given the time constraints the Ad Hoc group was not able to identify a full suite of needs. The work to support developing a science agenda will be further refined over the coming year.

A tailored process was developed for the Snohomish and Stillaguamish areas to help facilitate updating the local strategies for the Action Agenda in the absence of an LIO. This process was developed to be a quick and flexible process. The steps were as follows:

1. Watershed groups (e.g., Snohomish Salmon Recovery Forum, Stillaguamish Watershed Council, Snoqualmie Watershed Forum, Snohomish Marine Resource Committee, etc.) and other organizations/representatives involved in these watersheds (e.g., tribes, county, conservation districts, cities, ports, etc.) worked to revise strategies based on 2008 Action Agenda information.
2. An Ad Hoc group of interested parties convened a one-day workshop to review and discuss the information compiled by watershed groups and other agencies and came to a common understanding regarding the working list of strategy ideas below.

The next steps will be to work with the Local Integrating Organization to further vet and refine the strategies and near-term actions identified for inclusion into the final Action Agenda.

Key Threats/Pressures

In 2008, the Whidbey Action Area identified the following threats/pressures to the ecosystem. Work has not yet been completed in the Snohomish and Stillaguamish watersheds to identify if any additional threats are present or if those items identified in 2008 are no longer a threat, though some have begun this thinking/work while updating the strategies for the Action Agenda. Once a Local Integrating Organization is formed, there will be a more robust conversation around what the threats are to the area, and prioritization of these threats.

Threats identified in 2008, from the Whidbey Basin Profile include:

Habitat alteration

- **Marine/estuary**: Loss of estuary tidal marsh and habitat connectivity, with more than 80 percent of the Snohomish, approximately 75 percent of the Skagit, and 85 percent of the Stillaguamish estuaries diked, cutting off tidal marshes and blind tidal channels; only 18 percent of historic wetlands remain; potential future impacts from tidal power generation.
- **Shorelines**: Development along lake shorelines, resulting in reduced habitat availability, increased heterogeneity, nitrification, and increases in invasive species and toxic algal blooms.
- **Marine nearshore**: 38 percent of marine shoreline armored; over 5,000 overwater structures; 5.6 miles of railroad grade; disconnected feeder bluffs and pocket estuaries, development in sensitive areas.
- **Freshwater**: Loss of large river habitat complexity and floodplain connectivity from diking, riparian clearing, and floodplain development, reducing wood debris jams, side-channels, forested islands and pools.

- **Uplands**: Loss of working farms and forests through conversion resulting in altered basin hydrology and degraded habitat; 16 percent increase in impervious surface in Snohomish watershed from 1991-2001; potential future development pressure in nearshore, river valley and upland areas.

Pollution

- **Toxics**: Groundwater contamination leaching from past industrial development.
- **Bacterial pollution**: 48 percent of impaired waters listings due to bacterial pollution; shellfish harvest closures in Holmes Harbor, Penn Cove, Samish Bay, Similk Bay, and Port Susan.
- **Nutrient loading**: Contributes to eutrophication and naturally occurring low dissolved oxygen concentrations in Penn Cove, Saratoga Passage, Possession Sound; dissolved oxygen and temperate concerns found in streams.
- **Surface water runoff impacts**: Pollutant loading from urban stormwater and agricultural runoff; emerging pre-spawn fish mortality concern.

Freshwater resources

- **Limited water availability** for people, farms, and fish: Low summer flows in Water Resource Inventory Areas (WRIAs) 5 & 7.
- **Altered** magnitude, frequency and duration of **peak flow events** in WRIAs 3, 4, 5 & 7.
- **Alteration of surface hydrology**: Major alterations for flows in Skagit and Sultan rivers below dams.
- **Increased freshwater demand** from more people, resulting in decreased aquifer levels, saltwater intrusion, and decreased groundwater discharge.

Invasive species

- Potential negative ecological impacts on native populations: Japanese knotweed, Spartina, purple loosestrife.

Artificial propagation

- **Unknown impacts of hatchery production** on existing steelhead and other salmonid species threaten viability.
- **Unknown Impacts from straying hatchery** stocks in the Snoqualmie watershed.

Harvest

- **Fishing and bycatch, logging, and hunting practices**: Fishing and poaching; other local pressures need to be identified.

Localized climate change impacts

- **Sea level rise**: significant change and loss of estuarine habitat in Snohomish, Stillaguamish, and Skagit estuaries; significant loss of Whidbey Island beaches; risk of salt water intrusion; potential loss of floodplain capacity from diking.
- **Changes in hydrology** due to reduced snow pack and forest cover.

Other

- **Increase in population by 2025**: 49 percent in Skagit, Island, Snohomish counties (over 380,000 people).
- **Toxic algal blooms** in lake systems.

Opportunities, Priorities, and Near-Term Actions

The Stillaguamish-Snohomish area is working on developing strategies related to their unique needs and ecological conditions. Identification of prioritized strategies and actions will be the focus of LIO as soon as it is established. The following is a working list of over 100 strategies brainstormed by the ad hoc group.

Updated Initial Strategies and Actions

Protect and Restore Terrestrial and Freshwater Ecosystems

Smart Growth, Development, Land Use and Land Protection.

Focus land development away from ecologically important and sensitive areas**

- Use and increase site-appropriate low impact development (LID) techniques to manage for future planned growth and improve past practices
- *Solidify wetland protection, connection, and restoration components as part of stormwater retrofits in Comprehensive Plans by 2015, to create increased water storage in agricultural fields and decrease runoff (repeated in A3, B2 and C3)

Permanently protect the intact areas of the Puget Sound ecosystem that still function well**

- Protect intact mainstem rivers
- Protect unique rearing and spawning areas (for salmon, and forage fish), and important shorebird habitat
- *Identify and protect 100 percent of existing unarmored shoreline (in the Port Susan Marine Stewardship Area (MSA))
- Implement acquisition projects to protect intact habitat and/or purchase high priority sites for future restoration
- Protect degraded habitats with high potential or areas that are critical to long-term ecosystem function

Protect and steward ecologically sensitive rural and resource lands**

- Harmonize clearing and grading ordinances throughout Whidbey Basin and support enforcement of these ordinances
- Support extension, property tax incentive programs and transfer of development rights/purchase of development rights in high-priority rural residential areas at high risk of conversion
- Provide technical assistance to landowners of working lands
- Integrate small farms (such as horse farms or grass-fed beef farms) into current programs
- Continue to work cooperatively with farming community to develop a coordinated restoration and mitigation strategy that balances the needs of agriculture, fish, and flood protection
- Promote collaboration of salmon recovery watershed groups with the Snohomish and County Agricultural Advisory Board, King County Agricultural Commission and other farming groups
- Provide state recognition to jurisdictions that protect forest cover under National Pollutant Discharge Elimination System (NPDES) permitting for stormwater benefits (repeated in C4)
- Support and implement food security strategies that foster the long-term protection of working farms (including bringing forward a new generation of farmers, supporting more ecologically sensitive growing techniques, regulatory integration, and seed banks)

- *Solidify wetland protection, connection, and restoration components as part of stormwater retrofits in Comprehensive Plans by 2015, to create increased water storage in agricultural fields and decrease runoff (into Port Susan MSA)
- *Encourage the local and organic food movements: Farm Link connects Snohomish Farm Incubator graduates with local properties to encourage incoming farmers to promote stewardship and environmentally friendly techniques. (Puget Sound Fresh also promotes local produce organic farms and community supported agriculture (CSAs))

Encourage compact regional growth patterns and create dense, attractive and mixed-use and transit-oriented communities**

- Support local governments in meeting Growth Management Act (GMA) requirement updates
- *Encourage 90% of future growth in Urban Growth Areas (UGAs) by 2020 (within the Port Susan MSA)

Protect and restore floodplain function**

- Implement large-scale floodplain projects to remove bank armoring, re-connect side channels and provide mainstem rivers with ability to migrate and create diverse instream habitat
- Complete necessary modeling and planning coordinating flood management and habitat improvement
- By 2017, develop and implement a risk contingency program for restoration projects that provides landowner assurances, ensures project effectiveness and improves funding efficiency of restoration projects.

Restore Key Terrestrial and Freshwater Habitats.

Adapt, where necessary, and implement and maintain freshwater and upland restoration projects**

- Implement Salmon Recovery three-year work plan (WRIAs 5 & 7)
- Support engagement of community in restoration and maintenance, as appropriate and in coordination with the volunteer efforts described in the three-year work plans
- Implement restoration components of the shoreline management plans
- Develop a contingency fund to resolve unanticipated post-project impacts on adjacent properties if they occur (thus alleviating landowner concerns)
- *In areas that have degraded flood protection infrastructure along the Snohomish, Stillaguamish, Snoqualmie and Skykomish Rivers, construct set-back dikes that ensure that fields behind the setbacks will be better protected and return a portion of the original property to tidal marsh *(within the Port Susan MSA) (repeat in the Estuary/nearshore strategy)*

Mitigation that works**

- By 2015, seek to align recovery and habitat protection with mitigation funding by developing an agreement on how to count mitigation funding and activity toward restoration targets, where feasible and effective.
- Few strategies currently identified, requiring review and improvement.

Sustain Freshwater Availability for Instream Flow and Human Uses.

Protect and conserve freshwater resources to increase and sustain water availability for instream flows**

- Implement flow rules and programs in all basins
- Upgrade instream flow rule in Snohomish Basin

- Explore instream flow solutions including: 1) strategies to protect & enhance hydrologic function of mature forests; and 2) work to address low flows in concert with meeting agricultural irrigation needs
- Track Federal Energy Regulatory Commission licensing and hydropower projects in basin, and implement existing agreements in close coordination with other ecosystem strategies
- Investigate how to close sensitive basins from exempt wells based on best available science
- Examine effects of small-scale hydro projects on instream flow
- Examine effects of expected high flows, given current estimates based on climate science, on fish and humans
- Evaluate the effectiveness of instream flow rules in meeting their stated objectives
- Consider transferring surface water rights from tributaries to mainstems to improve tributaries' summer instream flows
- Investigate alternative water sources for different locations
- Integrate the Washington Department of Fish and Wildlife (WDFW) and the Washington Department of Ecology (Ecology) watershed characterization elements
- Encourage and implement irrigation efficiency projects on agricultural lands
- Incorporate the use of waste water on working lands to reduce other water source (in-stream or wells) needs
- Provide support for the King and Snohomish Counties groundwater education program
- In accordance with the Port Susan strategy: move toward closure of basins to future exempt wells
- In the Stillaguamish watershed, evaluate the risk to base flow that could result from gravel mining of mineral resource lands and develop overlays of important ecosystem components (e.g. coldwater springs, fish use, and mineral resource identified lands)

Protect and Recover Salmon.

Protect and Recover Salmon**

- Implement the WRIA 5 Chinook Recovery Plan
- Implement the WRIA 7 Chinook Recovery Plan
- Implement actions from the Port Susan Marine Stewardship Area plan (described elsewhere in this document), where salmon are a target.

Protect and Recover other Native Terrestrial and Freshwater Species.

Implementation of other plans in a coordinated way and maintenance and enhancement of biodiversity**

- *No* strategies *currently identified.*

Prevent and respond to the introduction of freshwater and terrestrial invasive species**

- Continue local efforts to identify and eradicate invasive species impairing habitat and agricultural productivity

Protect and Restore Marine and Marine Nearshore Ecosystems

Nearshore Growth, Working Waterfronts, and Marine Protection.

Use anticipated population and economic growth as a catalyst for recovery by building on existing efforts to establish protection and restoration priorities**

- Complete and implement Shoreline Master Program updates on schedule
- With regional support, seek to strengthen protection of non-armored shorelines.

Protect and conserve relatively intact ecosystems to maintain the health of Puget Sound**

- Evaluate need to protect ecosystem processes and quality of life needs when considering tidal energy projects
- Protect high value habitat: unique spawning areas, juvenile rearing areas, eelgrass beds, and bird habitats
- Implement the Port Susan marine stewardship strategies
- Maintain spawning areas for forage fish
- *Identify and protect 100 percent of existing unarmored shoreline (in the Port Susan Bay MSA planning area)
- Protect the marine riparian corridor
- Support policy that will allow railroads to deposit landslide sediment in the nearshore zone
- *Solidify wetland protection, connection, and restoration components as part of stormwater retrofits in Comprehensive Plans by 2015, to create increased water storage in agricultural fields and decrease runoff (in the Port Susan MSA planning area)
- *Protect remaining natural shoreline by encouraging soft shore armoring in bulkhead retrofits and where armoring is necessary (in the Port Susan MSA)

Restore Marine and Marine Nearshore Areas.

Implement and maintain priority nearshore and marine ecosystem restoration projects**

- Implement Salmon Recovery three-year work plan (WRIAs 5 & 7)
- Implement restoration components of the shoreline management plans
- Prioritize and strategically remove derelict gear following the work of the Northwest Straits Initiative
- Complete large scale estuary restoration projects in the Snohomish, and Stillaguamish rivers and meet restoration targets set in the salmon recovery plans
- Implement large-scale shoreline and nearshore projects to remove bank armoring where appropriate and/or use "green" armoring techniques, re-connect side channels and provide mainstem rivers with ability to migrate and create diverse instream habitat
- Implement small scale nearshore restoration and beach nourishment projects. Where possible, align these projects with other assessments (e.g., Mukilteo to Everett sediment nourishment study, Puget Sound Nearshore Ecosystem Restoration Partnership)
- Work with state and regional partners to create a state-level contingency fund for large projects to reduce project costs incurred from designs that account for low-probability contingencies
- *In areas that have degraded flood protection infrastructure, construct set back dikes that ensure that fields behind the setbacks will be better protected and return a portion of the original property to tidal marsh (in the Port Susan MSA)
- *Create design standards for soft-shore armoring or adopt existing standards from another Puget Sound location/ Marine Resources Committee facilitate implementation of education programs targeted at contractors, engineers, realtors and landowners to encourage soft armoring and bioengineering, and raise awareness about the impacts of shoreline hardening by 2015 (in the Port Susan MSA)

Support economic viability of working waterfronts to help maintain ecosystem function and sustain quality of life**

- *No* strategies *currently identified.*

Improve public access to Puget Sound**

- *No* strategies *currently identified.*

Protect and Recover Native Marine Species.

Protect and recover marine and nearshore species**

- Continue marine species studies and recovery work initiation by the Marine Resources Committee for mussels, forage fish, and Dungeness crab.

Fill Key Science and Information Gaps for Marine and Nearshore.

Prevent and respond to the introduction of marine invasive species**

- Continue local efforts to identify and eradicate invasive species impairing habitat
- Monitor and assess marine invasive species impact on native populations

Reduce and Control the Sources of Pollution to Puget Sound

Prevent and Reduce Toxic Loadings into Puget Sound.

Reduce the sources of toxic chemicals entering Puget Sound**

- Implement Watershed Management Plans addressing temperature, dissolved oxygen, mercury, and bacteria impairments. Encourage collaboration between state agencies and watershed groups
- Support hazardous waste education/technical assistance programs for businesses
- *Remove all project area waters from the Clean Water Act 303(d) list for fecal coliform and nutrients and prevent agri-chemicals from entering project area waters by 2015 (in the Port Susan MSA)
- *Prevent introduction of any agri-chemicals into surface waters from commercial/residential landscaping by 2015 (in the Port Susan MSA)
- By 2014, identify high priority sites for biogas digesters and seek to build them.

Control and Manage Stormwater.

Use a comprehensive approach to manage urban stormwater runoff at the site and landscape scales**

- Implement NPDES permits
- Begin private and public stormwater retrofits in dense urban and suburban areas
- Support site-appropriate LID and LID retrofits in small rural cities and suburban sub-basins (including rain gardens)
- Implement upland stormwater projects that reduce the impact of stormwater and pollutants on flood plain activities

Agricultural runoff**

- Provide support for technical assistance and cost-share programs for small farms and commercial agriculture to improve and integrate agricultural nutrient management
- *Solidify wetland protection, connection, and restoration components as part of stormwater retrofits in Comprehensive Plans by 2015, to create increased water storage in agricultural fields and decrease runoff (in the Port Susan MSA)
- Implement strategies to keep livestock out of streams
- Evaluate benefits of a King County Livestock Ordinance
- Provide technical resources for off-stream watering of livestock
- Develop livestock exclusion ordinances to protect water quality in the basin where needed.

Surface runoff from Forest Lands**

- Provide state recognition to jurisdictions that protect forest cover under NPDES permitting for stormwater benefits
- Implement forest road improvements and decommission forest roads where feasible.
- Develop strategies to provide better infiltration and water storage in the uplands of the Snohomish Basin, per the Snohomish habitat protection (EPA-funded) project.

Prevent Pathogen and Nutrient Loadings into Puget Sound.

Prevent, reduce and/or eliminate pollution from decentralized wastewater treatment systems**

- Support local efforts to identify and control sources of pollution from on-site septic systems (OSS)
- Create policies for OSS operations and maintenance (O&M); encourage enhanced nutrient treatment technologies for OSS
- Increase funding to standardize OSS O&M programs; develop a Puget Sound-wide low-interest low program to provide funding for OSS O&M programs
- Provide a stronger regulatory backstop to encourage participation in voluntary programs.

Prevent, reduce and/or eliminate pollution from centralized wastewater treatment systems**

- *No strategies currently identified.*

Rethink how we plan for and approach wastewater control and management**

- *No* strategies *currently identified.*

Control and manage pollution from discharges of wastewater from boats and vessels**

- *No* strategies *currently identified.*

Improve shellfish water quality and increase harvestable, upgraded shellfish acres in commercial production and use; coordinate, expand and promote financial incentives and programs for working aquatic lands that are protective of ecosystem health to provide abundant shellfish for commercial, subsistence, and recreational harvest consistent with ecosystem protection**

- Implement shellfish protection programs
- Explore opportunities to open shellfish areas that are conditionally closed by Washington Department of Health
- Develop strategies for sediment and hydrologic changes that will affect shellfish. Develop further science that identifies the key threats to climate change on shellfish and seek to implement actions that mitigate these threats.
- Continue to implement programs that improve water quality and prevent toxics loading.

Effectively prevent, plan for and respond to oil spills**

- Implement the Marine Resources Committee's tiered recommendations for Snohomish County oil spill response and prevention
- *By 2014 orchestrate local, state, and federal response to mitigate unintended damages from spill response related impacts to intertidal habitats *(in the Port Susan MSA)*

Address and Clean Up Cumulative Water Pollution Impacts in Puget Sound**

- Remove creosote logs and pilings from high deposition areas in the Snohomish and

Stillaguamish basins
- Work with local pollution sources to reduce pollution loading into Puget Sound

Strategies and actions to flow from the BSWP effort**
- Investigate effects of pharmaceuticals on ecosystems
- Consider the Natural Resources Conservation Service (NRCS) work on science in the altered environment for landowner-endorsed conservation measures
- Consider a Snohomish Basin total maximum daily load (TMDL) action plan to address pollution in the Snohomish Basin. Implement the existing Snoqualmie Watershed Water Quality Synthesis Report
- Explore opportunities to identify genetic markers for tracking specific sources of bacterial pollution.

Sustain, Coordinate, and Adapt Puget Sound Recovery Efforts

Capacity Building and Coordination.

Foster collaborative partnerships across partner interests and sectors to advance implementation.**
- Support integration of species recovery, water quality, aquatic reserve and natural resource management plans, shoreline master programs, Snoqualmie Watershed Forum initiatives and Marine Resource Committee strategies; start with salmon recovery, Marine Resources Committee, and water management plans
- Investigate a permit coordination pilot project in the Snohomish Basin
- Support the strategies of the Port Susan Marine Stewardship Area

Cultivate broad-scale practices and behaviors among Puget Sound Residents that benefit Puget Sound.**
- Citizen science programs
- *Encourage the local/organic food movement: Farm Link connects Snohomish Farm Incubator graduates with local properties to encourage incoming farmers to promote stewardship and environmentally friendly techniques (in the Port Susan MSA)
- *Increase landowner awareness of environmental stewardship as it relates to water quality through Snohomish-Camano ECO Net targeted awareness grant (if funded) or other ECO Net resources if necessary *(in the Port Susan MSA)*

Build Issue Awareness and Understanding that fosters beneficial practices and behaviors and removes institutional barriers to those practices.**
- Implement STORM group recommendations
- *Increase landowner awareness of environmental stewardship as it relates to water quality through Snohomish-Camano ECO Net and King County EcoNet targeted awareness grant (if funded) or other ECO Net resources if necessary (in the Port Susan MSA)
- *Implement comprehensive outreach plan to maintain good population structure (?) and reduce loss of fishing gear by 2013 using WDFW crab endorsement funds *(in the Port Susan MSA)*

Build Social and Institutional Infrastructure that fosters beneficial practices and behaviors and removes institutional barriers to those practices.**
- *Increase landowner awareness of environmental stewardship as it relates to water quality through Snohomish-Camano and King County ECO Net targeted awareness grant (if funded) or other ECO Net resources if necessary (repeated in D3) (in the Port Susan MSA).

- Support and enhance existing infrastructure and organizational capacity to engage and enhance stewardship activities (volunteerism, property management stewardship, etc.).
- Identify needed stewardship gaps and fill those gaps working closely with the Snohomish Camano and King County ECO Net membership.
- Develop enhanced relationships with local print media journalist (e.g. Everett Herald, Stanwood Camano News, River Current, Snoqualmie Valley Record, etc.) to generate more Puget Sound related articles.
- Gather and distribute results of multiple audience research efforts to outreach and education practitioners.
- Provide periodic natural resources updates / science news to elected officials.
- Provide training to stewardship organizers to increase their skill set in all facets of effect project implementation.
- Implement STORM group recommendations.
- Provide outreach to Stilly / Snohomish area residents on current problems in Puget Sound.
- Assert relationship between observed Puget Sound problems and resident practices.
- Support youth education efforts that provide Puget Sound ecosystem curriculum or connections with personal action impacts.
- Develop and distribute 'new resident welcome packets' that provide scientifically accurate watershed and local issues education.
- Develop and publicize Stilly - Snohomish speaker resource list to community organizers and educators.
- Prevent firewood harvest out of stream channels and rivers that prevents the accumulations of wood that is needed for salmon recovery.

Implement a Coordinated, Integrated Ecosystem Monitoring Program.**

- Evaluate low dissolved oxygen levels in Possession Sound and develop and implement strategy to address low dissolved oxygen levels if necessary (using lessons learned from Hood Canal).
- Address low dissolved oxygen levels in floodplain tributary streams utilized by salmonids.
- Secure funding for and implement Monitoring Plan priorities.
- By 2013, complete the Snohomish Basin monitoring and adaptive management plan and accompanying business plan. Seek regulatory buyoff from the WA Department of Fish and Wildlife and National Marine Fisheries Service.

Cultivate broad-scale practices and behaviors among Puget Sound residents that benefit Puget Sound.**

- Develop and adopt a menu of shoreline and bluff resident best management practices for consistent messaging.
- Provide technical assistance, at appropriate levels, to residents interested and able to improve the health of Puget Sound.
- Better utilize existing demonstration sites on rain gardens and other low impact development through tours and lectures.
- Develop soft shore armoring demonstration sites at public locations in the Snohomish/Stillaguamish watersheds.
- Publicize multiple benefits of practices and behaviors of priority stewardship practices, including personal benefits.

Develop and secure stable and diverse sources of funding to implement Action Agenda Priorities.**

- Develop alternative stable funding mechanisms, like Watershed Investment Districts.
- By 2017, develop a public/private partnership program that pilots how the private sector can be more actively engaged in recovery efforts.

Climate change information and adaptation.**

- See results of the Whidbey Basin Science Symposium
- By 2013, complete the Snohomish Basin habitat protection strategy (EPA-funded) for hydrology. Initiate implementation of the strategy.

Additional strategies under consideration:

- In the Stillaguamish watershed, evaluate the risk to base flow that could result from gravel mining of mineral resource lands and develop overlays of important ecosystem components (e.g. coldwater springs, fish use, and mineral resource identified lands)
- Further clarify: Investigate alternative water sources for different locations
- Clarify the following strategy: Complete necessary modeling and planning coordinating flood management and habitat improvement
- Reference to Ecology's Port Gardner sediment cleanup project
- Create livestock exclusion ordinance to protect water quality in the basin.
- Prevent firewood harvest out of stream channels and rivers that prevents the accumulations of wood that is needed for salmon recovery
- Add reference to Climate Stewards program, Tulalip Tribes' climate research
- Evaluate expanding the Port Susan Marine Stewardship Area strategies to apply to the rest of the nearshore area.
- Pressure/Threat Rating
- Science Needs Identification

* Indicates an action from the Port Susan Marine Stewardship Area Strategy
** Snohomish and Stillaguamish Watershed developed this list of local strategies within the context of an early draft outline of regional strategies and sub-strategies. Since this list of local strategies was compiled, the regional strategy outline changed. As such, the order and wording may not match what is currently in the Action Agenda. Once the local area has completed their prioritization process, the final list of local strategies will be cross-walked with the most current regional strategies.

Relationship to Recovery Targets

There are many different and complex activities advancing in the Stillaguamish and Snohomish areas that will contribute to the regional recovery targets. Because the LIO was recently established in this area, the focus in the coming year will be on identifying local threats and strategic priorities which describe the local contribution to the Soundwide ecosystem and pressure reduction targets (land development, wastewater, shoreline alteration, stormwater).

Local Implementation Structure

There are a wide variety of partners working in the Stillaguamish and Snohomish watersheds and the Local Integrating Organization was recognized by the Leadership Council in February 2012. This

organization is currently working to advance a system that utilizes an executive steering committee, implementation team, and existing watershed council structures.

References and Additional Resources

There are many local partners and organizations critical to advancing recovery in this area. This section will be further developed during the public review period.

Shared Strategy for Puget Sound watershed Profile. Available online at: http://sharedsalmonstrategy.org

Snohomish County Surface Water Management: http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SWM/Work_Areas/default.htm

Snohomish Watershed Salmon Recovery Forum: http://www1.co.snohomish.wa.us/Departments/Public_Works/Divisions/SWM/Work_Areas/Habitat/Salmon/Snohomish/

Stillaguamish Watershed Council: http://www.stillaguamish.nsn.us/SIRC.htm

Snohomish Marine Resources Committee: http://www.snocomrc.org/

Snohomish Conservation District: http://snohomishcd.org/

King Conservation District: http://www.kingcd.org/index.php

King County DNRP: http://www.kingcounty.gov/environment/dnrp.aspx

Snoqualmie Forum: http://www.govlink.org/watersheds/7/

Sound Salmon Solutions: http://soundsalmonsolutions.org/

WSU Extension: http://snohomish.wsu.edu/

References

http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/upload/Ch5_Stillaguamish.pdf

http://www.fs.usda.gov/mbs

http://www.co.snohomish.wa.us/documents/Departments/Public_Works/surfacewatermanagement/aquatichabitat/stilliplan/1Introduction.pdf

http://www.ecy.wa.gov/programs/wr/instream-flows/stillaguamishbasin.html

http://www.co.snohomish.wa.us/documents/Departments/Public_Works/surfacewatermanagement/snohomishsalmonplanfinal/section4.pdf

http://www.co.snohomish.wa.us/documents/Departments/Public_Works/surfacewatermanagement/snohomishsalmonplanfinal/section4.pdf

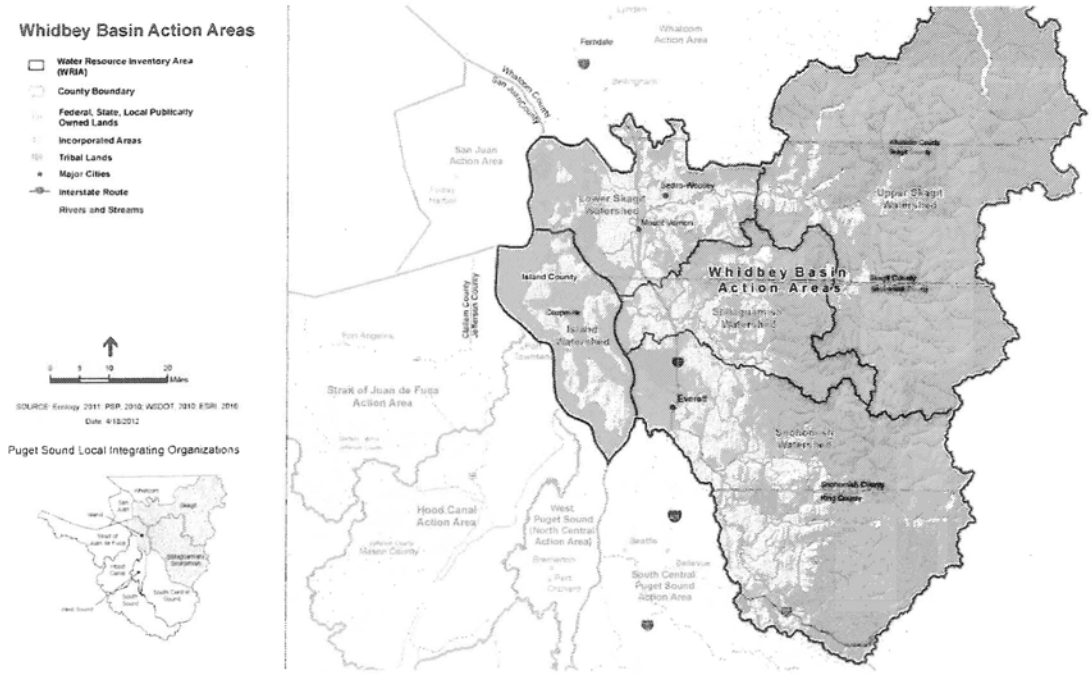
http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/washington/placesweprotect/port-susan-bay.xml

http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/upload/Ch5_Snohomish.pdf

http://www.snocomrc.org/uploads/Factsheets/Eelgrass.pdf

http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/upload/Ch5_Snohomish.pdf

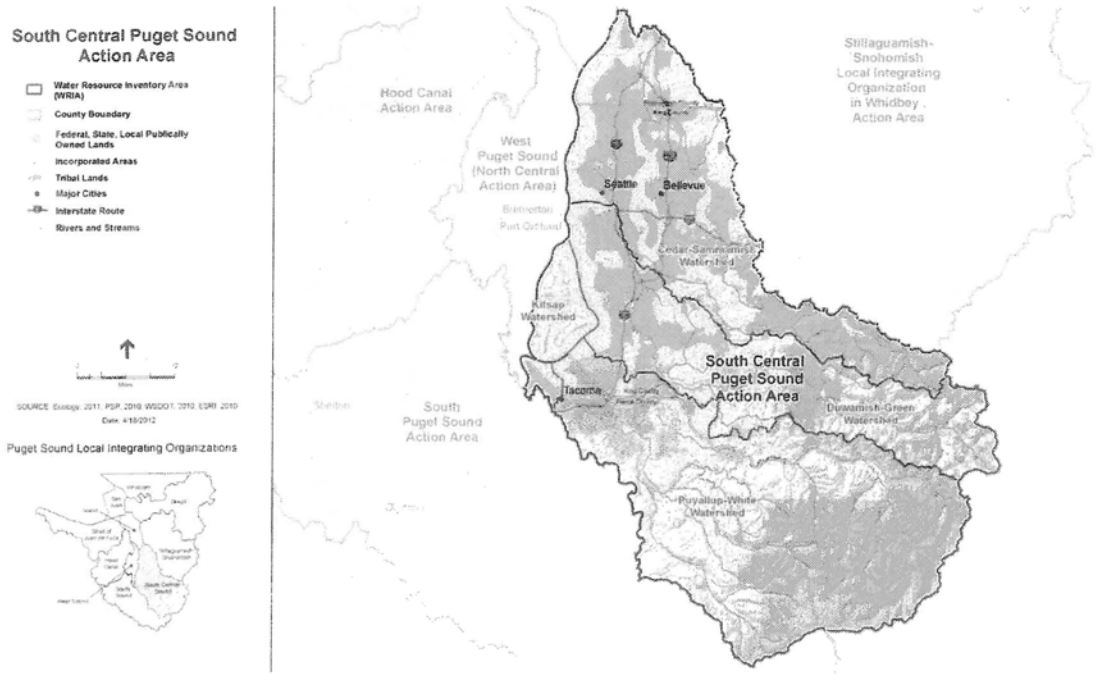
Whidbey Action Area Reference Map



The Action Agenda in South Central Puget Sound

Profile

The South Central Action Area is home to 2.5 million residents living in three of Washington's largest cities—Seattle, Bellevue, and Tacoma, and in suburban and rural residential development that reaches across unincorporated King and Pierce Counties. The northernmost portion of the action area is located in southwest Snohomish County. South Central Puget Sound is the most urbanized portion of Puget Sound and includes infrastructure of commercial and residential buildings, large areas of pavement, a heavily modified shoreline, and a pervasive road network. Although portions of the action area have been intensively developed, approximately 77 percent of the area is not considered urban, with vast tracts of agricultural lands in rural King and Pierce County, and undeveloped wilderness in Mount Rainier National Park and the Mount Baker-Snoqualmie National Forest. The three major river systems originate in the Cascades near Snoqualmie Pass, Cascade Pass, and Mount Rainier, travel through forests and farms, and empty into Lake Washington and Puget Sound. Glacial melt from Mount Rainier feeds the Puyallup/White River system, while the Green/Duwamish and Cedar/Sammamish are supplied by snow melt and rainfall. Lowland areas receive average rainfall of 40 inches per year. In highly urbanized portions of the region, many streams or stream segments have been placed in drainage pipes and re-assert their presence during storms and flood events.



The two largest bays in the South Central area are Seattle's Elliott Bay and Commencement Bay, which is near Tacoma. Vashon-Maury is the largest island south of the Admiralty Inlet. The major currents within the saltwater basin of central Puget Sound generally flow northward along the west side of Vashon Island, and southward through the East Passage. The marine waters of Puget Sound form warm layers at the surface during the summer months due to river input and solar heating. These layers are mixed during winter months by seasonal winds and cool weather. An underwater sill by the Tacoma Narrows also alters the pattern of marine water circulation.

South Central Puget Sound is the economic driver of the region, and largely of the State of Washington. The region generates over $200 billion in annual economic activity, comprising approximately 62 percent of the gross state product. Major commercial and industrial enterprises are concentrated here, including technology, aerospace, finance, insurance, health care, business and professional services, commercial fishing, recreation, and tourism. These industries are served by international port facilities in Seattle and Tacoma, along with SeaTac international airport, Boeing Field, and passenger and freight railroad services. The region has 14,900 acres of designated manufacturing industrial centers in six locations: Ballard Interbay, Duwamish, North Tukwila, Auburn/Kent, Overlake, and the Port of Tacoma. Water supply for most of the population of the area is provided by the City of Seattle and the City of Tacoma, through their operations on the Cedar and Green Rivers, respectively.

Following the adoption of the Growth Management Act in the 1990s, land use strategies have been somewhat effective in containing sprawl, as more than 93 percent of the growth in King County since 1996 has been concentrated within the designated urban growth boundary. Significant tracts of commercial forest and agriculture remain in the eastern and southeastern portions of the area. There are many challenges in trying to retain habitat features and natural amenities while trying to accommodate several hundred thousand new residents to this area in the next 20 to 25 years.

In general, the residents of the South Central Action Area are remarkably informed and engaged citizens. There is a high level of volunteerism and civic engagement with many agencies and local NGOs benefiting from the resources and knowledge base of the public for assistance with on-the-ground projects and public process for furthering recovery.

The varied ports and waterways of South Central Puget Sound have made it an international shipping center for regional and national industries, natural resource extraction (logging, fisheries, mining), and agricultural products. Urban estuaries support many small marine, ship building/repair, and industrial enterprises. Public transportation to Kitsap County and Vashon Island is provided by the Washington State Ferry System and other vessel traffic consists of passenger ferries, fishing boats, research vessels, small recreational craft, and cruise ships. Recreation spots include Lakes Washington, Sammamish, and Tapps; Puget Sound beaches such as Alki Beach in West Seattle, Seahurst in Burien, and Pt. Defiance in Tacoma; and along the Mountain to Sound Greenway along Interstate 90, the middle Green River, and the White River above Enumclaw. The headwaters of the major rivers in this area are protected through their status as parklands managed by the National Park Service, wilderness areas managed by the United States Department of Agriculture (USDA) Forest Service, and the headwater source areas of the water supplies of Seattle and Tacoma.

The federal listing of Puget Sound Chinook was the first time a threatened species listing for salmon had occurred in such an urban environment. Despite the extensive urbanization of South Central Puget Sound, Chinook salmon and other salmon species spawn in the major rivers and lakes. Unique salmon populations include the spring run of White River Chinook, Issaquah Creek and Cedar River summer and

fall Chinook, Lake Sammamish Kokanee, and Lake Washington Sockeye. The Green River is one of the top ten Steelhead rivers in Washington and supports substantial natural and hatchery populations of salmon. Bull trout, Rainbow and Coastal Cutthroat trout, and Coho, Chum, and Pink salmon are also present in some of the river systems. Strong community efforts and watershed partnerships, some through formal inter-local agreements, are focused on strategic, science-based salmon recovery efforts throughout the area, and habitat restoration programs depend on a combination of local, regional, state, and federal funding. While other fish, wildlife, and bird communities are abundant in undeveloped portions of the action area, those species that coexist well with humans are generally present in the urban sectors.

Local Action Agenda Process

The South Central Local Integrating Organization (LIO), known as the Action Area Caucus Group, spent nearly a year working through the 144 sound-wide actions in the 2008 Action Agenda, discussing how actions translate to local communities, watersheds, and the larger South Central Puget Sound area. The Caucus Group identified a top tier of actions and then developed more specific action plans to promote coordination and efforts to advance those priority actions.

The Caucus Group involved the participation of member groups, ad hoc working groups, and significant help from both policy and technical staff of member organizations to identify the threats and pressures most significant to the South Central Action Area. Final outcomes were discussed in meetings of the entire Caucus Group, and the information below was officially transmitted to the Puget Sound Partnership at the October 2011 meeting of the Ecosystem Coordination Board.

Key Threats/Pressures

The South Central Action Area Caucus Group has identified four priority issues to address key pressures on the South Central Puget Sound ecosystem. The priority issues include:

- Land development
- Shoreline alteration
- Stormwater
- Loss of floodplain function

The South Central Action Area Caucus Group also identified additional ecosystem pressures to address that are of specific importance to the South Central Puget Sound. The priority pressures include:

- Habitat conversion
- Climate change
- Dams, levees, and tidegates
- Legacy toxic contaminants
- Current use and release of excess toxics and nutrients

Opportunities, Priorities, and Near-Term Actions

In addition to the priority pressures identified for the South Central Puget Sound area and the local contributions to the Action Agenda ecosystem targets, the South Central Action Area Caucus Group also developed key themes and recommendations that are fundamental to the strategies and near-term actions (NTAs) described in greater detail below. The key themes and recommendations from the Caucus Group are:

- Local land use and environmental standards are essential for habitat protection and there is a need for better alignment between state standards and the targets being set for Puget Sound recovery;
- To effectively deal with pressures and threats, desired outcome and actions will have to be tailored to land uses and development patterns while working toward a Soundwide target;
- There needs to be a more concerted effort to effectively advocate for federal and state funding (including preserving current funding) for salmon recovery. In addition, there is a need for an integrated funding strategy for Puget Sound with salmon recovery and stormwater as central elements. The strategy should also be aligned with land use and regulatory changes; and
- To successfully advocate for state and federal funding for stormwater investments in Puget Sound, there needs to be a more refined assessment of total need and priorities across the region for retrofits, operation and maintenance, and source control.

The South Central Action Area Caucus Group identified ten priority strategies, as listed below (in alphabetical order). The ten priority strategies were honed from a more comprehensive list of strategies that were all considered important in addressing the local pressures.

A. Acquire or protect high-value habitat and land at immediate risk of conversion.
B. Change Shoreline Management Act (SMA) statutes and regulations to limit residential shoreline armoring and overwater coverage, and promote "green" shoreline replacements.
C. Develop a strategic funding proposal for habitat restoration and protection priorities.
D. Fund and implement stormwater retrofits, improvements to operations/maintenance of existing stormwater infrastructure, and additional source control measures.
E. Implement salmon recovery habitat protection and restoration recommendations.
F. Incorporate low impact development (LID) requirements into stormwater codes and develop and implement LID incentives.
G. Keep toxics and excess nutrients out of stormwater runoff and wastewater.
H. Restore floodplains to recreate ecosystem function.
I. Restore and protect Local Toxics Control Account funding under the Model Toxics Control Account (MTCA) for local toxics cleanup activities.
J. Work with local governments to develop and implement policies and regulations that advance Action Agenda implementation.

The South Central Action Area Caucus Group also identified eight NTAs to support the strategies. They include:

NEAR-TERM ACTIONS	RELATED LOCAL STRATEGY	POSSIBLE LEAD GOVERNMENT, AGENCY, AND/OR ORGANIZATION	PROPOSED PERFORMANCE MEASURE	POTENTIAL FUNDING SOURCE(S)
Policy Alignment a. Seek better alignment of state standards for stormwater, Shoreline Master Programs, and floodplain development regulations with Soundwide targets and Action Agenda priorities b. Review and align local policies and regulations with targets and Action Agenda priorities. c. Work with federal and state governments at a watershed scale to integrate current and future investments for Clean Water Act compliance (e.g. Superfund Clean-up, CSOs, NPDES), with habitat restoration, to maximize benefits; Work with agencies to increase funding sources.	J	a. PSP coordinates with state agencies b. Caucus Group using EPA funding for consultant to do pilot study, work with LIO Coordinator, Caucus Group and PSP c. PSP, legislature, Governor, Environmental groups, local governments, Water Resource Inventory Areas (WRIAs)	c. More unified approach by PSP and the region in seeking funding for habitat, stormwater, and Puget Sound protection.	
Salmon Recovery and Floodplains Implement highest priority salmon recovery habitat protection and restoration recommendations from WRIAs 8, 9 and 10 three-year work plans: For Floodplain Restoration: • Develop concept and preliminary strategy • Conduct economic analysis, including ecosystem goods and services • Ensure integration with floodplain acquisition and restoration plans.	E, C, H	Salmon Recovery lead entities	Regional salmon recovery metrics (possible examples include: acres restored, linear feet of stream or shoreline restored, fish passage barriers removed, etc.) To what extent are WRIA plan recommendations being implemented? Monitoring and adaptive management strategies Floodplain acres restored; linear	SRFB/PSAR, Conservation District, Conservation Futures, mitigation, EPA Puget Sound Restoration and Protection funds plus possible additional funding sources

NEAR-TERM ACTIONS	RELATED LOCAL STRATEGY	POSSIBLE LEAD GOVERNMENT, AGENCY, AND/OR ORGANIZATION	PROPOSED PERFORMANCE MEASURE	POTENTIAL FUNDING SOURCE(S)
			feet of levee setback, fish use	
Habitat at Risk Acquire and/or protect high-value habitat and land at immediate risk of conversion: • Utilize existing information from adopted plans; assess; consult plans (etc); create and implement a strategy • Provide increased funding for acquisition of high-value habitat at immediate risk of conversion	A	Local governments, NGOs (e.g. Forterra)	Acres acquired/protected (add #)	SRFB/PSAR, transfer of development rights (TDR), Conservation Futures, Conservation Districts, NGO land acquisition funds; FEMA for frequently flooded; Ecology's flood hazard
Sustainable Funding for Watersheds Seek to establish sustainable funding sources and authorities for watershed restoration and protection priorities: • Cross-WRIA discussions of funding need and review of potential mechanisms • Coordination with PSP and ECB Subcommittee working to develop an integrated funding strategy for Puget Sound recovery	C	WRIAs, watershed groups	Number of partners supporting funding proposal (including business interests)	Need legislative approval of local authorities that are better matched to an integrated, watershed approach to habitat, stormwater, and water quality.
"Green" Shorelines Implement "green" shoreline replacements: • Promote green shoreline BMPs, incentives • Fund/implement shoreline restoration plans	B	Local governments NGO's	# of property owners willing to restore shoreline; linear feet of armoring removed or "green" /soft shoreline installed)	Ecology, SRFB/PSAR, Conservation Districts
Stormwater Management a. Fund and implement municipal Stormwater Management Programs (SWMPs) including:	D, F	Legislature, Ecology, Local governments, NGOs	Dollars allocated annually to support SWMPs – both retrofit and operations and	Legislature/Ecology, Federal/EPA/National Estuary Program

NEAR-TERM ACTIONS	RELATED LOCAL STRATEGY	POSSIBLE LEAD GOVERNMENT, AGENCY, AND/OR ORGANIZATION	PROPOSED PERFORMANCE MEASURE	POTENTIAL FUNDING SOURCE(S)
• Structural stormwater retrofits • O&M of existing stormwater infrastructure • Source control (e.g., business inspections, education & outreach) • Incorporation of LID requirements into stormwater codes • Development and implementation of LID incentives • Incentives for business to help b. Identify and analyze funding mechanisms c. Advocate for ongoing funding for retrofits and operations.			maintenance funding Number of successful stormwater projects implemented Number of jurisdictions with LID requirements in stormwater codes	
"True" Source Control Develop Puget Sound wide effort for source control (i.e., product management, control; e.g., copper in brake pads legislation)	G	PSP/Ecology Local governments	Regional organization addressing (e.g., similar to 'Green Chemistry' in CA)	Legislature/Ecology, Federal/EPA/National Estuary Program
Funding for Remediation of Toxic Sites Restore and protect Local Toxics Account under Model Toxics Control Act (MTCA) to continue cleanup and remediation of toxic sites: • Educate legislators about the importance of assuring adequate state funding is available to move remedial actions forward in a timely manner.	I	Legislature/Ecology/ Governor/PSP – plus other interests such as ports, cities, counties, environmental community, some parts of the business community	Ecology is able to provide an appropriate level of state match to approved Remedial Action Grant projects. LTCA is protected for its intended statutory purposes.	Fee on existing toxics, including petroleum products.

Relationship to Recovery Targets

For the Soundwide pressure reduction targets (land development, wastewater, shoreline alteration, and stormwater), the South Central Action Area Caucus Group identified related local issues and opportunities to help reduce the pressure.

PRESSURE REDUCTION TARGET CATEGORY	LOCAL ISSUES/PROBLEMS	OPPORTUNITIES/SOLUTIONS
Land Development	Residential, commercial, port and shipyard development • Habitat loss/high-value habitat conversion (from historic conditions, including loss of forest cover); Reduced large woody debris and carbon inputs to stream systems; Loss of storage in wetlands; Reduction in habitat resilience; Degradation and loss of topsoil/duff layer • Development in the floodplain impairs ecological function • Watershed alteration that causes flooding, erosion, and polluted runoff • Local governments enact ineffective comprehensive land use plans, zoning, stormwater regulations, shoreline master programs, critical areas regulations, or incentive programs for protection of resource lands, open space, and habitat. • Lack of state standards for many plans and regulations. • Lack of federal standards that affect land development, including floodplain development and wetland mitigation. • "Vesting" of development rights under old standards limits some local governments ability to implement good land development practices.	• Protect highest priority habitat areas as identified in watershed-based salmon recovery plans • Develop best practices/model policies or regulations • Update land use policies and regulations updates (e.g., SMPs, CAOs, etc.) to support habitat restoration and protection priorities in existing plans • Ensure that agriculture and working forest land are maintained as economically viable • Reform vesting law to be at time of permit issuance • Local jurisdictions to sunset permits in areas vulnerable to conversion; Avoid re-extension of vesting rights • Buyout "frequently flooded" land • State agencies more explicitly link standards for land use comprehensive plans, Shoreline Master Program updates, stormwater regulations, local flood plans, and floodplain development regulations to targets for Puget Sound recovery (i.e., what standards or actions need to be present in local SMPs if we are going to meet the targets for shoreline armoring?) • PSP, state agencies and local governments develop and share best practices/model for policies, regulations, Transfer of Development Rights, and tax incentive programs (e.g., PBRS). • Identify areas where vested development regulations most limit capacity to meet recovery targets. Use targeted purchase of development rights, tax incentives to reduce number of parcels likely to develop under old standards. Local governments can tighten standards for re-extension of vesting rights. State should consider reform of vesting law.

PRESSURE REDUCTION TARGET CATEGORY	LOCAL ISSUES/PROBLEMS	OPPORTUNITIES/SOLUTIONS
		• The Army Corps of Engineers (Corps) and Department of Ecology (Ecology) approve King and Pierce counties' framework for "fee-in-lieu" of wetland stream mitigation, which will provide a potential model for other jurisdictions around the Sound.
Shoreline Alteration	• Residential shoreline armoring and overwater structures (including residential conversion to bulkheads, estuary hardening, and issues related to railroad mainline(bulkhead) maintenance) • Lack of adequately protective regulatory updates and enforcement; No clear path forward for local jurisdictions struggling to address shoreline armoring • Land use practices and regulations in conflict with environmental goals, including lack of enforcement regulations • Local governments influence shoreline armoring and construction of overwater structures through their Shoreline and critical areas regulations, Shoreline Master program restoration plans, zoning, investments in shoreline acquisition and restoration, and technical assistance to land owners • Ecology sets standards/reviews SMP updates • Local governments need support, guidance, funding to better align local SMPs with meeting Puget Sound recovery targets • While models for "green" shoreline development are being developed in freshwater environments, more examples along saltwater shoreline would facilitate more wide-spread adoption	• Promote "green" shoreline techniques for property owners (led by WRIA 8) • Leverage current SMP updates • Clear defintion from Ecology of no-net-loss provision for SMP updates • Change legislation to improve state shoreline regulations (currently armoring is an allowed accessory use to a single family residence) • Update Critical Area Ordinances • Implement the Salmon Recovery Plans-specifically the 3 year plans • Pursue watershed based analysis of habitat needs – from mountains to the Sound • Change state Hydraulic Project Approval (HPA) program requirements • Implement Puget Sound Nearshore Ecosystem Restoration Program (PSNERP) recommended projects • Implement Shoreline Acquisition and Protection Projects (Snohomish, King, Pierce counties) • PSP and Ecology more explicitly link standards for Shoreline Master Program updates to targets for Puget Sound recovery (i.e., what standards or actions need to be present in local SMPs if we are going to meet the target for shoreline armoring?) • PSP and Ecology support local plan update efforts by highlighting examples of actions and standards that will further PSP recovery targets. • PSP to seek federal and state funding for "restoration" elements of local SMPs
Stormwater	Surface water loading and runoff containing pollutants (conventional, toxics, organics, nutrients) from the built environment (industrial, transportation, commercial, residential, deposition, etc)	• Utilize Low Impact Development (LID) techniques • PSP to help integrate LID into local codes (fully implement requirements of Phase I and II NPDES permits (including LID requirements));

PRESSURE REDUCTION TARGET CATEGORY	LOCAL ISSUES/PROBLEMS	OPPORTUNITIES/SOLUTIONS
	• Need for more stormwater retrofits • Insufficient stormwater infrastructure maintenance • Habitat conversion from historic conditions, including loss of vegetative cover and duff • Disruption of natural hydrologic regimes, due to land conversion to impervious surfaces; asphalted and realigned stream channels; and native vegetation removal	link standards to targets for Puget Sound recovery • Improve working relationship with WSDOT on stormwater mitigation issues • WSU continues to use natural drainage approach to address multiple opportunities around naturally managing stormwater • Implement groundwater management plans (Pierce) • Implement Watershed Action Plans • Complete and implement total maximum daily loads (TMDLs) • Complete/implement comprehensive Drainage Basin Plans (Pierce County) • Pursue watershed based municipal stormwater permits • Fund a preliminary needs assessment for stormwater • Encourage retrofit projects; seek federal and state funding support; EPA-grant funded work in local watersheds (e.g., WRIA 9) is under way and will help to provide future guidance on how to identify and prioritize retrofit needs • Maintain stormwater infrastructure • Update Critical Areas Ordinances • Update SMPs • Fund and implement education and outreach programs • Clean up industrial pollution • Conduct business inspections • Implement Park, Recreation and Open Space Plan (Pierce County) • Share best practices through voluntary association of local governments (e.g., Sustainable Cities Roundtable) • True source control • Local governments influence stormwater runoff through their land use and zoning, stormwater regulations and design standards, clearing standards, public outreach, monitoring, maintenance of stormwater infrastructure, and capital investments in new facilities/facility retrofits • State and federal agencies set minimum standards for stormwater regulations and monitoring. PSP has identified a significant

PRESSURE REDUCTION TARGET CATEGORY	LOCAL ISSUES/PROBLEMS	OPPORTUNITIES/SOLUTIONS
		unmet need for stormwater retrofits and removal of legacy loads. • Future NPDES permits may include requirements for LID
Wastewater	• Combined Sewer Overflows (CSOs) • Increase in biotoxins, pathogens, and viruses	• Undertake additional Seattle and King County actions required to meet future NPDES requirements and federal/state water quality mandates. • Look for opportunities to integrate actions in response to different mandates at a watershed scale to maximize benefits from public investments in CSOs, Superfund clean-up, source control, habitat restoration, etc. • Use green stormwater infrastructure to slow the flow as part of CSO control strategies • Complete and Implement TMDLs for impaired water bodies (Watershed Action Plans) • Implement Watershed Action Plans
Loss of Floodplain Function	• Habitat Loss; Dams and Levees • Issues with levee vegetation maintenance • Conflict between the National Flood Insurance Program and the Endangered Species Act • Weak Floodplain Regulations (e.g. SMP, FEMA NFIP compliance) • Perceived conflict between agriculture and salmon recovery seen for ecologically significant/ highly productive land • Impacts of recreational safety concerns and policies on floodplain restoration efforts for salmon recovery and flood management • Habitat conversion from historic conditions, including loss of forest cover and natural floodplain functions; reduced large and woody debris and carbon inputs to stream systems; loss of storage in wetlands; reduction in habitat resilience change in hydraulic regime	• Implement watershed-based salmon habitat restoration and protection projects (Salmon Recovery Funding Board, Puget Sound Acquisition and Restoration, Puget Sound Nearshore Restoration Project, Estuary and Salmon Restoration Program, etc.) • Convene a regional forum to discuss and recommend a regional variance to the Corps levee vegetation maintenance standard • Obtain EPA Ecosystem Restoration and Protection grants for local projects • Allow for agriculture and working forest uses that are not detrimental to floodplain function or salmon recovery options • FEMA and NOAA provide clarity and assistance to jurisdictions for compliance with the National Flood Insurance Program • Develop approaches that balance river recreational safety with implementation of floodplain restoration project priorities • Prevent development in floodplains • Update Critical Areas Ordinances • Update SMPs • Buy out "frequently flooded" land • Construct setback levees

Of the ecosystem targets identified in the broader Action Agenda update, the South Sound LIO identified those that are of particular local interest to the region as well as local contributions to the targets. These include:

ECOSYSTEM TARGETS OF LOCAL INTEREST	LOCAL CONTRIBUTIONS TO SOUNDWIDE RECOVERY
Floodplains	• Implementation of riparian and floodplain restoration and protection priorities from watershed salmon recovery plans (measured by acres restored or protected). • Participation in efforts to obtain regional variance to Corps levee vegetation maintenance policy. • Sharing local approaches for updating floodplain development regulations for consistency with FEMA biological opinion. • Opportunity to engage new/emerging farming community of small-scale, direct marketing farms in practices (and marketing efforts) that achieve win-win outcomes (e.g., Salmon Safe farm labeling).
Shoreline Armoring	• Implementing nearshore restoration priorities in watershed salmon recovery plans (measured by linear feet of armoring removed and/or habitat restored). • Local jurisdictions updating shoreline master programs to guide shoreline land use, development regulations and restoration. • Federal, state and local governments jointly seeking funding to implement shoreline restoration elements of local SMPs. • Green Shorelines Steering Committee in WRIA 8 serving as multi-agency group working to increase awareness, acceptance, and implementation of green shorelines alternative to armored shorelines in Lake Washington and Lake Sammamish.
Freshwater Water Quality	• Green stormwater infrastructure projects
Summer Stream Flows	• Green stormwater infrastructure projects
Water Insects in Freshwater	• Green stormwater infrastructure • Creek restoration projects • Protection of existing high-quality riparian areas

Local Implementation Structure

The South Central Action Area contains well-functioning, coordinated efforts to restore habitat, protect habitat, and reduce water pollution. To build on and support the work of existing groups and to improve action area communication, coordination, and integration among these different efforts, a small, broadly inclusive caucus group was identified to help refine and confirm action area priorities using input from constituents. The South Central Action Area Caucus Group also helps identify opportunities to improve local coordination and

IMPLEMENTATION COORDINATION IN SOUTH CENTRAL

The South Central Action Area Caucus Group is composed of elected officials and staff from key implementer groups, including local jurisdictions, watershed groups, tribes, business, and non-governmental organizations.

integration of Puget Sound recovery efforts and update and inform the action area representative to the Ecosystem Coordination Board. In 2010, the Caucus Group was recognized by the PSP's Leadership Council as the Local Integrating Organization for the South Central Action Area.
Meetings of the Caucus Group are generally held on a quarterly basis, in advance of the Ecosystem Coordination Board Meetings. The Caucus Group has a part-time Coordinator funded through an EPA grant, available to all LIOs, to support the functions of the Caucus Group and help facilitate implementation. The PSP Ecosystem Recovery Coordinator manages the grant to the LIO, works closely with the LIO Coordinator, and remains an active participant in the Caucus Group and implementation process. Additional PSP staff, including technical and policy specialists, participates in Caucus Group meetings and activities as appropriate.

Participants in the Caucus Group include the following:

- King and Pierce counties
- Cities of Seattle, Tacoma, and Bellevue
- Suburban Cities Association of King County (City of Black Diamond and City of Maple Valley)
- Pierce County Cities and Towns Association (City of Fife)
- Ports of Seattle and Tacoma
- Muckleshoot Indian Tribe
- Puyallup Tribe of Indians
- Public Health – Seattle and King County
- Tacoma – Pierce County Health Department
- WRIA 8 (Lake Washington/Cedar/Sammamish Watershed) Salmon Recovery Council
- WRIA 9 (Green/Duwamish Watershed) Ecosystem Forum
- WRIA 10/12 (Puyallup/White and Chambers Clover Watershed) Citizen Advisory Committee
- Environmental constituency (Citizens for a Healthy Bay and Forterra)
- Agricultural constituency (WSU Extension and King Conservation District)
- Business constituency (Boeing and Tacoma Chamber of Commerce)
- Puget Sound Regional Council
- Puget Sound Partnership (state agencies rep)

References and Additional Resources

Puget Sound Regional Council: www.psrc.org

King County: www.kingcounty.gov

Pierce County Surface Water Management:
http://www.co.pierce.wa.us/pc/abtus/ourorg/pwu/about/water.htm

City of Seattle: www.seattle.gov

City of Tacoma: www.cityoftacoma.org

City of Bellevue: www.bellevuewa.gov

Suburban Cities Association of King County: www.suburbancities.org

Pierce County Cities and Towns Association:
http://www.co.pierce.wa.us/pc/abtus/profile/citiesandtowns.htm

Port of Seattle: www.portseattle.org

Port of Tacoma: www.portoftacoma.com

WRIA 8: http://www.govlink.org/watersheds/8/

WRIA 9: http://www.govlink.org/watersheds/9/

WRIA 10: http://www.co.pierce.wa.us/pc/services/home/environ/water/ps/leadentity.htm

Citizens for a Healthy Bay: www.healthybay.org

Forterra: www.forterra.org

ECONet: http://www.psp.wa.gov/econet_news.php

King Conservation District: www.kingcd.org

Pierce Conservation District: www.piercecountycd.org

Washington State University Extension King County: http://county.wsu.edu/king/Pages/default.aspx

Washington State University Extension Pierce County: http://county.wsu.edu/pierce/Pages/default.aspx

WSU Puyallup LID Stormwater Research Program:
http://www.puyallup.wsu.edu/stormwater/index.html

Puyallup River Watershed Council:
http://www.co.pierce.wa.us/pc/services/home/environ/water/ps/prwc/main.htm

Seattle & King County Public Health: http://www.kingcounty.gov/healthservices/health.aspx

References

http://www.kingcounty.gov/About/environment.aspx?print=1

http://www.seattle.gov/util/Services/Drainage_&_Sewer/Keep_Water_Safe_&_Clean/RestoreOurWaters/OurWatersheds/index.htm

http://www.co.snohomish.wa.us/documents/Departments/Public_Works/SurfaceWaterManagement/AquaticHabitat/Salmon/Countywide/CollinsPugetSoundMarsh2005.pdf

http://www.seadocsociety.org/how-puget-sound-works

http://cms.cityoftacoma.org/Planning/Shoreline/SMP_Drafts/Final_InvenChar.pdf

http://www.seattle.gov/oir/datasheet/economy.htm

http://www.seattle.gov/util/About_SPU/Water_System/Water_Supply/WaterSupply/index.htm

http://your.kingcounty.gov/budget/benchmrk/bench98/acrobat/chapter4.pdf

http://cmbc.ucsd.edu/content/1/docs/coas_40_sp03_27_44_simensta.pdf

http://www.nps.gov/archeology/sites/discEvalPdfs/PWR_CCSO_SAIP_Plan.pdf

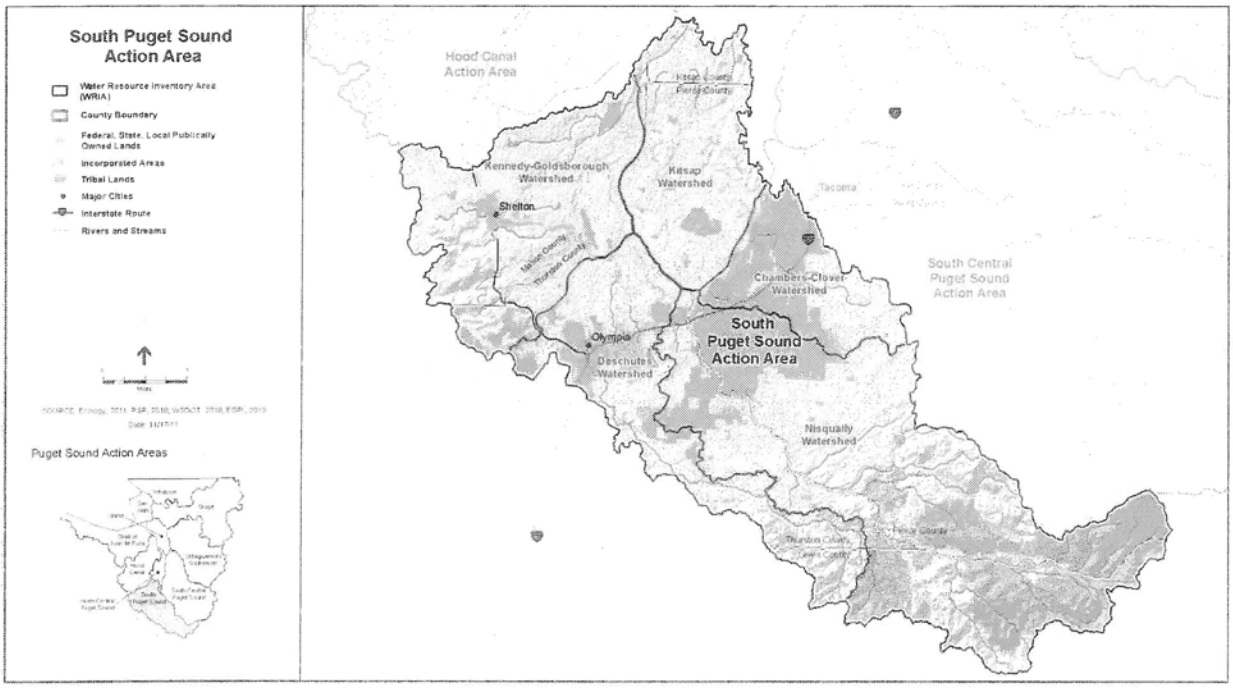
http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/upload/Ch5_Lk_Wash.pdf

The Action Agenda in South Puget Sound

Profile

The South Sound is one of the fastest growing areas in Washington State, exceeding the State's growth rate consistently since the 1960s. By 2005 the population has doubled to about 300,000. It is estimated that the South Sound population will grow by another 150,000 people within the next 25 years. The growth rate is high because of the stable economy, high quality of life, and lower cost of living compared to the Central Puget Sound region. Approximately 75 percent of the population growth is from people moving to the South Sound – only a quarter of the growth is from births.

Much of the population is centered near the towns and cities of Shelton, Olympia, Lacey, Tumwater, Steilacoom, University Place, Lakewood, Tacoma, DuPont, the community of Allyn, and along shorelines. Land use varies from urban populations to rural and mixed use. Commercial forestry and tribal and non-tribal commercial shellfisheries dominate the natural resources industries. The capital of Washington State, Olympia, is located in the South Sound.



Unique Ecosystem Characteristics and Assets

South Puget Sound is unique. It has seven finger inlets – each with its own headwater estuary – four large islands and over 450 miles of shoreline. Its terrain is characterized by rolling hills and ridges. There are steep bluffs bordering Puget Sound which are intersected by small, steep ravines that drain the upland areas. The terrain and soils of the area have been heavily influenced by past glacial activity.

Hydrology in the area is characterized by a number of short streams with headwaters in upland lake or wetland areas that drain into Puget Sound. The downstream reaches of these streams are usually confined within steeply sloping ravines with sidewall seeps. There are a number of estuarine bays and lagoons located along the shorelines where these streams intersect with Puget Sound. Larger river systems include the Nisqually River and the Deschutes River. Tidal ranges in South Sound are extensive, with maximum ranges of upwards of 20 feet. Yet, much of the South Sound has slow circulation and sensitivity to nutrients, causing a trend to low dissolved oxygen.

The waters of South Puget Sound provide some of the finest shellfish habitat in the world and present an array of recreational, commercial and tribal harvest opportunities. Washington leads the country in production of farmed clams, oysters and mussels with an annual value of over $107 million. Washington shellfish growers directly and indirectly employ over 3,200 people and provide an estimated total economic contribution of $270 million. The South Puget Sound shellfish industry is the largest fish industry in all of Puget Sound. It also has the highest rate of economic return to ports of landing within South Sound. The commercial shellfish industry is thriving, demand is expanding in markets worldwide, and clean water is the essential catalyst for continued success. Recreational use of the shorelines for clam digging, swimming, boating, fishing, and beach combing on state, county, city and private beaches is popular. Efforts to

Notable Accomplishments

The Lead Entities for salmon recovery in South Puget Sound and county, NGO, and private partners worked together to secure the acquisition of the Devils Head parcel on the Key Peninsula, resulting in permanent protection of 94 acres of shoreline, forested upland, and other important habitat.

DNR, the South Puget Sound Salmon Enhancement Group, and the Squaxin Island Tribe partnered to remove 3,150 square feet of overwater docking made of 48 creosote treated wood pilings and 84.6 tons of creosote treated wood on Squaxin Island. A 400-foot rock bulkhead along the Squaxin Island shoreline was also removed, completely restoring the shoreline to a natural condition.

The Pierce County Shellfish Partners worked to achieve a recent upgrade of more than 100 acres of historic shellfish beds in Vaughn Bay, closed to harvest due to poor water quality for more than twenty years. Thurston County and partners also worked to achieve an upgrade of 240 acres of historic shellfish beds in Henderson Inlet.

The Nisqually Tribe and a host of partners recently completed a massive restoration project that restored tidal hydrology to over 900 acres of the Nisqually River delta. This project has immediate benefits to salmon from the Nisqually watershed and many other river basins in Puget Sound.

restore populations of native shellfish – such as Olympia oysters – have increased in recent years, but non-native shellfish still dominate the assemblage of species that make up much of the economic backbone of South Sound.

Use of marine waters and nearshore areas by juvenile salmon and trout rates high in South Puget Sound, not only for salmonids coming from freshwater systems in the area, but also during summer when salmon from elsewhere in Puget Sound, and even British Columbia, are known to feed in the rich South Sound.

Local Action Agenda Process

The local integrating organization (LIO) in South Puget Sound is known as the Alliance for a Healthy South Sound, and has been meeting regularly for over a year. The Alliance has developed an in-depth process through which it will refine a list of key threats to ecosystem health, articulate strategies and actions supporting ecosystem recovery, and quantify the Action Area's contribution to achieving specific Sound-wide pressure reduction/ecosystem recovery targets by 2020. It is also in the process of developing both an organizational and science-based work plan, in addition to identifying major threats to ecosystem health and prioritized strategies for ecosystem recovery.

Key Threats/Pressures

The South Sound LIO is working through a process to identify which of Puget Sound Partnership's pressure reduction/ecosystem recovery targets are most applicable in the South Sound Action Area. Through this process, the LIO will objectively assess and articulate key threats to ecosystem health and recovery in South Puget Sound. The list below represents previous work by LIO members and others to capture some of the threats of potential consequence in the Action Area, but may be significantly refined based on the LIO's ongoing process to assess the relevance of Sound-wide pressure reduction targets.

- Habitat conversion from historic conditions, including loss of forest cover; reduced large woody debris and carbon inputs to stream systems; loss of storage in wetlands; reduction in habitat resilience; and degradation and loss of topsoil/duff layer.
- Land use practices and regulations in conflict with environmental goals, including lack of enforcement of regulations.
- Disruption of natural hydrologic regimes and loss of natural floodplain and wetland functions, due to land conversion to impervious surfaces; asphalted and realigned stream channels; and native vegetation removal.
- Technical and financial difficulty with retrofitting many South Puget Sound cities for stormwater water quality treatment.
- High sensitivity for pollution due to low flushing rates and long residency times in South Puget Sound marine waters.
- A combination of natural and anthropogenic characteristics affecting dissolved oxygen conditions that may lead to stress and mortality of fish and other aquatic organisms in South Puget Sound marine waters.

- Use of onsite septic systems at contemporary urban densities degrades fresh and marine water quality.
- Increase in biotoxins, pathogens, and viruses result in loss of private, recreational, commercial, and tribal shellfish harvest.
- Above average growth rates shown over the last several decades expected in South Sound counties, which will present fundamental challenges in controlling nutrient inputs to South Puget Sound.
- Aquatic and terrestrial habitat alterations significantly reducing salmon population abundance, productivity, and resilience.
- Difficulty maintaining and increasing public access to shorelines due to future population growth and development pressure.
- Amplification of many current stressors to ecosystems, infrastructure, and human communities in South Sound from the impacts of climate change.

Opportunities, Priorities and Near Term Actions

As described above, the South Sound LIO is working through a process to identify which regional pressure reduction/ecosystem recovery targets are most applicable in the South Sound Action Area. Through this process, the LIO will refine its list of key threats and develop its own local and complimentary strategies and actions. It will also articulate South Sound's contribution to achieving soundwide targets.

Prior to the formal creation of the Alliance for a Healthy South Sound, local entities developed and led a process to identify key science needs, threats to ecosystem health, and both existing and desired actions/programs needed to advance ecosystem recovery in the South Sound Action Area. The result of this work was an extensive report and inlet-by-inlet list of actions, programs, and strategies that contribute to the recovery of Puget Sound, which is included in the Reference section of this profile. Along with the process detailed above, the Alliance will likely draw heavily on this list when articulating opportunities and priorities for ecosystem recovery.

Interim, unranked ecosystem restoration priority strategies and actions are listed below. These 25 elements contribute directly to the Puget Sound Partnership's three Strategic Initiatives, in addition to salmon recovery goals articulated in the South Sound chapter of the Puget Sound Chinook Recovery Plan.

Strategic Initiative: *Protection and Restoration of Habitat*

- Secure perpetual public ownership of McNeil Island for preservation, restoration and low impact public access.
- Develop and implement South Puget Sound Conservation Plan elements, including high priority actions from:
    - McLane Creek Protection Plan
    - Goldsborough Creek Protection Plan
    - Skookum Creek Habitat Action Plan
    - Nisqually Protection (and Restoration) Plan
    - Deschutes Protection Plan

- Implement top tier projects from the South Sound Watersheds 3-year plan
- Implement all South Sound nearshore projects described by the Puget Sound Nearshore Estuarine Restoration Program's 10% feasibility list, including:
    - Chambers Estuary
    - Sequalitchew Estuary
    - Deschutes Estuary
    - Mission Creek (Thurston)
    - DNR marine lab
    - Bayshore Acquisition and Restoration at Oakland Bay
- Support advocacy efforts to partner with railroad on significant shoreline improvements.
- Support Shoreline Management Program updates designed to protect existing, functioning drift cells in South Sound.
- Support Eco-net endorsed educational efforts meeting the intent of this priority.
- Reconfigure I-5 through the Nisqually lowlands to reconnect the flood plain through the valley.

Strategic Initiative: *Prevention of Pollution from Urban Stormwater Runoff*

- Advocate for increased treatment levels at Wastewater Treatment Plants in South Sound, including zero discharge at Solo Point.
- Clean up industrially polluted sites consistent with the State's Model Toxics Control Act process, beginning with Budd Inlet and Oakland Bay.
- Complete and Implement Deschutes Total Maximum Daily Load (TMDL) and implement Oakland Bay TMDL.
- Achieve a balance of local, state and federal funding for full implementation of National Pollutant Discharge Elimination System (NPDES) municipal stormwater permits.
- Implement retrofitting on non-compliant stormwater systems.
- Implement stormwater management on a watershed basis.
- Support non-NPDES mandated stormwater programs in smaller communities (e.g.; Eatonville).
- Implement oil spill response preparation and training.
- Support Eco-net endorsed educational efforts meeting the intent of this priority.

Strategic Initiative: *Recovery of Shellfish Beds*

- Use the results of Department of Ecology's South Puget Sound Dissolved Oxygen model to determine sub-basin nutrient reduction targets for South Sound.
- Complete the Eld/Totten/Little Skookum TMDL and implement recommendations.
- Re-open shellfish beds, including: Henderson, Burley Lagoon, Minter, Oakland Bay, North Bay.
- Prevent closure of shellfish beds at Filucy Bay and Rocky Bay.
- Support programs and projects that implement, teach or otherwise encourage best management practices to remove nutrients and/or pathogens from surface waters.
- Improve Operations and Management of septic systems in all 4 counties (potentially building on the successful Henderson Inlet Model).
- Enhance on-site septic repair grant and loan programs.
- Support Eco-net endorsed educational efforts meeting the intent of this priority.

The tables below list some of the projects that the Alliance believes will help address the priority strategies and actions listed above. The Alliance anticipates that funding will be sought to implement these projects, or parts of these projects, within the next year to two years.

AHSS PRIORITY	ACTIONABLE & SEEKING FUNDING	STATUS
Develop and Implement South Sound Conservation Plan elements	McLane Creek Protection Plan, Goldsborough Creek Protection Plan, Skookum Creek Habitat Action Plan, Nisqually Protection (and Restoration) Plan, Deschutes Protection Plan	Recommendations of these plans that are not listed elsewhere in the South Sound Watersheds salmon recovery 3-year work plan are actionable and will be seeking funding
Implement all South Sound nearshore projects described by the PSNERP 10% feasibility list	John's Creek Estuary/Bayshore Acquisition at Oakland Bay	In progress through a partnership with Squaxin Island Tribe, Capitol Land Trust and Taylor Shellfish Farms and seeking further funding.
Implement urban TMDLs	Complete and implement Deschutes TMDL	While the TMDL is not yet finalized, there are actionable projects that may be seeking funding in the near-term.
Implement urban TMDLs	Implement Oakland Bay TMDL	There are actionable projects seeking funding
Implement retrofitting on non-compliant stormwater systems	Stormwater retrofits	Seeking funding in the near-term from multiple sources
Support a balance of local, state and federal funding for full implementation of NPDES municipal stormwater permits.	NPDES implementation	Seeking funding from a variety of sources
Support non-NPDES mandated stormwater programs in smaller communities (e.g.; Eatonville)	Small community stormwater planning including, but not limited to LID/Rain garden planning	Using the work done by the Eatonville community as a template for other communities that may wish to fund implementation plans including, but not limited to, LID and rain gardens in their rural communities.
Implement oil spill response preparation and training	Oil spill response and training	More funding is needed for equipment bases and training in parts of South Sound that are both heavily trafficked and which do not currently have easy access to either.
Support programs and projects that implement, teach or otherwise encourage best management practices to remove nutrients and/or pathogens from surface waters	Establishing, rewarding and teaching best management practices relating to nutrient and/or pathogen outputs	There are multiple projects in this area that may be seeking funding.
Improve operations and management of septic systems in all four counties	Establishing, supporting and implementing septic system management and maintenance	Multiple project possibilities for funding in all four counties that address septic system function

AHSS PRIORITY	ACTIONABLE & SEEKING FUNDING	STATUS
Implement all South Sound nearshore projects described by the PSNERP 10% feasibility process for South Sound (Deschutes, Chambers, Sequalitchew, Mission Creek, DNR Marine Lab, Bayshore Acq & Restoration at Oakland Bay)	Puget Sound Nearshore Estuarine Restoration Program (PSNERP) 10% feasibility projects in the South Sound	In all cases, there are next steps that can be presented for funding.
Clean up industrially polluted sites, consistent with the State Model Toxics Control Act process, beginning with Budd Inlet and Oakland Bay	Clean up industrially polluted sites in Budd Inlet and Oakland Bay	Multiple projects may be seeking funding which address this action
Enhance on-site septic repair grant and loan programs	Enhance on-site septic repair grant and loan programs	Multiple opportunities in all jurisdictions.
Eco-net endorsed educational efforts meeting the intent of AHSS priorities	Eco-net supported projects that address AHSS near-term actions	Multiple projects may be proposed by the South Sound eco-nets that represent important education work that is associated with the AHSS near term actions.
Implement South Sound Watersheds salmon recovery 3-year work plan	Implement South Sound salmon recovery 3-year work plan, which sequences and reports on actionable top priority projects in each WRIA as determined by each Lead Entity.	Multiple projects in each WRIA for near term actions and funding
Support Shoreline Management Program updates designed to protect existing, functioning drift cells in the South Sound	Support Shoreline Management Program (SMP) updates designed to protect existing, functioning drift cells in the South Sound	Multiple actions in multiple jurisdictions

ADVOCACY	NOTES
JBLM – Solo Point wastewater treatment plant	They are expanding to meet needs of a growing population, updating treatment levels to the levels that the LOTT plant will be treating. They are considering a move to zero discharge and should be encouraged to do so.
Chambers wastewater treatment plant	They are expanding to meet needs of growing population, but treatment may not sufficient to lower total nutrient output.
Long term stable funding for continued TMDL studies	Funding should be available and sufficient to complete and implement existing TMDLs as well as to continue this program
Achieve a balance of local, state and federal funding for full implementation of NPDES municipal stormwater permits.	Funding should be available and sufficient without undue burden on local funding.
Implement stormwater management on a watershed basis.	

ADVOCACY	NOTES
Support advocacy efforts to partner with railroad on significant shoreline improvements	An MOU is being sought by the Puget Sound Partnership
Support efforts of small non-NPDES mandated communities to manage stormwater	Small communities may wish to emulate the Eatonville stormwater management program with, but not limited to, LID and rainwater gardens.
Support increased funding for all 4 counties' septic management plans	Further funding is needed for operations and management as well as enhanced grant and loan programs for on-site septic repair.
Support full range of South Sound PSNERP projects that went to the 10% feasibility list	These projects include Deschutes Estuary Restoration, Chambers Estuary restoration, Sequalitchew and Mission Creek Restoration, the DNR Marine Lab restoration and the acquisition and consequent restoration of John's Creek/Bayshore at Oakland Bay.
Advocate for completion and implementation of the Eld/Totten/Little Skookum TMDL	The TMDL requires a local lead to pass through the EPA approval process and move on to the implementation stage.

WATCH LIST	STATUS
McNeil Island	A scope of work for management review is being conducted by the Office of Financial Management and is due out in October of 2012. It should include clear recommendations that AHSS can review
Reconfigure I-5 through the Nisqually lowlands to reconnect the flood plain throughout the valley	There is a 3-year plan feasibility study on the removal of I-5 fill to restore tidal marsh.

Link to Recovery Targets

As described in the "Notable Accomplishments" section above, entities within South Puget Sound are already making contributions toward achieving regional recovery targets in shellfish bed restoration, removal of shoreline armoring, stormwater and wastewater treatment, and other areas. In order to objectively assess which of the soundwide targets are most applicable in South Sound, and to quantify what its future contributions toward achieving those targets will be, the Alliance has convened a technical sub-committee and developed a process by which it will articulate these goals. The Alliance anticipates that this work will be ongoing through 2012.

Local Implementation Structure

The structure of the LIO is described in greater detail within the Implementation Coordination text box. The Executive Committee, which provides policy direction for the organization, has held five meetings since 2010. The Work Group, consisting primarily of staff from entities represented on the Executive Committee, provides topical expertise and support to the Executive Committee and has met ten times since 2010. The Council of South Puget Sound stakeholders – currently under development – will consist

of a number of sub-committees that provide technical guidance to the Executive Committee. To date, participants in the Alliance have included:

- **Tribes** – Nisqually, Squaxin Island, Puyallup
- **Counties** – Kitsap, Mason, Pierce, Thurston
- **Cities** – Olympia
- **Government Entities / Agencies** – Mason Conservation District, Puget Sound Partnership, Thurston Conservation District, Washington Department of Ecology, Washington Department of Fish & Wildlife, Washington Department of Natural Resources
- **Watershed Management and Salmon Recovery Organizations** – Chambers/Clover Watershed Council, Lead Entities for WRIA 10, 11, 12, 13, 14, and 15
- **Non-Governmental Organizations** – Deschutes Estuary Restoration Team, People for Puget Sound
- **Educational Institutions** – Washington State University Cooperative Extension for Thurston County, Washington Sea Grant
- **Industry** – Taylor Shellfish Company

IMPLEMENTATION COORDINATION IN THE SOUTH SOUND

The South Sound LIO – Alliance for a Healthy South Sound – covers the South Sound Action Area. An Executive Committee guides the LIO, and is composed of elected officials from four counties (Thurston, Mason, Pierce, Kitsap) and three tribes (Nisqually, Squaxin Island, Puyallup). The organizational structure also includes a Work Group of staff from South Puget Sound Tribes, counties, cities, NGOs, and other entities in addition to a broadly representative Council that will assist the Work Group and Executive Committee with the implementation of local Action Agenda strategies and actions. The four South Puget Sound counties and three tribes have been working collaboratively since Spring 2010 to establish this local forum, identify members, and clarify objectives. Puget Sound Partnership's Leadership Council formally recognized the LIO in September of 2011.

References and Additional Resources

Alliance for a Healthy South Sound: http://www.healthysouthsound.com/

Henderson Inlet Community Shellfish Farm: http://www.restorationfund.org/projects/csf/hendersoninlet

Nisqually Tribe Natural Resources Department: http://www.nisqually-nsn.gov/content/natural-resources

Pierce County Shellfish Partners Program: http://www.co.pierce.wa.us/pc/services/home/environ/water/ps/shellfish.htm

"Puget Sound Chinook Salmon Recovery Plan" (chapters including Nisqually watershed, Puyallup/White and Chambers/Clover watersheds, Deschutes watershed, Kennedy/Goldsborough watersheds, and West Sound watersheds). 2007. Available: http://www.psp.wa.gov/SR_map.php

Puyallup Tribe: http://www.puyallup-tribe.com/

"South Puget Sound Action Area Action Agenda Basis". South Puget Sound Core Group, 2008. Available: www.tpchd.org/file_viewer.php?id=3517

Squaxin Island Tribe Natural Resources Department:
http://www.squaxinisland.org/natural_resources/index.html

References

http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/upload/Ch5_S_Sound.pdf

http://www.pugetsoundnearshore.org/technical_papers/geomorphology.pdf

http://www.ecy.wa.gov/puget_sound/dissolved_oxygen_study.html

http://www.pugetsoundnearshore.org/technical_papers/shellfish.pdf

http://blog.seattlepi.com/greenacreradio/2010/07/08/industrial-feedlots-in-puget-sound-estuaries-geoduck-farms-for-asian-markets/

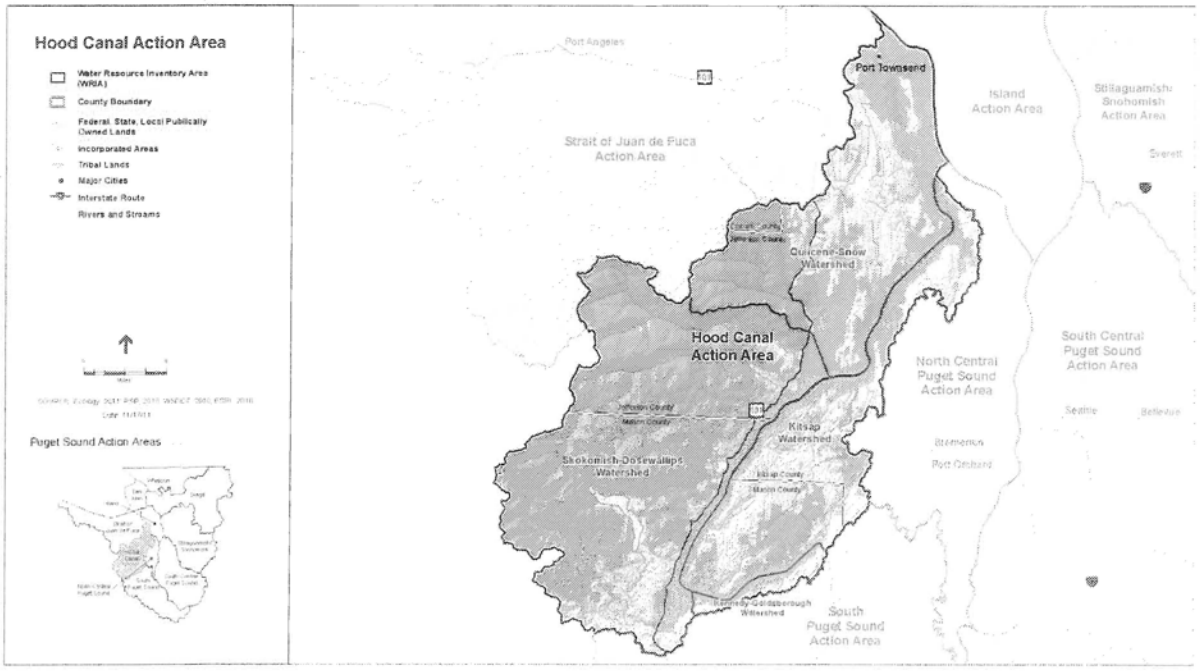
http://www.nmfs.noaa.gov/aquaculture/docs/shellfish/nw_shellfish_initiative_noaa_fact_sheet.pdf

The Action Agenda in Hood Canal

Profile

Hood Canal is a long, narrow, natural L-shaped fjord that separates the Olympic and Kitsap peninsulas. This marine water body extends southward from Foulweather Bluff, at the northern tip of the Kitsap Peninsula, and Tala Point to its southern terminus at Lynch Cove. Hood Canal is approximately 68 miles long and one and a half to two miles wide. The Hood Canal Action Area includes the Canal itself, the uplands and streams that enter into it from both sides, and extends north to Point Wilson in the city of Port Townsend. On the west side of the Canal, major rivers including the Skokomish, Dosewallips, and Big Quilcene drop rapidly from the Olympic Mountains, while smaller streams such as the Dewatto and Tahuya drain the west side of the Kitsap Peninsula. Precipitation along the Canal varies from 75 inches annually at Skokomish, to only 19 inches in Port Townsend

Although the average depth of Hood Canal is 177 feet, the underwater topography can be as deep as 600 feet. Marine water circulation in Hood Canal is naturally poor, particularly in the southern 20 miles. A relatively shallow, underwater sill south of the Hood Canal Bridge limits water exchange with incoming ocean water from the Strait of Juan de Fuca. Hood Canal also has poor vertical mixing as fresh water entering from rivers and streams can form a distinct layer at the surface. Dense algal blooms die off, sink, and decay – reducing the dissolved oxygen in deeper layers and degrading water quality for many marine species. In general, these oceanographic conditions present special challenges in managing nutrient and other inputs deriving from human activities, in pursuit of water quality that supports both a healthy ecosystem and a healthy economy in the communities surrounding Hood Canal.



The Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam, and the Suquamish Tribes retain treaty fishing rights in the Hood Canal region. The Port Gamble S'Klallam Reservation is located at the north end of Hood Canal, while the Skokomish Reservation is located at the south end. The eastern shore of Hood Canal is home to the U.S. Navy Submarine Base at Bangor, the largest industry and development on the Canal. Populated centers in west Kitsap County include Port Gamble and Seabeck. Southern Hood Canal begins in Belfair and the Tahuya Peninsula and runs along relatively developed lower Hood Canal towards the Skokomish estuary and Potlach.

Notable Accomplishments

Skokomish and Quilcene River Estuary restoration projects

Regional Hood Canal Pollution, Identification and Correction (PIC) Program

The Hood Canal Dissolved Oxygen Program investigative study, which illuminated the causes and implications of chronic and episodic low dissolved oxygen

Regional Riparian Planting and Invasive Species Control Programs

Regional conservation planning including the Kitsap Forest and Bay Project of up to 7000 acres of forest and 1.8 miles of shoreline

Much of the west side of Hood Canal borders Olympic National Forest and Park. The US Highway 101 and population centers of Quilcene, Brinnon, Hoodsport, and the Skokomish Valley lie along the narrow fringe of land on the west shore of the Canal. The Hood Canal Bridge is a critical transportation link between the Kitsap and Olympic Peninsulas. The proximity to Olympic National Park and Forest, cultural attractions in Port Townsend and Union, and hunting, fishing, and camping opportunities have generated a significant tourism industry and the proliferation of recreational homes.

Unique Ecosystem Characteristics and Assets

Hood Canal is famous for its shellfish as it is characterized by prime growing conditions for oysters and other shellfish species. Rivers flowing from the Olympic Mountains mix with brackish waters at ideal temperature and water conditions that support some of the largest shellfish hatcheries and productive growing areas in the world. The native Olympia oysters (*Ostreola conchaphila*) of Hood Canal were largely overharvested by 1870, although several small populations in the area are being nurtured back to life. Oyster growers introduced the larger, faster-growing Pacific oysters (*Crassostrea gigas)* to compensate, and shellfish farms were staked out throughout Hood Canal. Today the oysters of Hood Canal are internationally famous, and connoisseurs identify them by place names including Quilcene, Dabob, and Hama Hama, much like fine wines from specific regions and vineyards. Oysters and other bivalve species are filter feeders, processing hundreds of gallons of water daily, and are thus highly valuable for their ability to clean the water. However, this also makes them vulnerable to pollutants and toxic contaminants.

The human population of the Hood Canal region is generally low, as a majority of the uplands are managed as private and public forest lands. Relatively larger population concentrations are found along lower Hood Canal and around Lynch Cove. Though impacted by the dissolved oxygen problems and other modifications to rivers and shorelines, fisheries and aquaculture remain economically significant

to the Hood Canal region. Commercial and recreational fisheries occur for salmon, spot prawn, Dungeness crab, clams and oysters, and geoduck. Fishing is closed for rockfish and flatfish, due in part to the recent low dissolved oxygen problems.

Hood Canal is home to several other important and unique marine and upland species. An evolutionarily significant unit (ESU) of chum salmon that return in the summer spawn only in the rivers and creeks of Hood Canal and the eastern Strait of Juan de Fuca. Other populations of Chum, Coho, Pink, and Chinook salmon spawn, rear, and migrate in Hood Canal, along with steelhead, Bull, and Cutthroat trout. Many of these salmonid species spend a large part of their early lives in the estuary, and water quality conditions in the Canal are essential to their continued survival. Hood Canal is also used by marine mammals, and has unusual timing periods for birthing and pupping of some seal species. Orca whales occasionally enter Hood Canal for short periods of time to feed on prey species indigenous to Hood Canal. In places, patches of old growth and other intact forest provide unique habitats for bird species and mammals in close proximity to the marine shoreline. Herds of elk in the eastern Olympics migrate seasonally along the river corridors.

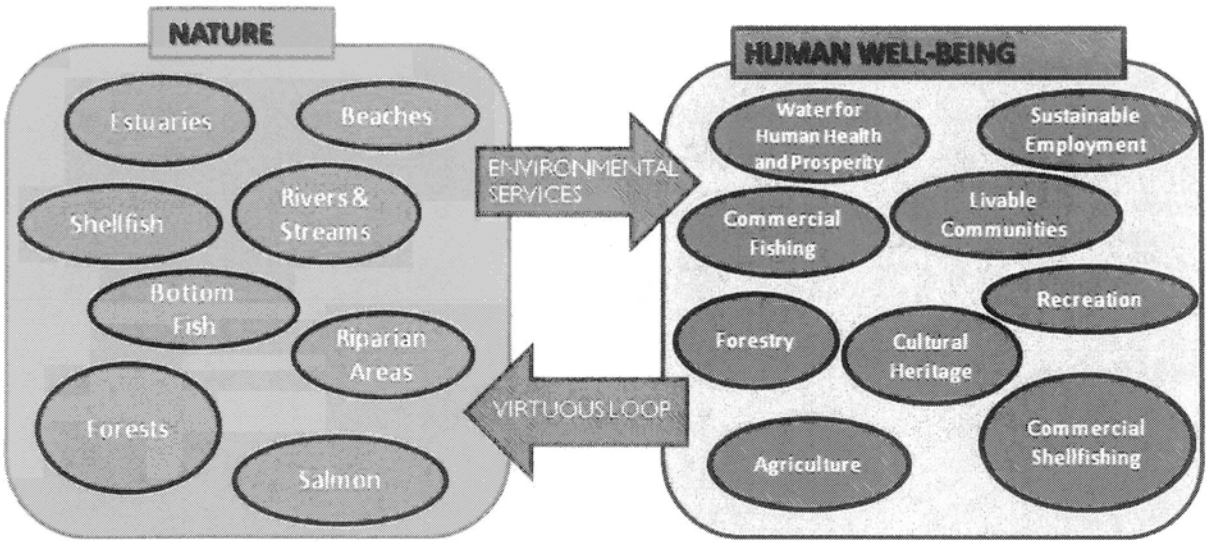
The natural beauty and relatively warm summer water conditions of the Canal draw many visitors for boating, sailing, water-skiing, swimming, and diving. A unique blend of year-round and seasonal residents and visitors comprise the watershed's population, and often promote activities to restore Hood Canal's water quality, species, and other ecosystem features.

Local Action Agenda Process

The Hood Canal Coordinating Council (HCCC) is the Local Integrating Organization for the Hood Canal Action Area. The vision of the HCCC is that *humans benefit from and coexist sustainably with a healthy Hood Canal*. As the Local Integrating Organization (LIO), HCCC is responsible for leading the prioritization and implementation of Action Agenda strategies and actions in the Hood Canal Action Area. The Puget Sound Partnership's Leadership Council has formally recognized the HCCC as the Action Area's LIO. Originally established in 1985, the HCCC was created to address community concerns about water quality problems and related natural resource issues in the watershed. As such, the Council provides an effective, well-established forum in which many of the issues anticipated to be under the purview of LIOs can be addressed. They have worked through a series of public outreach efforts, partner workshops, and Board consultations, to help the community find common ground on a vision for Hood Canal's future. Through collaboration with partners and the community, the HCCC has also identified the most critical ecological and socioeconomic focal components that should be fostered into the future, the most imminent pressures diminishing those priorities, and an initial list of key strategies and actions important to protecting and restoring the environmental and economic health of Hood Canal. Further prioritization is needed, and will continue in 2012.

Key Threats/Pressures

The community has defined 17 ecological and socioeconomic focal components, illustrated in the diagram below, that together cover the scope of the LIO's vision statement and must be conserved.



There are regional pressures that endanger the ability of the focal components to function and persist into the future, and are the focus of the region's pressure reduction objectives. Although the prioritization of strategies and actions that most effectively alleviate these pressures still needs to be completed for the IWMP and the Action Agenda, the processes did identify the pressures/threats below as ranking 'very high' or 'high' in the Hood Canal region. These include:

- Residential / Commercial Development (very high)
- Transportation / Service Corridors (very high)
- Climate Change / Severe Weather (very high)
- Shoreline Infrastructure (Marine and Freshwater) (high)
- Shoreline Levees (Marine and Freshwater) (high)
- Water Withdrawal / Diversions (high)
- Invasive Species (high)
- Wastewater (high)
- Stormwater (high)
- Timber Production (high)
- Oil / Hazardous Spills (high)

Opportunities, Priorities and Near Term Actions

The HCCC has identified a comprehensive set of strategies and near term actions that would be needed to reduce pressures and meet the vision, though further refinement is needed to prioritize them and create a work plan to optimize the coordinated efforts to implement actions that have explicit outcomes. Implementation of the actions identified and presented below will contribute substantially to the recovery of the Hood Canal Action Area. Top priority near term actions that are in-progress are identified below. The list following the Near Term Actions are actions and strategies that are either in-progress and ongoing or have been recognized as a need.

Priority Near Term Actions (in-progress)

- In coordination with a number of partners, HCCC will complete its Integrated Watershed Management Plan (IWMP) by June 30, 2013. Based on critical, high priority strategies and actions identified in the IWMP, HCCC will develop Local Near Term Actions for incorporation into the Action Agenda.
- In coordination with the US Navy and other partners, HCCC will implement the In-lieu Fee (ILF) Mitigation Program. The HCCC ILF Program is intended primarily to serve permit applicants in the Hood Canal drainages of Kitsap County, Jefferson County, and Mason County whose project triggers compensatory mitigation for unavoidable impacts to aquatic resources. The HCCC ILF Program will enable mitigation monies generated as a result of these projects to be directed toward the top conservation and restoration priorities in the Hood Canal watershed, as guided by the Instrument and that are commensurate with the type and amount of impacts generating the mitigation monies. Working with its partners in this process, HCCC will be in position to implement high priority actions from the ILF for 2012 and beyond.
- Phase I of a regional Hood Canal Pollution Identification and Correction (PIC) program is in progress to determine the needs for a comprehensive regional program. The program will provide information about the sources of pollution, including failing septic systems. Results of this Phase I approach will allow development and implementation of the regional program during Phase II, slated for 2014 and beyond.
- HCCC will develop the Hood Canal Regional Stormwater Retrofit Plan to coordinate stormwater and low impact development retrofit efforts on a regional scale. Stormwater retrofit and LID practices improve water quality, help protect shellfish beds, decrease flooding risks and increase aquifer recharge.. By the end of 2014 a list of prioritized stormwater retrofit projects will be available to determine feasibility for implementation.
- By June 30, 2013, HCCC will convene a climate change symposium to identify unique vulnerabilities and potential adaptation strategies for the Hood Canal Action Area. Based on results of this symposium, HCCC will identify high priority adaptation strategies.
- As the Lead Entity for salmon recovery, HCCC will continue to target funding to the highest Tier I salmon recovery projects, as listed in the Hood Canal Three Year Work Plan. Projects include acquisition, protection, and restoration activities.

Additional Actions and Strategies

Planning

- Assess the need to update county comprehensive plans to meet goals of the Integrated Watershed Management Plan (IWMP). Empower the HCCC IWMP Steering Committee to evaluate Land Use and advise the HCCC Board on progress.
- Participate in the updating of Shoreline Master Plans (SMPs) for Kitsap and Mason counties and the City of Bremerton (South Kitsap Industrial Area) to ensure consistency with goals of the IWMP. Support implementation of the plans once completed.
- Recommend opportunities to implement and enforce existing regulatory programs of the counties (SMP, Critical Area Ordinances [CAOs], County Comprehensive Plans, etc.) and state (Revised Codes of Washington [RCWs] and Washington Administrative Codes [WACs]) such as around permit enforcement on new development.
- Identify opportunities to improve planning for, and services of and between, urban and rural communities such as identifying grant opportunities and funding for improving sewer systems.
- Improve financial and technical assistance programs aimed at fostering voluntary stewardship and improving re/development standards such as participating in Low Impact Development

trainings and implementations, identifying standards for softshore protection, and engaging in sustainable working farms and forests.

Agriculture and Forestry

- Participate in and support efforts to permanently protect larger tracts of forests for their ecological and community values. For example, the Kitsap Forest and Bay Project which is working to conserve 7,000 acres of forest and 1.8 miles of shoreline on Port Gamble Bay as well as projects in Dabob Bay and Stavis.
- Protect, foster and incentivize sustainable, working forests and farms (e.g., extinguishing development rights and other programs) by engaging in the Dosewallips, East Jefferson and Tahuya forest protection efforts.
- Implement and monitor effectiveness of programs such as Forest Practices Habitat Conservation Plans (HCPs) and similar agreements, the USFS Northwest Forest Plan and Access and Travel Management Plans, and select Salmon Habitat Projects.
- Form a Hood Canal forests and forestry focal group to develop and implement balanced approaches to conserving forests and forestry and support sub-regional groups to meet regional goals.
- Form a Hood Canal agriculture focal group (or three affiliated sub-regional groups) to develop and implement balanced approaches to conserving agricultural lands.

Nearshore and Estuaries

- Consult with landowners and public about potential high priority Puget Sound Nearshore Estuary Restoration Program (PSNERP) projects and advocate for funding for high priority projects with landowner support.
- Restore beaches by removing or retrofitting infrastructure, setting back structures where feasible, and revegetating shorelines. Ensure updating and implementation of priority shoreline projects across various plans.
- Restore estuaries by removing infrastructure and setting back levees/revetments where feasible. Ensure updating and implementation of priority estuary projects across various plans.

Invasive Species

- Identify and create strategies to focus on invasive species that pose the biggest threats to implementation of the IWMP and salmon recovery plans.
- Educate decision-makers on the need to increase funding available for Noxious Weed Control Boards to help implement local priorities .
- Work with partners to implement a Regional Knotweed Control Strategy that includes messaging and outreach to key constituents such as landowners, landscapers, and nurseries.
- Implement WDFW's and Skokomish Tribe's Aquatic Nuisance Species Management Plan for organisms like ballast water, Zebra mussels, etc. Develop messaging and outreach to key constituents.

Water Quality and Wastewater

- Identify where in the Hood Canal watershed the highest risk onsite septic systems (OSS) are located now or could be located in the future. Develop a mechanism, such as through the regional Pollution Identification and Correction (PIC) program, to evaluate the risk of contribution of nitrogen from OSS to Hood Canal and to address critical uncertainties in nitrogen loads.

- Research and register low cost, low maintenance, non-proprietary retrofits of existing OSS and new OSS that will reduce nitrogen by at least 80% from the initial septic effluent concentration (average domestic septic tank effluent is 57.7 mg/L TN, concentrations range from 26-124 mg/L TN) as well as remove pathogens.
- Explore the current regulations related to wastewater and water quality (nutrients and dissolved oxygen) and assess potential additional or modified local or state regulations to address nitrogen and/or dissolved oxygen in Hood Canal from septic systems, boats, and other sources.
- Continued involvement of county and state managers and planners in the Aquatic Rehabilitation Technical Advisory Committee to develop recommended actions to address water quality in Hood Canal. Finalize and implement the Aquatic Rehabilitation Communication Plan to educate and engage the public in the realization of actions.
- In coordination with state agencies (Fish and Wildlife, Parks and Recreation, Department of Natural Resources, etc.) and building from the WRIA 16 Planning Unit's prioritized list of needs, address the need for additional sanitary services at popular recreation sites around Hood Canal.
- Continue connecting residences and businesses to the new advanced wastewater treatment and water reclamation facility in Belfair. Monitor improvements in water quality in the adjacent marine waters and gauge treatment efficiency and effluent quality. Recommend updates for shellfish growing areas in the currently downgraded/prohibited area in Lower Hood Canal as appropriate.
- Using experience from the Belfair project, implement existing plans to improve wastewater infrastructure in the Port Hadlock and Dosewallips areas.
- Facilitate progress with the Potlatch advanced wastewater treatment facilities to connect Skokomish Tribal housing development, the Potlatch State Park, and residences in adjacent shoreline areas.
- Complete detailed design engineering and permitting and obtain funding for advanced wastewater treatment in the core Skokomish Reservation area.
- Revise feasibility analyses and facility planning and obtain funding for advanced wastewater treatment in the Hoodsport Rural Activity Center (RAC) area.
- Work with jurisdictions and the WRIA planning unites to develop and implement a regional continuous monitoring program that includes: groundwater; streams, shorelines, and marine waters; and stream aggradation/degradation mitigation, including a field-based assessment of uplands and individual streams on sources and amounts and how it can be mitigated. This research will also include Phases II and III of a water demand, supply and availability study as well as community outreach and education around water quantity and quality.
- Use scientific findings, including those of the Hood Canal Dissolved Oxygen Program and others to develop corrective actions and management programs to address issues of eutrophication and low dissolved oxygen in Hood Canal. Related activities to be supported include:
    - Completing the peer review process of the scientific findings;
    - Supporting additional investigation on the effects of low dissolved oxygen on the marine biota as appropriate to develop pertinent corrective actions; and
    - Developing and implementing an appropriate monitoring and evaluation program building on available marine water monitoring (i.e., ORCA buoys, monthly citizen-monitoring program, and others).
- Improve coordination and support implementation of the Washington Department of Ecology's Model Toxics Control Act cleanup plan for industrial pollution in Port Gamble Bay, Geographic Response Plans, and Northwest Wildlife Plan.

- Work with partners to continue the clean up of marine debris throughout Hood Canal, but with a particular focus on the north end.

Stormwater

- Advise jurisdictions throughout the Hood Canal watershed on opportunities to revise development code to incorporate current stormwater management practices, specifically by adopting and incorporating the most current Department of Ecology stormwater manual. Work with these jurisdictions to prioritize stormwater retrofits within Hood Canal based on an analysis of current land use and the existing built environment and to promote retention of natural land cover as the most effective way to prevent stormwater runoff.
- Support the counties and tribes to implement the PIC programs that address issues of pollutant source control and illicit discharge detection and elimination.
- Provide guidance on the adoption of low impact development (LID) practices to be used as a first choice to the maximum extent practicable in new development, redevelopment, and retrofitting of existing development.
- Request that the Washington State Department of Ecology provides a statewide stormwater Best Management Practices (BMPs) training program (similar to the Certified Erosion and Sediment Control Leads program) for site inspectors to learn about compliance with stormwater BMPs.
- Track the recommendations of Ecology's Stormwater Workgroup and work with the HCCC Technical Advisory Committee Stormwater Workgroup to evaluate if additional, Hood Canal specific, stormwater monitoring plans are needed.

Floodplains

- Implement comprehensive floodplain management plans where they exist.
- Restore floodplains and channel migration zones by removing infrastructure and setting back revetments where feasible and protect functioning floodplains and channel migration zones.

Outreach and Education

- Ensure incorporation of outreach and education with the public and key stakeholders in actions and initiatives identified above.
- Develop materials to convey to the public the importance/benefits of work done to multiple focal components.

Link to Recovery Targets

The Hood Canal Integrated Watershed Management Planning process has identified several focal ecosystem components and ecosystem pressures relevant to supporting the achievement of Soundwide recovery targets, such as reopening shellfish beds, addressing stream flows and toxic in sediments, rebuilding salmon runs, reducing the stress to marine biota from low dissolved oxygen levels, and establishing a Puget Sound quality of life index.

IMPLEMENTATION COORDINATION IN HOOD CANAL

The Hood Canal Coordinating Council (HCCC) is the Local Integrating Organization (LIO) for the Hood Canal Action Area. The HCCC works with partners, community groups, and citizens, to advocate for and implement regionally and locally appropriate actions to protect and enhance Hood Canal's environmental and economic health.

Associated strategies and actions will alleviate pressures. As an example, the action to protect Port Gamble Bay and associated forested uplands supports achieving targets associated with land use, armored shorelines, salmon, and eelgrass to name a few. Local recovery actions and their role in achieving Soundwide recovery targets is an ongoing process and will be honed in the Integrated Watershed Management Plan.

Local Implementation Structure

The Hood Canal Coordinating Council (HCCC) is a watershed-based "council of governments", comprised of Jefferson, Kitsap, and Mason Counties, the Port Gamble S'Klallam Tribe, and the Skokomish Tribe. The HCCC also includes the several federal and state agencies as ex officio, nonvoting members. The HCCC is the Local Integrating Organization for the Hood Canal Action Area.

The HCCC serves a variety of functions and operates in a number of capacities. First, as an interlocal agency under Chapter 39.34 RCW, the HCCC coordinates the activities of its members and other public entities and Indian tribes in their efforts to protect and restore the Hood Canal watershed. HCCC's Board of Directors includes the County Commissioners of each member County and the Tribal Chairperson or a duly - authorized representative of each member Tribe. The HCCC also was formed as a non - profit, public benefit corporation under Chapter 24.03 RCW, Washington's Nonprofit Corporations Act, to serve as the interlocal agency's fiscal agent. The Internal Revenue Service (IRS) has recognized the HCCC's nonprofit corporation as a public charity under section 501(c)(3) of the Internal Revenue Code. Finally, the HCCC serves a variety of functions pursuant to Chapter 90.88 RCW, the Aquatic Rehabilitation Act. The Act designates the HCCC as the local management board for Hood Canal rehabilitation under RCW 90.88.010(3). HCCC is the inter - WRIA coordinator for watershed planning under RCW 90.88.030(1)(b). The HCCC also is the lead entity and regional recovery organization for summer chum salmon recovery under RCW 90.88.030(1)(a). As the lead entity, HCCC develops both short term and longer term project lists, solicits sponsors to implement the programs and evaluates and ranks project proposals.

The HCCC, through a broad array of effective partnerships, is working with the community to create a strategic action plan that will set priorities to ensure a future in which the Hood Canal remains a special place for all to enjoy. The Integrated Watershed Management Plan, which is synonymous with the Action Agenda update, will be used as the vehicle to provide information to the Puget Sound Partnership on progress made in Hood Canal.

References and Additional Resources

Hood Canal Coordinating Council: www.hccc.wa.gov

PARTNERS: LOCAL JURISDICTIONS AND SERVICES	WEBSITE
City of Bremerton	http://www.ci.bremerton.wa.us/
City of Port Townsend	http://www.cityofpt.us/
Clallam County	http://www.clallam.net/

Clallam County Noxious Weed Control Board	http://www.clallam.net/weedcontrol/
Jefferson County	http://www.co.jefferson.wa.us/
Jefferson County Community Development	http://www.co.jefferson.wa.us/commdevelopment/default.htm
Jefferson County Environmental Health	http://www.jeffersoncountypublichealth.org/index.php?environmental
Jefferson County Marine Resources Committee	http://www.jcmrc.org/
Jefferson County Noxious Weed Control Board	http://www.co.jefferson.wa.us/WeedBoard/Default.asp
Jefferson County Parks and Recreation	http://www.countyrec.com/info/default.aspx
Jefferson County Public Works	http://www.co.jefferson.wa.us/publicworks/
Kitsap County	http://www.kitsapgov.com/
Kitsap County Community Development	http://www.kitsapgov.com/dcd/
Kitsap County Noxious Weed Control Board	http://county.wsu.edu/kitsap/nrs/noxious/Pages/default.aspx
Kitsap County Parks and Recreation	http://www.kitsapgov.com/parks/
Kitsap County Public Works	http://www.kitsapgov.com/pw/
Kitsap County Surface and Storm Water Management	http://www.kitsapgov.com/sswm/
Kitsap County Health District	http://www.kitsapcountyhealth.com/
Kitsap County Stream Team	http://www.kitsapgov.com/dcd/nr/stream_team/
Mason County	http://www.co.mason.wa.us/
Mason County Community Development	http://www.co.mason.wa.us/community_dev/index.php
Mason County Environmental Health	http://www.co.mason.wa.us/health/environmental/index.php
Mason County Public Works	http://www.co.mason.wa.us/public_works/index.php
PARTNERS: CONSERVATION DISTRICTS	**WEBSITE**
Jefferson Conservation District	http://jeffersoncd.org/welcome.html
Kitsap Conservation District	http://kitsapcd.org/
Mason Conservation District	http://www.masoncd.org/
PARTNERS: ORGANIZATIONS & FOUNDATIONS	**WEBSITE**
10,000 Years Institute	http://10000yearsinstitute.org/
Chimacum Grange	http://chimacumgrange.org/Home_Page.php
Chumsortium	http://hccc.wa.gov/Groups/Chumsortium/default.aspx
East Jefferson Watershed Council	http://www.ejwc.org
Forterra	http://www.forterra.org/
Great Peninsula Conservancy	http://greatpeninsula.org/

Hood Canal Environmental Council	http://hoodcanalenvironmentalcouncil.org/
Hood Canal Salmon Enhancement Group	http://hcseg.org/
Hood Canal Watershed Education Network	http://hccc.wa.gov/Groups/HCWEN/default.aspx
Jefferson Land Trust	http://www.saveland.org/
Kitsap Peninsula Visitor and Convention Bureau	http://www.visitkitsap.com/
Laird Norton Family Foundation	http://www.lairdnorton.org/
Long Live the Kings	http://lltk.org/
Lower Hood Canal Watershed Coalition	http://hccc.wa.gov/About+Us/Events+Calendar/366281.aspx
National Fish and Wildlife Foundation	http://www.nfwf.org/AM/Template.cfm?Section=Home
North Kitsap Trails Association	http://www.northkitsaptrails.org/
North Olympic Land Trust	http://northolympiclandtrust.org/
North Olympic Salmon Coalition	http://nosc.org/
Northwest Watershed Institute	http://nwwatershed.org/
Pacific Northwest Salmon Center	http://www.pnwsalmoncenter.org/
People for Puget Sound	http://pugetsound.org/
Port Townsend Marine Science Center	http://www.ptmsc.org/
Project Citizen	http://new.civiced.org/programs/project-citizen
Puget Sound Keeper Alliance	http://pugetsoundkeeper.org/
Skokomish Watershed Action Team	http://hccc.wa.gov/Groups/SWAT/default.aspx
Stillwaters Environmental Learning Center	http://www.stillwatersenvironmentalcenter.org/
The Nature Conservancy	http://www.nature.org/
The Sierra Club	http://www.sierraclub.org/
The Wildlife Society	http://joomla.wildlife.org/
Washington Onsite Sewage Association	http://www.wossa.org/
West Sound Watersheds Council	http://westsoundwatersheds.org/
Wild Fish Conservancy	http://wildfishconservancy.org/
PARTNERS: TRIBAL GOVERNMENTS	**WEBSITE**
Jamestown S'Klallam Tribe	http://www.jamestowntribe.org/
Lower Elwha Klallam Tribe	http://elwha.org/
Point No Point Treaty Council	http://pnptc.org/
Port Gamble S'Klallam Tribe	http://www.pgst.nsn.us/
Skokomish Tribe	http://www.skokomish.org/
Suguamish Tribe	http://www.suquamish.nsn.us/
PARTNERS: STATE AGENCIES AND	**WEBSITE**

PROGRAMS	
Puget Sound Partnership	http://www.psp.wa.gov/
Washington Conservation Corps	http://www.ecy.wa.gov/wcc/index.html
Washington State Department of Agriculture	http://agr.wa.gov/
Washington State Department of Ecology	http://www.ecy.wa.gov/
Washington State Department of Fish and Wildlife	http://wdfw.wa.gov/
Washington State Department of Health	http://www.doh.wa.gov/
Washington State Department of Natural Resources	http://www.dnr.wa.gov/Pages/default.aspx
Washington State Department of Transportation	http://www.wsdot.wa.gov/
Washington State Parks and Recreation	http://www.parks.wa.gov/
Washington State Recreation and Conservation Office	http://www.rco.wa.gov/
Water Resource Inventory Area 16/14b Planning Units	http://www.ecy.wa.gov/apps/watersheds/wriapages/16.html
Water Resource Inventory Area 17 Planning Unit	http://www.ecy.wa.gov/apps/watersheds/wriapages/17.html
PARTNERS: FEDERAL AGENCIES AND PROGRAMS	**WEBSITE**
Americorps	http://www.americorps.gov/
National Marine Fisheries Service	http://www.nmfs.noaa.gov/
National Oceanic and Atmospheric Administration	http://www.noaa.gov/
National Park Service	http://www.nps.gov/index.htm
Olympic National Park	http://www.nps.gov/olym/index.htm
United States Army Corps of Engineers	http://www.usace.army.mil/Pages/default.aspx
United States Department of Commerce	http://www.commerce.gov/
United States Environmental Protection Agency, Region 10	http://www.epa.gov/
United States Fish and Wildlife Service	http://www.fws.gov/
United States Forest Service	http://www.fs.fed.us/
United States Geological Survey	http://www.usgs.gov/
United States Navy	http://www.navy.mil/swf/index.asp
PARTNERS: UNIVERSITY SERVICES	**WEBSITE**
Olympic Educational Service District	http://www.oesd.wednet.edu/oesd/site/default.asp
University of Washington	http://www.washington.edu/

Washington Sea Grant	http://www.wsg.washington.edu/
Washington State University Jefferson County Extension	http://jefferson.wsu.edu/
Washington State University Kitsap County Extension	http://county.wsu.edu/kitsap/Pages/default.aspx
Washington State University Mason County Extension	http://county.wsu.edu/mason/Pages/default.aspx
PARTNERS: PRIVATE SECTOR	**WEBSITE**
Green Diamond Resource Company	http://greendiamond.com/
Manke Lumber	http://www.mankelumber.com/
Pope Resources	http://www.orm.com/

References

General

http://www.gonorthwest.com/Washington/hoodcanal/Hood_Canal.htm
http://www.psparchives.com/publications/our_work/hood_canal/hood_canal/Watershedpledgebooklet.pdf

Dissolved Oxygen

http://www.hoodcanal.washington.edu/
http://www.hoodcanal.washington.edu/aboutHC/brochure.html

Water Quality

http://wa.water.usgs.gov/projects/hoodcanal/data/HC.pdf
http://www.ecy.wa.gov/programs/wq/tmdl/skokomish/index.html
http://www.hoodcanal.washington.edu/observations/bloom_fishkill.jsp
http://www.usawaterquality.org/themes/health/extension/testing.html

Climate

http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?waptow

Fish and Wildlife

http://www.nwfsc.noaa.gov/trt/trt_documents/hood_canal_summer_chum_sesu280207final-1corr.pdf
http://www.rco.wa.gov/salmon_recovery/regions/hood_canal.shtml
http://www.marinemammal.org/pdfs/London2006.pdf
http://www.olympicpeninsula.org/things-to-do/fishing-and-shellfishing-quilcene-brinnon-and-hood-canal-area

http://www.restorationfund.org/sites/default/files/OlyOyster%20RestorationV1.pdf
http://nathistoc.bio.uci.edu/Filter%20feeders.htm

Military

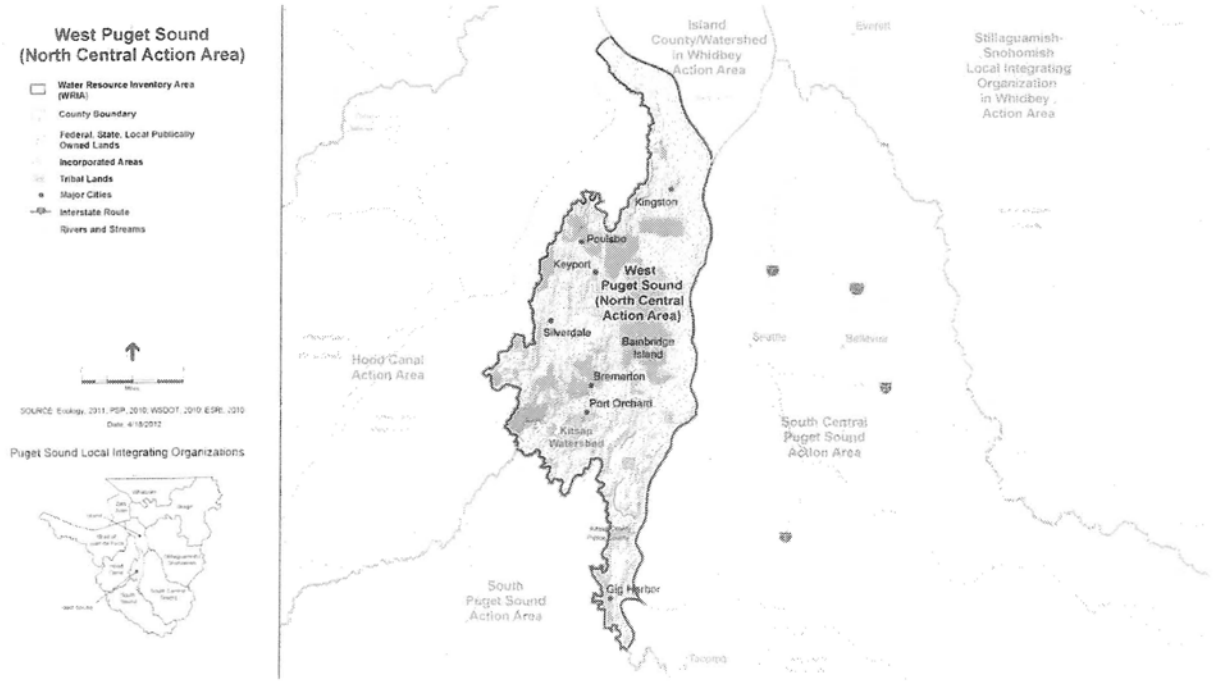
http://www.ofm.wa.gov/economy/military/military.pdf

The Action Agenda in West Puget Sound (North Central Action Area)

Profile

West Puget Sound (North Central Action Area) occupies the geographic center of the Puget Sound Basin. With over 220 miles of shoreline, and extensive bluffs, pocket estuaries, protected bays, harbors, and lagoons, the West Sound's most prominent feature is its expanse of nearshore reaches. Bluffs along the coastline provide a supply of sediment that drifts along the shore, building beaches and forming spits, lagoons, deltas, and tideflats. Bainbridge Island, approximately five miles wide by ten miles long, is one of the largest islands in Puget Sound and has 53 miles of shoreline. Agate Passage, Port Washington Narrows, and Rich Passage are characterized by high currents due to the circulation of Puget Sound tides through these narrow openings. Streams originate from lakes, groundwater discharge, or headwater wetlands that often contribute flow to multiple watersheds. These unique lowland freshwater ecosystems provide highly productive habitat for salmon and trout.

The history of the West Sound is completely connected to Puget Sound. West Sound is the heartland of Suquamish Ancestral Territory. The Suquamish and their ancestors have occupied the region for the past 14,000 years. Important Suquamish leaders in the early historic period such as Kitsap, Challicum, and Seattle controlled extended Suquamish families who occupied more than 15 winter villages. Old



Man House on Agate Passage was the "mother village" of the Suquamish, occupied over 5000 years with an historic period cedar plank longhouse. The five incorporated cities began as dock locations for the historic "Mosquito Fleet". The Puget Sound "Mosquito Fleet" was comprised of small steamers and sternwheelers that carried passengers and cargo up and down the Sound prior to bridges and state run ferries. Businesses, homes and eventually roads, were all located close to the shorelines of Puget Sound. Gig Harbor and Poulsbo were also home to cod and salmon fishing fleets.

The West Sound's port districts are important as centers for commerce, military installations, and as critical hubs for marine transportation. More than half of the 23 million annual passengers on the Washington State Ferry System travel between the West Sound and the greater Seattle metropolitan area. Eagle Harbor on Bainbridge Island hosts the ferry system's maintenance and repair facility. Bridges at Agate Passage and the Tacoma Narrows link the West Sound Action Area by road to the rest of Puget Sound. Recreational vessels are moored throughout the West Sound Action Area, with over 2000 permanent and transient slips. Other recreational amenities of the region include several state and local parks used for camping, boat launching, beach walking, hiking, bird watching, swimming, picnicking, shellfishing and kayaking.

The United States military presence in West Sound Puget Sound began in 1891 and since that time the region has played a pivotal role for military operations in several wars and conflicts. Naval Base Kitsap has facilities at Bremerton, Keyport and Manchester, and is the West Sound's largest employer.

The Port Madison Indian Reservation, straddling Miller Bay between the communities of Suquamish and Indianola, is the center of the Suquamish culture named after the beach at Old Man House on Agate Passage and meaning 'place of clear saltwater' in Lushootseed. Incorporated cities in the West Sound Action Area include Bainbridge Island, Port Orchard, Poulsbo, Bremerton and Gig Harbor. Bremerton is the largest city in the Action Area, with a population of almost 38,000. Incorporated cities and Urban Growth Areas make up 44% of the land base.

Notable Accomplishments

Carpenter Creek Estuary is currently being restored, which was a high priority in the first Action Agenda.

The Action Area is also making considerable progress on restoring Chico Creek, leveraging the partnerships and work of many to restore the watershed in phases.

The area is a leader in water quality improvement projects, which have resulted in the upgrade of 2,500 acres of shellfish beds. Additionally, wet weather water quality in Dyes and Sinclair Inlets is improved due to the completion of combined sewer overflow construction projects by the City of Bremerton.

Unique Ecosystem Characteristics and Assets

The West Sound Action Area constitutes almost half of the nearshore habitat in the Central Basin of Puget Sound. This habitat includes dozens of embayments including open coastal inlets and functioning pocket estuaries, intact bluffed back beaches, and the only plunging rocky coastline in the Basin. The subtidal and intertidal portions of the West Sound support some of the densest and highest quality wildstock geoduck clam fisheries in the world. The West Sound has 90 streams used by wild populations

of chum, coho, steelhead, and cutthroat trout. The shoreline provides refuge, food and rearing area for other juvenile salmon, including Chinook and Hood Canal summer chum, as they enter the Sound from larger rivers on the eastern shore and Hood Canal. Much of the nearshore is utilized for spawning by native marine fishes including Pacific herring, surf smelt and Pacific sand lance. Commercial, recreational and tribal shellfish activity is prominent along most of West Sound's shorelines. Hatchery programs operated by the Suquamish Tribe at Gorst and Grovers Creek provide some salmon harvest opportunities for tribal fishers and recreational anglers.

The historic uses of military support activities and ship building left toxic legacies at Eagle Harbor, Keyport, Dyes Inlet, Sinclair Inlet and Manchester. The sites were contaminated by disposal of military testing materials, creosote and other chemicals, and are in varying degrees of remediation as part of the U.S. Environmental Protection Agency (EPA) superfund site clean-up process.

Many people move to the West Sound Action Area because of its rural feel, and the majority of residents choose to live outside the incorporated cities. This can result in conversion from existing rural forestland to an urban/suburban landscape, resulting in fragmented or degraded habitat. The population is expected to grow by 43% in the next 20 years, adding another 100,000 people. The increased population will require additional sewage or septic systems, and drinking water. Since the West Sound has no snow-fed water supplies, key aquifer recharge areas will need to be protected. An urbanizing landscape will also increase stormwater runoff which threatens water quality, patterns of streamflow, and the availability of groundwater for human use. Stormwater has also been noted as a vector for pathogens which have closed shellfish harvesting in some West Sound bays.

Local Action Agenda Process

The West Sound Action Area is currently working to establish a Local Integrating Organization (LIO) that will leverage ongoing efforts, improve communication and prioritize local actions. A representative planning group met in 2011 and early 2012 to work on identifying the local threats, strategies, and actions listed below and determine how to move implementation forward in the area.

Key Threats/Pressures

For the 2011 Action Agenda update, the West Sound has identified 13 local priority issues to address pressures on the West Sound ecosystem. The local priority issues are listed below, categorized by the four pressure reduction targets.

Land Development

- Loss of forest cover, riparian habitat and intact freshwater ecosystems
- Population growth, new development and redevelopment
- Transportation network (shoreline roads, infrastructure needs, etc.)

Shoreline Alteration

- Loss of unaltered/undeveloped shoreline

Stormwater

- Polluted runoff from the built environment
- Alteration of the hydrologic regime (increased flow/flooding) in the form of impairment of groundwater Infiltration and recharge

Wastewater

- Failing septic systems
- Discharge from vessels

Other

- Data gaps impeding effective fisheries management
- Climate change and sea level rise
- Loss and degradation of freshwater habitats
- Downgrades of approved shellfish growing areas
- Legacy contamination

Strategic Initiatives, Priorities, and Near-Term Actions

The West Sound culled a list of more than 80 strategies of importance to the area down to the comprehensive list of 46 strategies included in the table below. In addition, they have identified a list of 13 near-term actions (NTAs) and 10 additional, longer-term actions. Further prioritization of both the strategies and actions will continue as the LIO becomes operational.

Alignment with Puget Sound Partnership Strategic Initiatives

During its process to refine and prioritize local near-term actions, the West Sound identified an opportunity to align its evolving strategies and actions with the Puget Sound Partnership's (PSP) three strategic initiatives. The Partnership proposed the concept of strategic initiatives during the Action Agenda update process, as a means of allowing more focused attention on actions that address priority pressures to Puget Sound health. The initiatives as currently envisioned are as follows:

- Protection of habitat in support of salmon recovery;
- Prevention of water pollution from urban stormwater runoff; and
- Protection of water quality and nearshore habitat from rural and agricultural runoff.

The 13 NTAs below are closely aligned with the Partnership's strategic initiatives. In addition to these specific contributions, both near and longer-term actions will help to achieve multiple, basin-wide ecosystem recovery goals in the Action Agenda.

LOCAL PRESSURES TO ADDRESS	STRATEGIES (BOLDED ARE OF HIGHEST PRIORITY)	ACTIONS (BOLDED ARE LOCAL NEAR-TERM ACTIONS)
Loss of Forest Lands and Riparian /Freshwater Systems	• ***Participate in and support an effort led by Forterra to conserve 7,000 acres of forest and 1.8 miles of shoreline on Port Gamble Bay, through the Kitsap Forest and Bay Project***. *This spans two action areas.* • **Develop framework for identifying and prioritizing areas for conservation; identify areas at risk and strategies to protect/prevent their development** • **Update and correct all "water type" maps in the West Sound Action Area to improve protection of designated streams and wetlands and address fish passage issues; take actions based on recommendations as water type assessments are completed, as with recently completed 2010 assessment in North Kitsap (including Grovers, Carpenter, and Cowling creeks)** • Continue to utilize West Sound Watershed Council (WSWC) as a forum for prioritizing areas for watertyping and for identifying sources of funding. • Support the Growth Management Act (GMA) to increase focus on accommodating population in urban areas to avoid loss of rural lands and important habitat	• Complete an inventory of existing watershed characterizations and related local assessments (East Kitsap Nearshore, salmon recovery plans, etc.) that advance ecosystem recovery in the West Sound Action Area. • Establish metrics to evaluate land cover changes against an overall county-wide goal of no net loss of important forested and freshwater ecosystem functions
Population Growth, New Development and Redevelopment	• **Methodically monitor and report key metrics related to population growth and development for adaptive management and to minimize urban sprawl (examples include annual urban/rural growth patterns, average density for new construction, average bulk density per jurisdiction, canopy cover change in priority conservation and development areas)** • **Within priority conservation areas address historic and potential new development patterns, legacy lots and redevelopment to ensure no net loss of ecosystem function** • **Encourage infill development in urban areas as an alternative to expanding Urban Growth Areas (UGAs)**	• Identify properties within current UGAs available for development • Convene cities, county, and regional planning offices to identify key metrics related to population growth (e.g. land use) that are necessary for adaptive management
Transportation Network (old roads, infrastructure needs,	• **Advocate for viable funding solutions for retrofitting streets for stormwater improvement and water crossing structures with inadequate fish**	• **By January 2013, the West Sound Watersheds Council and West Sound LIO will develop a process for the review of**

LOCAL PRESSURES TO ADDRESS	STRATEGIES (BOLDED ARE OF HIGHEST PRIORITY)	ACTIONS (BOLDED ARE LOCAL NEAR-TERM ACTIONS)
etc.)	**passage.** • **Ensure transportation planning and development is aligned with ecosystem protection to avoid new development in priority conservation areas** • **Prioritize actions to eliminate/minimize/mitigate impacts from shoreline roads to nearshore processes and species and from road crossings over streams and estuaries.**	**transportation infrastructure projects that addresses environmental impacts and key fish passage barriers**
Loss of Unaltered / Undeveloped Shoreline	• **Prioritize and protect marine and nearshore ecosystems by improving shoreline permitting compliance monitoring and enforcement using Shoreline Management Programs (SMPs), watershed assessments, watershed and marine spatial plans and regional ecosystem protection standards** • **Align regulatory programs across cities/counties for better coordination on development, and address publicly owned shoreline (Including Corps, EPA, and Navy; GMA, SMA, Hydraulic code, etc); Improve communication, planning, and integration between County and City SMPs and Navy INRMPs so that shoreline functions are protected at the drift cell scale regardless of political or jurisdictional lines** • **Identify priority areas where otherwise functioning drift cells and their associated processes – erosion, sediment contribution, transport and deposition – are compromised by armoring, and encourage armoring removal and erosion control alternatives that better protect and restore nearshore ecosystem processes.** • Encourage shoreline restoration by developing streamlined materials and designs for property owners; keep in mind property owner's perspective; include evaluation metrics for awareness and willingness to make a change. • Continue and expand a regular interagency team of local-state-federal-tribe shoreline review experts to achieve conservation objectives and help align existing conservation plans	• **During the SMP update process for all West Sound jurisdictions in 2012-13, the West Sound Watersheds Council will ensure that restoration plans for every SMP include alternatives to traditional shoreline armoring, and incentives for the removal of existing armoring. The goal is for no net gain in shoreline armoring within any West Sound jurisdiction over the next 2 years** • **By 2013, The West Sound Watersheds Council – in coordination with the Suquamish Tribe and others – will develop and implement periodic surveys of eelgrass and forage fish spawning habitat under a scientifically rigorous methodology, and update spawning habitat maps** • Regularly conduct and report on status and trends relative to local shoreline pressure reductions
Polluted Runoff from the Built	• **Adopt and implement the most current stormwater and Low Impact Development (LID)**	• **By December 2014, Kitsap County Surface and Stormwater Management Program – with direct assistance from and close**

LOCAL PRESSURES TO ADDRESS	STRATEGIES (BOLDED ARE OF HIGHEST PRIORITY)	ACTIONS (BOLDED ARE LOCAL NEAR-TERM ACTIONS)
Environment	**regulations and design guidance** • **Implement new stormwater program regulations that address vesting and create incentives for developers (upland areas in particular) to conserve ecosystem function.** • **Implement stormwater and LID Retrofit Plan projects in priority areas and continue stormwater and LID retrofit planning in other priority areas.** • Improve coordination of water quality, sediment, and stream health monitoring with a feedback mechanism to implement adaptive management of stormwater • Train local installers and designers of LID facilities, specifically bioretention and permeable pavement • Implement and share Kitsap County's "Water as Resource" Policy.	**coordination with other stormwater utilities and agencies in the County – will provide training for 80% of LID professionals in Kitsap County, including plan review staff, designers, installers, inspection, and maintenance staff** • **By December 2015, Kitsap County Surface and Stormwater Management Program – in coordination with jurisdictions and other partners – will design and construct high priority retrofit projects treating 10 acres of pollution generating impervious surfaces**
Impairment of Groundwater Infiltration and Recharge	• **Rank, fund and construct water reuse projects in the West Sound that emphasize reusing water for consumptive use first (e.g., golf courses, non-potable uses), and environmental applications second (wetland enhancement, stream augmentation, aquifer recharge)** • **Identify opportunities to conserve groundwater within aquifers and reserve instream flow; Develop watershed by watershed "budgets" that include potable needs, agriculture needs, aquifer needs, and stream flow/wetland needs** • Encourage development that uses water from professional purveyors. Monitor number of exempt wells and include this information in managing groundwater resources • Provide financial and technical support to methodically monitor key metrics and systematically manage groundwater resources • Develop and implement water conservation strategies targeting users and owners of exempt wells. Incorporate an evaluation measure • Use the USGS groundwater model to inform future land use planning and test possible strategies for groundwater infiltration and recharge. • Work with water districts to identify and protect highest priority upland and headwater forests on	• Develop a reclaimed water comprehensive plan

LOCAL PRESSURES TO ADDRESS	STRATEGIES (BOLDED ARE OF HIGHEST PRIORITY)	ACTIONS (BOLDED ARE LOCAL NEAR-TERM ACTIONS)
	critical aquifer recharge areas. Encourage development that retains a high percentage of forest land as dedicated open space.	
Sewage from Failing Septic Systems	• **Establish and fund a septic repair and loan program** • **Expand Pollution Identification and Correction (PIC) programs in Kitsap & Pierce Counties** • **Utilize PIC methodology for addressing sewage from failing septic systems to improve water quality and protect public health** • **Establish sewer systems where On-site septic systems (OSSs) are failing in key areas**	• **Kitsap Public Health together with the municipality will conduct sewer infrastructure feasibility study for sewers in areas such as Ostrich and Phinney Bay, by December 2013.** These areas are identified and ranked annually in the Kitsap Public Health PIC Priority List. Ranking criteria includes points assigned to each area based on water quality data and also whether the area has been designated as an OSS area of concern. The PIC priority list does prioritize for the need for sewers • **Kitsap Public Health will report on the number of OSS failures repaired using funds from the Craft3 septic loan program by December 2013** • **Kitsap Public Health will report on the number of failing septic systems identified using PIC methodology, the number repaired and associated improvements in water quality by December 2013**
Discharge from Vessels	• Develop West Sound strategies to deal with marine vessel sewage and live aboard communities with local plans, policies, and regulations.	• **By January 2013, Kitsap Public Health will identify potential pump out stations and develop needs assessment to address marine vessel sewage**
Data Gaps Impeding Effective Fisheries Management	• **Integrate harvest and hatchery plans into local recovery planning**	• Expand smolt trapping and spawning surveys to better understand the distribution of salmonids in West Sound • Update salmon escapement estimates on an in-season basis
Climate Change and Sea Level Rise	• Identify local public infrastructure and private structures at risk due to sea level rise; report findings to affected parties.	• Identify local public infrastructure and major private structures at risk due to sea level rise; report findings to affected parties.
Loss and Degradation of Freshwater Habitats	• **Engage regional leaders in funding solutions for high price, high priority capital projects (e.g. SR3 Bridge at Chico)** • **Assist with regional and local Steelhead Recovery Planning**	• **By December 2013, the West Sound LIO – in coordination with Washington Department of Transportation – will develop a funding strategy and schedule for replacing the SR3 culvert with a bridge on Chico Creek.** • **By April 2013, the West Sound Watersheds**

LOCAL PRESSURES TO ADDRESS	STRATEGIES (BOLDED ARE OF HIGHEST PRIORITY)	ACTIONS (BOLDED ARE LOCAL NEAR-TERM ACTIONS)
	• Assist NOAA fisheries in identifying steelhead habitats with necessary features for designation as "critical" under the Endangered Species Act (ESA) • Continue efforts to restore hydrologic function and landscape connectivity within the Clear Creek watershed	**Council will develop a local chapter of a Steelhead Recovery Plan. The Council will propose a budget and implementation strategy for its local chapter of the Recovery Plan by December 2013** • **By February 2013, the Suquamish Tribe will develop a detailed protection and restoration plan for the upper Chico Creek watershed. By December 2013, the Tribe will seek funding to undertake similar work for the high priority, refugia Curley and Blackjack Creek watersheds**
Downgrades of Approved Shellfish Growing Areas	• **Encourage local private shellfish harvest as a means of creating connections between people and shoreline health and of increasing the public's investment in the nearshore.** • **Prioritize shellfish growing areas that are closed or have the potential to close, and initiate actions that will lead to upgrades** • **So that commercial shellfish harvest certification can be restored to areas of Ostrich and Oyster Bays, resolve issues identified in Washington Department of Health report: "2009 Shoreline Survey of the Dyes Inlet Shellfish Growing Area - Ostrich and Oyster Bays Addendum."** • **Address bacterial contamination in freshwater streams with high landscape connectivity with receiving estuaries and bays that create closure zones at their mouths (e.g. Clear, Barker Creeks, Grover's Creek, Miller Bay)**	• **By April 2013, Kitsap Public Health – in partnership with the Puget Sound Restoration Fund – will expand a pilot shoreline owner shellfish gardening program to at least one additional site, as an outreach tool for water quality and shoreline issues. By December 2013, the program will be expanded to include two additional sites. Concurrently, Kitsap Public Health will report on the results and actions from PIC shoreline monitoring affecting shellfish growing areas, e.g. number of fecal sources identified and corrected**
Legacy Contamination	• Support efforts that address source identification, control, and cleanup. • Continue monitoring of toxics in biota to track progress on improving ecological health and to protect human health, such as through supporting WDFW's Toxics in Biota Program (a component of PSAMP), and continuing PSAMP tissue sampling in Sinclair Inlet	• Undertake more extensive sampling in Keyport Lagoon to better characterize the sources, nature, and extent of PCB and dioxin contamination

Near-Term Actions by Strategic Initiative

Protection of Habitat in Support of Salmon Recovery

Five near-term actions held by the West Sound Watersheds Council, West Sound LIO, and Suquamish Tribe will advance the habitat protection initiative:

- During the Shoreline Master Program (SMP) update process for all West Sound jurisdictions in 2012-13, the West Sound Watersheds Council will ensure that restoration plans for every SMP include alternatives to traditional shoreline armoring, and incentives for the removal of existing armoring. The goal is for no net gain in shoreline armoring within any West Sound jurisdiction over the next 2 years
- By 2013, The West Sound Watersheds Council – in coordination with the Suquamish Tribe and others – will develop and implement periodic surveys of eelgrass and forage fish spawning habitat under a scientifically rigorous methodology, and update spawning habitat maps
- By December 2012, the West Sound LIO – in coordination with Washington State Department of Transportation (WSDOT) – will develop a funding strategy for replacing the SR3 culvert with a bridge on Chico Creek. Permitting phases of the project will be initiated by December 2013
- By April 2013, the WSWC will develop a local chapter of a Steelhead Recovery Plan. The Council will propose a budget and implementation strategy for its local chapter of the Recovery Plan by December 2013
- By February 2013, the Suquamish Tribe will develop a detailed protection and restoration plan for the upper Chico Creek watershed. By December 2013, the Tribe will seek funding to undertake similar work for the high priority, refugia Curley and Blackjack Creek watersheds

Prevention of Water Pollution from Urban Stormwater Runoff

Two near-term actions held by stormwater utilities, agencies, and jurisdictions will advance the urban stormwater runoff prevention initiative:

- By December 2014, Kitsap County Surface and Stormwater Management Program – with direct assistance from and close coordination with other stormwater utilities and agencies in the County – will provide training for 80% of LID professionals in Kitsap County, including plan review staff, designers, installers, inspection, and maintenance staff
- By December 2015, Kitsap County Surface and Stormwater Management Program – in coordination with jurisdictions and other partners – will design and construct high priority retrofit projects treating 10 acres of pollution generating impervious surfaces

Protection of Water Quality and Nearshore Habitat from Rural and Agricultural Runoff

Five NTAs held by Kitsap Public Health, local jurisdictions, and NGOs will advance the rural water quality protection initiative:

- Kitsap Public Health will report on the number of OSS failures repaired using funds from the Craft3 septic loan program by December 2013
- Kitsap Public Health together with the municipality will conduct sewer infrastructure feasibility study for sewers in areas such as Ostrich and Phinney Bay, by December 2013

- Kitsap Public Health will report on the number of failing septic systems identified using PIC methodology, the number repaired and associated improvements in water quality by December 2013
- By January 2013, Kitsap Public Health will identify potential pump out stations and develop needs assessment to address marine vessel sewage
- By April 2013, Kitsap Public Health – in partnership with the Puget Sound Restoration Fund – will expand a pilot shoreline owner shellfish gardening program to at least one additional site, as an outreach tool for water quality and shoreline issues. By December 2013, the program will be expanded to include two additional sites. Concurrently, Kitsap Public Health will report on the results and actions from PIC shoreline monitoring affecting shellfish growing areas, e.g. number of fecal sources identified and corrected

Relationship to Recovery Targets

Many of the strategies and actions listed above will address and bolster PSP Soundwide Recovery Targets, including OSSs, freshwater quality, shellfish beds, shoreline armoring, swimming beaches, and wild Chinook salmon. West Sound Action Area jurisdictions participated in the development of the Soundwide Targets by attending public meetings on those subjects and providing written comments as they were being developed.

IMPLEMENTATION COORDINATION IN THE WEST SOUND

Updating the Action Agenda has been administered through engaging the salmon recovery lead entity, the West Sound Watersheds Council (WSWC) (The geographic area of WSWC includes all of the West Sound Action Area and a portion of the South Sound Action Area) in addition to the LIO planning group. WSWC members are tracking the Action Agenda, with critical knowledge necessary to provide an informed update for the West Sound Action Area. Participants regularly include counties, cities, Tribes, NGOs, University staff, citizens and state agency staff. WSWC has a broad email notification list that was notified about this update process.

Local Implementation Structure

A planning group assembled in March 2011, including representation from the cities of Bremerton, Poulsbo, Port Orchard and Bainbridge Island; Kitsap and Pierce Counties; the Suquamish and Port Gamble S'Klallam tribes; public utility districts; land trusts; WSU Extension; Kitsap Health District and the Kitsap Regional Coordinating Council. The Port Districts and the City of Gig Harbor were invited but unable to attend. The group met four times in 2011 and envisioned the formation of a caucus based organization represented through four key areas: government and regulatory; restoration and protection; public health, education and outreach; and the private sector and commerce. The LIO is expected to be established and operating in 2012. In the absence of an LIO, smaller workgroups and the West Sound Watersheds Council have been engaged to help identify local strategies and actions.

References and Additional Resources

West Sound Watersheds Council. http://www.westsoundwatersheds.org/

Shoreline Master Plan Updates:

- Kitsap County. http://www.kitsapshoreline.org/
- Gig Harbor. http://www.cityofgigharbor.net/page.php?id=1030
- Bremerton. http://www.ci.bremerton.wa.us/display.php?id=936
- Poulsbo. http://www.cityofpoulsbo.com/planning/planning_shoreline.htm
- Port Orchard. http://cityofportorchard.us/shoreline
- Bainbridge Island. http://www.ci.bainbridge-isl.wa.us/2012_smp_update.aspx

http://www.ci.bainbridge-isl.wa.us/

http://www.bainbridgeislandwashington.com/local/cityinfo.html

http://www.kpud.org/water/reference/docs/bainbridgeisland

http://www.wsdot.wa.gov/ferries/traffic_stats/annualpdf/2011.pdf

http://www.abam.com/portfolio/project/108

http://www.biparks.org/parksandfacilities/general_info.html

http://www.seattle.gov/parks/history/military.htm

http://www.donhr.navy.mil/

http://www.suquamish.nsn.us/

http://www.ci.bremerton.wa.us/

http://onepugetsound.org/about/voyage91/

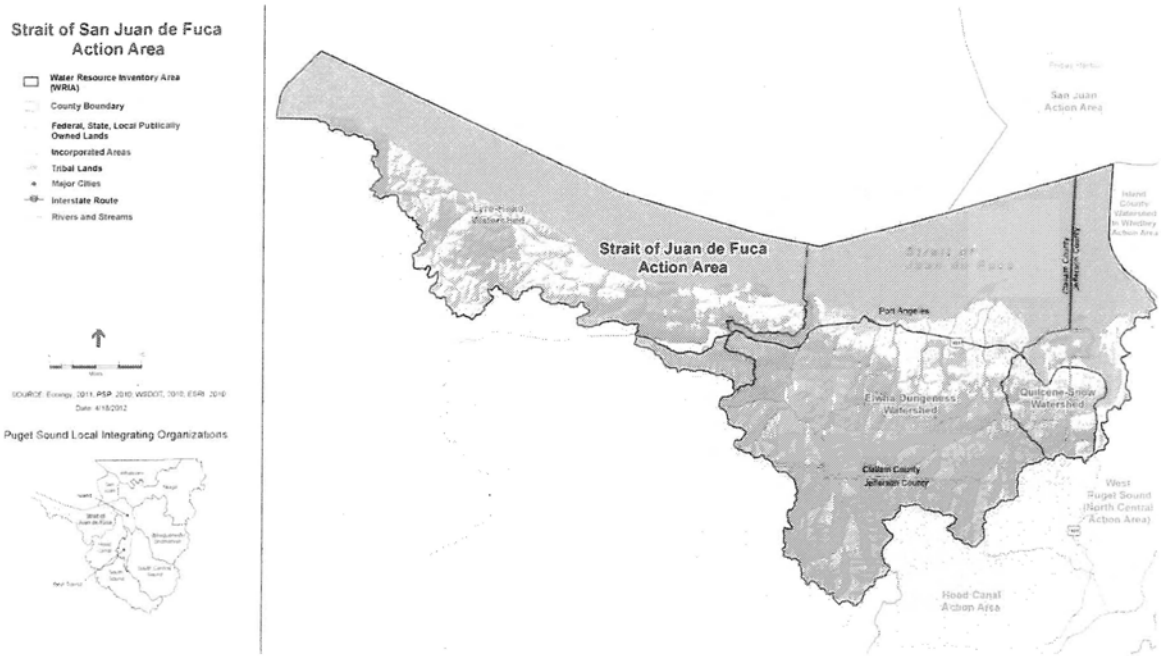
The Action Agenda in the Strait of Juan de Fuca

Profile

The Strait of Juan de Fuca (Action Area and geographic area for the Local Implementing Organization) includes the waters and associated watersheds from the northwestern tip of the Olympic Peninsula (Cape Flattery) to the eastern end of the Strait of Juan de Fuca (Point Wilson at Port Townsend). It is home to the Makah, Lower Elwha Klallam and Jamestown S'Klallam Nations and tribal reservations, Clallam and Jefferson counties, the cities of Port Townsend, Port Angeles, and Sequim, and much of Olympic National Park and Olympic National Forest.

The Strait of Juan de Fuca is the bridge between inner Puget Sound and the Pacific Ocean. It provides an essential pathway for exchange of incoming cold, dense saltwater and the circulation of freshwater runoff from Puget Sound and Georgia Basin rivers. This exchange, assisted by strong ocean currents in the western Strait and intense tidal action in the eastern end prevents the marine waters of this area from becoming stagnant.

The Strait Action Area has a rugged and diverse shoreline of 217 linear miles. The uplands are primarily forested, with most of the upper watersheds lying in federal, state, or private parks, forest or timberland. Many of the upper watersheds are in Olympic National Park. In other places, commercial



timber harvest remains an important economic sector, supporting an active paper mill in Port Angeles. More than three-quarters of the private land west of the Elwha watershed is zoned for commercial forest, and portions of the western Strait are in their third rotation for timber harvest. Agriculture also is part of the rural landscape along the Strait, with approximately 5,000 acres of irrigated farmland in the dry Sequim-Dungeness Valley. Smaller scale agriculture occurs in other scattered areas, particularly the Salt Creek area west of Port Angeles and in the Discovery Bay watershed.

Many other economic activities in the Strait also depend directly on the Puget Sound ecosystem, and include ship building/repair, marinas, shellfish culture and harvest, commercial and recreational fishing, and tourism. A large retirement population, drawn by the relatively dry climate, scenic environment, and other community features, has shifted the eastern Strait economy toward more service-based activities. Marine transportation is hugely reliant on the Strait of Juan de Fuca, as almost all the vessels entering or leaving the seaports of Puget Sound and the Georgia Basin pass through the Strait.

Unique Ecosystem Characteristics and Assets

The Strait of Juan de Fuca is the migration and transportation corridor between Puget Sound and the Pacific Ocean for many species of fish, marine mammals, bird populations, and humans. The marine shoreline and nearshore contain the majority of Washington's coastal kelp resources. The Strait has 95 (linear) miles of floating kelp, 161 miles of non-floating kelp, and 75 miles of eelgrass. The kelp forests and eelgrass meadows provide food and cover for outbound and returning runs of salmon from all over Puget Sound, as well as birds, marine mammals, and the species they depend on. The connectivity of kelp and eelgrass habitat in the Strait is essential to the function of the Puget Sound ecosystem. Sheltered bays, beaches and over 22 small "pocket" estuaries at the mouths of the many creeks entering the Strait also support salmon, bull trout, forage fish and shellfish.

Notable Accomplishments

Large scale restoration continues on the Dungeness River Floodplain, including multiple acquisitions for habitat protection.

Significant progress has been made on instream flow in the Dungeness area.

The Morse Creek Channel re-meander project reconnected the mid-reaches of Morse Creek with 9 acres of its historical floodplain.

Phased protection of the Pysht River floodplain through acquisition and revegetation will also open public access.

Unique populations of raptors, marine birds, Roosevelt elk, black-tailed deer and other mammals, as well as anadromous and resident fish, are found throughout the Strait. Notable bird species include the federally-protected northern spotted owl and marbled murrelet. Olympic National Park recently reintroduced the fisher, a larger relative of the weasel, which has been locally extinct for decades. The population of sea otters that migrates between the outer coast and the Strait has increased from the initial 59 animals reintroduced in 1969-1970 to 800 animals, but is still small enough to be highly vulnerable to a catastrophic event such as an oil spill. Protection Island, part of the Dungeness National Wildlife Refuge, is a critically important marine bird rookery for Puget Sound. This island and other portions of the Strait are important haul-out areas for seals and sea lions.

In 2011, the three-year process of removing the Elwha and Glines Canyon dams was started in order to restore a free-flowing Elwha river. The largest dam removal project in

US history will reopen more than 70 miles of mostly pristine spawning and rearing habitat in the Elwha River and its tributaries. Salmon populations are predicted to swell from 3,000 to nearly 400,000 as all five species of Pacific salmon return to one of the Pacific Northwest's most productive salmon streams. The Elwha is the largest watershed in Olympic National Park, and the return of salmon to this ecosystem will return marine-derived nutrients to the watershed, restoring a vital food source for the range of life that inhabits it.

Local Action Agenda Process

The Strait Ecosystem Recovery Network (ERN) is the Local Integrating Organization (LIO) for the Strait Action Area, and leads the prioritization and implementation of Action Agenda strategies in the Strait Action Area. The Strait ERN undertook an extensive and aggressive effort to complete a Strategic Plan and Work Plan to implement the Action Agenda within the Strait Action Area for the 2011-13 Biennium. As part of this process the Strait ERN began by identifying the most immediate and significant "local threats" to the entire Strait of Juan de Fuca / North Olympic Peninsula ecosystem (i.e., Strait of Juan de Fuca Action Area geography) that may best benefit from the focused support and advocacy work of the collective membership of the Strait Ecosystem Recovery Network to accomplish actions at the local, state, tribal, and federal levels (see Key Threats/Pressures list below). Using these threats as an internal guide, the Strait ERN identified a list of 25 strategic priorities and then used the regional strategy prioritization methods from "open standards" as a guide to rank six of the 25 Strategic Priorities to be of the highest priority within the 2011-13 biennium for the Strait Action Area (see Priorities list below).

Key Threats/Pressures

The Strait ERN has identified seventeen local threats to the health of the Strait of Juan de Fuca Ecosystem. These threats, as determined by the Strait ERN, are listed alphabetically below.

- Agriculture and Livestock Grazing Operations
- Air Pollution and Atmospheric Deposition
- Aquaculture
- Climate Change Induced Stressors
- Derelict Gear (and Vessels)
- Human Sewage
- Invasive Species and Other Problematic Species (Terrestrial, Freshwater, Estuarine, Marine)
- Land Use Conversions of Farms and Forests to Other Uses
- Legacy Infrastructure - Large Scale
- Legacy Toxic Contamination Sources - Large Scale
- Marine Commercial Vessel Traffic Hazards
- New Shoreline and Upland Modifications that Damage Intact Habitat and Habitat Forming Processes
- Oil and Hazardous Materials Spills - Large Scale
- Surface Water Loading and Excessive Runoff from the Built Environment
- Timber Harvest, Forest Practices, and Silvicultural Operations - Large Scale
- Unsustainable Fishing/Harvesting
- Water Withdrawals and Diversions

The Strait ERN reserves the ability to act upon each threat as the occasion arises.

Opportunities, Priorities, and Near-Term Actions

The Strait ERN identified 25 Strategic Priorities for the Strait Action Area. They ranked six of these as the highest priority for the 2011-13 biennium. These highest priorities, which are also considered to be the Near-Term Actions (NTA) for the Strait Action Area, include (in rank order):

1. **Elwha River Ecosystem Recovery** – Implement Elwha River Ecosystem Recovery Efforts and associated projects.
2. **Salmon Recovery Plans** (Puget Sound Salmon Recovery Plan, Hood Canal/ Eastern Strait of Juan de Fuca Summer Chum Recovery Plan, Puget Sound Steelhead Recovery Plan – in development) – Implement N. Olympic Peninsula Lead Entity (NOPLE) for Salmon and Hood Canal Coordinating Councils Lead Entity (HCCC-LE) 3-year Work Plans.
3. **Oil Spill Prevention, Preparedness, and Response** – Implement and promote improvements in oil spill prevention, preparedness, and response programs, policies, or capabilities for the benefit of the Strait of Juan de Fuca and adjacent waters.
4. **Shoreline Master Program Updates, Implementation, and Intergovernmental Coordination** (Jefferson County, Clallam County and cities of Port Townsend, Sequim, and Port Angeles).
5. **Stormwater Management Program Updates and Implementation** (Clallam, Jefferson, Port Angeles, Sequim, and Port Townsend).
6. **Instream Flow Rules** – Adopt and/or implement Instream Flow Rules for Water Resource Inventory Areas (WRIAs) 17, 18 East, 18 West, and 19.

The additional nineteen strategic priorities (in alphabetical order) are:

- **Aquatic Resources Habitat Conservation Plans** - Develop and implement Aquatic Resources Habitat Conservation Plans (HCP)
- **Carlsborg Wastewater Treatment and Water Reuse** - Implement Carlsborg Urban Growth Area Wastewater Treatment and Water Reuse Strategy
- **Clean Water District Plans** (Sequim-Dungeness Bay & Eastern Jefferson County) - Implement Sequim-Dungeness Bay and East Jefferson County Clean Water Districts projects and programs, including a total maximum daily load (TMDL) implementation strategy or on-site sewage management programs
- **Climate Change Mitigation, Adaption, and Implementation of Programs and Plans** - Account for the effects of climate change by appropriately mitigating or adapting projects, programs, local ordinances, and regulations. Enable Strait ERN member organizations to implement local climate change programs and plans.
- **Critical Areas Ordinances** - Update, implement, and enforce Critical Areas Ordinances
- **Forest Practices** - Implement sustainable and ecologically sound forest practices on public and private timberlands.
- **Green Jobs** - Promote ecosystem-based "Green Jobs" and businesses
- **Landfill Assessments, Closure, and Remediation** - Assess, close, and remediate, where necessary, solid waste landfills within the Strait of Juan de Fuca Action Area

- **Local Recovery Capacity** - Build local capacity of the Strait ERN and its active member organizations to strategically plan, collaborate, and coordinate; obtain funding; update, manage, and implement programs and projects; and enforce local codes and ordinances throughout the Strait Action Area
- **Marine Resource Plans (Clallam and Jefferson MRCs)** - Implement Marine Resources Committee's (MRC's) Action Plan for Clallam and Jefferson counties and Northwest Strait Commission Regional Projects
- **Migration Corridor Integrity** - Protect and restore the Strait of Juan de Fuca Action Area (including its marine, estuarine, and fresh waters) as a migratory corridor for fish, marine birds, orcas, and other species
- **Non-Indigenous Species Programs** - Promote programs and projects that prevent or reduce the effects of bio-Invasions of marine (including from ballast water), freshwater, or terrestrial non-indigenous species
- **Outreach, Education, Public Involvement: A. Strait ECO Net** - Support the efforts of Strait ECO Net to provide consistent and coordinated outreach, education and involvement opportunities for the general public; **B. Technical Assistance** - Support the efforts of the Conservation Districts and others to provide technical assistance to homeowners, landowners, and businesses; Support efforts to provide locally available professional training opportunities; **C. BuiltGreen™** - Support the effort to promote and market BuiltGreen™ development, particularly LID, toxics reduction, energy savings, and sustainable and regenerative power and water practices.
- **Port Angeles Harbor Ecosystem Recovery** - Clean up and restore Port Angeles Harbor and waterfront
- **Sewage Discharges (Treated and Untreated)** - Reduce harmful discharges of pollutants from ships, sewage outfalls, and biosolids applications.
- **Sustainable Commercial, Tribal, and Recreational Fishing and Shellfishing** - Promote the sustainable harvest of finfish and shellfish.
- **Toxic Source Reduction Programs** - Improve, develop, and implement toxics source reduction programs and projects.
- **Watershed Planning Detailed Implementation Plan Development and Implementation (WRIAs 19, 18 West, 18 East, and 17)** - Develop and/or implement Watershed Planning (2514) Detailed Implementation Plans (DIPs) for WRIAs 19, 18 West, 18 East, and 17
- **Working Lands and Tidelands Protection** - Protect (long term); support stewardship; and promote sustainable and ecologically sound principles and practices for working farms, forests, and aquaculture/mariculture operations.

The "Strait ERN 2011-13 Biennial Work Plan, Appendix A2, Strait ERN Priority Actions" contains a comprehensive list of actions for all 25 strategic priorities identified by the Strait ERN. This list includes the sequencing (or prioritization) of specific actions, where possible, under each strategic priority. The list also includes possible lead government/ agency/ organizations and the estimated funding needed, if available, for the 2011-13 biennium for each specific action. For the purposes of the Action Agenda update, the Strait ERN considers the multiple specific actions listed under each of the top six strategic priorities to constitute "packaged local near-term actions" (Packaged LNTA). For example, the three specific actions listed under the first strategic priority, "Elwha River Ecosystem Recovery" all roll up as a Packaged LNTA. The six Packaged LNTAs are listed below. For more details on each of the specific actions, see the latest revision of Appendix 2 of the Strait ERN 2011-13 Biennial Work Plan available from the weblink below.

"PACKAGED" LNTA (ID#) [1]	POSSIBLE LEAD GOVERNMENT, AGENCY, AND/OR ORGANIZATION	POTENTIAL FUNDING SOURCE(S)	PROPOSED PERFORMANCE MEASURE[1]
Elwha River Ecosystem Recovery (ID #6) a. Stock preservation and weir operation b. Monitoring (adults, juveniles, smolts) c. Habitat restoration projects	Elwha Fish Committee partners and others	SRFB, PSAR, EPA Lead Organizations	Continuous weir operation and monitoring of salmonids (adults, juveniles, and smolts) on the Elwha River (*i.e.* Priority Action ID#s 6a and 6b)
Salmon Recovery Plans (ID#18) a. North Olympic Peninsula Lead Entity (NOPLE) 3-year Work Plan b. NOPLE Elwha revegetation project c. NOPLE Dungeness River floodplain restoration, Phase II d. NOPLE Elwha Engineered Log Jams e. Hood Canal Coordinating Council (HCCC) Lead Entity (LE) 3-year Work Plan f. HCCC LE Snow Creek and Salmon Creek estuary restoration	North Olympic Peninsula Lead Entity, Hood Canal Lead Entity, and their respective member organizations	SRFB, PSAR, EPA Lead Organizations (Components: Watershed Protection and Restoration; Marine and Nearshore Protection and Restoration; and Toxics and Nutrients Prevention, Reduction, and Control)	Initiate or significantly advance all of the four specific Priority Actions identified by the Strait ERN for the Strait Action Area (*i.e.* Priority Action ID#s 18b, 18c, 18d, and 18f)
Oil Spill Prevention, Preparedness, and Response (ID#15) * - Implement and promote improvements in oil spill prevention, preparedness, and response programs and capabilities for the benefit of the Strait of Juan de Fuca and adjacent waters. • a. Improve transboundary coordination on oil spills b. Establish Vessel of Opportunity Program in Neah Bay c. Expand oil spill drills along Strait of Juan de Fuca and Coast • • *See insert for information on progress and ongoing work on oil spill issues, and details on the specific actions listed above for this Packaged LNTA.	a. Makah Tribe, Ecology, Industry, U.S. Coast Guard, and Navy b. Strait ERN, U.S. and Canadian Coast Guards, Ecology, Canadian Department of Fisheries and Oceans (DFO), and Transport Canada c. Strait ERN, U.S. and Canadian Coast Guards, Ecology, DFO, Transport Canada, U.S. Congress, and U.S. State Department	Ecology and EPA Lead Organizations, U.S. Coast Guard, and Industry	*In sequence:* a. Ensure 1+ CANUSPAC Exercise (or deployment) is conducted and incorporates transboundary movement of personnel and/or equipment b. Vessel of Opportunity established in Neah Bay by July 2014 or referenced in contingency plans approved by April 2014

"PACKAGED" LNTA (ID#) [1]	POSSIBLE LEAD GOVERNMENT, AGENCY, AND/OR ORGANIZATION	POTENTIAL FUNDING SOURCE(S)	PROPOSED PERFORMANCE MEASURE[1]
			c. Strait ERN participates in worst case or deployment drill planning process
Shoreline Master Program (SMP) Updates, Implementation, and Intergovernmental Coordination (Jefferson County, Clallam County and cities of Port Townsend, Sequim, and Port Angeles) (ID#20) a. City of Port Townsend SMP – stormwater education b. City of Port Townsend SMP – bulkhead removal c. City of Port Townsend SMP – restore native marine riparian vegetation d. City of Port Angeles SMP Update e. City of Sequim SPM Update f. Jefferson County SMP – Annual Restoration Planning Summit g. Jefferson County SMP – Assess shoreline restoration progress h. Jefferson County SMP – Identify and implement shoreline armoring, riparian enhancement, fill removal and culvert replacement projects i. Jefferson County SMP update j. Clallam County SMP implementation k. Clallam County SMP adaptive management l. Clallam County SMP update m. Ecosystem valuation n. Enhanced shoreline protection o. Finfish aquaculture speaker forum	Clallam and Jefferson counties and Cities of Port Angeles, Sequim, and Port Townsend, and others	EPA Lead Organizations (Components: Watershed Protection and Restoration; Marine and Nearshore Protection and Restoration)	Recommended Option: Develop the economic baseline (Ecosystem Valuation) for the ecosystem functions that will be monitored by the No Net Loss indicators for all 5 local jurisdictions within the Strait Action Area (Priority Action ID# 20m). Alternative Option: Initiate or complete 30% of the new Priority Actions identified by the Strait ERN for the Strait Action Area (*i.e.,* Priority Action ID#s 20a, 20b, 20c, 20f, 20g, 20h, 20j, 20k, and 20m)
Stormwater Management Program Updates and Implementation (Clallam, Jefferson, Port Angeles, Sequim, and Port Townsend) (ID#21) a. City of Port Townsend Stormwater Management Plan b. City of Sequim Stormwater Management Plan c. City of Port Angeles CSO reduction d. City of Port Angeles NPDES Stormwater Management Program implementation e. Jefferson County Public Education Plan implementation	Clallam and Jefferson counties and Cities of Port Angeles, Sequim, and Port Townsend, and others	EPA Lead Organizations (Components: Watershed Protection and Restoration; Marine and Nearshore Protection and Restoration; and Toxics and Nutrients Prevention, Reduction, and	Recommended Option: Adoption of LID incentives and ordinances by all 5 Strait Action Area local jurisdictions (i.e., Priority Action ID#s 21a, 21b, 21d, 21f, 21g, 21h, 21k, and 21m) Alternative Option:

"PACKAGED" LNTA (ID#) [1]	POSSIBLE LEAD GOVERNMENT, AGENCY, AND/OR ORGANIZATION	POTENTIAL FUNDING SOURCE(S)	PROPOSED PERFORMANCE MEASURE[1]
f. Jefferson County low impact development and BMP staff training g. Jefferson County low impact development and BMP training for development community h. Clallam County stormwater technical assistance i. Clallam County outreach and education j. Clallam County stormwater monitoring a data analysis k. Clallam County Stormwater management staff training l. Clallam County land use analysis m. Clallam County Stormwater Management Plan n. Stormwater impacts reduction from roads speaker forum		Control)	Initiate or complete 25% of the new Priority Actions identified by the Strait ERN for the Strait Action Area (i.e., 21b, 21e, 21f, 21h, 21i, 21j, 21k, 21l, and 21n)
Instream Flow Rules (WRIA 17, WRIA 18 East, WRIA 18 West, and WRIA 19) (ID#9) a. Adopt and implement Dungeness Instream Flow and Water Management Rule b. WRIA 18 East stream flow improvements c. Implement WRIA 17 Intream Flow and Water Management Rule d. Adopt Instream Flow Rules for WRIA 18 West e. Adopt Instream Flow Rules for WRIA 19	Washington Department of Ecology and local watershed management organizations (*i.e.*, WRIAs 19, Elwha Morse Management Team, Dungeness River Management Team, and East Jefferson Watershed Council) and their respective member organizations	Ecology	Initiate or complete 66% of the Priority Actions identified by the Strait ERN for the Strait Action Area (i.e., Priority Action ID#s 9a, 9b, and 9c)

[1] ID# refers to the Strait ERN Strategic Priority identification number as used in the Strait ERN 2011-13 Biennial Work Plan.

Oil Spill Prevention, Preparedness, and Response (ID#15) - Progress on a number of key actions, initially identified by the Strait ERN for the Oil Spill Prevention, Preparedness, and Response Strategic Priority, include:

- Permanent stationing of the Neah Bay Response Tug
- Strait ERN presence on various committees through the Makah Tribe's appointment to and participation in the Region 10 Regional Response Team/Northwest Area Committee (RRT/NWAC), Cross Partnership Oil Spill Workgroup (along with Clallam County Commissioner Doherty), and the oil spill advisory group established by Ecology to oversee rulemaking required by SB 1186

- Establishing a liaison role with Incident Command during a spill event for the Strait ERN through the Makah Tribe's appointment to the RRT; and
- Makah Tribe's participation in the U.S. and Canadian Coast Guards annual joint spill response exercises, known as CANUSPAC, along the Strait and Coast, that also proved instrumental in calling for an update of oil spill capabilities across the international boarder within the U.S. Coast Guard Reauthorization. Tribal participation to improve trans-boundary coordination, however, remains a priority for this biennium.

While the progress outlined above is clearly noteworthy, a number of ongoing needs remain, including:

- Updating and "ground-truthing" the Geographic Response Plans (GRP) through a rigorous drill program that would also incorporate vessels of opportunity and volunteers, as called for in SB 1186. In addition, work to assure that information contained within existing GRPs is being incorporated into updates of local Shoreline Master Programs, and visa versa, needs to be accomplished
- Continued funding for HAZWOPER, the Incident Command System, and Oiled Wildlife classes for volunteers across Strait Action Area, historically sponsored by the Clallam Marine Resources Committee (MRC), in cooperation with the Jefferson MRC; and
- Continued support for publicly funded oil spill response equipment caches strategically located throughout Strait Action Area, and funding for routine training in the use of that equipment.

Three specific actions, considered to be of highest priority, remain for this biennium's Strait ERN Oil Spill Preparedness, Prevention, and Response, Packaged LNTA (C10.2 LNTA #1), including the:

- **Neah Bay Vessel of Opportunity Program** (ID#15c) – The Port of Neah Bay (Port), strategically located at the junction between the Strait of Juan de Fuca and the outer Coast, is defined as a spill response "staging area" in the State's Oil Spill Contingency Plan. With the Makah Fishing Fleet, government and industry spill response assets, and the emergency rescue tug all stationed at the Port, it offers an ideal location to develop a Vessel Of Opportunity (VOO) program. The value of such a critical enhancement to the region's response capacity was recognized in an April 20, 2011 letter from the Governor to Ecology's Director, Ted Sturdevant. The Strait ERN supports establishment of a VOO program in Neah Bay as part of SB 1186, as well as additional programs along the Strait of Juan de Fuca (i.e., Port of Port Angeles and Port Townsend). Establishment of a Neah Bay VOO also furthers implementation of the U.S. Coast Guard Reauthorization Act of 2010 calling for a Neah Bay Pilot Project. This work is particularly important to accomplish over the next biennium as the U.S. Coast Guard will be moving the High Volume Port Line from Port Angeles to Cape Flattery in July 2012, thereby requiring more response capability in the western strait and outer coast region.
- **Expansion of oil spill drills along the Strait and Coast** (ID#15g) – The Strait of Juan de Fuca is the busiest commercial maritime waterway in Washington State for it receives traffic bound to and from the third largest port-complex in the U.S. as well as Canada's largest port. The rapid growth of tar sand oil being exported from the Port of Vancouver has significantly increased the risk of a large spill in the region. These unconventional oils will require unique response techniques to be developed. In addition, a proposed coal terminal near Bellingham will also significantly increase traffic of ships twice the size of tankers allowed to ply these waters. For these reasons, it is critical that worst-case oil spill exercises, including equipment deployment, be conducted regularly in this region. The combined spill response assets housed in Neah Bay

and Port Angeles afford substantial opportunities to drill. In addition, coordinating efforts with the Northwest Maritime Center (Port Townsend, WA) to host and expand drills and table-top exercises along the Strait of Juan de Fuca, outer Coast, and Puget Sound waterways, utilizing their Pilothouse/Oil Spill Training Center (currently under construction), should be considered. Drills and exercises should also incorporate vessels of opportunity, publicly funded response equipment caches, and maritime industry participants. All of these assets are owned by different organizations, that if drilled together, would afford opportunities to improve efficiencies through coordination.

- **Improved Trans-boundary coordination on oil spills** (ID#15b) – Recognizing that the majority of the Strait of Juan de Fuca is bordered by Canada, it is critical that we continue to exercise our combined spill response capacity in this region. The Strait ERN supports enhancement of CANUSPAC, on both sides of the border with additional equipment and personnel. These exercises primarily involve drilling the procedures necessary to bring a limited amount of response assets across the border. In addition, the U.S. Coast Guard Reauthorization Act called for the two countries to reevaluate the comparability of spill response, tug escort, and rescue towing assets on either side of the border as discussed in the Combined Vessel Traffic Service Treaty. It is expected that this effort will commence this biennium. The British Columbia/Pacific States Oil Spill Task Force has already documented the disparity of spill response capacity across the border. The completion of this review would serve to significantly improve our region's combined capabilities. Additionally, the current estimates of Canadian vessel traffic projections need to be incorporated into updates of vessel traffic risk assessments.

Relationship to Recovery Targets

The Strait ERN worked to link the local threats and strategic priorities (listed above) with the Soundwide pressure reduction targets (land development, wastewater, shoreline alteration, stormwater, and floodplains). Those linkages are illustrated in the following table.

SOUNDWIDE PRESSURE REDUCTION TARGET CATEGORY	LOCAL THREAT	LOCAL STRATEGIC PRIORITIES
Land Development	New (Shoreline and) Upland Modifications that Damage Intact Habitat and Habitat Forming Processes	• Critical Areas Ordinances • Outreach, Education, Public Involvement - B. Technical Assistance • Outreach, Education, Public Involvement - C. BuiltGreen™ • Salmon Recovery Plans • SMP Updates, Implementation, and Intergovernmental Coordination • Working Lands and Tidelands Protection
	Legacy Infrastructure – Large Scale	• Elwha River Ecosystem Recovery • Forest Practices • Landfill Assessments, Closure, and Remediation • Marine Resource Plans • Migration Corridor Integrity * • Port Angeles Harbor Ecosystem Recovery • Salmon Recovery Plans

SOUNDWIDE PRESSURE REDUCTION TARGET CATEGORY	LOCAL THREAT	LOCAL STRATEGIC PRIORITIES
	Land Use Conversions of Farms and Forests to Other Uses	• Climate Change Mitigation, Adaption, and Implementation of Programs and Plans • Outreach, Education, Public Involvement - B. Technical Assistance • Salmon Recovery Plans • Watershed Planning Detailed Implementation Plans • Working Lands and Tidelands Protection
	Water Withdrawals and Diversions	• Carlsborg Wastewater Treatment and Water Reuse • Climate Change Mitigation, Adaption, and Implementation of Programs and Plans • Instream Flow Rules • Outreach, Education, Public Involvement - B. Technical Assistance • Salmon Recovery Plans • Watershed Planning Detailed Implementation Plans • Working Lands and Tidelands Protection
Shoreline Alteration	New Shoreline (and Upland) Modifications that Damage Intact Habitat and Habitat Forming Processes	• Aquatic Resources Habitat Conservation Plans * • Climate Change Mitigation, Adaption, and Implementation of Programs and Plans Critical Areas Ordinances • Marine Resource Plans • Migration Corridor Integrity * • Outreach, Education, Public Involvement - C. BuiltGreen™ • Salmon Recovery Plans • SMP Updates, Implementation, and Intergovernmental Coordination • Working Lands and Tidelands Protection
Stormwater	Surface Water Loading and Runoff from the Built Environment	• Clean Water District Plans • Climate Change Mitigation, Adaption, and Implementation of Programs and Plans • Instream Flow Rules • Outreach, Education, Public Involvement - B. Technical Assistance • Outreach, Education, Public Involvement - C. BuiltGreenTM • Stormwater Management Program Updates and Implementation • Watershed Planning Detailed Implementation Plan • Working Lands and Tidelands Protection
Wastewater	Human Sewage	• Carlsborg Wastewater Treatment and Water Reuse • Clean Water District Plans • Outreach, Education, Public Involvement - B. Technical Assistance • Stormwater Management Program Updates and Implementation • Watershed Planning Detailed Implementation Plan
Floodplains	New Shoreline and Upland Modifications that Damage Intact Habitat	• Climate Change Mitigation, Adaption, and Implementation of Programs and Plans • Critical Areas Ordinances • Migration Corridor Integrity * • Salmon Recovery Plans

SOUNDWIDE PRESSURE REDUCTION TARGET CATEGORY	LOCAL THREAT	LOCAL STRATEGIC PRIORITIES
	and Habitat Forming Processes	• SMP Updates, Implementation, and Intergovernmental Coordination • Working Lands and Tidelands Protection
	Legacy Infrastructure – Large Scale	• Climate Change Mitigation, Adaption, and Implementation of Programs and Plans • Elwha River Ecosystem Recovery • Forest Practices • Migration Corridor Integrity * • Salmon Recovery Plans • SMP Updates, Implementation, and Intergovernmental Coordination
	Land Use Conversions of Farms and Forests to Other Uses	• Climate Change Mitigation, Adaption, and Implementation of Programs and Plans • Critical Areas Ordinances • Salmon Recovery Plans • Working Lands and Tidelands Protection
	Climate Change Induced Stressors	• Climate Change Mitigation, Adaption, and Implementation of Programs and Plans • Critical Areas Ordinances • Salmon Recovery Plans • SMP Updates, Implementation, and Intergovernmental Coordination • Working Lands and Tidelands Protection

* Specific Priority Actions remain to be determined for this Local Strategic Priority at a future Strait ERN Speaker Forum.

The Strait ERN also worked to link the local threats and strategic priorities (listed above) with other regional ecosystem pressures. While these ecosystem pressures may not have a Soundwide Pressure Reduction Target at this time, they are considered important to the Strait Action Area. Those linkages are illustrated in the following table.

OTHER REGIONAL ECOSYSTEM PRESSURES	LOCAL THREAT	LOCAL STRATEGIC PRIORITIES
Agriculture, Livestock Grazing	Agriculture and Livestock Grazing Operations	• Clean Water District Plans • Climate Change Mitigation, Adaption, and Implementation of Programs and Plans • Instream Flow Rules • Outreach, Education, Public Involvement - B. Technical Assistance • Salmon Recovery Plans • Watershed Planning Detailed Implementation Plan • Working Lands and Tidelands Protection
Animal Harvesting (Aquatic)	Unsustainable Fishing/Harvesting	• Sustainable Commercial, Tribal, and Recreational Fishing and Shellfishing *

OTHER REGIONAL ECOSYSTEM PRESSURES	LOCAL THREAT	LOCAL STRATEGIC PRIORITIES
Climate Change and Severe Weather	Climate Change Induced Stressors	• Climate Change Mitigation, Adaption, and Implementation of Programs and Plans • Instream Flow Rules • Marine Resource Plans • Outreach, Education, Public Involvement - B. Technical Assistance • Outreach, Education, Public Involvement - C. BuiltGreen™ • Salmon Recovery Plans • SMP Updates, Implementation, and Intergovernmental Coordination • Stormwater Management Program Updates and Implementation • Watershed Planning Detailed Implementation Plan • Working Lands and Tidelands Protection
Derelict Fishing Gear	Derelict Gear and Vessels	• Marine Resource Plans • Migration Corridor Integrity * • Sustainable Commercial, Tribal, and Recreational Fishing and Shellfishing *
Energy Production and Energy Emissions	Air Pollution and Atmospheric Deposition	• Climate Change Mitigation, Adaption, and Implementation of Programs and Plans • Outreach, Education, Public Involvement - C. BuiltGreen™ • Toxic Source Reduction * • Working Lands and Tidelands Protection
Fin Fish Aquaculture and Shellfish Aquaculture	Aquaculture	• Aquatic Resources Habitat Conservation Plans * • Migration Corridor Integrity * • Non-Indigenous Species Programs * • SMP Updates, Implementation, and Intergovernmental Coordination • Working Lands and Tidelands Protection *
Invasive Species (Aquatic and Terrestrial)	Invasive Species and Other Problematic Species (Terrestrial, Freshwater, Estuarine, Marine)	• Non-Indigenous Species Programs * • Salmon Recovery Plans • Working Lands and Tidelands Protection
Oil and Hazardous Materials Spills	Oil and Hazardous Materials Spills - Large Scale	• Oil Spill Prevention, Preparedness, and Response
Timber Production	Timber Harvest and Silvicultural Operations - Large Scale	• Climate Change Mitigation, Adaption, and Implementation of Programs and Plans • Forest Practices • Salmon Recovery Plans • Working Lands and Tidelands Protection

OTHER REGIONAL ECOSYSTEM PRESSURES	LOCAL THREAT	LOCAL STRATEGIC PRIORITIES
Toxics and Legacy Contaminants	Legacy Toxic Contamination Sources - Large Scale	• Landfill Assessments, Closure, and Remediation • Port Angeles Harbor Ecosystem Recovery • Toxic Source Reduction *
Transportation and Service Corridors	Marine Commercial Vessel Traffic Hazards	• Non-Indigenous Species Programs * • Sewage Discharges (Treated and Untreated) * • Toxic Source Reduction *

* Specific Priority Actions remain to be determined for this Local Strategic Priority at a future Strait ERN Speaker Forum.

In addition, the Strait ERN identified the following ecosystem targets of local interest as well as local contributions to the targets.

ECOSYSTEM TARGETS OF LOCAL INTEREST	LOCAL CONTRIBUTIONS TO SOUNDWIDE RECOVERY
Swimming Beaches	• Clean Water District Plans • Outreach, Education, Public Involvement - B. Technical Assistance • Port Angeles Harbor Ecosystem Recovery • Sewage Discharges (Treated and Untreated) • Stormwater Management Program Updates/Implementation • Toxic Source Reduction * • Watershed Planning Detailed Implementation Plans
Summer Stream Flows	• Carlsborg Wastewater Treatment and Water Reuse • Climate Change Mitigation/Adaption/Implement Programs&Plans • Instream Flow Rules • Outreach, Education, Public Involvement - B. Technical Assistance • Outreach, Education, Public Involvement - C. BuiltGreen™ • Salmon Recovery Plans • Stormwater Management Program Updates and Implementation • Watershed Planning Detailed Implementation Plans • Working Lands (and Tidelands) Protection
Water Insects in Freshwater	• Carlsborg Wastewater Treatment and Water Reuse • Clean Water District Plans • Climate Change Mitigation/Adaption/Implement Programs & Plans • Critical Areas Ordinances • Forest Practices • Instream Flow Rules • Non-Indigenous Species Programs * • Outreach, Education, Public Involvement - B. Technical Assistance • Outreach, Education, Public Involvement - C. BuiltGreen™ • Salmon Recovery Plans • SMP Updates, Implementation & Intergovernmental Coordination • Stormwater Management Program Updates and Implementation • Watershed Planning Detailed Implementation Plans

ECOSYSTEM TARGETS OF LOCAL INTEREST	LOCAL CONTRIBUTIONS TO SOUNDWIDE RECOVERY
	• Working Lands (and Tidelands) Protection
Toxics in Fish	• Landfill Assessments, Closure, and Remediation • Oil Spill Prevention, Preparedness, and Response • Port Angeles Harbor Ecosystem Recovery • Sewage Discharges (Treated and Untreated) * • Stormwater Management Program Updates & Implementation • Toxic Source Reduction *
Freshwater Water Quality	• Carlsborg Wastewater Treatment and Water Reuse • Clean Water District Plans • Forest Practices • Outreach, Education, Public Involvement - B. Technical Assistance • Outreach, Education, Public Involvement - C. BuiltGreen™ • Salmon Recovery Plans • SMP Updates, Implementation & Intergovernmental Coordination • Stormwater Management Program Updates and Implementation • Toxic Source Reduction * • Watershed Planning Detailed Implementation Plan • Working Lands and Tidelands Protection
Estuaries	• Aquatic Resources Habitat Conservation Plans * • Climate Change Mitigation/Adaption/Implement Programs & Plans • Critical Areas Ordinances • Elwha River Ecosystem Recovery • Marine Resource Plans • Migration Corridor Integrity * • Port Angeles Harbor Ecosystem Recovery • Salmon Recovery Plans • SMP Updates, Implementation & Intergovernmental Coordination • Working Lands and Tidelands Protection
Marine Sediment Quality	• Aquatic Resources Habitat Conservation Plans * • Clean Water District Plans • Landfill Assessments, Closure, and Remediation • Marine Resource Plans • Oil Spill Prevention, Preparedness, and Response • Port Angeles Harbor Ecosystem Recovery • Sewage Discharges (Treated and Untreated) * • SMP Updates, Implementation & Intergovernmental Coordination • Stormwater Management Program Updates and Implementation • Toxic Source Reduction *
Eelgrass	• Aquatic Resources Habitat Conservation Plans * • Clean Water District Plans • Climate Change Mitigation/Adaption/Implement Programs & Plans • Critical Areas Ordinances • Elwha River Ecosystem Recovery • Marine Resource Plans • Migration Corridor Integrity *

ECOSYSTEM TARGETS OF LOCAL INTEREST	LOCAL CONTRIBUTIONS TO SOUNDWIDE RECOVERY
	• Non-Indigenous Species Programs * • Oil Spill Prevention, Preparedness, and Response • Port Angeles Harbor Ecosystem Recovery • Salmon Recovery Plans • SMP Updates, Implementation & Intergovernmental Coordination • Stormwater Management Program Updates and Implementation • Working Lands and Tidelands Protection
Floodplains	• Climate Change Mitigation/Adaption/Implement Programs & Plans • Critical Areas Ordinances • Elwha River Ecosystem Recovery • Forest Practices • Outreach, Education, Public Involvement - B. Technical Assistance • Salmon Recovery Plans • SMP Updates, Implementation, Intergovernmental Coordination • Watershed Planning Detailed Implementation Plan • Working Lands and Tidelands Protection
Wild Chinook Salmon (Note: Chinook abundance target should be considered as a surrogate for all other populations of salmonids)	• Aquatic Resources Habitat Conservation Plans * • Carlsborg Wastewater Treatment and Water Reuse • Clean Water District Plans • Climate Change Mitigation/Adaption/Implement Programs & Plans • Critical Areas Ordinances • Elwha River Ecosystem Recovery • Forest Practices • Instream Flow Rules • Marine Resource Plans • Migration Corridor Integrity * • Non-Indigenous Species Programs * • Oil Spill Prevention, Preparedness, and Response • Outreach, Education, Public Involvement - B. Technical Assistance • Outreach, Education, Public Involvement - C. BuiltGreen™ • Port Angeles Harbor Ecosystem Recovery • Salmon Recovery Plans • SMP Updates, Implementation, Intergovernmental Coordination • Stormwater Management Program Updates and Implementation • Sustainable Commercial, Tribal, Recreational Fishing • Toxic Source Reduction * • Watershed Planning Detailed Implementation Plan • Working Lands and Tidelands Protection
Shoreline Armoring	• Aquatic Resources Habitat Conservation Plans * • Climate Change Mitigation/Adaption/Implement Programs & Plans • Critical Areas Ordinances • Elwha River Ecosystem Recovery • Landfill Assessments, Closure, and Remediation • Marine Resource Plans • Migration Corridor Integrity * • Outreach, Education, Public Involvement - C. BuiltGreen™

ECOSYSTEM TARGETS OF LOCAL INTEREST	LOCAL CONTRIBUTIONS TO SOUNDWIDE RECOVERY
	• Port Angeles Harbor Ecosystem Recovery • Salmon Recovery Plans • SMP Updates, Implementation, Intergovernmental Coordination • Working Lands and Tidelands Protection
Mgt. of On-Site Sewage Systems	• Carlsborg Wastewater Treatment and Water Reuse • Clean Water District Plans • Marine Resource Plans • Toxic Source Reduction * • Watershed Planning Detailed Implementation Plan
Pacific Herring	• Aquatic Resources Habitat Conservation Plans * • Clean Water District Plans • Climate Change Mitigation/Adaption/Implement Programs & Plans • Critical Areas Ordinances • Elwha River Ecosystem Recovery • Marine Resource Plans • Migration Corridor Integrity * • Non-Indigenous Species Programs * • Oil Spill Prevention, Preparedness, and Response • Port Angeles Harbor Ecosystem Recovery • Salmon Recovery Plans • SMP Updates, Implementation, Intergovernmental Coordination • Sustainable Commercial, Tribal, and Recreational Fishing *
Shellfish Beds	• Aquatic Resources Habitat Conservation Plans * • Clean Water District Plans • Climate Change Mitigation/Adaption/Implement Programs & Plans • Critical Areas Ordinances • Elwha River Ecosystem Recovery • Landfill Assessments, Closure, and Remediation • Marine Resource Plans • Migration Corridor Integrity * • Non-Indigenous Species Programs * • Oil Spill Prevention, Preparedness, and Response • Port Angeles Harbor Ecosystem Recovery • SMP Updates, Implementation, Intergovernmental Coordination • Stormwater Management Program Updates and Implementation • Sustainable Commercial, Tribal, and Recreational Fishing * • Toxic Source Reduction * • Working Lands and Tidelands Protection
Orca	• Aquatic Resources Habitat Conservation Plans * • Climate Change Mitigation/Adaption/Implement Programs & Plans • Critical Areas Ordinances • Elwha River Ecosystem Recovery • Forest Practices • Instream Flow Rules • Landfill Assessments, Closure, and Remediation

ECOSYSTEM TARGETS OF LOCAL INTEREST	LOCAL CONTRIBUTIONS TO SOUNDWIDE RECOVERY
	• Marine Resource Plans • Migration Corridor Integrity * • Non-Indigenous Species Programs * • Oil Spill Prevention, Preparedness, and Response • Port Angeles Harbor Ecosystem Recovery • Salmon Recovery Plans (Note: likely not a linear relationship) • Sewage Discharges (Treated and Untreated) * • SMP Updates, Implementation, Intergovernmental Coordination • Stormwater Management Program Updates and Implementation • Toxic Source Reduction * • Watershed Planning Detailed Implementation Plan • Working Lands and Tidelands Protection
Dissolved Oxygen in Marine Waters (Note: Low DO Target is focused on Port Angeles Harbor.)	• Climate Change Mitigation/Adaption, Implement Programs & Plans • Port Angeles Harbor Ecosystem Recovery • Sewage Discharges (Treated and Untreated) * • Stormwater Management Program Updates and Implementation • Toxic Source Reduction *

* Specific Priority Actions remain to be determined for this Strategic Priority at a future Strait ERN Speaker Forum.

Local Implementation Structure

Starting in 2009, the Strait ERN worked to identify local treats, priorities, and near-term actions. As part of that work, the Strait ERN held nine Speaker Forums at quarterly meetings (as of January 2012) to gain background information on strategic topics, including:

- Oil Spill Preparedness, Prevention, and Response
- Multi-State Agency Watershed Characterization Project
- Aquatic Lands Habitat Conservation Plan
- Forest Practices Habitat Conservation Plan
- Climate Change Adaption
- NOAA Biological Opinion / FEMA National Floodplain Insurance Program – Local Implementation
- Strait of Juan de Fuca as a Migratory Corridor for Salmonids
- Net Pen Aquaculture (issue tabled for now); and
- Diarrhetic Shellfish Poisoning

IMPLEMENTATION COORDINATION IN THE STRAIT OF SAN JUAN DE FUCA

The Strait ERN covers the Strait Action Area. The LIO, which officially formed in 2009, is made up of leaders (i.e., elected officials and high-level staff) from a diverse set of governments, agencies, special districts, organizations, recovery processes, institutions, and key businesses and business groups in the Strait of Juan de Fuca Action Area. The LIO's co-chairs are the Strait Action Area's representative and the alternate to the Partnership's Ecosystem Coordination Board. The LIO is guided by a Steering Group. The LIO forms Task Force groups, made up of volunteers from the membership, as needed to focus on implementing local strategies and actions.

Participants in or contributors to this process included the following:

- **Tribes** – Makah, Lower Elwha Klallam, Jamestown S'Klallam, and Port Gamble S'Klallam
- **Counties** – Clallam and Jefferson
- **Cities** – Port Angeles, Sequim, and Port Townsend
- **Port** – Port Angeles, Neah Bay
- **Government Entities / Agencies** – Clallam and Jefferson Conservation Districts, Hood Canal Coordinating Council (HCCC), Point-No-Point Treaty Council, Puget Sound Partnership, Washington Departments of Fish and Wildlife, Ecology, and Natural Resources, US Coast Guard Sector Seattle, and Olympic Coast National Marine Sanctuary
- **Watershed Management, Salmon Recovery, and Marine Organizations** – North Olympic Lead Entity for Salmon and HCCC-Lead Entity (for salmon recovery), Management Teams or Councils for Watershed Resource Inventory Areas 19, 18 (including Elwha-Morse Management Team and Dungeness River Management Team), and 17 (East Jefferson Watershed Council), and Clallam and Jefferson Marine Resources Committees, a part of the Northwest Straits Commission, Sequim-Dungeness Clean Water District, and Sunland Water District
- **Business-Based Non-Governmental Organizations** - North Olympic Timber Action Committee, Pacific Shellfish Growers Association, North Peninsula Home Builders Association - BuiltGreen™ of Clallam County, Multi-Vision Integration LLC, and Northwest Maritime Center
- **Natural Resource-Based and Working Land Preservation Non-Governmental Organizations (with wide Strait of Juan de Fuca geographic coverage)** - North Olympic Salmon Coalition, North Olympic Land Trust, Jefferson Land Trust, Olympic Environmental Council, Protect the Peninsula's Future, People for Puget Sound, North Olympic Peninsula Group of the Sierra Club, and Coastal Watershed Institute
- **Educational Institutions** - WSU Jefferson County Extension, Washington Sea Grant
- **Place-Based Educational / Public Involvement Organizations** – Strait ECO Net, Feiro Marine Science Center, Dungeness River Audubon Center, and Port Townsend Marine Science Center
- **Volunteer-Based Public Involvement Organizations** – Washington State University Clallam and Jefferson County Beach Watchers/Water Watchers and Shore Stewards and Clallam County Streamkeepers

References and Additional Resources

Strait Ecosystem Recovery Network 2011-13 Biennial Work Plan. Available online at: http://www.mypugetsound.net/index.php?option=com_docman&task=cat_view&gid=190&limit=100&limitstart=0&order=hits&dir=DESC&Itemid=172

References

http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/upload/Ch5_Elwha.pdf

http://www.clallam.net/environment/assets/applets/W18d1_2.11-Strait-of-JDF.pdf

http://www.pac.dfo-mpo.gc.ca/science/oceans/cotesud-southcoast/JdFG_e.pdf

http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Puget-Sound/upload/Ch5_Dungeness.pdf

http://www.portofpa.com/marine-facilities/log-handling.html

http://www.clallam.net/realestate/assets/applets/FreshH20-ReachSheets6-2011.pdf

http://www.clallamcd.org/storage/publications/Long%20range%20plan%20Resource%20Inventory2.pdf

http://www.elwhainfo.org/people-and-communities/region

http://www.bestretirementspots.com/port-angeles-washington.htm

http://www.nps.gov/olym/naturescience/fisher-reintroduction.htm

http://sanctuaries.noaa.gov/science/condition/pdfs/oc_conditionreport08.pdf

http://www.fws.gov/refuges/profiles/index.cfm?id=13533

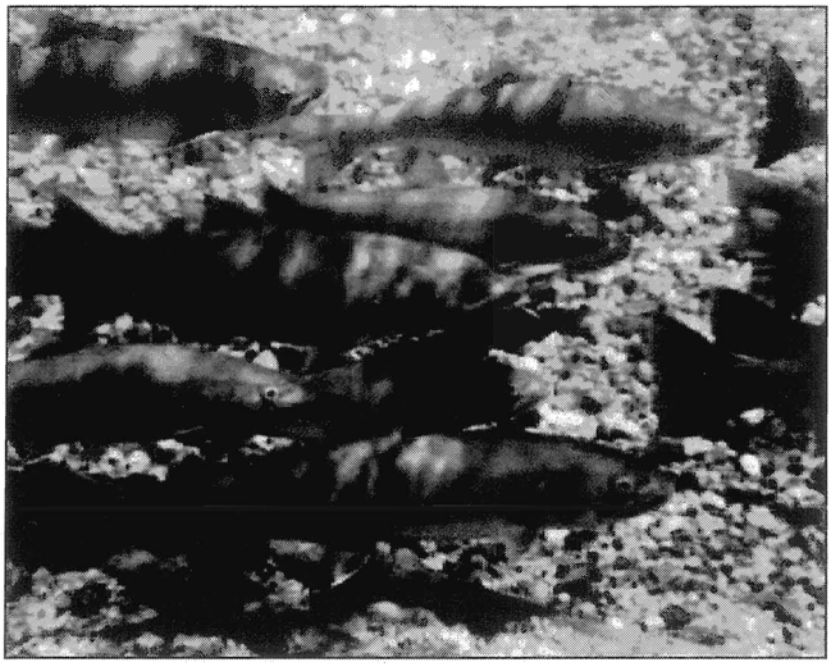
http://www.usbr.gov/pmts/sediment/projects/ElwhaRiver/ElwhaGlinesCanyon.htm

http://www.nps.gov/olym/naturescience/elwha-ecosystem-restoration.htm

Board Supplemental Exhibit 2:

Washington State Department of Fish and Wildlife's Knight, K (2009) Land Use Planning for Salmon, Steelhead and Trout

LAND USE PLANNING
FOR SALMON, STEELHEAD AND TROUT:



A land use planner's guide to salmonid habitat protection and recovery

October 2009

Aquatic Habitat Guidelines Program

Washington Department of FISH and WILDLIFE

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Acknowledgments

This guidance document is a benchmark of 21st Century Salmon and Steelhead, a Washington Department of Fish and Wildlife Initiative to recover naturally-spawning salmon and steelhead populations. It is also a product of the Aquatic Habitat Guidelines (AHG) Program, a multi-agency committee within Washington State that receives support and participation from the Departments of Fish and Wildlife, Ecology, Natural Resources, Transportation, Commerce, the Recreation and Conservation Office, and the Puget Sound Partnership.

A special note of gratitude to the WDFW internal review committee who provided oversight, technical assistance and edits throughout the development of this document.

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Funding Provided By

Washington Department of Fish and Wildlife, the State of Washington Department of Ecology, and the United States Environmental Protection Agency provided funding for this project. Funding has been provided in part through EPA Grant No. C9-00044904-0 to the Department of Ecology from the United States Environmental Protection Agency. The Department of Ecology allocates and administers funding for this grant. The contents of this document do not necessarily reflect the views and policies of the United State Environmental Protection Agency, nor does the mention of trade names or commercial products constitute endorsement or recommendation for their use. This project is also in partial fulfillment of a 2007 Direct Implementation Fund Grant to provide Landscape Guidance for Residential Development, WDFW Number 07-1599, DOE Contract No. C0800175.

Preferred Citation:

Knight, K. 2009. Land Use Planning for Salmon, Steelhead and Trout. Washington Department of Fish and Wildlife. Olympia, Washington.

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CHAPTER ONE
INTRODUCTION

1.1 Why This Guidance

The Washington Department of Fish and Wildlife (WDFW) is providing this guidance on planning for salmon, steelhead and trout (also known as salmonids) to help integrate local land use planning programs and state salmonid recovery efforts. This planner's guide to salmonid recovery is intended for local government planners and includes information on state salmonid recovery efforts, sources of scientific guidance and model policies and development regulations.

The focus of this guidance is on naturally spawning salmon, steelhead and trout because these species are at-risk of extinction. Over one hundred populations of salmon and steelhead have been listed as threatened or endangered in Washington State under the federal Endangered Species Act (ESA) (Good et al. 2005), and at least seven salmon stocks are already extinct in Puget Sound (Brennan and Culverwell 2004). To recover salmonid populations, Washington has multiple efforts underway including the development and implementation of regional recovery plans. Yet regional salmon recovery plans are often disconnected from local land use planning initiatives.

> *It is Washington State's goal to: "restore salmon, steelhead and trout populations to healthy harvestable levels and improve those habitats on which fish rely." - Washington State Joint Natural Resources Cabinet (GSRO 1999)*

Incorporating the information provided in this guidance into local land use planning and decision-making is an important step towards reaching the goal of recovering naturally-spawning salmonid populations. Approximately 54% (23.4 million acres), of land in Washington State is privately owned (IAC 2001) and mostly regulated by local government planning programs. Much of this land includes low-lying areas where salmonid habitat is prevalent, such as floodplains and river deltas. Upland development activities also impact this habitat. Therefore, land use decisions implemented at the local level affect salmonid recovery efforts and protection strategies.

Salmonid habitat includes in-stream physical characteristics (e.g., temperature, water quantity, structure, substrate conditions, pool/riffle ratios, etc.), but habitat is strongly influenced by watershed processes beyond the waterline, including canopy cover, riparian condition, large woody debris recruitment, impervious surfaces and stormwater discharge, sediment delivery, water allocations (withdrawals), road location and maintenance, watershed hydrology, and nutrient dynamics. Therefore, planning for salmon, steelhead and trout must address the condition and extent of water-related resources as well as upland processes that influence aquatic habitat.

The intent of this guidance is to assist local governments working on comprehensive updates to Growth Management Act (GMA) and Shoreline Management Act (SMA) planning programs and related regulatory and incentive-based programs. The GMA and the SMA are the two most significant state laws governing local land use planning decisions to protect critical salmonid habitat. The GMA requires special consideration be given to conservation or protection measures necessary to preserve or enhance critical anadromous fish resources. The SMA requires no net loss to fish and wildlife conservation areas which includes anadromous fish habitat. To address these requirements, this guidance provides science-based management recommendations in the form of model policies and regulations. These recommendations can be incorporated into local GMA and SMA planning programs including critical area ordinance updates under the GMA and shoreline master program updates under the SMA.

1.2 Relationship to Other Guidance

WDFW has previously published sources of scientific information and recommendations to protect and recover salmonid habitat. These include the Pacific Salmon and Wildlife technical report (Cederholm et al. 2000), Statewide Steelhead Management Plan (WDFW 2008), and nearshore (Envirovision et al. 2007) and riparian management recommendations (Knutson and Naef 1997). These reports, as well as other best available science (BAS) for anadromous fish resources provided by the Washington State Department of Commerce (formerly Department of Community, Trade and Economic Development) (WDCTED 2003), provide local governments with numerous scientific resources related to salmonids. These existing sources of information are referenced throughout this new guidance document.

Due to the breadth of scientific information already available to help local governments provide special consideration for salmonids, this guidance document focuses primarily on how planning policies and regulations can incorporate the science. More specific language tailored to local circumstances may be necessary. WDFW regional biologists or habitat consultants may be able to assist in fine-tuning the general policy and regulatory recommendations to local circumstances. Appendix A provides sources of science, habitat management recommendations and other relevant resources, including contact information for WDFW staff.

1.3 How to Use This Guidance

This introductory chapter describes the purpose and need for this guidance and provides an overview of salmonid recovery planning in Washington state and the relationship of salmonid recovery to land use planning. Chapter Two provides an overview of salmonid ecology, including habitat functions and potential habitat impacts associated with land use activities. This summary of salmonid ecology is written for the non-biologist and is not meant to provide an exhaustive review of the scientific literature. The literature cited should be consulted for additional scientific information.

In Chapter Three the relationship of salmonid recovery to land use planning is discussed in greater detail. This chapter is organized by planning tools designed to manage development impacts to salmonid habitat. Each planning tool includes a table of model policies and regulations, local example policies and regulations, and planning resources. The model policy and regulatory recommendations are meant to inform land use plans and codes, while the examples offer an existing local approach to address salmonid recovery in land use planning programs.

Additional resources for land use planners related to salmonid recovery planning in Washington State can be found in the appendices. Appendix A includes resources such as partners in salmonid recovery planning, management recommendations and habitat mapping resources. Appendix B includes a list of definitions for terms used in this document; these definitions can also be used to inform local policies and regulations.

1.4 Salmonid Recovery in Washington State

Salmon, steelhead and trout are in the family *Salmonidae*, and referred to collectively as salmonids[1]. Some salmonids are anadromous, meaning that they spawn in freshwater, but reside in both freshwater (including lakes, rivers, streams, as well as wetlands) and saltwater (including estuary and open ocean) environments for at least some portion of their lifetime. However, some species exhibit a higher propensity to reside wholly in freshwater.

In this document, a greater emphasis is placed on migrating salmonids that rely on freshwater and saltwater environments because these fish combine high value to people (food, recreation, cultural importance), high value to ecosystems of the state (they support a vast array of species in fresh and salt water from orca whales, sea lions, and seabirds to otters, eagles, herons, and insects), and sensitivity to their environment (water quality, water quantity, food source, habitat structure and access).

Salmonids indigenous to the State of Washington that are currently listed under ESA are provided in Table 1.1. Within each species there is Evolutionary Significant Units (ESU) or Distinct Population Segments (DPS)[2] that are defined by regional geographic extent and genetic differentiation. For example, populations that are reproductively isolated from each other such as Upper Columbia spring-run Chinook and Upper Columbia fall-run Chinook are in separate ESUs. For additional information on federally ESA listed fish species by ESU/DPS in Washington State visit:
http://wdfw.wa.gov/fish/management/esa/federally_listed_esa_fish.pdf.

[1] Salmonids include federally listed native char, commonly known as Bull Trout or Dolly Varden.
[2] For a complete definition of Evolutionary Significant Unit or Distinct Population Segment, see Appendix B, Definitions.

Table 1.1: ESA[3] Listed Pacific Salmonids in Washington State

Common/*Scientific* Name	ESU/ DPS	Federal Listing
Chinook Salmon/	Puget Sound	Threatened
Oncorhynchus tshawytscha	Upper Columbia River Spring Run	Endangered
	Snake River Fall Run	Threatened
	Lower Columbia River	Threatened
	Snake River Spring Run	Threatened
	Snake River Summer Run	Threatened
Chum Salmon/	Hood Canal Summer Run	Threatened
Oncorhynchus keta	Columbia River	Threatened
Coho Salmon/	Puget Sound/Strait of Georgia	Candidate
Oncorhynchus kisutch	Lower Columbia River	Threatened
	Southwest Washington	Candidate
Sockeye Salmon/	Ozette Lake	Threatened
Oncorhynchus nerka	Snake River	Endangered
Steelhead (Rainbow Trout)/	Middle Columbia River	Threatened
Oncorhynchus mykiss	Puget Sound	Threatened
	Snake River Basin	Threatened
	Upper Columbia River	Threatened
	Lower Columbia River	Threatened
Bull Trout/Dolly Varden/	Coastal-Puget Sound	Threatened
Salvelinus confluentus	Upper Columbia River	Threatened
	Middle Columbia River	Threatened
	Snake River	Threatened
	Touchet/Walla Walla[4]	Threatened
	Lower Columbia River	Threatened
	Olympic Peninsula	Threatened
	Northeast Washington	Threatened
Coastal Cutthroat Trout/	Southwest Washington/	Candidate
Oncorhynchus clarki clarki	Columbia River Coastal	

For salmonid populations to achieve recovery and ultimately a delisting, the ESA requires the federal government to develop recovery plans. The ESA is concerned with the extinction risk faced by an entire ESU. Therefore, NOAA-Fisheries

[3] The ESA defines "Endangered" as any species which is in danger of extinction throughout all or a significant portion of its range; "Threatened" includes any species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

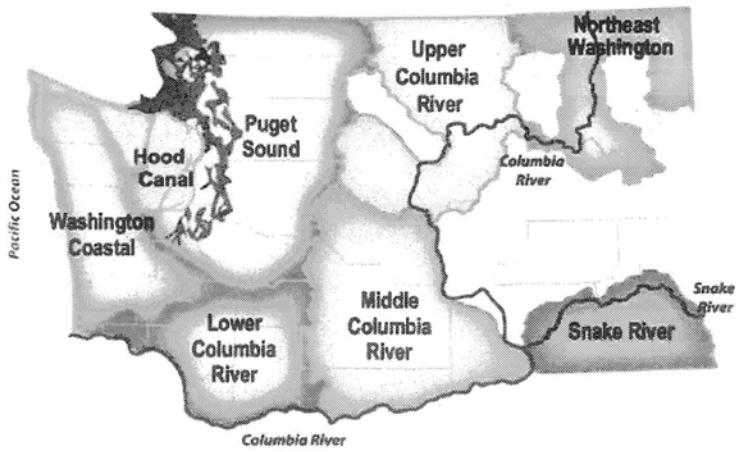
[4] Oregon Recovery Unit

(NOAA-F)[5] has determined that such recovery plans need to be prepared at an ESU scale, or regional basis. The plans are to integrate actions necessary in habitat, harvest, hatcheries, and hydropower, and gain commitments to retain and recover salmonid populations at risk of extinction (NMFS 2007). This guidance focuses on habitat because local government planning decisions influence the recovery and protection of salmonid habitat. For information on WDFW management of harvest, hatcheries and hydropower, please visit: *http://wdfw.wa.gov/fish/management/salmon_conservation/21st_css/index.html*.

1.5 Salmon Recovery Plans

In Washington State, regional recovery boards have been formed to coordinate the development and implementation of regional salmon recovery plans. Recovery plans are an important resource for local planners regarding listed

Figure 1.1: Salmon Recovery Regions in Washington State



Graphic courtesy of Governor's Salmon Recovery Office

salmonids and priority habitat recommendations in their region. Recovery plans include watershed profiles as well as lead entity strategies (*http://www.rco.wa.gov/srfb/leadentities.htm*) to guide on-the-ground

[5] The Fisheries Division of the National Oceanic and Atmospheric Administration (NOAA) has jurisdiction over anadromous fish listed under the ESA. Trout and whitefish are under the jurisdiction of the United States Fish and Wildlife Service.

restoration and acquisition projects and work plans to implement projects at the watershed scale. The regional recovery plans are available at: *http://www.governor.wa.gov/gsro/regions/recovery.asp* (links are provided to each regional recovery board below). Six regional recovery plans have been adopted by NOAA-F: Upper, Middle, and Lower Columbia River, Snake River, Puget Sound, and Hood Canal.

Washington Coastal. The Washington Coastal Salmon Recovery Region includes all Washington river basins flowing directly into the Pacific Ocean and includes all or portions of Clallam, Jefferson, Grays Harbor, Mason, Thurston, Pacific, and Lewis counties. The federally listed salmonids in this region are Lake Ozette sockeye and bull trout, both listed as threatened. More information available at: *http://www.wcssp.org*.

Puget Sound. The Puget Sound Salmon Recovery Region is the largest in the state and comprises all or part of 12 counties including Whatcom, Skagit, Island, San Juan, Snohomish, King, Pierce, Thurston, Mason, Kitsap, Jefferson, and Clallam. The Puget Sound Salmon Recovery Region includes the Puget Sound Chinook and steelhead Evolutionarily Significant Unit (ESU), identified by the NOAA Fisheries as well as Lyre/Hoko drainages (Water Resource Inventory Area 19). Puget Sound Chinook, steelhead, and bull trout are listed as threatened. More information available at: *http://www.psp.wa.gov/SR_status.php*.

Hood Canal. The Hood Canal is located within the Puget Sound Salmon Recovery Region, but has a separate salmon recovery plan for Hood Canal. It includes portions of Jefferson, Mason, Clallam, and Kitsap Counties. Puget Sound Chinook, Puget Sound steelhead, Hood Canal summer chum and bull trout are listed as threatened. More information available at: *http://hccc.wa.gov/*.

Lower Columbia River. The Lower Columbia River Salmon Recovery Region encompasses five counties in Southwest Washington. This Region includes Clark, Cowlitz, Lewis, Skamania, and Wahkiakum, and portions of Pacific and Klickitat counties. Chinook, coho, chum, steelhead, and bull trout are listed as threatened. More information available at: *http://www.lcfrb.gen.wa.us/default1.htm*.

Middle Columbia River. The Middle Columbia River Salmon Recovery Region includes salmon bearing streams in Benton, Kittitas, Yakima, and parts of Chelan

and Klickitat counties. Steelhead and bull trout are listed as threatened in this region. More information available at: *http://www.ybfwrb.org/*.

Upper Columbia River. The Upper Columbia River Salmon Recovery Region includes salmon-bearing streams in Chelan, Douglas, and Okanogan counties. Spring Chinook, steelhead and bull trout are listed as threatened. More information available at: *http://www.ucsrb.com/*.

Northeast Washington. The Northeast Washington Recovery Region includes salmon bearing streams in Ferry, Lincoln, Pend Oreille, Spokane, and Stevens counties. There is no official recovery board in this region; recovery strategies are coordinated by the Pend Oreille Lead Entity, the Kalispell Tribe (see Appendix A for information on the role of Lead Entities). Bull trout are listed as threatened. More information available at: *http://www.pocd.org/2496.html*.

Snake River. Snake River Salmon Recovery Region includes salmon-bearing streams in Walla Walla, Columbia, Garfield, Asotin, and parts of Franklin and Whitman counties. Sockeye, Chinook, steelhead and bull trout are listed as threatened. More information available at: *http://www.snakeriverboard.org/.*

1.6 Salmonid Recovery and Land Use Planning

Managing development of urban and suburban areas, industrial, residential and business uses, as well as resource lands are assumed to be the primary activities of local government land use planning programs. Because local government growth management and shoreline management plans regulate many of the land use decisions in these areas, local governments are in a unique position to influence the protection and restoration of salmonid habitat.

Areas of rapid urban growth tend to occur near water resources, such as Puget Sound or the Columbia River basin, where the terrain is easier to develop. These lowland areas provide a majority of the freshwater and marine/estuarine habitat available to salmonids. Therefore, development in these areas can result in a dramatic loss of habitat.

In order for salmonid recovery to become a reality, it is necessary that local governments adopt policies and rules specific to salmonid recovery and protection in their land use planning programs.

Agricultural and forest lands have the potential to preserve important habitat and watershed processes for salmonids, if carefully managed. But, agricultural production and forest practices can harm salmonid habitat if best management practices are not implemented. For example, agricultural production that allows animal access to waterways can result in bank erosion and nutrient loading thus harming water quality and salmonid habitat structure. Forest practices can also impact salmonid habitat in freshwater tributaries where streams can become clogged with sediment or fish are unable to access natal streams or important spawning areas due to poorly installed culverts at forest road crossings.

Voluntary restoration and protection projects are a key element of regional recovery plans, but voluntary projects alone will not be able to keep pace with development impacts, particularly given the current rate of growth that Washington is experiencing. Washington State has grown by nearly one million people in the last decade, bringing the total population to over six and a half million.[6] A growing population has altered land cover resulting in increased urbanization and a greater demand on resource lands including existing agricultural and forest lands.

Voluntary restoration and acquisition projects also demand extensive funding and coordination to purchase land, conservation easements and/or implement habitat improvements. For example, restoring a reach of shoreline to its natural function requires multiple steps to obtain funding and implement construction/restoration activities to restore salmonid habitat functions. Cumulative impacts from multiple shoreline armoring projects that removed shoreline vegetation and disrupted sediment supply to the beach likely reduced or eliminated forage fish spawning areas (an important prey species) and vegetative shading, food supply and cover (Envirovision et al. 2007). Steps necessary to achieve a restored condition could include the purchase of properties in whole or in part, deconstruction and removal of bulkhead materials and associated fill stabilizing the site by replanting native vegetation, and restoring natural beach grade by adding sediment and large wood. Furthermore, it may take several years to achieve full function after initial restoration actions are implemented. Thus it is less costly to protect sensitive areas than it is to repair them once damaged (May et al. 1996).

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[6] Washington State Office of Financial Management, 2008 Population Trends. http://www.ofm.wa.gov/forecasting/key2pop.asp.

The recommendations in this guidance are intended to support voluntary and incentive-based approaches to land use planning for salmonids, as well as to assist local governments with meeting planning and salmon recovery laws. As stated earlier, land use decisions made by local governments significantly influence salmonid habitat. Comprehensive planning programs provide an opportunity to prioritize critical salmonid habitat areas and designate appropriate land uses consistent with recovery plan priorities. Local permitting programs under the zoning ordinance, critical areas ordinance and shoreline master program provide an opportunity to regulate development to protect critical salmonid habitat. Incentive programs, such as transfer of development rights or open space tax programs provide an opportunity to protect sensitive salmonid habitat from development. Recommendations addressing all of these aspects of local planning are provided in the guidance.

CHAPTER TWO
PACIFIC SALMONIDS AND LAND USE

2.1 Salmonid Ecosystem Interactions

The ecological impacts of salmonids are far-reaching. These organisms have variable life stages that connect them to the ecology of many aquatic and terrestrial consumers. They have an indirect relationship to the entire food web and play a crucial role in supporting overall ecosystem health (Cederholm et al. 2000). Over 137 species of birds, mammals, amphibians and reptiles use salmonids for one or more stages of their life, preying on eggs, juvenile and adult salmonids (Cederholm et al. 2000). Many species also feed on salmonid carcasses, including terrestrial and aquatic insects, which then become food for young salmon (Gende et al. 2002).

Salmonid influence on watershed processes also includes biofeedback. Carcasses decomposing in a riparian system fertilize soils and promote faster growing trees around streams and lakes (Fresh 2006). Increasing vegetative production provides more trees for large woody debris recruitment which in turn provides cover, spawning, and rearing habitat for salmon.

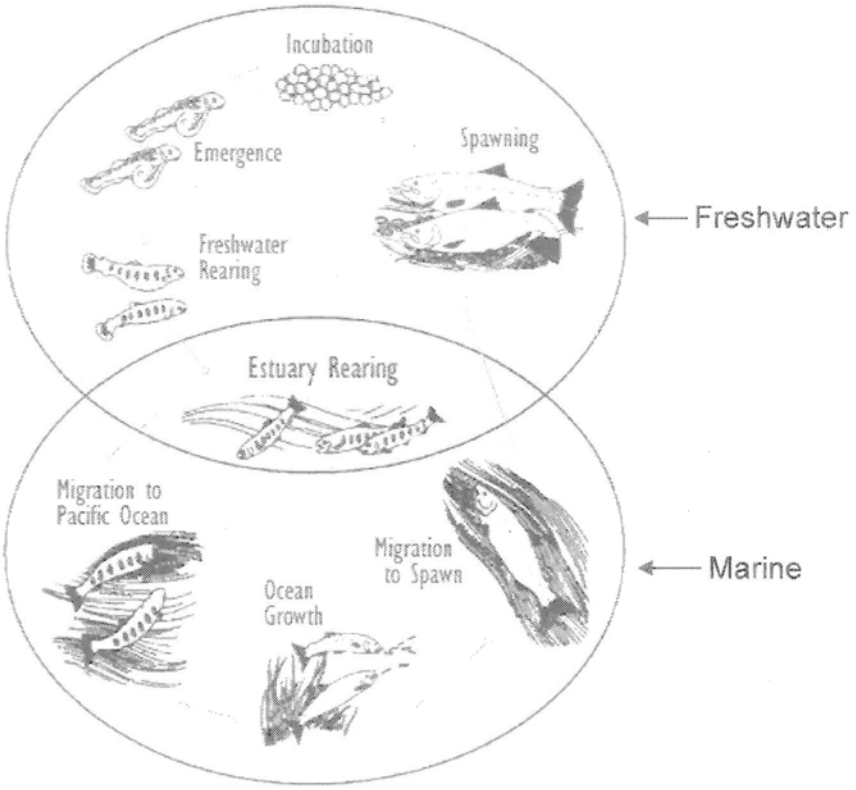
Because of their contribution to the productivity of the entire watershed, salmonids are considered a "keystone species" (Quinn 2005). A keystone species is extremely important because it plays a critical role in ecosystem health, having a disproportionate influence on other species (Kauffman et al. 2001). It is unknown how far the impacts of losing salmonids in watersheds would go, but it is likely there would be far-reaching impacts on all natural resources.

2.2 Anadromous Fish Life Stages and Habitat

Salmonids are also considered an umbrella species because they require large blocks of relatively natural or unaltered habitat to maintain viable populations in freshwater and saltwater environments throughout their life. The life stages of anadromous salmonids are shown in Figure 2.1. The stages include spawning and egg incubation, freshwater rearing, seaward migration, open ocean rearing, return migration to freshwater to spawn and the deposition of marine derived nutrients into the freshwater ecosystem (Cederholm et al. 2000). Survival of

anadromous salmonids depends upon their ability to occupy and move among freshwater, nearshore and open ocean habitats (Fresh 2006).

FIGURE 2.1 Anadromous Fish Life Stages



Graphic courtesy of Washington Department of Fish and Wildlife

Salmonids have evolved with diverse life history trajectories allowing them to exploit interannual variation in conditions. For example, within the same river system Chinook salmon juveniles may migrate directly to sea as fry, migrate to the delta and rear for months before moving to sea, migrate to the nearshore but move into subestuaries for rearing, or remain in the river system for months before migration to sea (Fresh 2006). Therefore, it is important to retain healthy habitat in a variety of habitats to allow exploitation of a variety of different life history trajectories and spatial structure (McElhany et al. 2000). Following is an overview of salmonid life stages.

2.2.1 Freshwater Spawning. Spawning and egg incubation occurs in freshwater where females construct a nest, or redd. Redd site selection is influenced by physical variables, such as stream depth, velocity, and substrate size (sand, gravel, etc.). The shallow downstream ends of pools leading to riffles contain loose gravels the product of size-dependent sediment transport and deposition following erosion upstream. Female salmonids use their tail to clean away sand and silt before depositing eggs into excavated pits (Cederholm et al. 2000). The eggs are fertilized by one or more males before the female covers them with more gravel. Habitat structure such as large woody debris found in many streams increases the habitat complexity by creating areas with different depths, velocities, substrate types and amounts of cover, and adds stability to the redd during winter floods . In general, spawning salmonids avoid the slowest water with fine sand and silt; avoid the fastest water; and prefer water about 30-60 cm deep, flowing about 30-100 cm per second over coarse sand and small to medium gravel (2-10 cm in diameter). These conditions allow a high flow of oxygenated water through the interstitial spaces in the streambed, bringing cool, well-oxygenated water to the redd and carrying away metabolic waste (Quinn 2005). If temperature and flow conditions are suitable, the eggs will hatch as alevin in 19-150 days. Alevin initially stay inside the redd substrate and require the same habitat functions, cool temperatures and flow to provide well-oxygenated water and carry away metabolic waste. Mortality of eggs and alevin in redds is often associated with suffocation from excessive silt, heat stress from elevated temperature regimes (particularly in spring and early summer), and excavation of the redd during winter storms (Bjornn and Reiser 1991).

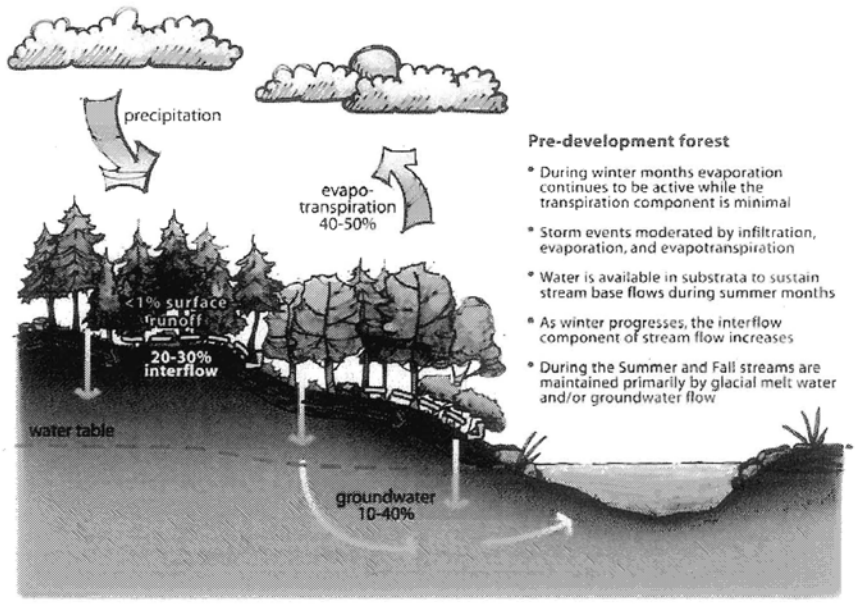
Photo 2: Coho Salmon Spawning

2.2.2 Freshwater Rearing. Freshwater rearing continues as the fish develops from an alevin to a fry. At this stage they feed on a variety of aquatic and terrestrial insects[7] and often seek refuge in low-velocity areas such as side

[7] Larger juvenile salmonid (parr) may supplement their macroinvertebrate diet with occasional salmonid eggs or fry (Cederholm et al. 2000).

channels, oxbows, floodplain wetlands (NMFS 2008), in pools below riffles, behind large woody debris or boulders, undercut banks, or on the margins of streams. Large woody debris or boulders create local variations in flow because water speeds up adjacent to the obstacle and the water is slowed on the leeward side creating pools. These in-stream features allow juvenile cutthroat trout, steelhead and larger salmon to occupy low velocity locations in the channel to conserve energy while feeding from the relatively higher velocity areas carrying food. Likewise, off-channel areas provide energy-efficient territories for rearing salmonids, especially coho, with good winter feeding conditions and a place to avoid high flows and turbidity of main rivers (Cederholm et al. 2000).

Figure 2.2 Natural Hydrologic Regime



Graphic courtesy of AHBL, from the LID Technical Guidance Manual for Puget Sound, 2005, Puget Sound Partnership and Washington State University Extension.

The mix of in-channel and hydraulic features that shape freshwater rearing habitat extends beyond the waterway. Upland areas provide key habitat in the freshwater environment as natural terrestrial vegetation provides food source (insects), cover and large woody debris recruitment. Upland native vegetation also contributes to erosion control and temperature control and filters pollutants and sediment that run off impervious surfaces (see Figure 2.2).

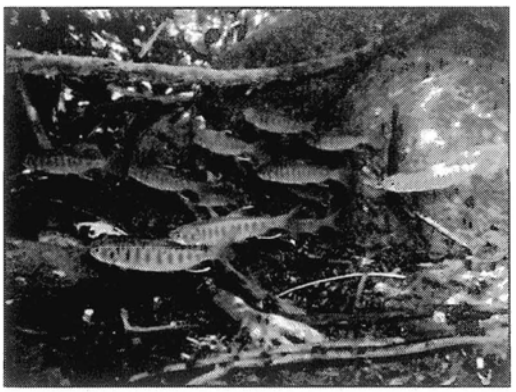
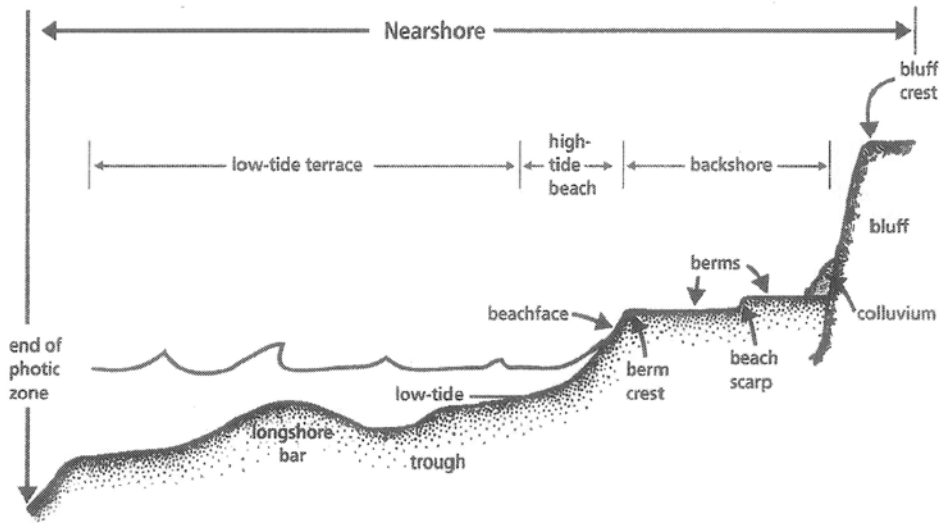


Photo 3: Coho Freshwater Rearing

2.2.3 Nearshore: Marine and Estuarine Habitat. The physical, chemical, and biological processes that create nearshore habitats are critical to salmonids survival (Fresh 2006). Figure 2.3 shows the nearshore zone, which includes the photic zone, the maximum depth offshore where sunlight is sufficient to support

Figure 2.3 Nearshore Zone

Cross-section of a beach with terminology used in the Puget Sound area



Graphic courtesy of Johannessen and MacLennan 2007 modified from Komar 1976

plant growth, as well as the shoreline and upland and backshore areas that directly influence shoreline conditions (Envirovision et al. 2007). Nearshore areas that are not significantly affected by freshwater inputs are considered nearshore "marine" habitats (Buchanan et al. 2001) and the nearshore also extends upstream to estuaries and bays where freshwater and marine waters converge (Envirovision et al. 2007).

Commonly, within a year or two, all anadromous salmonids migrate downstream to estuaries. The amount of time spent in the transition zone of estuaries varies. Estuaries provide important feeding areas (due to food abundance and diversity), refuge from predators, and a place for growth before entering the ocean (Simenstad et al. 1982; Cederholm et al. 2000). Species such as Chinook, pink and chum rely heavily on the estuary for foraging, growth, and physiological transition between freshwater and saltwater (smolting), while others may reside in the estuary and feed and head back up the stream for another season (Cederholm et al. 2000).

Photo 4: Natural Shoreline Habitat

After migrating through their natal estuaries and deltas, juvenile salmonids forage for food in nearshore marine habitats on their way to the open ocean. Within the Puget Sound, exposed, cobble, or gravel beaches appear to be preferred nearshore marine habitats for salmonids (Simenstad et al. 1982). Nearshore food webs support abundant prey types especially important to juvenile salmonids including a wide variety of aquatic and terrestrial invertebrates, and forage fish including herring, sandlance, surf smelt, and anchovy. All marine and estuarine nearshore habitats are occupied by forage fish (Pentilla 2007).

Near marine shorelines, juvenile salmonids seek refuge from predators in eelgrass and macroalgae (kelp and marine alga) (Williams and Thom 2001; EnviroVision et al. 2007). Other nearshore features that may reduce predation on juvenile salmonids include high levels of turbidity, presence of shallow water habitat, and abundant and diverse prey resources that sustain high growth rates

and allow juvenile salmonids to rapidly outgrow many of their predators (Fresh 2006).

Upland vegetation provides similar habitat functions in the nearshore environment as in freshwater riparian areas (Brennan and Culverwell 2004). Shoreline terrestrial vegetation provides food source (insects), cover and input of large woody debris and filters pollutants and sedimentation from impervious surface runoff. All these habitat components of the nearshore support a gradual transition between estuarine and marine waters which is an energy intensive process for salmonids.

2.2.4 Ocean Residence. Salmonids may spend between one to five years and travel great distances in the Pacific Ocean before returning to their natal streams to spawn as adults. The amount of time spent in the ocean and the migration patterns vary among and within species. For example, anadromous salmonids will always migrate to the ocean and return to spawn before dying, whereas the resident phenotype of *Oncorhynchus mykiss* (rainbow trout) does not migrate to the ocean. In addition, both steelhead and rainbow trout can spawn multiple times in a lifetime (Cederholm et al. 2000).

Chum and pink salmon migrate seaward shortly following emergence from the gravel, going directly to the estuaries and the ocean, spending very little time in freshwater, whereas some races of stream-type Chinook and almost all coho salmon may remain in freshwater for at least one or two years before smolting and migrating seaward (Simenstad et al. 1982). Sockeye salmon rear almost exclusively in lakes as juveniles and may remain for one or two years before smolting and steelhead often remain for at least two years and sometimes as many as five to seven years before migrating seaward.

Once salmonids reach the open ocean they forage opportunistically on a diverse assemblage of marine organisms (Cederholm et al. 2000). However, ocean habitat components are beyond the scope of this guidance document.

2.2.5 Return Migration. After one to five years, salmonids are prompted to return to freshwater environments to spawn by internal physiological changes, temperature changes, length of day, and barometric pressure, among other

Photo 5: Chum Return Migration

environmental triggers (Quinn 2005). Adult salmonids find their way back to their natal streams for spawning using olfactory cues imparted by chemical odors emanating from individual watersheds and tributaries (Bjornn and Reiser 1991; Quinn 2005). The return migration requires a reverse transition from saline to freshwater environments which again occurs in estuarine nearshore environments. If natal stream habitat has been degraded in the time these fish have been away in the open ocean, spawning success may be impaired or eliminated.

2.3 Habitat Functions

Although the habitat requirements of each species of anadromous salmonid differ somewhat, all share some common habitat needs to support life stage development (Spence et al. 1996). Common habitat functions include:

- a stable incubation environment (flow regime/water quantity),
- cool, well-oxygenated, unpolluted water (water quality),
- cover (habitat structure),
- sufficient sources of prey (food source), and
- unimpeded access to off-channel areas and saline waters (access).

2.3.1 Flow Regime (Water Quantity). Flow patterns affect salmonid survival due to the close inter-relationship between the fish and its stream (May et al. 1996; Spence et al. 1996). The amount, location and timing of water flow is a product of (1) climate (how much water falls when and whether it is frozen or liquid), (2) gravity acting on water, and (3) resistance from rock, soil, vegetation, and surfaces modified by humans. Not all water flows in channels as streams or rivers; some water seeps into the soil and becomes groundwater. Groundwater may later intersect a channel and provide the vast majority of stream flow in dry seasons.

The amount of flow determines the depth and velocity distribution in a channel; velocity will vary from place to place in a channel even with a constant flow.

Varied depth and velocities are favorable for salmonid habitat, but very high and very low flows can pose a risk to developing eggs, depending on the magnitude relative to the flows at the time of spawning (May et al. 1996; Spence et al. 1996). In a healthy riparian system, natural flood and drought events establish habitat processes such as erosion or sediment input which provide new sediments for spawning and incubation, but does not overwhelm the system.

Land use strongly interacts with water use to affect how much water and velocity is delivered to yield good habitat in streams. Stormwater runoff is an example of how land use practices can alter natural flow patterns. Excessive flow scours fish habitat (especially spawning habitat), delivers pollutants and pathogens, and brings excess nutrients to surface waters during wet weather (May et al. 1996). Increased flows can fill up spaces between rocks with fine sediment, resulting in decreased oxygen and concentrated waste. Stormwater runoff can also create decreased flows when rain that is routed to streams from impervious surfaces is not routed through groundwater, which can result in low or dry stream reaches and lethal temperature regimes during summer months.

In addition, water allocations for hydropower, irrigation, or municipal/industrial diversion alterations can harm salmonids by changing the amount and type of in-stream flow. For example, peaks in electricity demand influence the timing and volume of hydrosystem releases which can lead to the stranding of adults, juveniles and redds (Spence et al. 1996).

2.3.2 Water Quality (Temperature and Chemistry). Water quality includes temperature, dissolved oxygen, and other dissolved and suspended substances. The most common water quality concerns for salmonid-associated aquatic communities are adequate dissolved oxygen concentration, temperature, pH, and avoidance of contaminants.

Stream temperatures influence egg incubation timing, growth and development, disease susceptibility, movement timing, and survival. The State of Washington Department of Ecology gathered continuous temperature data from a variety of sources and found that in general, during non-spawning and non-incubating times, the temperature should be less than 16-17.5°C (~60-63.5°F) and spawning temperatures should be less than 12.5-14°C (~54.5-57°F) (Hicks 2000). In freshwater temperatures at or above these temperature ranges, salmonids

become lethargic, prone to diseases, lose competitive interactions to other fishes, and become more susceptible to predation (Bjornn and Reiser 1991).

Photo 6: Bull Trout in Clean Freshwater

Water temperature is affected by air temperature, flow regime, riparian vegetation (shade), turbidity, groundwater-surface water interactions, channel complexity, water diversions, substrate composition, the presence of headwater wetlands and lakes, and reservoir releases (May 2003). Many of these conditions and associated impacts are affected by land development practices.

Freshwater temperatures also influence water chemistry. Cool, well-oxygenated water is essential for salmonid survival. Natural streams generally contain an abundant supply of dissolved oxygen (DO) (May 2003). Warmer temperatures increase the metabolic demand for oxygen while the capacity of freshwater to hold oxygen decreases (Quinn 2005). The concentration of DO must be above a critical level (commonly 3 ppm) for salmonids to exist in freshwater streams (Bjornn and Reiser 1991). Embryo dependence on DO peaks just before hatching. Alevins prefer high concentrations of DO and reduced concentrations can adversely affect the swimming performance of salmonids during return migration. Also important to consider is relative water volume; a small polluted stream entering a large river is quickly diluted, perhaps to a level of minimal (although potentially cumulative) impact. The same polluted stream entering a small stream may be devastating to fish and human use.

Photo 7: In-stream Habitat Structure

2.3.3 Habitat Structure. In-stream salmonid habitat includes structures such as boulders and large woody debris that create critical functions such as pools and riffles in streams, and cover from predators in freshwater, estuarine and nearshore environments. Large woody debris (LWD) and boulders dissipate the flow of energy, protect streambanks, stabilize streambeds, store sediments including trapping spawning gravel, and provide natural in-stream cover from predators and habitat diversity for salmonids (Bisson et al. 1987; Crispin et al. 1993; May et al. 1996). Deep areas of pools provide living, holding and hiding space for adult and juvenile fish and can influence the distribution and abundance of juvenile salmonids in streams (Beechie and Sibley 1997; Johnson et al. 2005). LWD also provides surface area on which primary and secondary production occur, providing food for salmonids. Maintaining sufficiently broad riparian zones that allow natural channel migration, flooding and habitat forming processes will ensure trees are available for recruitment to the stream to support salmonid rearing as well as providing resting areas for salmonids as they migrate upstream to spawn (Spence et al. 1996).

2.3.4 Food (Energy) Source. To support life stage development, salmonids require sufficient energy to meet their basic metabolic needs (Spence et al. 1996). In freshwater environments, juvenile salmonids feed on macroinvertebrate stream drift from both in-stream and terrestrial sources. In freshwater and marine systems, as much as 50% of the food resources for salmonids are derived from terrestrial insects falling into the stream or nearshore environment (Brennan et al. 2004).

As salmonids mature and enter nearshore environments, they begin to feed on smaller fish as well as invertebrates. In marine and estuarine areas larger salmonids feed on forage fish, such as sand lance, surf smelt and herring (Envirovision et al. 2007).

2.3.5 Access. Access refers to the return migration of adult salmonids returning to spawn in their native channels. Interference with migration can lead to

reproductive failure and population decline. Migrating upstream demands a great deal of energy and fish need unimpeded access to suitable spawning and rearing habitats. Fish passage barriers, such as improperly designed or maintained culverts, can result in complete barriers blocking all fish migration, temporal barriers delaying access can result in mortality before spawning, and partial barriers that block juvenile or weaker salmonids within a species can reduce genetic diversity (Wofford et al. 2005).

Photo 8: Cutthroat Migrating Upstream

2.4 Land Use and Potential Habitat Impacts

Land use such as urban and rural growth, agricultural production and forest practices can have detrimental impacts on salmonid habitat functions and therefore salmonid survival. However, land use planning can avoid and minimize many of these impacts when policies and regulations integrate salmon recovery plan priorities and include management practices designed to protect and restore salmonid habitat. Management and protection of salmonid habitat includes a special emphasis on stormwater, riparian areas, wetlands, in-stream habitat including large woody debris, floodplains, channel migration, landslide hazard areas, and water quality.

2.4.1 Urban and Rural Growth. Development in rural and urban areas is often located in low-gradient areas within a watershed where riparian systems converge. Urban growth in these riparian environments can alter land surface, soil, vegetation and hydrology by increasing the area of impervious surface. Impervious surface area is strongly correlated with adverse impacts on stream conditions including extensive changes in basin hydrology, channel morphology, and physio-chemical water quality (May et al. 1996; Booth 2000; R2 Resource Consultants et al. 2000). Likewise, loss of forest cover can result in changes to high and low flow

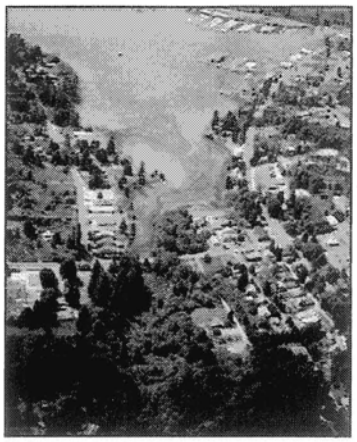


Photo 9: Shoreline Development

frequencies and magnitudes (Chamberlin et al. 1991; Beschta et al. 2000; Grant et al. 2008).

Implementing land use planning for salmon, steelhead and trout can avoid many impacts associated with urban and rural growth by maintaining estuarine, wetland and riparian habitats, and adjacent upland habitats, among others. For example, limiting impervious surface in the watershed and locating development away from riparian systems (using native vegetation buffers) would improve salmonid habitat function and hence survival (May 2003; May 2009). Impervious surface limits and recommendations are discussed in greater detail in Chapter Three (section 3.2.2 stormwater runoff management and section 3.3.1 comprehensive planning).

2.4.2 Agricultural Use.[8] The cultivation of land for agricultural production is also commonly located in low-gradient areas, such as floodplains or coastal estuaries (Kauffman et al. 2001). One of the potential impacts of agricultural production on salmonid habitat functions include the removal of streamside vegetation from excessive livestock grazing resulting in elevated water temperatures and increased fine sediment. Additionally, manure storage and treatment can reduce dissolved oxygen concentrations. These effects

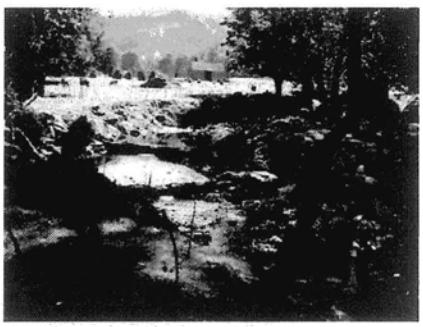


Photo 10: Stream Adjacent to Agricultural Use

[8] In 2007, the Washington State Legislature passed Senate Bill 5248, prohibiting counties and cities from amending or adopting new critical areas ordinance provisions for agricultural activities until July 1, 2010. The law did not change requirements pertaining to critical areas not associated with agricultural activities "nor limit the ability of a county or city to adopt or employ voluntary measures or programs to protect or enhance critical areas associated with agricultural activities." (Senate Final Bill Report SSB 5248) As of the date of publication of this document, the William D. Ruckelshaus Center is facilitating a stakeholder group working on alternative approaches to address potential impacts of agriculture on critical areas. Nothing in this guidance document is intended, therefore, to suggest new critical areas regulations for agriculture. Incentive-based programs and best management practices for agriculture are discussed in section 3.3.7. Under the Shoreline Management Act, new agricultural activities and uses on *non*-agricultural lands can be addressed, but SMPs "shall not require modification of or limit agricultural activities occurring on agricultural lands. In jurisdictions where agricultural activities occur, master programs shall include provisions addressing new agricultural activities on land not meeting the definition of agricultural land, conversion of agricultural lands to other uses, and other development on agricultural land that does not meet the definition of agricultural activities." WAC 173-26-241

are more pronounced in smaller streams. Riparian functions may be further impacted by chemical and nutrient fertilizers, pesticides, and fine sediments from farm runoff (Spence et al. 1996). In some cases, dike construction, stream relocation, and tide gate installation have restricted access to historically important in-stream and off-channel habitats.

Retaining vegetation along waterways through agricultural areas improves water quality by increasing shade, filtering solutes and suspended particles and decreasing bank erosion and manure impacts. Vegetated areas also contribute to salmonid food source by providing leaf litter and insect recruitment as well as habitat structure through large wood recruitment.

Another form of agriculture that can impact salmonid habitat is aquaculture. Aquaculture includes the farming of food fish, shellfish, and other aquatic plants and animals in fresh water, brackish water or salt water areas. Aquaculture activities such as planting and harvesting of shellfish can impact salmonids in marine intertidal waters where eelgrass beds (a critical habitat for juvenile salmonids) may be reduced or damaged (Mumford 2007). Net pen operations in marine waters can increase disease and parasite transmissions to wild salmon and steelhead (Rosenberg 2008). Management of aquaculture in an ecological context is an emerging issue and guidance to mitigate habitat impacts is not complete. Therefore, aquaculture policy and regulatory recommendations are not included in this document.

2.4.3 Forest Practices. Forest practices can impact salmonid habitat functions when forest activities, such as road building, impede fish passage and extensive clearing associated with timber harvest removes vegetation and compacts soil. This influences water flows and can result in erosion and sedimentation, introducing fine particles into streams. Fine particles can clog spawning substrates, inhibiting the interchange of oxygenated water and cause egg suffocation and juvenile entombment (Everest et al. 1987; NRC 1996). The removal of downed woody debris also takes away natural damming debris from the forest floor (Knutson and Naef, 1997).

Photo 11: Logged Wetland

The removal of timber in upland areas can influence salmonid habitat even in areas with non-fish bearing streams. Removing vegetation exposes upland riparian areas to direct sunlight thereby increasing water temperatures (Chamberlin et al. 1991). Water is warmed when flowing over the surface of warmer land and unbuffered tributaries and eventually reaches fish-bearing streams at lower elevations.

The Forest and Fish Law (Chapter 76.09 RCW) was created to address habitat impacts associated with commercial timber harvest, however, non-commercial timber removal and conversion of forest lands to developed lands are regulated by local governments. Land use planning for salmon, steelhead and trout should include protection and management of terrestrial and aquatic areas to avoid forest practices related activities (such as road building) and land conversions.

2.4.4 Habitat Impacts Associated with Land Use. Table 2.1 includes a list of potential development actions related to urban and rural growth (R2 Resource Consultants et al. 2000), the habitat function potentially impacted (May et al. 1996) and the potential planning tool that if implemented, would promote the protection of existing salmonid habitat functions. Chapter Three contains further discussion of planning tools to maintain habitat functions. A reference to indicate corresponding management recommendations is indicated using parentheses in column three (e.g., 3.2.1, etc.)

Table 2.1: Planning tools to manage development impacts on salmonid habitat

Development Action	Potential Impact on Salmonid Habitat Function	Potential Planning Tool to Manage Development Impacts
River channel clearing and channelization (stream bank alterations)	Water quality, flow regime, habitat structure, access	Channel Migration Zone protection (3.2.9), riparian buffers and vegetation retention (3.2.3),[9] floodplain protection (3.2.8), large woody debris recruitment (3.2.6), in-stream work standards (3.2.7), clearing and grading standards (3.3.4)
Loss of riparian vegetation	Water quality, flow regime, habitat structure, food source	Riparian buffers and vegetation retention (3.2.3), building setbacks (3.3.5), stormwater management (3.2.2), LID practices (3.2.2), clearing and grading standards (3.3.4), LWD recruitment standards (3.2.6), habitat restoration projects (3.2.1), incentives to protect habitat (3.3.10)
Loss of forested areas	Water quality, flow regime, access, habitat structure	Forest land conversion regulations (3.3.8), riparian buffers and riparian vegetation retention on all streams (3.2.3), LWD recruitment standards (3.2.6), incentives to protect habitat (3.3.10), zoning regulations (3.3.2)
Loss of farmland	Flow regime, access, habitat structure	Zoning regulations (3.3.2), incentive programs to retain working farmland that follow best management practices (e.g., purchase or transfer of development rights, voluntary restoration programs) (3.3.7; 3.3.10).

[9] Restoration projects that provide a net benefit to habitat functions are allowed in buffers. Buffers are intended to prohibit development and vegetation clearing in the riparian buffer.

Table 2.1: Planning tools continued

Development Action	Potential Impact on Salmonid Habitat Function	Potential Planning Tool to Manage Development Impacts
Loss of wetlands	Water quality, flow regime, habitat structure, food source	Wetland buffers and development standards (e.g., no-fill) (3.2.5), building setbacks (3.3.5), clearing and grading standards (3.3.4), incentives to protect habitat (3.3.10).
Loss of estuarine and nearshore areas	Water quality, habitat structure, food source, access	Shoreline development standards/ riparian buffers and vegetation retention (3.2.3; 3.2.4), building setbacks (3.3.5), floodplain protection (3.2.8), incentives to protect habitat (3.3.10).
Bulkhead and overwater structures	Water quality, flow regime, habitat structure, food source	Shoreline development standards/ riparian buffers and vegetation retention (3.2.3; 3.2.4), building setbacks (3.3.5), floodplain protection (3.2.8).
Upland clearing and grading	Water quality, flow regime, habitat structure, food source, access	Zoning regulations (3.3.2), Channel Migration Zone protection (3.2.9), Landslide Hazard Area protection (3.2.10), riparian buffers and vegetation retention (3.2.3), floodplain protection (3.2.8), clearing and grading standards (3.3.4).
Fish passage barriers	Flow regime, habitat structure, access	Road standards (3.3.6), non-commercial forest practices (3.3.8).
Water allocations/ stormwater runoff	Water quality, flow regime	Stormwater management (3.2.2), LID practices (3.2.2), water quality standards (3.2.11).
Industrial effluent	Water quality	Zoning regulations (3.3.2), water quality standards (3.2.11).

CHAPTER THREE
PLANNING FOR SALMON, STEELHEAD AND TROUT

3.1 SMA/GMA and Salmonid Recovery

With approximately fifty-four percent of uplands in Washington State in private ownership (IAC 2001) and mostly under the planning authority of local governments, the land use decisions of landowners and local governments influence salmonid survival to a great extent. Two laws that are most influential to governing salmonid habitat at the local level are the Shoreline Management Act (SMA) and Growth Management Act (GMA). Under both of these statutes, local governments are required to develop planning policies and regulations that protect anadromous fish resources.

3.1.1 Shoreline Management Act. The Shoreline Management Act (Chapter 90.58 RCW), or SMA, requires all local governments in Washington State to adopt Shoreline Master Programs (SMPs) that contain policies and regulations that will ensure no net loss of shoreline ecological functions. The SMA establishes a balance of authority between local and state government. Cities and counties are the primary regulators, but the state (through the State of Washington Department of Ecology) has approval authority of local master programs and some permit decisions (variances and conditional use permits). Shoreline areas affected include marine waters, streams with a mean annual flow greater than 20 cubic feet per second, water areas of the state greater than 20 acres, land extending 200 feet landward of the ordinary high water mark and associated wetlands, river deltas and some or all of the 100-year floodplain.

Protecting "the land and its vegetation and wildlife, and the waters of the state and their aquatic life" is a fundamental policy goal of the SMA. As stated in the Legislative findings of the Act:

> *RCW 90.58.020 (Excerpts) ...It is the policy of the state to provide for the management of the shorelines of the state by planning for and fostering all reasonable and appropriate uses. .... This policy contemplates protecting against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the state and their aquatic life, while*

> *protecting generally public rights of navigation and corollary rights incidental thereto....*
>
> *In the implementation of this policy the public's opportunity to enjoy the physical and aesthetic qualities of natural shorelines of the state shall be preserved to the greatest extent feasible consistent with the overall best interest of the state and the people generally. To this end uses shall be preferred which are consistent with control of pollution and prevention of damage to the natural environment, or are unique to or dependent upon use of the state's shoreline. ...*
>
> *Permitted uses in the shorelines of the state shall be designed and conducted in a manner to minimize, insofar as practical, any resultant damage to the ecology and environment of the shoreline area and any interference with the public's use of the water.*

SMPs are, at a minimum, to achieve no net loss of ecological functions necessary to sustain shoreline natural resources and to plan for restoration of ecological functions where they have been impaired (WAC 173-26-201(2)(c)). The SMP guidelines (WAC 173-26) point to ecosystem connections among freshwater, marine and terrestrial shoreline environments that support anadromous fish life cycles. Every SMP is based on local conditions and includes an inventory and characterization of shoreline areas, environment designations, shoreline goals, policies and regulations, a cumulative impacts analysis, and a shoreline restoration plan.

When preparing and amending an SMP, there are opportunities to give special consideration to protect salmonid habitat functions in several phases of the program. In the *Inventory and Characterization of Shoreline Areas,* each jurisdiction is required to prepare an analysis of relevant shoreline issues of concern including "fish and wildlife conservation areas"; anadromous fish habitat is a fish and wildlife conservation area of concern. *Environment Designations* are based on the existing pattern of use, the biological and physical character of the shoreline, and the goals and aspirations of the community as expressed through comprehensive plans as well as SMP criteria. The SMP Guidelines recommend six basic environment designations (WAC 173-26-211). Environment designations most appropriately assigned to critical salmonid habitat are "natural," "conservancy," "urban-conservancy," and "aquatic".

Data from the shoreline inventory, which ideally incorporates information from local salmon recovery plans, nearshore and watershed analyses, and priority habitats and species data, can help determine where these areas are located. Examples of such areas might include spawning beds (e.g., forage fish spawning beaches, intact kelp and eelgrass beds) and areas of high quality, intact native vegetation identified in a habitat assessment or recovery plan as key to supporting listed populations. Because environment designations inform development regulations, assigning appropriate environment designations to these habitat areas can help protect the remaining highest quality salmonid habitat areas.

SMP documents also include a *Restoration Plan* to achieve overall improvements in shoreline ecological functions over time. Restoration plans influence salmonid recovery because each considers and addresses existing restoration projects, identifies degraded areas, prioritizes future restoration projects and provides monitoring strategies to ensure restoration projects and programs will be implemented consistent with the plan. SMP Restoration Plans should be closely linked with existing salmonid recovery efforts, including habitat limiting factors analysis, salmon recovery plans, lead entity strategies and associated multi-year work plans and watershed management plans.[10] More information on coordination with salmonid recovery programs is provided in Appendix A.

Finally, SMPs are to establish *Shoreline Policies and Regulations* that apply to shoreline modifications and uses. Shoreline rules are to be at least as protective as the jurisdictions critical areas ordinance (discussed further in the GMA section) and assure that development does not result in a net loss of ecological functions[11]. Because shoreline regulations are to be based on scientific and

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[10] The Watershed Planning Act was enacted by the Washington State Legislature in 1998. The act encourages local governments to develop watershed plans using collaborative processes. The plans are based on water resource inventory areas (WRIAs). The Department of Ecology provides funding for and reviews watershed management plans. Watershed management plans address four main items, water availability, water quality, fish habitat, and in-stream flows. These plans include specific recommended actions linked to land use planning and coordination with salmon recovery plans.

[11] The State of Washington Departments of Ecology and Commerce have published interim guidance on determining shoreline jurisdiction and integration with critical areas designated under GMA (*http://www.ecy.wa.gov/programs/sea/sma/st_guide/SMP/index.html*). WDFW encourages local governments to consider RCW 90.58.030, which allows land necessary for buffers for critical areas that

technical information[12] permitted development can be assessed at an ecosystem scale rather than site-specific scale. If implemented, this will result in better protection of salmonid habitat by considering ecosystem-wide processes in land use decisions.

The SMP establishes a framework for protecting critical shoreline areas in the State of Washington. To further protect salmonids, the environment designation informs policies and provisions for regulating development, the inventory and characterization can be referenced to assess cumulative impacts to ecological functions, and the restoration plan can be referenced to determine consistency with recovery priorities and inform habitat mitigation. For example, if local salmonid recovery goals are integrated into the goals of the restoration plan, then linking mitigation to opportunities identified in the restoration plan will not only mitigate site-specific project impacts, but move overall recovery forward. Port Townsend's restoration plan lists a number of groups (including the Hood Canal Coordinating Council) and programs as resources for achieving restoration goals. The plan states:

> *"...the City's SMP represents an important vehicle for facilitating and encouraging restoration projects and programs that could be led by private and/or non-profit entities...*
>
> *When shoreline development occurs, the City should look for opportunities to conduct restoration in addition to minimum mitigation requirements. Development may present timing opportunities for restoration that would not otherwise occur and may not be available in the future." Section 14.9, Port Townsend SMP.*

3.1.2 Growth Management Act. In 1990 the Legislature found that "uncoordinated and unplanned growth, together with a lack of common goals... pose a threat to the environment, sustainable economic development, and the

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occur within shorelines of the state to be included in the SMP. Including these buffers will help to ensure consistent regulation of activities across the critical area.

[12] The scientific standards for SMPs, which is "the most current, accurate and complete scientific or technical information available" [excerpt from WAC 173-26-201(2a)], differs somewhat from the Best Available Science rule RCW 36.70A.172 for critical areas ordinances. However, the same sources of scientific and technical information are useful to both SMP and CAO provisions regarding anadromous fish.

health, safety, and high quality of life enjoyed by residents of this state. It is in the public interest that citizens, communities, local governments, and the private sector cooperate and coordinate with one another in comprehensive land use planning." This is the foundation for the Washington State Growth Management Act (Chapter 36.70A RCW), or GMA.

Several planning goals (RCW 36.70A.020) adopted in the Act influence salmonid recovery and protection:

> *Goal 8: Natural resource industries. Maintain and enhance natural resource-based industries, including productive timber, agricultural, and fisheries industries. Encourage the conservation of productive forest lands and productive agricultural lands, and discourage incompatible uses.*
>
> *Goal 9: Open space and recreation. Retain open space, enhance recreational opportunities, conserve fish and wildlife habitat, increase access to natural resource lands and water, and develop parks and recreational facilities.*
>
> *Goal 10: Environment. Protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water.*

Local governments must consider these goals in relation to other important GMA goals for providing efficient transportation, economic development, housing, and respecting property rights, among others. This document focuses on opportunities to implement GMA goals and requirements related to salmonid protection and recovery. However, recommendations are provided with understanding about the sometimes competing priorities local governments face when implementing GMA requirements. Within this challenging framework, most counties and cities in Washington are required to implement specific aspects of the GMA. They must agree on county-wide planning policies to guide regional issues such as urban growth areas, public facilities, economic development, and affordable housing. They must adopt comprehensive plans to provide the framework and policy direction for land use decisions made within the local jurisdiction. Finally, they must adopt development regulations that carry out their comprehensive plans.

Although not all jurisdictions must plan fully under GMA, all jurisdictions are required to designate and protect natural resource lands and critical areas. Critical areas include the following areas and ecosystems: (a) wetlands; (b) areas with a critical recharging effect on aquifers used for potable water; (c) fish and wildlife habitat conservation areas (including rivers, streams, lakes, and salt water shorelines); (d) frequently flooded areas; and (e) geologically hazardous areas (RCW 36.70A.030(5)). These areas are to be designated and protected using the best available science to protect the functions and values of environmentally sensitive areas (RCW 36.70A.172).

> *(1) In designating and protecting critical areas under this chapter, counties and cities shall include the best available science in developing policies and development regulations to protect the functions and values of critical areas. In addition, counties and cities shall give special consideration to conservation or protection measures necessary to preserve or enhance anadromous fisheries. RCW 36.70A.172(1).*

In addition to developing policies and regulations based on best available science, the Act goes further and requires that "special consideration" be given to conservation or protection measures necessary to preserve or enhance anadromous fisheries (WAC 365-195-900). Special consideration means that measures supported by current science relating to protection or enhancement for anadromous fish resources should be given more weight[13]. If protective measures are identified as necessary for the protection or enhancement of anadromous fish resources they should be carefully evaluated; those that are applicable to local conditions should be used.

Special consideration of anadromous salmonid habitat includes designating and protecting the aquatic and terrestrial environments that influence salmonid habitat functions, including water quality, flow regime, food source, access, and habitat structure. In order to be effective for salmonid habitat protection, critical area regulations should address the condition and extent of water-related resources as well as upland processes that affect aquatic habitat including

[13] The description of "special consideration" is consistent with how this term is defined in WAC 365-195-925. Growth Management Hearings Board findings support that "special consideration" requires science to be more heavily weighted than might otherwise be required by BAS provisions. See *Diehl v. Mason County* 95-2-0073 (Compliance Order, 3-22-00); *FOSC v. Skagit County* 96-2-0025c (Compliance Order, 8-9-00), and *FOSC v. Skagit County* 00-2-0033c (Final Decision and Order, 8-9-00).

watershed processes of canopy cover, extent of impervious surface, stormwater, water quality, water allocations, watershed hydrology, nutrient flow, and species interactions.

3.2 Recommendations for Protecting Salmonid Habitat in Local Planning

This section highlights policy and regulatory considerations for local governments to protect salmonid habitat functions in freshwater, marine and terrestrial environments. Policies are included because these establish the vision for protecting anadromous fish resources. Regulations have been included because rules, along with volunteer efforts and incentive programs discussed in section 3.3.10, are necessary to implement the vision.

Recommendations are organized by topic areas that include specialized management programs (e.g., stormwater) or habitat elements (e.g., nearshore areas) to protect salmonid habitat function from development impacts. Within each topic area, example policy and regulatory language is provided, as well as planning resources for additional guidance. For example, a riparian area is a habitat element and retaining a vegetated riparian buffer is a recommendation that would increase shade and reduce stream temperature, reduce impervious surface, filter sediments and other pollutants, contribute to terrestrial food sources, and recruit large woody debris. Prohibiting development in riparian buffers therefore maintains salmonid habitat functions such as water quality, food source, habitat structure and flow regime. Planning resources, such as riparian and nearshore management recommendations, are listed for more in-depth scientific recommendations to determine riparian buffer widths.

Throughout all of the regulatory programs and management approaches described below, mitigation sequencing is important to ensure no net loss of critical salmonid habitat functions. The sequencing for mitigation is straightforward: first try to avoid the impact altogether, then move to minimizing, reducing, and compensating for the impact. While detailed mitigation recommendations to repair, rehabilitate or restore specific habitat impacts are beyond the scope of this document, a few mitigation-related recommendations have been included throughout the tables. The salmon recovery plans, planning resources listed in the tables, literature cited and general references provide data and more specific recommendations for moving through the mitigation

sequence. Mitigation plans should be developed and implemented by qualified professionals. In all mitigation, monitoring is essential.

To protect anadromous fish habitat, special emphasis should be placed on management of the following categories listed below. These categories represent the key management program or salmonid habitat element related to land use changes that local planning can address.

1. Integration of Salmon Recovery Plans
2. Stormwater Runoff
3. Riparian Areas
4. Nearshore Areas
5. Wetlands
6. Large Woody Debris Recruitment
7. In-Stream Habitat
8. Floodplain Areas
9. Channel Migration Zone
10. Landslide Hazard Areas
11. Water Quality

A note on climate change: Climate variability and change is an emerging issue and many of the policy and regulatory consideration in the proceeding tables tailored to salmonid habitat would also address planning for climate change. Some examples of predicted climate change impacts in Washington state related to salmonid habitat include: shifts in seasonal streamflow timing; rising stream temperatures that will likely reduce the quality and extent of freshwater salmon habitat; exacerbated flooding due to predicted high levels of precipitation in the Puget Sound, decreased reservoir storage in central Washington; and sea level rise shifting coastal beaches inland and increasing erosion of unstable bluffs (Mote et al. 2008). For more information on the predicted impacts of climate change in Washington state visit the University of Washington Climate Impacts Group: *http://cses.washington.edu/cig/fpt/planning.shtml*; State of Washington Department of Ecology: *http://www.ecy.wa.gov/climatechange/index.htm*; and Puget Sound Partnership: *http://www.psparchives.com/our_work/climate.htm*.

3.2.1 Integration of Salmon Recovery Plans. There are watershed planning processes and salmonid recovery activities (e.g., site specific restoration projects) underway throughout the state, often more than one in the same watershed. In order for salmonid recovery to succeed, it is critical that salmon protection, recovery and enhancement efforts be tracked and coordinated amongst the various partners (e.g., government agencies, non-profit and tribes).

Photo 12: Riparian Vegetation Restoration

Internal agency coordination is also critical. Local government staff involved in salmon recovery planning may not be the same staff as those developing and implementing land use policies and regulations. Therefore, coordination amongst departments is imperative. Coordination includes partnership and collaboration with outside agencies and groups as well as agencies within the local government. Depending on how a local government is organized, administrative services, health departments, parks, planning, building and public works departments may all influence land use decisions that affect salmonid habitat.

Table 3.2.1: Integration of Salmonid Recovery Plans Recommendations

Policy Considerations	• Continue to work with other local, State, federal, and tribal agencies to jointly develop and implement comprehensive integrated watershed and salmon recovery plans (including associated multi-year work plans). • Coordinate planning programs with regional salmonid recovery organizations to ensure development standards are consistent with salmonid protection and restoration. • Adopt regional and watershed salmon recovery plans by reference and consider these as sources of best available science. • Develop and adopt salmonid recovery plans including an inventory of watersheds and local restoration and protection priorities based on best available science (see City of Seattle example listed below). • Coordinate Shoreline Master Program restoration plans with salmonid recovery and watershed management plans, water clean-up plans for TMDLs, stormwater management programs, and with stormwater basin plans where they have been developed. For example, implement a process to align projects in salmon recovery plans with areas identified in the SMP as needing restoration. • Adopt a resolution that directs all county departments to establish salmonid recovery priorities and programs consistent with lead entity strategies and regional salmon recovery plans.
Policy Example (Prioritizing Salmon Recovery and Protection): *In December 2003, the city of Seattle finalized the Urban Blueprint for Habitat Protection and Restoration. The Urban Blueprint analyzes what chinook salmon do as they move through Seattle, and helps identify the actions needed to protect them. The Urban Blueprint draws on recent and groundbreaking research by independent scientists and guides the city in making wise investments in salmon recovery. http://www.seattle.gov/util/About_SPU/Management/SPU_&_the_Environment/SalmonFriendlySeattle/SPU01_002751.asp.* ***Policy Example (Salmon Recovery Planning):*** *King County shall continue to participate in the Water Resource Inventory Area based salmonid recovery plan implementation efforts and in other regional efforts to recover salmon and the ecosystems they depend on, such as the Puget Sound Partnership. King County's participation in planning and implementation efforts shall be guided by the following principles: a. Focus on early federally listed salmonid species first, take an ecosystem approach to habitat management and seek to address management needs for other species over time; b. Concurrently work on early actions, long-term projects and programs that will lead to improvements to, and information on, habitat conditions in King County that can enable the recovery of endangered or threatened salmonids, while maintaining the economic vitality and strength of the region; c. Address both King County's growth management needs and habitat conservation needs; d. Use best available science as defined in WAC 365-195-905 through*	

Table 3.2.1: Integration of Salmonid Recovery Plans Recommendations

<table>
<tr><td colspan="2">365-195-925; e. Improve water quality, water quantity and channel characteristics; f. Coordinate with key decision-makers and stakeholders; and g. Develop, implement and evaluate actions within a watershed-based program of data collection and analysis that documents the level of effectiveness of specific actions and provides information for adaptation of salmon conservation and recovery strategies. King County Comprehensive Plan Chapter Four, Environment, Policy 601.

Policy Example (Internal Consistency): Planning and design of flood control works and instream structures should be consistent with and incorporate elements from applicable watershed management plans, restoration plans and/or surface water management plans. Whatcom County Shoreline Master Program, Flood Control Works and Instream Structures, 23.100.06.</td></tr>
<tr><td>Regulatory Considerations</td><td>• Match allowed uses requiring mitigation to appropriate restoration and enhancement activities as identified in salmonid recovery, watershed management, and shoreline restoration plans.
• Ensure shoreline environment designations and associated uses are consistent with areas identified as protection or restoration priorities in salmonid recovery, watershed management, and shoreline restoration plans.
• Conduct "planned actions" through decision-making that integrates the work of planning, stormwater management, parks, and other local departments.</td></tr>
<tr><td colspan="2">Regulatory Example (Habitat Area Enhancement/Restoration): The approval authority may, in consultation with WDFW and other experts (such as tribal biologists or DNR botanists), approve restoration of important habitat areas and associated buffers subject to an approved critical area report and restoration plan (see Section 17.15.880) and applicable provisions of this chapter. Stream enhancement/restoration shall only be performed under a plan for the design, implementation, maintenance and monitoring of the project approved by a qualified fisheries biologist and, if needed, by a civil engineer with experience in stream hydrology. The project shall be carried out under the direct supervision of a qualified fisheries biologist, hydrologist, or engineer with demonstrated experience, as appropriate. Thurston County Critical Areas Ordinance (In Draft), 17.15.860, http://www.co.thurston.wa.us/permitting/.</td></tr>
<tr><td>Planning Resources</td><td>See Chapter One for links to regional recovery plans and Appendix A for a list of salmonid recovery planning resources including watershed management plans, habitat limiting factors reports and mapping resources.</td></tr>
</table>

3.2.2 Stormwater Runoff. Traditional urban and rural development practices remove forests, vegetation and topsoil, compact soils, and increase impervious surface areas, diminishing the land's ability to hold and infiltrate rainwater. The remaining water becomes stormwater runoff, rushing off impervious surfaces such as roofs, roads and compacted soils instead of infiltrating the soil column (Booth 2000). Stormwater runoff can alter substrate conditions by carrying fine sediment to streams, which may reduce spawning gravel quality for salmonids and harm their food sources such as aquatic invertebrates.

In addition, changes in the frequency, magnitude, and timing of stormwater runoff results in stream channel and ecosystem alterations that are detrimental to salmon and their habitat (May 2009). Increased peak flows cause channel widening and shallowing, exposing streams to greater solar insolation and contributing to stream temperature warming. Runoff and erosion can also lead to channel incision, increasing stream velocity, and causing more frequent and deeper flood scour of the stream bed and salmon redds. Flashier stormwater runoff timing decreases groundwater recharge and reduces surface water-groundwater interactions, which cools stream water for cold-water dependent salmonids. In the Puget Sound, stormwater outfalls concentrate runoff onto discrete locations on the beach, inhibiting the flow of water that might normally exist over broader reaches of beach. This may impact habitats and species particularly sensitive to desiccation, including forage fish eggs.

Stormwater runoff from impervious surfaces also transports contaminants, especially metals, petroleum hydrocarbons, pesticides, and herbicides, to surface waters where suspected synergistic effects may be detrimental to salmonids (Scholz et al. 2000). Thus, ecosystem changes resulting from altered stormwater runoff regimes directly and indirectly jeopardize a number of different habitat elements on which salmonids rely.

Habitat functions impacted by stormwater runoff include water quality, flow regime, habitat structure and food source.

Runoff is of particular concern in regions of intense rainfall, such as glacial outwash regions surrounding Puget Sound, or limited vegetation and landscapes with thin soils, such as the arid and semiarid interior east of the Cascade Range (Booth 2000). Recent research in western Washington has determined that measurable degradation to downstream aquatic habitat occurs where impervious

cover exceeds 5-10% and native forest cover is reduced to less than 65% of watershed area (May et al. 1996; Booth 2000). Washington state agencies such as the Puget Sound Partnership and the State of Washington Department of Ecology, as well as the federal Environmental Protection Agency, have determined that stormwater runoff is the leading contributor to water quality pollution of urban waterways in western Washington State (*http://www.psp.wa.gov/stormwater.php*). Therefore, it is imperative that local governments manage stormwater with policies, regulations and incentive programs (e.g., LID) to reduce and treat stormwater runoff.

Table 3.2.2: Stormwater Runoff Management Recommendations[14]

Policy Considerations	• Adopt a stormwater design manual equivalent to the State of Washington Department of Ecology's most current version of "Stormwater Management Manual for Western Washington" or "Stormwater Management Manual for Eastern Washington." The minimum requirements of these Ecology manuals for new and redevelopment should be used, including the flow control and treatment standards. • Use the Low Impact Development (LID) approach and techniques to better manage stormwater for new development, redevelopment and retrofit projects. This includes: limit land clearing, retain and, where necessary, restore native vegetation and soils, minimize site disturbance and development footprints, limit impervious surfaces through use of permeable pavement or other techniques, create graded swales and rain gardens to disperse and infiltrate stormwater runoff on site, and utilize rainwater catchment for landscaping irrigation. • Implement a comprehensive stormwater management program to manage runoff from existing development, including: prohibiting, finding and remedying pollution discharges, properly maintaining stormwater systems, conducting public education, implementing source control and retrofits for existing stormwater facilities, and guiding stormwater basin planning. (NPDES Phase I and Phase II Municipal Stormwater Permit Program – State of Washington Department of Ecology: http://www.ecy.wa.gov/programs/wq/stormwater/municipal/index.html).
***Policy Example (Management Methods)**: Stormwater runoff shall be managed through a variety of methods, with the goal of limiting impacts to aquatic resources, reducing the risk of flooding, protecting and enhancing the viability of agricultural lands and promoting groundwater recharge. Methods of stormwater management shall include temporary erosion and sediment control, flow control facilities, water quality facilities as required by the Surface Water Design Manual, and best management practices as described in the Stormwater Pollution Control Manual. Runoff caused by development shall be managed to prevent adverse impacts to water resources, forests, and farmable lands. Regulations shall be developed for lands outside of the Urban Areas that favor nonstructural stormwater control measures when feasible including: vegetation retention and management; clearing limits; limits on actual and effective impervious surface; low-impact development methods that minimize direct overland runoff to receiving streams; and limits on soil disturbance. King County Comprehensive Plan Chapter Four, Environment, Policy 419.*	

[14] See also Table 3.2.11 Water Quality Management Recommendations.

Table 3.2.2: Stormwater Runoff Management Recommendations[14]

Regulatory Considerations	• Incorporate adaptive management provisions to address cumulative increases to total impervious area and reductions in forest cover to thresholds at the sub-basin scale in stormwater regulations. Thresholds are based on best available science. To protect aquatic resources, WDFW recommends limiting impervious surfaces to no more than 10% of an urban watershed. More than 10% impervious surfaces will have responding effects on channel morphology, water quality, and fish and wildlife habitat functions regardless of the width of the riparian area (Knutson and Naef 1997). • Encourage limited impervious surfaces, vegetation retention, and retention of natural soils and topography in site design by incorporating Low Impact Development standards. • Prohibit new discharge facilities from contributing pollutants and excessive artificial nutrients to riparian areas. • Require temporary or permanent erosion and sedimentation controls to prevent the introduction of sediments or pollutants to water bodies or water courses within salmonid habitat.
Regulatory Example (Management Manual): *The proposed activity must be designed and constructed in accordance with the Stormwater Management Manual for Eastern Washington, as amended (Ecology 2004) for those geographic areas covered under the Eastern Washington Phase II Municipal Stormwater Permit (Ecology 2007) or activities covered under the Ecology General Construction Permit (Ecology 2005), and/or the locally adopted program, as applicable. Walla Walla County Critical Areas Ordinance, 18.08.240.*	
Planning Resources	**Stormwater Management and Design Manual:** State of Washington Department of Ecology, *http://www.ecy.wa.gov/programs/wq/stormwater/index.html*. **Low Impact Development Technical Guidance Manual for Puget Sound:** Puget Sound Action Team (Hinman 2005), *http://www.psparchives.com/publications/our_work/stormwater/lid/LID_manual2005.pdf*. **Stormwater Resources:** Puget Sound Partnership, *http://www.psparchives.com/our_work/stormwater/stormwater_resources.htm*. **Watershed Processes and Aquatic Resources: A Literature Review:** Washington Department of Fish and Wildlife (May 2009), *http://wdfw.wa.gov/hab/watershed_aquaticreview.htm*. **Soil BMP Requirements:** *http://buildingsoil.org/* or *http://www.soilsforsalmon.org/*.

3.2.3 Riparian Areas. Salmonids are particularly sensitive to their freshwater environments which includes aquatic environments such as off-channel wetlands and floodplain areas and adjacent terrestrial habitat which is the riparian area (or zone). Riparian areas influence multiple habitat functions: food source, habitat cover, habitat structure, oxygen, water quality, spawning grounds, migration routes to ocean systems and filters water runoff and substrate inputs to the riparian area (Kauffman et al. 2001; NMFS 2008). Protecting the riparian area to maintain these functions is essential to survival of salmonids and many other species.[15]

Photo 13: Fish Passage Barrier

Functional riparian areas have adequate vegetation that moderates the movement of materials between the terrestrial environment and the stream, provides shade which can have a significant effect on moderating water temperature and climate within riparian zones, provides streambank stabilization with erosion resistant roots that bind soils and builds banks during high flows, provides large woody debris, filters fine sediment from upstream urban development, and favors percolation into groundwater, where soil filters many contaminants, keeping them out of water bodies (Knutson and Naef 1997; Cederholm 2000; Kauffman et al. 2001). Riparian vegetation also provides a home for terrestrial insects and aquatic insects which feed upon organic matter (litterfall) derived from adjacent riparian vegetation that fall into the stream (Kauffman et al. 2001). This underscores the importance of maintaining healthy, diverse, and mature riparian vegetation to provide a steady food source to the stream as well as nearshore ecosystems (discussed in section 3.2.4). The functions of riparian areas are fundamentally altered when upland and riparian vegetation is removed (May 2003).

Maintaining connectivity of small freshwater tributaries to larger riparian systems is also an important consideration. Salmonids migrate or use different areas of a watershed at different times during their life histories. Artificial barriers to migration disrupt connectivity. Fish passage barriers include poorly designed

[15] Knutson and Naef (1997) estimate 85% of Washington's terrestrial vertebrate species use riparian habitat for essential life activities.

culverts and dams as well as areas made too shallow for fish to swim past because of water diversion or groundwater pumping.

Small streams, both non-fish bearing and fish bearing, are important for determining the amounts and timing of stream flow and therefore salmonid habitat downstream. In mountain streams, much of the flow, as well as the timing and quality of flow, is determined by headwater processes (snowfall, freezing, melt, glacial melt, rainfall). Disturbance (such as timber cutting and road building) will impact the hydrologic flow regime and water quality. Small freshwater tributaries at any elevation that are tightlined or filled as part of land development also diminish the function of hydrologic regimes, reducing infiltration, as well as nutrient and substrate contribution to marine waters or larger river systems (Cederholm et al. 2000). The reduction of terrestrial vegetation can elevate maximum stream temperatures, increase flow fluctuations and reduce winter stream temperatures (where ice formation is a concern, like some eastern Washington streams) (R2 Resource Consultants et al. 2000). Small fish-bearing tributaries also provide important refuge areas for juvenile salmonids trying to survive winter floods.

Freshwater aquatic environments are not only influenced by terrestrial vegetation alterations, but also in-water projects. Hydraulic projects such as shoreline armoring and overwater structures can impact salmonid habitat functions in lakes and streams by decreasing aquatic food supply, changing prey diversity, disrupting migration and feeding areas, increasing wave energy, increasing scour, and increasing predation. Shoreline armoring can also eliminate a potential source of sediment/spawning gravel inputs associated with natural channel migration and erosional processes and may reduce future spawning gravel recruitment in downstream stream reaches.

Habitat functions maintained by riparian areas include water quality, flow regime, habitat structure, food source and access.

Wide terrestrial buffers, a near-continuous corridor, mature, native vegetation, and limits on in-water projects are all necessary to protect salmonid habitat functions in riparian areas. Riparian buffers should be established based on best available science for the resource, the quality of existing riparian vegetation and the ability of the site to grow mature native trees (May et al. 1996). In areas with existing development (where natural buffers are unrealistic), explicit provisions for

retaining and/or replanting (and maintaining, particularly during plant establishment) native vegetation for a variety of land uses can be required and enforced to compensate for inadequate existing buffers and flexible development standards.

Table 3.2.3: Riparian Areas Management Recommendations[16]

Policy Considerations	• Protect and restore natural streambank, estuarine and nearshore conditions and functions, including vegetative cover, natural input of large woody debris and gravels by adopting riparian buffers (and associated building setbacks) and avoiding bank hardening. • Designate natural buffers of a width based on best available science along all riparian systems that support salmonid habitat. Riparian systems include fish-bearing streams, feeder tributaries, wetlands, lakes as well as estuarine and nearshore areas. • Designate riparian buffers that maintain native riparian vegetation and encourage the restoration of riparian vegetation. When removal cannot be avoided, require mitigation that addresses cumulative impacts and requires replanting. • Use the *Washington State Integrated Streambank Protection Guidelines* and the *Washington State Stream Habitat Restoration Guidelines* when considering protection and restoration of stream habitat. • Restrict livestock access to streams and rivers to prevent streambank and vegetation degradation, channel widening and heating, and direct salmonid impacts, such as redd (nest) trampling.
Policy Example (Riparian Buffers): *Maintain buffers between land-disturbing activities and surface water resources to meet the standards of the best available fisheries science for protecting water resources and related habitat functions. Jefferson County Comprehensive Plan Chapter Eight, Environment Element, Policy 2.5.* ***Policy Example (Vegetated Buffers):*** *Vegetation removal adjacent to riparian areas, resulting from development or other activities, should be strictly controlled with adequate buffers maintained to support the healthy functioning of the hyporheic zone. Pierce County Comprehensive Plan, Water quality 19A.60.050.*	
Regulatory Considerations	• Adopt a setback of at least 15 feet from the edge of riparian buffers to protect buffer habitat from impacts associated with construction and buildings. • Establish natural vegetation buffer widths based on best available science and sufficient to maintain functions and processes necessary for salmonids. • If modifications or buffer averaging must be allowed to prevent an unreasonable hardship on a landowner,

[16] See also Table 3.2.4 Nearshore Areas Management Recommendations.

Table 3.2.3: Riparian Areas Management Recommendations[16]

	require habitat enhancement to protect the integrity, functions, and values of existing anadromous fish habitat (see below for habitat management plan recommendations). Buffer averaging requires review by a qualified habitat biologist. • Measure buffers landward from the Ordinary High Water Mark (OHWM). • Extend buffers to include adjacent critical areas buffers (such as those associated with wetlands, lakes, floodplains, and channel migration zones). • Require a habitat management plan, prepared by a qualified professional, for vegetation clearing in a buffer. Clearing of native vegetation is only permitted if no net loss to fish and wildlife habitat conservation areas can be shown or clearing of native vegetation is necessary to mitigate hazardous trees. Consideration should also be given to assessing the temporal loss of function(s) from such clearing. Although functions recover over time, interim measures to enhance recovery times and trajectories should be implemented. Preferably, some measures (e.g., replacement plantings) should be conducted prior to or concurrent with clearing activities to minimize overall temporal losses. A qualified professional must prepare the report (e.g., arborist). • Require a vegetation conservation plan to ensure native vegetation retention and restoration to ensure no net loss of marine and freshwater riparian functions. The plan is reviewed by a qualified professional. • Avoid permitting development that will require bank protection. If bank protection cannot be avoided, follow bank protection recommendations in the *Washington State Integrated Streambank Protection Guidelines*.
Regulatory Example (Vegetated Buffers): *Establishment of Buffers. The Director shall require the establishment of buffer areas for activities adjacent to habitat conservation areas when needed to protect habitat conservation areas. Buffers shall consist of an undisturbed area of native vegetation or areas identified for restoration established to protect the integrity, functions, and values of the affected habitat. Required buffer widths shall reflect the sensitivity of the habitat and the type and intensity of human activity proposed to be conducted nearby and shall be consistent with the management recommendations issued by the Washington Department of Fish and Wildlife. Walla Walla County Critical Areas Protection, Chapter 18.08.640.* ***Regulatory Example (Hazardous Trees):*** *(1) In a critical area or critical area buffer, removal of hazardous, diseased or dead trees and vegetation by the landowner may be permitted when necessary to: (a) Control fire; or (b) Halt the spread of disease or damaging insects consistent with the State Forest Practices Act, RCW 76.09; or (c) Avoid a hazard such as landslides; or (d) Avoid a threat to existing structures or above-ground utility lines. (2) Before hazardous, diseased or dead trees and vegetation may be removed by the*	

Table 3.2.3: Riparian Areas Management Recommendations[16]

landowner pursuant to subsection (1): (a) Unless there is an emergency pursuant to SCC 14.24.070(1), the landowner shall obtain written approval from Planning and Development Services. This consent shall be processed promptly and may not be unreasonably withheld. If the Administrative Official fails to respond to a hazard tree removal request within 10 business days, the landowner's request shall be conclusively allowed; and (b) The removed tree or vegetation should be left within the critical areas or buffer unless the Administrative Official, or a qualified professional, warrants its removal to avoid spreading the disease or pests; and (c) Any removed tree or vegetation shall be replaced with an appropriate native species in appropriate size. Replacement shall be performed consistent with accepted restoration standard for critical areas within one (1) calendar year. (d) For 14.24.130 only, a qualified professional shall mean a certified arborist, certified forester or landscape architect. Skagit County Critical Areas Ordinance, 14.24.130 Hazard Tree Removal.

***Regulatory Example (Vegetation Retention):** Standards for allowed uses and activities. Vegetation Removal. 1. Removal of native vegetation. Removal of native vegetation within priority habitat, marine riparian habitat areas, and riparian habitat areas along streams, within wetlands and buffers of both shall be prohibited except as provided for in this chapter.3. Noxious weeds and invasive plants. a. Removal of noxious weeds, as defined by Chapter 16-750 WAC, under the direction of the Thurston County Noxious Weed Control Agency, is permitted in important habitat areas consistent with a county approved integrated pest management plan, applicable county and state regulations, and Subsections W(3)(d) and (e) below. b. Removal of invasive plants is permitted subject to Subsections W(3) (c-e). c. Plant removal shall be performed such that it will not increase the likelihood of stream bank erosion, marine bluff erosion (see Section 17.15.600), significantly damage untargeted vegetation, or impair any habitat functions. These areas may be maintained to promote native vegetation; The method of removal shall be approved in writing by Thurston County Development Services Department, consistent with applicable county, state, and federal regulations. d. Hand tools shall be used for plant removal unless the approval authority determines that the scale of the project warrants use of small scale equipment (e.g., riding mowers or light mechanical cultivating equipment) or other method (i.e., application of herbicide with a state and federally approved formulation by a licensed applicator in accordance with the safe application practices on the label) and use of the equipment/method does not pose a significant risk to untargeted areas, habitat functions, or water quality. e. Erosion shall be effectively controlled and exposed areas shall be stabilized immediately following plant removal consistent with Chapter 15.05 TCC. If the area of exposed soil exceeds 100 square feet, it shall be planted with appropriate native plant species present in the area at a density that will provide complete ground cover at maturity, unless the approval authority determines that the area will revegetate naturally without jeopardizing water quality or the important habitat area. Thurston County Critical Areas Ordinance (In Draft), 17.15.870, http://www.co.thurston.wa.us/permitting/.*

Table 3.2.3: Riparian Areas Management Recommendations[16]

Planning Resources	**Riparian Management Recommendations:** Washington Department of Fish and Wildlife Priority Habitats and Species Management Recommendations (Knutson and Naef 1997), *http://wdfw.wa.gov/hab/phspage.htm*. **Integrated Streambank Protection Guidelines:** Washington State Aquatic Habitat Guidelines Program (2002), *http://wdfw.wa.gov/hab/ahg*. **Stream Habitat Restoration Guidelines:** Washington State Aquatic Habitat Guidelines Program (2004), *http://wdfw.wa.gov/hab/ahg*. **Restoring the Watershed, A Citizen's Guide to Riparian Restoration in Western Washington.** Washington Department of Fish and Wildlife, *http://wdfw.wa.gov/recovery.htm*. **Managing Vegetation on Coastal Slopes:** State of Washington Department of Ecology, *http://www.ecy.wa.gov/programs/sea/pubs/93-31/intro.html*. **Riparian Areas: Functions and Strategies for Management.** National Research Council (NRC 2002), *http://www.nap.edu/books/0309082951/html/*. **Shoreline Management Jurisdiction:** • River and stream shorelines, State of Washington Department of Ecology, *http://www.ecy.wa.gov/programs/sea/sma/st_guide/jurisdiction/rivers.html*. • Lake shorelines, State of Washington Department of Ecology, *http://www.ecy.wa.gov/programs/sea/sma/st_guide/jurisdiction/rivers.html*. • Lake shorelines, Wild Fish Conservancy, *http://www.washingtontrout.org/laketyping.shtml*. **Mapping Resources (listed in Appendix A):** • *SalmonScape* • *WDFW Priority Habitats and Species Data* • *PSNERP Change Analysis*

3.2.4 Nearshore: Marine and Estuarine Areas. On the westside of the state, local governments regulate both freshwater and nearshore areas. Nearshore areas include the saltwater subtidal zone (marine), intertidal zone (open shoreline, estuaries and bays) and terrestrial riparian zone (Buchanan et al. 2001). Riparian areas along the nearshore enhance habitat function of nearshore areas for juvenile salmonids during their migration through Puget Sound to the open ocean. Estuaries are a particularly important nearshore habitat as they provide distinctive environmental conditions (e.g., brackish water) necessary for the physiological transition of juveniles from freshwater to saltwater and for mature adults returning to freshwater streams. Puget Sound shorelines and bays also provide important salmonid habitat for juvenile feeding and migration (Brennan and Culverwell 2004). Marine shorelines and bays along Washington's coast also provide feeding, refuge and migratory transition habitat for salmonids.

Habitat functions maintained by nearshore areas include water quality, flow regime, habitat structure, food source and access.

Nearshore riparian areas are vulnerable to many of the same impacts as freshwater riparian areas including stormwater runoff, loss of riparian vegetation,shoreline armoring and overwater structures. Overwater structures, such as floats, can impact salmonid prey sources and refugia when shading and grounding occurs. Shoreline armoring can impact nearshore environmental processes and functions by blocking, delaying, or eliminating sediment delivery to beaches necessary for sustaining smelt and sand lance spawning habitat (Penttila 2007). Nearshore habitat that supports both salmonids and forage fish will become increasingly vulnerable to disturbance and loss as sea levels rise and beach habitats are squeezed between rising waters and shoreline armoring (Washington State Climate Advisory Team 2007).

Photo 14: Nearshore Feeder Bluff

The management recommendations for marine, estuary, and freshwater riparian areas are very similar. Marine and estuarine riparian areas support many of the same habitat functions as freshwater riparian areas (food, access, habitat

structure) and management recommendations, such as maintaining vegetated riparian buffers are essential (Brennan and Culverwell 2004). Therefore, management recommendations provided in table 3.2.3, riparian areas management recommendations are relevant in nearshore environments.

Table 3.2.4: Nearshore Areas Management Recommendations[17]

Policy Considerations	• Designate natural shoreline buffers of a width based on best available science to protect salmonid habitat processes and functions. (See table 3.2.3 riparian areas for more on buffers.) • Designate natural shoreline buffers that maintain native riparian vegetation and encourage the restoration of riparian vegetation. When removal cannot be avoided, require mitigation that addresses cumulative impacts and requires replanting. • Maintain the connectivity and nursery habitat at the mouths of tributaries, estuaries, and wetlands and other nearshore habitats through the establishment of habitat buffers. • Identify and protect potential and known forage fish (herring, smelt, and sand lance) spawning areas. • Allow new bank stabilization of shorelines only after an imminent threat to existing residential or business structures or critical public facilities has been demonstrated by a geotechnical or hydrologic analysis and reviewed by a qualified third party. Structure relocations and innovative, bioengineering alternatives to hard armoring should always be considered first. • Require proposed bulkhead rebuild projects to evaluate the effectiveness of alternative designs (e.g., structure relocations and soft-shore approaches) as opposed to in-kind replacement. • Identify feeder bluffs and protect them (and their functions) through appropriate shoreline designation and SMP regulations. • Identify intact beach systems (including sediment delivery, transport, and accretion areas) and protect them through appropriate shoreline designation and SMP regulations. • Locate new or enlarged piers, floating docks, mooring buoys, navigational aids and swimming floats away from (and not in) marine aquatic vegetation beds and are sufficiently restricted to protect salmonid rearing areas and migration corridors. • Encourage community use projects for piers, boat ramps, and access sites.

[17] See also Table 3.2.3 Riparian Areas Management Recommendations.

Table 3.2.4: Nearshore Areas Management Recommendations[17]

Policy Example (Nearshore Habitat Designation and Protection): *The county should identify and protect, consistent with best available science, important, sensitive marine habitats, such as juvenile salmon migration corridors, kelp and eelgrass beds, shellfish beds, and herring and smelt spawning areas. Thurston County Comprehensive Plan Chapter Nine, Environment, Policy C.3.2.*	
Regulatory Considerations	• Establish marine riparian habitat areas and management zones consistent with best available science (examples include Knutson and Naef 1997; Tri-County Assembly 2000; Envirovision et al. 2007) extending on a horizontal plane, landward from the ordinary high water mark. The marine riparian habitat area retains existing conditions, including native vegetation. When conditions are degraded, replanting of native vegetation may be a condition for upland development. Development permitted in the marine riparian management zone is restricted as necessary to minimize adverse impacts to existing native vegetation that have a beneficial impact on marine critical areas, such as forage fish-spawning beaches. Development in the marine riparian management area requires a vegetation conservation plan or habitat management plan with measures to promote and sustain native vegetation and facilitate dispersion and filtering of runoff. • Include provisions for overwater structures such as, no grounding of floats, use of inert materials that do not pose a risk to water or sediment quality, full compliance with *U.S. Army Corps of Engineer Regional General Permit Number 6*, timing restrictions to protect critical forage fish spawning and incubation time, no fill or armoring of the shoreline, grating/materials that allow sunlight to penetrate docks, piers, and floats, and loss of existing native vegetation requires mitigation. Overwater structures should be constructed of materials that will not adversely affect water quality or aquatic plants and animals in the long term. • Prohibit bulkheads and piping systems that result in water falling rather than flowing and dispersing onto the shore. • Prohibit shoreline structures (e.g., boat ramps, groins) that disrupt drift cell function (such as sediment and gravel transport). • Replace disturbed marine riparian vegetation with equivalent native species appropriate for the site. Mitigation provides 100 % replacement of lost vegetation, and provide for an equal amount of vegetative function.

Table 3.2.4: Nearshore Areas Management Recommendations[17]

Regulatory Example (Overwater structures): *Marinas or launch ramps shall not be permitted within the following marine shoreline habitats because of their scarcity, biological productivity and sensitivity unless no alternative location is feasible, the project would result in a net enhancement of shoreline ecological functions, and the proposal is otherwise consistent with this Program: (1) Marshes, estuaries and other wetlands; (2) Tidal pools on rock shores; (3) Kelp beds, eelgrass beds, spawning and holding areas for forage fish (such as herring, surf smelt and sandlance); Whatcom County Shoreline Master Program, Boating Facilities: Marinas and Launch Ramps, 23.100.04.* ***Regulatory Example (Shoreline Armoring):*** *All shoreline development shall be located and designed to avoid or minimize the need for shoreline stabilization measures and flood protection works, such as bulkheads, revetments, dikes, levees, dikes, or substantial site regrades. Where measures and works are demonstrated to be necessary, biostabilization techniques shall be the preferred design option unless demonstrated to be infeasible or where other alternatives will provide less impact to the shoreline environment. [sic] City of Sumner Shoreline Master Program, General Environmental Impact Regulations, 16.16.020 (E).* ***Regulatory Example (Nearshore Habitat Protection):*** *All shoreline development and activity shall be located, designed, constructed, operated, and managed to minimize interference with beneficial natural shoreline processes including those that contribute to properly functioning conditions for proposed, threatened and endangered species, such as water circulation, sand and gravel movement, erosion, and accretion. City of Sumner Shoreline Master Program, General Environmental Impact Regulations, 16.16.020 (F).*	
Planning Resources	**Protecting Nearshore Habitat and Functions in Puget Sound:** Washington State Aquatic Habitat Guidelines Program (Envirovision et al. 2007), *http://wdfw.wa.gov/hab/nearshore_guidelines/*. **Marine and Estuarine Shoreline Modification Issues and Overwater Structures:** Washington State Aquatic Habitat Guidelines Program White Papers, *http://wdfw.wa.gov/hab/ahg/ahgwhite.htm*. **The Importance of Estuarine Habitats to Anadromous Salmonids:** United States Fish and Wildlife Service (Aetkin 1998), *www.fws.gov/westwafwo/fisheries/Publications/FP005.pdf*. **Mapping Resources (listed in Appendix A):** • *Salmonscape* • *WDFW Priority Habitats and Species* • *DNR Shorezone Inventory* • *Ecology Coastal Zone Atlas* • *PSNERP Change Analysis*

Photo 15: Natural Wetland Habitat

3.2.5 Wetlands. Wetlands are areas in the landscape that are inundated or saturated by surface or ground water and support vegetation adapted to life in saturated soil conditions (McMillan 1997). Wetlands promote more movement of water into groundwater, settle erosion products (instead of transporting them to a stream), and contribute to less extreme hydrology (May 2003). Stream-adjacent wetland habitat contributes to salmonid survival by providing off-channel habitat, food source and moderating stream flows. Wetlands and associated vegetation provide essential off-channel habitat to sustain young salmonid growth and protect them from predators (Spence et al. 1996). Wetland habitat also hosts amphibious species and insects that are potential food sources for salmonids. Wetlands moderate stream flows by preserving adequate water recharge to streams during low flow periods and protect rearing salmonids from the effects of high flows.

Habitat functions maintained by wetland protection include water quality, flow regime, habitat structure, food source and access.

Table 3.2.5: Wetlands Management Recommendations

Policy Considerations	• Adhere to *State of Washington Department of Ecology guidance* when identifying, classifying, and protecting wetlands (e.g., "Washington State Wetland Identification and Delineation Manual," "Washington State Wetland Rating System for Western Washington," "Wetlands in Washington State, Volume 2: Guidance for Protecting and Managing Wetlands.") • Protect the connectivity of wetlands to streams and nearshore habitats through the establishment of habitat buffers.
Policy Example (Wetland Protection): *King County's overall goal for the protection of wetlands is no net loss of wetland functions and values within each drainage basin. Acquisition, enhancement, regulations, and incentive programs shall be used independently or in combination with one another to protect and enhance wetlands functions and values. Watershed management plans, including ((Water Resource Inventory Area)) WRIA plans, should be used to coordinate and inform priorities for acquisition, enhancement, regulations, and incentive programs within unincorporated King County to achieve the goal of no net loss of wetland functions and values within each drainage basin. King County Comprehensive Plan Chapter Four, Environment, Policy 446. [sic]*	
Regulatory Considerations	• Rate, designate and map wetlands according to the State of Washington Department of Ecology Wetland Rating System. Activities allowed in wetlands do not alter the structure or functions of the existing wetland. Development in or near wetlands requires a critical areas report prepared by a qualified wetland scientist. • Tailor wetland buffers to protect specific anadromous fish habitat and functions, as supported by best available science. • If modifications or buffer averaging must be allowed to prevent an unreasonable hardship on a landowner, require a habitat management plan, prepared by a qualified professional, to protect the integrity, functions, and values of existing anadromous fish habitat. Buffer averaging requires review by a qualified habitat biologist. • Extend buffers to include adjacent critical areas (such as riparian areas). • Allow no fill or disposal of dredge material on wetlands.
Regulatory Example (Wetland Classification): *(1) Classification. Wetlands shall be classified using the 2004 Washington State Department of Ecology's Wetland Rating System for Western Washington (Ecology Publication #04-06-025), or as amended. Wetland rating categories shall not be determined*	

Table 3.2.5: Wetlands Management Recommendations

based upon illegal modification to the land. Wetland delineations shall be determined by using the Washington State Wetlands Identification and Delineation Manual, March 1997, or as amended hereafter. Jefferson County Critical Areas Ordinance 18.22.300. ***Regulatory Example (Wetland Buffer Widths):*** (A) *Increased Buffer Widths. The approval authority shall require an increase in the buffer width specified in Table 9-1 when a wider buffer is necessary to protect wetland and buffer functions, specified in subsections D (1) and (2) below. Buffer widths expanded pursuant to this section shall not be decreased through other provisions of this chapter.* *"(2) Inadequate vegetative cover to maintain water quality. If the standard buffer specified in Table 9-1 has inadequate vegetative cover to protect the wetland from sedimentation, excess nutrients, pollutants or damaging changes in pH, the approval authority, in consultation with a qualified professional, may increase the buffer width twenty-five percent to protect water quality. (For purposes of this section, inadequate buffers lack dense, continuous vegetation spanning the distance specified Table 9-1 for maintenance of water quality, or as modified by Subsection D (1) above).* *In lieu of increasing the buffer width, the approval authority may allow implementation of a buffer planting plan. This buffer planting plan shall provide for planting of all bare and sparsely vegetated areas within the portion of the buffer needed to maintain water quality (per Table 9-1 or as modified by Subsection D(1)) with grasses and native shrubs, at densities that will effectively filter/absorb sediment, nutrients and pollutants, as determined by the approval authority. The applicant shall submit a surety consistent with Section 17.15.330 and provide for monitoring and maintenance to ensure survival or replacement of the planted vegetation." Thurston County Critical Areas Ordinance (In Draft), 17.15.950 in part, http://www.co.thurston.wa.us/permitting/.*	
Planning Resources	**Wetland Identification and Delineation Manuals**: State of Washington Department of Ecology, http://www.ecy.wa.gov/programs/sea/wetlands/index.html. • Wetlands in Washington – Volume 1: A Synthesis of the Science (March 2005, Publication #05-06-006) • Wetlands in Washington – Volume 2: Guidance for Protecting and Managing Wetlands (April 2005, Publication #05-06-008) • Wetland Mitigation in Washington State: Part 1 – Agency Policies and Guidance (Version 1, March 2006, Publication #06-06-011a) • Wetland Mitigation in Washington State: Part 2 – Developing Mitigation Plans (Version 1, March 2006, Publication #06-06-011b)

3.2.6 Large Woody Debris Recruitment. Large woody debris may be the most important structural component of salmonid habitat (May et al. 1996). If a large tree falls within a riparian area (freshwater and estuarine areas), it has the potential to recruit to the channel and influence channel morphology catching smaller trees and branches that would otherwise float away. Benefits include dissipation of energy associated with water flow, streambank protection and stabilization, sediment storage, and in-stream cover and habitat diversity (May et al. 1996). Habitat diversity includes the creation of pools that provide suitable rearing habitat for salmonids where food is plentiful with minimal energy expenditure. These pools also assist in the retention of salmonid carcasses by adding habitat complexity where these carcasses may settle out and add nutrients for stream productivity (Cederholm et al. 2000). Deep pools may also provide cover from predators (Kauffman et al. 2001).

Habitat functions maintained when large woody debris naturally recruits to the stream include habitat structure, flow regime and access.

Additionally, large woody debris provides salmonid habitat functions in marine riparian areas (Envirovision et al. 2007). Large woody debris, such as logs and rootwads, recruited to the marine shoreline provides beach stabilization, increases habitat complexity and facilitates the sorting and accumulation of sediments, including fine-grained substrate in the upper beach important for forage fish spawning grounds.

In some cases, property owners request removal of large woody debris when it poses a safety concern or is perceived to promote bank erosion. Wood is also removed at areas of high recreational use such as boat launches. However, threats posed by LWD can often be alleviated by repositioning the wood within the channel; removal should be a last resort and appropriately mitigated by replacing wood in another location to offset habitat impacts. Safety concerns associated with log jams in popular river systems are a growing concern among recreational kayaking and rafting interests and will need further exploration of suitable resolution. Signage at river or stream boat launches can help educate the public about the habitat benefits and safety risks associated with LWD.

Table 3.2.6: Large Woody Debris Recruitment Management Recommendations

Policy Considerations	• Retain large woody debris in streams and along estuarine and marine shorelines (e.g., within buffer areas or management zones) and maintain long-term recruitment of large woody debris from riparian zones. • Prohibit removal, relocation, or modification of large woody debris in aquatic habitats and adjacent banks except when posing an immediate threat to public safety or critical facilities. Assessments of safety threat posed by LWD should be determined in consultation with a qualified geomorphologist. • Mitigate the movement or removal of large woody debris complexes clearly posing a threat to infrastructure and critical facilities. Mitigation may include placing the wood back into the system at a location where it will not pose an immediate hazard and where the lack of large woody debris has been identified as a problem. If wood is not returned to the system, it should be reserved for use in habitat restoration projects. Mitigation also includes replanting native trees at the site of removal. • Consider the inherent nature of wood to accumulate and move in streams and along estuarine and marine shorelines when planning for new or reconstructed infrastructure. • Prohibit salvage logging (including firewood cutting) from riparian areas, including driftwood removal along shorelines.
Policy Example (Vegetation Retention): *King County should adopt development regulations for vegetated areas along streams, which once supported or could in the future support mature trees, that include buffers of sufficient width to facilitate the growth of mature trees and periodic recruitment of woody vegetation into the water body to support vegetation-related shoreline functions. King County October 2008 Draft Shoreline Master Program, Policy 640.*	
Regulatory Considerations	• Require department review and professional assessment for hazard tree removal to determine if a tree poses a "direct threat to property and life." A habitat management report prepared by a qualified arborist must be submitted that includes a description of existing habitat conditions, explores alternatives to outright removal (such as limbing or crown thinning), assesses tree health for recruiting to the channel, and on-site replanting provisions to mitigate removal impacts. Hazard tree removal within a stream requires a Hydraulic Project Approval permit under Chapter 77.55 RCW from the Washington Department of Fish and Wildlife. • Prohibit new structures at dams or weirs that inhibit the passage of wood. • If LWD poses an immediate threat to public safety or critical facilities, a qualified professional (e.g.,

Table 3.2.6: Large Woody Debris Recruitment Management Recommendations

	arborist/engineer) is to determine the appropriate habitat management recommendations. Threats can often be alleviated by repositioning the debris; removal is a last resort.
Regulatory Example (Hazardous Trees): *To the maximum extent practical...Hazard trees should be retained in aquatic area buffers and either topped or pushed over toward the aquatic area. King County Critical Areas Ordinance, 21A.24.365.* ***Regulatory Example (Hazardous Trees):*** *The county may authorize the limbing, thinning or removal of hazard trees in important habitat areas and associated buffers provided that: c. Snags shall be left in place to provide habitat unless they have a disease that would jeopardize other trees. All trees and branches cut in the important habitat area and buffer shall remain there unless the tree is diseased. Thurston County Critical Areas Ordinance (In Draft), 17.15.870, http://www.co.thurston.wa.us/permitting/.*	
Planning Resources	**Stream Habitat Restoration Guidelines**, Washington State Aquatic Habitat Guidelines Program (2002), *http://wdfw.wa.gov/hab/ahg*.

3.2.7 In-stream Habitat. In addition to large woody debris, other structural components support salmonid life history stages. Certain substrate (e.g., gravel, cobble) in the stream bed provide critical habitat for egg incubation and embryo development. Human influences on water flows can result in excessive scour and aggradations to substrate, diminishing streambed habitat (May et al. 1996).

Habitat functions maintained by in-stream habitat protection include flow regime and access.

Streams with healthy riparian habitats help maintain natural erosion rates along streambanks. Naturally stable stream banks provide refuge habitat for juvenile salmonids during winter flood events, and help control excessive sediment erosion. In contrast, stream banks armored with rock and other hardened material can increase the frequency of over-bank flows and force accelerated erosion on opposite banks, creating the perceived need to armor additional streams banks.

In addition to flow regime, access is impacted when in-stream construction projects, such as stream crossings, channel changes, dredging, pipeline crossing and water diversions (temporary or permanent) alter the bed and flow of water.

Photo 16: In-Stream Habitat

While road crossings using culverts or bridges are designed to provide fish passage, individual projects and particularly cumulative projects impact habitat connectivity (e.g., floodplain fill) and may result in loss of spawning or rearing habitat.[18] Bridges that span the entire high water channel of a stream are far less impacting than culverts, causeways, or bridges with multiple piers.

Impacts to natural channel processes (e.g., sediment transport and supply to the channel as well as access) from channel changes, pipeline crossings and other projects associated with land use and road building emphasize the need for planning to avoid cumulative impacts. In-stream water diversions need to be properly designed to avoid stranding of salmon and managed to avoid impacts to flow regime detrimental to salmonid resources.

[18] Additional recommendations for road crossings are located in section 3.3.7 Road Standards.

Chapter 77.55 RCW grants the authority to the Washington Department of Fish and Wildlife to permit construction projects in state waters that impact fish life. Any person, organization, or government agency proposing to conduct any construction activity that will use, divert, obstruct or change the bed or flow of waters of the state must do so under the terms of a Hydraulic Project Approval (HPA) permit, issued by WDFW. Waters of the state includes all salt and fresh waters waterward of the ordinary high water line and within the territorial boundary of the state (RCW 77.55.011). Although WDFW permits hydraulic projects when the project meets specifications to protect fish life, local governments are in a unique position to adopt complimentary in-stream protection standards to ensure adequate protection of in-stream salmonid habitat. Contact the Washington State Office of Regulatory Assistance, Environmental Permitting, for information about other permits needed for in-stream projects: *http://www.ora.wa.gov/resources/permitting.asp*.

Table 3.2.7: In-stream Habitat Management Recommendations

Policy Considerations	• Retain streambed gravel. • Remove human-made barriers to salmonid migration, such as blocking culverts and tide gates; maintain fish passage throughout the range of anadromous and resident fish species. • Discourage in-stream structures that are not improving habitat functions such as flood control works. • Avoid new road construction at stream and wetland crossings. Measures to prevent new crossings include: investigation of alternative access locations across neighboring properties and use of joint access roads for multiple lots whether developed together or individually. When avoidance cannot be achieved, bridges should be considered before culverts. • Identify and prioritize the repair/replacement of stream crossings that impede salmon passage as part of a local jurisdiction's periodic Transportation Improvement Program. Identify funding and develop a work schedule to remedy problem stream crossings, working cooperatively with responsible parties, whether public or private. • Maintain stream flows and limit effects on aquifers or streams by requiring mitigation. • Limit outdoor irrigation by encouraging landscaping that requires little irrigation (xeri-scaping).
Policy Example (Substrate Retention): *Mining, dredging, or the removal of gravel, fill or similar materials from streams, ground water recharge areas, or other surface water areas shall be strictly controlled to prevent adverse alterations to flow characteristics, siltation and the pollution or disruption of fish passage, spawning beds, or juvenile rearing areas. Pierce County Comprehensive Plan, Water quality 19A.60.050.* ***Policy Example (Flood Control):*** *Non-structural and non-regulatory methods to protect, enhance, and restore shoreline ecological functions and processes and other shoreline resources should be encouraged as an alternative to structural flood control works and in-stream structures. Nonregulatory and non-structural methods may include public facility and resource planning, land or easement acquisition, education, voluntary protection and enhancement projects, or incentive programs. Whatcom County Shoreline Master Program, Flood Control Works and In-stream Structures, 23.100.06.*	
Regulatory Considerations	• Prohibit removal of gravel from the streambed. • Avoid activities including mining, dredging or the removal of gravel, fill or similar materials from freshwater

Table 3.2.7: In-stream Habitat Management Recommendations

	streams and nearshore habitats. When activities cannot be avoided, a habitat management plan, prepared by a qualified professional, is required to minimize impacts to salmonid habitat. • Avoid road crossing culverts in critical salmonid habitat areas, particularly spawning areas. When avoidance is not an option, road-crossing culverts are designed to facilitate upstream fish migration (see planning resources). • Require that any existing crossings which impede fish passage be repaired or replaced during road upgrade or improvement projects, subdivision approvals, building, or site development permit approvals to offset new development impacts. • If crossing cannot be avoided, adopt standards for culvert placement and design as listed in WDFW's Design Manual for Culverts. Culverts and bridges should pass the 100-year flood event plus associated debris. In addition to effects on salmonids, under-sized culverts frequently result in failure and replacing such a crossing twice is more expensive than installing an appropriately sized structure the first time. • Inventory existing fish passage barriers at time of land use application and if mitigation is necessary, correction or removal of fish passage barriers is required.
Regulatory Example (Stream Crossings): *Any private or public road expansion or construction which is proposed and must cross streams classified within this article, shall comply with the following minimum development standards:* *(a) The design of stream crossings shall meet the requirements of the Washington Department of Fish and Wildlife. Fish passage shall be provided if necessary to address manmade obstructions on-site. Other alternatives may be allowed upon a showing that, for the site under review, the alternatives would be less disruptive to the habitat or that the necessary building foundations were not feasible. Submittal of a habitat management plan which demonstrates that the alternatives would not result in significant impacts to the fish and wildlife habitat area (FWHCA) may be required;* *(b) Crossings shall not occur in salmonid spawning areas unless no other reasonable crossing site exists. For new development proposals, if existing crossings are determined to adversely impact salmon spawning or passage areas, new or upgraded crossings shall be located as determined necessary through coordination with the Washington State Department of Fish and Wildlife;* *(c) Bridge piers or abutments shall not be placed either within the floodway or between the ordinary, high water marks unless no other reasonable alternative placement exists;* *(d) All stream crossings shall be designed based on the 100-year projected flood flows, even in non-fish bearing Type Np and*	

Table 3.2.7: In-stream Habitat Management Recommendations

Ns streams. In addition, crossings for Type S and F streams should allow for downstream transport of large woody debris; *(e) Crossings shall serve multiple properties whenever possible; and* *(f) Where there is no reasonable alternative to providing a culvert, the culvert shall be the minimum length necessary to accommodate the permitted activity. Jefferson County Critical Areas Ordinance,18.22.250.* ***Regulatory Example (Stream Restoration):** Allowed Uses. Restoration of streams previously piped or channeled into a new or relocation streambed when part of a restoration plan that will result in equal or better habitat and water quality and quantity, and that will not diminish the flow capacity of the stream or other natural stream processes; provided, that the relocation has a state hydraulic project approval and all other applicable permits. Walla Walla County Critical Areas Ordinance, 18.08.620.*	
Planning Resources	**Design of Road Culverts for Fish Passage:** Washington State Aquatic Habitat Guidelines Program (2003), http://wdfw.wa.gov/hab/ahg/. **Protecting Nearshore Habitat and Functions in Puget Sound:** Washington State Aquatic Habitat Guidelines Program (Envirovision et al. 2007), http://wdfw.wa.gov/hab/nearshore_guidelines/. **In-stream Flow Rules**: State of Washington Department of Ecology, http://www.ecy.wa.gov/programs/wr/instream-flows/isfrul.html.

3.2.8 Floodplain Areas. Flooding is a natural event that can have positive influences on salmonid habitat (e.g., recruitment and redistribution of large woody debris and gravels). However, flooding exacerbated by floodplain development including impervious surfaces and man-made flood control structures (such as levees and dikes) can negatively affect salmonid habitat by increasing sediment loads, increasing point and non-point source pollutants, decreasing access to distributary channels and pocket estuaries, and removing in-stream habitat structures such as large woody debris. Floods have their greatest impact to salmonid populations during incubation where they can scour redds (NMFS 2008).

Habitat functions maintained by floodplain protection include water quality, flow regime, habitat structure, food source, and access.

Floodplain areas are the relatively flat, low-lying areas adjacent to the main channel of a river or stream (May 2003) subject to inundation by the base flood (WDCTED 2003). Floodplains areas also include coastal areas adjacent to marine waters and behind dikes and levees such as isolated distributary channels, pocket estuaries and estuarine marsh habitat.

Protecting floodplain areas is becoming more important than ever as natural flooding events may increase in frequency due to climate change. Climate change evidence includes increases in average air and ocean temperatures, widespread melting of snow and glaciers, and rising sea level (IPCC 2007). In the short-term climate change is affecting the frequency and magnitude of storm events, resulting in unpredictable flooding events. In the long-term, sea level is expected to rise, inundating and regularly flooding the lowest lying areas during the daily tide cycle. Sea level rise will shift coastal beaches inland and increase erosion of unstable bluffs, endangering houses and other structures built near the shore or near the bluff edges. Significant erosion can cause coastal inlets to migrate and lagoons to fill, and may undermine the shoreline armoring constructed to protect against shoreline erosion. Low-lying river deltas, port areas, and ocean beach communities on the Long Beach peninsula of Willapa Bay and the Ocean Shores community near Grays Harbor are known to be at risk (Washington State Climate Advisory Team 2007).

Table 3.2.8: Floodplain Areas Management Recommendations

Policy Considerations	• Prohibit new development in the 100-year floodplain. • Prohibit new dikes, levees, tide-gates, floodgates, pump stations, culverts, dams, water diversions, and other alterations to the floodplain, excepting habitat improvements such as a wider culvert for fish passage. • Develop accurate floodplain mapping, using LIDAR mapping and parcel information to help determine local areas of flood hazard. • Develop flood hazard reduction plans and ordinances. • Identify opportunities for and encourage restoration of side channel habitat for salmonids as mitigation for modifying existing floodplain structures where feasible. • Adhere to the *National Marine Fisheries Service Biological Opinion* (NMFS 2008) list of reasonable and prudent alternatives to prevent and/or minimize the degradation of channel and floodplain habitat[19]. Although, the 2008 biological opinion was issued for the Puget Sound region, the recommendations can be applied statewide to protect salmonid habitat. • Increase opportunities for land exchanges that retain or restore floodplain and delta habitats. • Investigate potential local effects of climate change and consider potential for increased floods. • Require that geotechnical reports associated with shoreline bluff safety incorporate climate change influences predicted over the next 100 years.
Policy Example (Flood Hazard Protection): *Protect flood hazard areas from development and uses that compromise the flow, storage and buffering of flood waters, normal channel functions, and fish and wildlife habitat and to minimize flood and river process risk to life and property. Jefferson County Comprehensive Plan Chapter Eight, Environment Element, Goal 11.* ***Policy Example (Flood Hazard Management Plans):*** *In cooperation with other applicable agencies and persons, the County should continue to develop long term, comprehensive flood hazard management plans, such as the Lower Nooksack River Comprehensive*	

[19] NMFS intends that improved land use controls in flood zones to protect salmon will be a prerequisite for remaining eligible for Federal Emergency Management Act (FEMA) flood insurance (NMFS 2008). CAO and SMP updates may provide local governments with an opportunity to implement the improved land use standards within FEMA flood zones that are intended under the NMFS Biological Opinion, and thus ensure that property owners can obtain FEMA flood insurance.

Table 3.2.8: Floodplain Areas Management Recommendations

<table>
<tr><td colspan="2">Flood Hazard Management Plan, to prevent needless flood damage, maintain the natural hydraulic capacity of floodways, and conserve valuable, limited resources such as fish, water, soil, and recreation and scenic areas. Whatcom County Shoreline Master Program, Flood Control Works and Instream Structures, 23.100.06.

Policy Example (Flood Control): New or expanding development or uses in the shoreline, including subdivision of land, that would likely require structural flood control works within a stream, channel migration zone, or floodway should not be allowed. Whatcom County Shoreline Master Program, Flood Control Works and In-stream Structures, 23.100.06.</td></tr>
<tr><td>Regulatory Considerations</td><td>• Prohibit development in the floodway and 100-year floodplain.
• Designate frequently flooded areas. A critical area report using best available science is required to avoid floodplain alteration.
• If development within the 100-year floodplain is permitted, subject any loss of floodplain habitat to mitigation sequencing provisions. Additionally, indirect adverse effects of development in the floodplain (effects to stormwater, riparian vegetation, bank stability, channel migration, hyporheic zones, wetlands, etc.) must also be mitigated such that equivalent or better salmonid habitat protection is provided. Use Low Impact Development (LID) methods such as those described in the Low Impact Development Technical Guidance Manual for Puget Sound (reduce and disconnect impervious surfaces and retain/restore native vegetation) for permitted development within the 100 year floodplain.
• Where feasible, require removal or set back of flood control structures (e.g., dikes, levees, and other hard armoring impacts), particularly those located along the lower reaches of river systems.</td></tr>
<tr><td colspan="2">Regulatory Example (Flood Storage): Development proposals and alterations shall not reduce the effective base flood storage volume of the floodplain. A development proposal shall provide compensatory storage if grading or other activity displaces any effective flood storage volume. King County Critical Areas Ordinance, 21A.24.240.

Regulatory Example (Flood Control): Flood control works to protect existing development should be permitted only when the primary use being protected is consistent with this Program, and the works can be developed in a manner that is compatible with multiple use of streams and associated resources for the long term, including shoreline ecological functions, fish and wildlife management, and recreation. Whatcom County Shoreline Master Program, Flood Control Works and Instream Structures, 23.100.06.</td></tr>
</table>

Table 3.2.8: Floodplain Areas Management Recommendations

Regulatory Example (Flood Control): *New flood control works are prohibited on estuarine shores, on point and channel bars, and in salmon and trout spawning areas, except for the purpose of fish or wildlife habitat enhancement or restoration. Whatcom County Shoreline Master Program, Flood Control Works and Instream Structures, 23.100.06.*	
Planning Resources	**Biological Opinion on Puget Sound National Flood Insurance Program:** National Marine Fisheries Service (September 22, 2008), *http://www.nwr.noaa.gov/*. **Low Impact Development Technical Guidance Manual for Puget Sound**: Puget Sound Action Team (Hinman 2005), *http://www.psparchives.com/publications/our_work/stormwater/lid/LID_manual2005.pdf*. **Climate Change Streamflow Scenarios:** Climate Impacts Group, University of Washington *http://cses.washington.edu/cig/fpt/ccstreamflowtool/sftscenarios.shtml*.

3.2.9 Channel Migration Zone. Natural flooding conditions are supported when river channels are able to migrate across the floodplain, gradually eroding one bank while depositing sediment along the other. This area, where a stream or river is susceptible to channel erosion and therefore reforming is termed a channel migration zone (CMZ). The CMZ includes lateral, down valley migration, vertical change (aggradation and incision), and avulsions or bend cutoffs. This natural process of a river or stream channel movement creates side channels and off-channel areas that shelter juvenile salmon. A CMZ is different from floodways and floodplains as mapped on Flood Insurance Rate Maps. Floodplains and floodways are focused on inundation, whereas CMZs characterize areas susceptible to channel erosion either within or outside areas prone to flooding (Rappe and Abbe 2003).

Habitat functions maintained by channel migration protection include water quality, flow regime, habitat structure, food source and access.

Most migrating streams move through their alluvial deposits. The term dynamic equilibrium is used to describe an alluvial stream condition where a balance between incoming and outgoing sediment exists. The stream location and channel shape or geometry may change locally but overall deposition and erosion rates are balanced. For example, a stream bend may be in dynamic equilibrium between the erosion rate on the outer bend and the deposition rate on the inner bend or point bar. Consequently, native fish have adapted to the balance of flow conditions and timing of flows and the habitats in the channels (cascades, riffles, runs, pools) and their life histories are tied to such geomorphic and hydrological features.

Natural channel migration provides important habitat functions for salmonids as the water meanders and braids creating side channels and off-channel areas that provide forage, natural cover, rearing and refuge for juvenile salmonids (NMFS 2008). Channel migration also alters habitat structure as water courses erode shoreline vegetation and recruit LWD to the channel. Development and shoreline modifications that result in interference with the process of channel migration may result in a net loss of ecological functions associated with the rivers and streams disrupting off-channel hydrological connections and interfering with recruitment of large woody debris.

Table 3.2.9: Channel Migration Zone Management Recommendations

Policy Considerations	• Delineate channel migrations zones. • Designate channel migration zones as critical areas because they are important fish and wildlife conservation areas. • Minimize adverse impacts in existing channel migration zones by adopting CMZ protection standards. • Discourage new dwelling units or expansion of existing structures within the CMZ. • Limit development and shoreline modifications that would result in interference with the process of channel migration that may result in a net loss of ecological functions associated with the rivers and streams. • Allow no new or expanded channel stabilization projects or other river control structures in the channel migration zone, unless protecting existing essential facilities or increasing habitat through bioengineered restoration. • Encourage the removal or relocation of structures within the channel migration zone to facilitate the natural recovery of channel migration processes that create and maintain salmonid habitat. • Plan for and facilitate removal of artificial restrictions to natural channel migration, restoration of off channel hydrological connections and return river processes to a more natural state where feasible and appropriate.
Policy Example (CMZ Protection): *The county should minimize disruption of long-term stream channel migration processes that allow formation of essential habitat features by prohibiting construction of new structures in channel migration zones and minimizing streambank stabilization. Thurston County Comprehensive Plan Chapter Nine, Environment, Policy D.4.*	
Regulatory Considerations	• Allow no development in CMZ plus 50 feet. Exceptions must be mitigated and not adversely affect water quality, water quantity, flood volumes, flood velocities, spawning substrate, and/or floodplain refugia for listed salmonids. • Allow no fill or disposal of dredge material on shorelands or wetlands within a river's channel migration zones.

Table 3.2.9: Channel Migration Zone Management Recommendations

Regulatory Example (Riparian Buffers): *The Director shall have the authority to increase the width of a stream buffer on a case-by-case basis when such increase is necessary to achieve any of the following...Maintain areas for channel migration. Walla Walla County Critical Areas Ordinance, 18.08.674.* ***Regulatory Example (CMZ Protection):*** *Areas adjacent to critical areas shall be considered to be within the jurisdiction of these requirements and regulations to support the intent of this Chapter and ensure protection of the functions and values of critical areas. Adjacent shall mean any activity located...Within the floodway, floodplain, or channel migration zone; Walla Walla County Critical Areas Ordinance, 18.08.030.*	
Planning Resources	**Channel Migration Assessment:** State of Washington Department of Ecology, *http://www.ecy.wa.gov/programs/sea/sma/cma/index.html*. **Shoreline Master Program Guidelines:** State of Washington Department of Ecology, Chapter 173-26 WAC, *http://www.ecy.wa.gov/programs/sea/sma/guidelines/index.html*.

3.2.10 Landslide Hazard Areas. Steep slopes such as marine bluffs replenish beach substrate which influences the habitat functions salmonids use in nearshore riparian areas. Natural erosion rates of shoreline bluffs provide essential functions by providing beach material ("beach nourishment") and therefore shoreline bluffs should be maintained.

Photo 17: Salmon Beach Landslide, Tacoma

Land use activities, such as timber harvest, impervious surface (including road building), clearing and grading, and cutting into the toe of a slope, can destabilize marine bluffs and increase erosion, causing landslides, and elevating levels of suspended sediments and turbidity. Other land use activities that can accelerate erosion and bluff instability on marine bluffs include irrigating lawns and landscaping, septic system discharges, and disrupted drainages. Designating and protecting landslide hazard areas, such as marine bluffs, is important to maintain salmonid habitat functions in the nearshore environment.

Designating and protecting steep slopes in freshwater habitat areas is also important for salmonid survival. Landslides infrequently occur adjacent to freshwater systems where the landscape is natural. When they do occur in natural systems, they contribute large wood which sorts sediment into suitable spawning gravel and unsuitable fine sediment. In systems that have been managed for timber, agriculture or urban development, landslides deliver sediment to the streams without wood, which smothers spawning gravel.

Habitat functions maintained by landslide hazardous areas protection include water quality, flow regime, habitat structure, food source and access.

Many freshwater riparian hillslope failures that enter stream channels may move considerable distances downstream, removing streamline vegetation and soil. Landslides that reach stream channels can transform into catastrophic debris torrents that can scour headwater channels down to bedrock and create a mass export of sediment and large wood to larger, downstream fish-bearing channels. Although gravel and large woody debris can benefit habitat structure,

highly altered rates of their disturbance and delivery can have negative impacts on whole stream reaches, leading to channel widening, riparian forest degradation, reducing food resources and warming stream temperatures (Cederholm et al. 2000). Human activities that can influence landslides include vegetation removal near and on unstable slopes, cutting into the toe of a slope, altering natural drainage patterns and contributing to surface erosion, and developing within channel migration zones.

Table 3.2.10: Landslide Hazard Areas Management Recommendations

Policy Considerations	• Give special protection to landslide hazard areas that can damage rivers and streams during mass wasting events. • Adopt riparian buffers to retain natural vegetation and prevent development on steep slopes. • Maintain vegetation and control drainage on steep slopes. • Protect marine bluffs to allow natural functions of beach nourishment and avoid elevated levels of suspended sediments and turbidity.
Policy Example (LHA Protection): *The protection of lands where development would pose hazards to health, property, important ecological functions or environmental quality shall be achieved through acquisition, enhancement, incentive programs and appropriate regulations. The following ((natural landscape features)) critical areas are particularly susceptible and should be protected.....Slopes with a grade of 40 percent or more or landslide hazards that cannot be mitigated; King County Comprehensive Plan Chapter Four, Environment, Policy 503.*	
Regulatory Considerations	• Designate and protect marine feeder bluffs as a geologically hazardous area. • Measure buffers on streams with ravines from the edge of the bankfull channel (May 2003). • Prohibit vegetation removal in landslide/geologically hazardous areas, including viewshed clearing. If viewshed pruning is permitted, limbing or crown thinning is in compliance with National Arborist Association pruning standards. • Maintain the top slope of bluffs with native vegetation. • Prohibit the placement of structures on feeder bluffs. Require a geotechnical assessment, reviewed by a third party, for shoreline armoring of feeder bluffs to evaluate problems and analyze potential solutions, including the use of alternative designs (Envirovision et al. 2007). • Prohibit development that alters natural drainage and cuts into the slope, especially the toe. • If modifications must be allowed to prevent an unreasonable hardship on a landowner, require habitat enhancement to protect the integrity, functions, and values of existing anadromous fish habitat (see planning resources for habitat management plan recommendations). Management plans should be prepared by a

Table 3.2.10: Landslide Hazard Areas Management Recommendations

	qualified geologist in consultation with a qualified biologist. • Avoid site development that increases infiltration on unstable and potentially unstable bluffs. Stormwater runoff, both in fresh and marine systems, does not contribute to the erosion of the shoreline. • Require moving structures further back from marine feeder bluffs during redevelopment, provided sufficient land is available. Use smaller lot-line setbacks to accommodate structure relocation where it would protect habitat.
Regulatory Example (Marine Bluff Protection): *Increased marine buffer. The width of the marine buffer shall be increased where there are steep slopes, landslide hazard areas, or inadequate vegetation to protect water quality... Thurston County Critical Areas Ordinance (In Draft), 17.15.830, http://www.co.thurston.wa.us/permitting/.* ***Regulatory Example (Vegetation Retention):*** *Unless otherwise provided in K.C.C. 21A.24.045 or as a necessary part of an allowed alteration, removal of any vegetation from a landslide hazard area or buffer is prohibited; King County Code 21A.24.280.*	
Planning Resources	**Managing Drainage on Coastal Bluffs**: State of Washington Department of Ecology, *http://www.ecy.wa.gov/programs/sea/pubs/95-107/intro.html*. **Puget Sound Landslides:** State of Washington Department of Ecology, *http://www.ecy.wa.gov/programs/sea/landslides/index.html*. **Integrated Streambank Protection Guidelines**: Washington State Aquatic Habitat Guidelines Program (2002), *http://wdfw.wa.gov/hab/ahg/*. **Protecting Nearshore Habitat and Functions in Puget Sound**: Washington State Aquatic Habitat Guidelines Program (Envirovision et al. 2007), *http://wdfw.wa.gov/hab/nearshore_guidelines/*.

3.2.11 Water Quality. Clean, well-oxygenated water is necessary at all stages of life for salmonids to thrive. While climate change may influence water quality over the long-term, most water quality degradation can be attributed to land use development practices. Development removes native vegetation, increases water temperatures, and compromises water quality by causing excessive runoff and stormwater discharge which washes nutrients, contaminants, and toxic materials from impervious surfaces into waterways (R2 Resource Consultants et al. 2000). Though these changes are most noticeable in streams draining highly urbanized watersheds (May et al. 1996), smaller scale development impacts are also important in less urbanized watersheds.

Water quality protection also benefits flow regime, food source and habitat structure.

Other sources of water quality degradation include sewage and septic discharges, direct application of chemicals to tidelands, marine dumping, and airborne contaminants, and mis-application of pesticides and herbicides, all of which introduce toxic substances that may threaten salmonid survival. Aquatic invertebrates (a primary food source for juvenile salmonids) are also strongly affected by water quality.

In addition to chemical properties of water, cool water temperatures are especially important for salmonid survival. As mentioned in section 2.3.2, salmonids thrive at temperatures below 17.5°C (~61°F) (Hicks 2000). Potential conditions leading to elevated water temperatures include loss of shading vegetation, reduced groundwater recharge, and increased nutrient inputs.

Water quantity is another aspect of water quality that supports salmonid habitat functions. As discussed in section 2.3.1, salmonid survival is dependent on adequate stream flow throughout the year. Land use development that alters impervious surface cover, results in stream channelization, or otherwise diverts the natural flow of water can have detrimental consequences for salmonid development through all life stages.

Table 3.2.11: Water Quality Management Recommendations[20]

Policy Considerations	• Identify water quality and hydrologic processes within jurisdictions, including water quantity problems, stream flow issues, important groundwater recharge areas and natural storage areas, and existing pollutant sources. • Maintain or restore the natural sources, storage, delivery, and routing of surface water, groundwater, sediments, and nutrients. • Protect and promote healthy riparian areas, groundwater recharge areas, and natural storage areas. • Classify and map critical aquifer recharge areas. • Develop short and long-term strategies where water quality problems are known to exist. • Develop local ordinances to protect water quality. • Make efficient use of recycled water. • Consider new technologies and planning techniques for wastewater and stormwater treatment that may also benefit salmonids. • Promote low-impact development techniques for all new development and redevelopment (see section 3.2.2 stormwater management recommendations, for more information). • Promote water conservation practices on individual development sites, including water-wise landscaping practices, on-site water reclamation and reuse, as well as rainwater catchment. • Encourage water reclamation and reuse at public wastewater treatment plants to enhance stream flows in water quantity-limited watersheds. • Participate in regional water quality monitoring efforts. • Prohibit pesticide/herbicide use in riparian and wetland buffers. (Include exemptions for noxious weed control State of Washington Department of Ecology-approved activities and pesticides approved by the EPA for use near aquatic systems). • Review and consider planning and development-related recommendations in TMDL (total maximum daily load)

[20] See also Table 3.2.2 Stormwater Runoff Management Recommendations.

Table 3.2.11: Water Quality Management Recommendations[20]

	implementation and local watershed management plans as administered by the State of Washington Department of Ecology pursuant to the Watershed Management Act (Chapter 90.82 RCW). • Adopt a ground water management program designed to protect ground water quality, to ensure ground water quantity, and to provide for efficient management of water resources within a designated ground water management area or subarea and developed pursuant to Chapter 173-100 WAC. • Plan for and implement public sewer and water line extensions in synchrony to prevent alteration of water system balances, particularly in small watersheds where surface waters are fed by shallow groundwater aquifers. Extension of sewer lines into areas on private wells, can lead to the net export of water from a subbasin, reducing downstream surface water flows. • Consider water reclamation and reuse plans that return clean, reclaimed water to streams higher in a watershed for the benefit of in-stream aquatic resources consistent with local multi-stakeholder watershed plans. • Encourage the adoption of water metering to educate watershed residents on water use and conservation measures. • Develop educational programs that promote the use of Low Impact Development principles and practices among developers, builders and homeowners to better manage stormwater and maintain and improve water quality of surface and groundwaters.
Policy Example (Water Quality Protection): *Shoreline uses and modifications should be designed and managed to prevent degradation of water quality and alteration of natural conditions. Whatcom County Shoreline Master Program, Aquatic Shoreline Area, 23.30.11.* ***Policy Example (Water Quality Protection):*** *The location, construction, operation, and maintenance of all shoreline uses and developments should maintain or enhance the quantity and quality of surface and ground water over the long term. Whatcom County Shoreline Master Program, Water Quality and Quantity, 23.90.04.* ***Policy Example (Pollution Prevention):*** *Shoreline use and development should minimize the need for chemical fertilizers, pesticides or other similar chemical treatments to prevent contamination of surface and ground water and/or soils, and adverse effects on shoreline ecological functions and values. Whatcom County Shoreline Master Program, Water Quality and Quantity, 23.90.04.* ***Policy Example (Stream Flow Assessment):*** *The county should determine, based on watershed plans, if there are areas where low*	

Table 3.2.11: Water Quality Management Recommendations[20]

summer stream flows or elevated instream water temperature may, now or in the future, imperil anadromous or native resident fish. If such areas are identified, the county should devise and implement development restrictions and management practices as necessary to sustain the fish. Thurston County Comprehensive Plan Chapter Nine, Environment, Policy B.3.	
Regulatory Considerations	• Require water quality/habitat monitoring when development projects unavoidably impact wetland or stream-riparian habitats. • Require critical area reports prepared by a qualified professional for development projects which have the potential for adverse impacts on surface or ground water quality or quantity. These critical area reports should link to any local water quality assessment available through the State of Washington Department of Ecology or other local agency, and prescribe mitigation and monitoring. • Require Best Management Practices (BMPs) in areas supporting critical salmonid habitat including shorelines and riparian zones, to protect water quality. BMPs include: — Control soil loss and reduce water quality degradation caused by high concentrations of nutrients, animal waste, toxics, and sediment using techniques that prioritize source control over water quality treatment/filtration; — Prevent adverse impacts to surface water and ground water flow, circulation patterns, and to the chemical, physical, and biological characteristics of wetlands; — Protect trees and vegetation designated to be retained during and following site construction; and — Provide, monitor and enforce appropriate standards for proper use of chemical herbicides within critical areas. — Prohibit discharge of pollutants into stormwater systems, and regulate runoff from new development, redevelopment, and construction (see stormwater runoff section 3.2.2). • Adopt provisions to protect the hyporheic zone that contains some portion of surface waters, serves as a filter for nutrients, and maintains water quality (see regulatory consideration in section 3.2.3 riparian areas management recommendations and section 3.2.7 in-stream habitat management recommendations). • Adopt riparian and wetland buffer widths that accommodate water quality and aquatic habitat functions as indicated in best available science guidance, including WDFW riparian management recommendations and State of Washington Department of Ecology wetlands management guidance.

	• Require shoreline modifications are required to be constructed of materials that will not adversely affect water quality or aquatic plants and animals.
Regulatory Example (Hydrogeologic Assessment): *For all proposed activities to be located in a critical aquifer recharge area, a critical area report shall contain a level one hydrogeological assessment. A level two hydrogeologic assessment shall be required for any of the following proposed activities: Any other activity determined by the Director likely to have an adverse impact on ground water quality or quantity or on the recharge of the aquifer. Walla Walla County Critical Areas Ordinance, 18.08.230.* ***Regulatory Example (Pollution Prevention):*** *All materials that may come in contact with water shall be constructed of materials, such as untreated wood, concrete, approved plastic composites or steel, that will not adversely affect water quality or aquatic plants or animals. Materials used for decking or other structural components shall be approved by applicable state agencies for contact with water to avoid discharge of pollutants from wave splash, rain, or runoff. Wood treated with creosote, copper chromium arsenic or pentachlorophenol is prohibited in or above shoreline water bodies. Whatcom County Shoreline Master Program, Water Quality and Quantity, 23.90.04.*	
Planning Resources	**Water Quality:** State of Washington Department of Ecology Temperature Standards and Criteria, *http://www.ecy.wa.gov/programs/wq/swqs/temperature.html*; Frequently Asked Questions about Protecting High Quality Waters in Washington, *http://www.ecy.wa.gov/biblio/0810001.html*; Water Quality Assessments, *http://www.ecy.wa.gov/programs/wq/303d/2008/index.html; and Water Clean-up Plans, http://www.ecy.wa.gov/programs/wq/tmdl/TMDLsbyWria/TMDLbyWria.html.* **Watershed Management Plans:** State of Washington Department of Ecology *http://www.ecy.wa.gov/biblio/watershed.html*. **Protecting Nearshore Habitat and Functions in Puget Sound:** Washington State Aquatic Habitat Guidelines Program (Envirovision et al. 2007), *http://wdfw.wa.gov/hab/nearshore_guidelines/*. **Marine and Estuarine Shoreline Modification Issues and Overwater Structures**: Washington State Aquatic Habitat Guidelines Program White Papers, *http://wdfw.wa.gov/hab/ahg/ahgwhite.htm*. **Septic System Resources:** Puget Sound Partnership, *http://www.psparchives.com/our_work/waste/septics.htm*.

3.3 Additional Regulatory and Programmatic Management Recommendations

3.3.1 Comprehensive Planning. Comprehensive planning is the primary tool to address future land use and the intensity of development across a landscape. Comprehensive planning operates at different scales, from county-wide, to watersheds, to smaller scale planning areas such as sub-areas. At each scale, considering how landscape-level processes are impacting salmonid habitat is important. Comprehensive county-wide planning may inform decisions that need to be made at the watershed scale which in turn informs decisions at the site scale. For example, a watershed with salmonid-bearing streams would receive a land use designation that would ensure zoning densities and impervious surface limits were set at a threshold to avoid impacts such as stream channel enlargement and instability, stream bank erosion and fine sediment production and streambed scour and fine sediment deposition (May 2009). Site-specific development regulations, such as riparian buffers, would be tailored to support impervious surface limits and protect stream channels.

Guidance documents and planning tools available from the Washington Department of Fish and Wildlife and the State of Washington Department of Ecology can assist with this landscape-level approach to understanding how changes to ecosystem processes in different parts of the landscape have "downstream" effects on salmonids.

Watershed Planning Resources:
Chris May's literature review of watershed processes and aquatic resources,
Hhttp://wdfw.wa.gov/hab/watershed_aquaticreview.htmH;
Ecology's Landscape Planning page, including information on watershed characterization,
Hhttp://www.ecy.wa.gov/mitigation/landscapeplan.htmlH; and
WDFW's information page on Local Habitat Assessments,
Hhttp://wdfw.wa.gov/habitat/lha/index.htmlH.
The Puget Sound Partnership has identified watershed assessment as a key tool to prioritizing protection and restoration actions and land use decision-making across the landscape (Action Agenda item A.1.3,

Comprehensive Plans often include several related plans or sections (e.g., Subarea Plan, Wastewater Facilities Plan, Water System Plan, Special Purpose District Plans, etc.) that may be adopted by reference, incorporated within the plan or otherwise guide project management (e.g., Transportation Improvement Programs). Because related plans are developed by a variety of departments, they may not be developed with salmonid habitat protection in mind. To remedy this potential inconsistency, a policy should be established that related plans adopted by reference to the Comprehensive Plan address salmonid habitat protection and restoration priorities as outlined in the Comprehensive Plan.

3.3.2 Zoning. Zoning establishes uses and development intensities across the landscape consistent with the local comprehensive plan. The zoning ordinance includes use districts and densities that set the foundation for all future land use decisions (subdivision, maximum allowable impervious surface, working lands, urban areas, building design, etc.). Therefore, zoning districts have a significant influence on protecting salmonid habitat. Below are several considerations for establishing zoning districts.

- Set densities that are appropriate to salmonid habitat needs within the district and the watershed as a whole. In areas where adjoining local jurisdictions share responsibility to protect the health of a particular watershed, work together to assure that densities are set that reflects the needs of the entire watershed.
- Establish overlay districts to reflect channel migration zones and other biodiversity areas protecting salmonid habitat.
- Limit conditional and special uses in salmonid habitat conservation areas.
- Allow flexible density and lot configuration to protect habitat areas.
- Review rezone proposals in priority salmonid recovery watersheds (as identified in salmon recovery plans) with heightened scrutiny. Ensure rezones give proper consideration to the capacity of the land to support human densities and public infrastructure, while maintaining the productive capacity of salmonid as well as other fish and wildlife habitat.

3.3.3 Subdivision Code. Regulations over the division of land often can influence salmonid habitat protection. Land division impacts critical salmonid habitat because it increases density and creates multiple owners, each with a different idea about how to use their land. For example, adjacent landowners may share the same wetland. One landowner may have retained the natural vegetative buffer and has avoided using any pollutants such as lawn fertilizers. Another neighbor sharing the same wetland system, may have cleared a lawn up to the water's edge and treats their landscaping with heavy chemicals that runoff into the water, therefore diminishing the habitat benefits provided by their neighbor. Examples of provisions to improve management of salmonid habitat conservation areas when subdividing parcels are listed here:

- Avoid subdivision of land that is wholly located within a salmonid habitat area (e.g., riparian or wetland buffers); require mitigation when subdivision cannot be avoided.
- Allow for flexible subdivision design, such as cluster development[21], planned unit development, or conservation subdivisions that set aside habitat conservation areas into reserve tracts with one set of management recommendations. Habitat management plans for open space tracts should provide for long term stewardship.

> ***Subdivision Example (Cluster Development):*** *Skagit County Conservation and Reserve Developments (CaRDs) encourage open space retention of critical areas by providing a density bonus when homes are grouped on smaller lots and large areas of open space are set-aside (Skagit County Code 14.18.300).*

- Allow flexibility in lot size and configuration, including on-site density transfers to protect habitat patches and corridors.
- Encourage developers to locate open space tracts adjacent to other open space and/or contiguous with other protected fish and wildlife habitat corridors.

[21] Incentives for clustering housing do not necessarily require a density bonus. Other incentives may include fast-track permitting or transfer of development rights. Density bonus incentives should be carefully reviewed to ensure the outcome to improve management of salmonid habitat conservation areas.

- Provide agency and public review for all rural subdivisions (e.g., does not exempt large lot segregations from review).

3.3.4 Clearing and Grading Ordinance. Clearing and grading occurs early in the development process and planning and site management choices at this stage can have a major impact on salmonid habitat conservation areas. Impacts to avoid or mitigate include increasing erosion and sedimentation, reducing slope stability, increasing soil compaction, damaging sensitive and critical areas, and disrupting flow regime. Examples planning provisions for clearing and grading are listed below. (For more information see the Washington State Department of Commerce Technical Guidance Document for Clearing and Grading in Western Washington, *http://www.commerce.wa.gov/site/420/default.aspx*.)

- Clearing and grading permits should assess how to manage important habitat patches and connectivity and minimize vegetation disturbance.
- Adopt a clearing and grading ordinance or site alterations ordinance to limit the impacts of sediment-laden runoff to local streams and wetlands. When clearing is essential, encourage the practice of uprooting and retaining whole trees for later use as large woody debris in habitat projects by offering incentives such as fast-track permitting or mitigation credits.
- Avoid clearing and development in riparian zones.
- Limit clearing and grading to that necessary for establishment of the use or development. Clearing and grading should avoid significant adverse impacts and minimize the alteration of the volume, rate or temperature of freshwater flows to or within the habitat area and any buffer.
- Clearing and grading permits should be identified with future actions (as opposed to isolated actions).

3.3.5 Building Code. Building materials and associated construction impacts can also impact salmonid habitat conservation areas. Example provisions to include in the building code are listed here:

- Incorporate Low Impact Development techniques such as "green building" for areas of high fish and wildlife diversity to reduce water use and release of toxins from building materials.
- Include a building setback of at least 15 feet from habitat buffers.

3.3.6 Road Standards. Road development can impact salmonid habitat in a variety of ways including severing connections between streams and adjacent floodplain networks, converting subsurface to surface flow by intercepting groundwater flowpaths and diverting flow to streams, thereby increasing run-off, "flashiness" and erosion. Carnefix and Frissell (2009) summarize many of these impacts in a literature review titled, Aquatic and Other Environmental Impacts of Roads: The Case for Road Density as Indicator of Human Disturbance and Road-Density Reduction as Restoration Target; A Concise Review. This study found that road densities of greater than 1 road per square mile result in highly significant impacts to aquatic resources. In upland areas of influence on salmonid habitat, maintaining low road densities through comprehensive planning and development regulations can help reduce these impacts. But capital projects such as road building and maintenance are often managed by departments separate from departments that plan zoning, critical area ordinance or shoreline master program amendments. Therefore, road design standards can be disconnected from habitat protection priorities.

Below is an example of road standard considerations to protect salmonid habitat protection. Additional recommendations regarding in-stream crossings are listed in Table 3.2.7, In-stream Habitat Management Recommendations.

- Encourage use of Low Impact Development techniques during the site planning and layout phase of a project, particularly in areas of high aquatic species diversity or salmonid-bearing streams. Examples of these techniques include narrower road widths and the use of pervious paving materials.
- Avoid construction in, or clearing of, riparian areas.
- Enhance riparian habitat when it is reasonable to do so while working on adjacent county roads.

Regional Road Maintenance Program:
*The H**Regional Road Maintenance ESA Program HGuidelinesH** were developed by several agencies in Washington state to assist local governments in meeting ESA take rules for road maintenance projects and in implementing the program. The National Marine Fisheries Service has approved an ESA 4(d) limit for road maintenance that is carried out in accordance with the program guidelines to conserve listed salmonids. The Regional Road Maintenance ESA Program Guidelines describes physical, structural, and managerial best management practices designed so that when they are used, singularly or in combination, they reduce road maintenance activities' impacts on water and habitat.*

- Control drainage by directing road runoff onto forest floor before reaching a stream.
- Ensure road maintenance practices avoid direct or indirect entry of herbicides or pesticides into aquatic waters. Allow flexible road design in rural areas.
- Petroleum based substances should be prohibited to reduce dust on rural un-paved roads.

3.3.7 Agricultural Activities. Agricultural activities have the potential to preserve important habitat and watershed processes for salmonids, if carefully managed. Some of the potential impacts of agricultural production to avoid include the removal of streamside vegetation, livestock access to waterways, and farm runoff such as chemical and nutrient fertilizers, pesticides, and fine sediments. Non-regulatory approaches to addressing these impacts are highlighted here (see footnote 8 in section 2.4.2 for more information).

- Encourage new agricultural activities follow Best Management Practices that when used collectively provide riparian protection, source control and filtration to prevent contributing pollutants to surface and ground waters to conserve important habitat areas for salmonids while maintaining working lands.

- Work with the Natural Resources Conservation Service, United States Department of Agriculture Farm Service Agency and local Conservation District to discuss Farm Bill and other incentive programs for habitat enhancements on agricultural lands.

> H***Wildlife Habitat Incentives Program (WHIP)***H*:*
> *The purpose of this program is to assist landowners who want to establish and improve aquatic or upland wildlife habitat. Projects with declining wildlife species are given priority. WHIP provides assistance to conservation-minded landowners who are unable to meet the specific eligibility requirements of other USDA conservation programs. The NRCS works with the participant to develop a wildlife habitat plan that typically lasts 5 to 10 years. WHIP agreements between generally last from 5 to 10 years. The program provides up to 75% cost sharing. Participants voluntarily limit future use of the land for a period of time, but retain private ownership. An important note regarding salmon conservation: The Salmon Habitat Restoration Initiative is authorized under WHIP in 5 states (Alaska, California, Maine, Oregon, and Washington). Landowners have flexible options for 1 to 15+ year agreements. Projects include riparian restoration, fish passage barriers, restoring gravel spawning beds, and reducing agricultural runoff.*

- Encourage the development of farm management plans to limit animal access to waterways, fence off and concentrate agricultural activities away from streams, wetlands, and riparian areas, and prevent water runoff of farm or animal waste to streams.

> ***Agricultural Activity Example (CREP):*** *The Washington State Conservation Reserve Enhancement Program (CREP) provides incentives to property owners to restore and improve salmon and steelhead habitat on private land by planting native trees, shrubs, and grasses along streams that support salmon or steelhead. The program is jointly managed by the Farm Service Agency and the H**Washington State Conservation Commission**H. Contact your local Conservation District for more information.*

- Encourage vegetation retention and restoration in riparian areas (see Conservation Reserve Enhancement Program (CREP) cited in the previous example).

3.3.8 Forest Practices. Chapter 76.09 RCW grants the authority to the Washington Department of Natural Resources to permit timber harvest on non-federal public and private forest lands in Washington State. In some counties a transfer of jurisdiction to the local government has occurred for non-commercial forest practices due to the number of forest land conversions (Class IV special permits). These governments include Clark, King, Spokane, Mason, Pierce, and Thurston Counties; and the cities of Port Townsend and Bonney Lake. Other jurisdictions will be taking over this authority in the coming years. More information available at: *http://www.dnr.wa.gov/forestpractices/*.

The ***Forest and Fish Report*** of 1999 recommends adaptive management techniques to improve forest practices affecting water quality and salmonid habitat. To address cumulative impacts to the watershed resulting from forest practices, watershed administrative units were established and a watershed analysis is to be performed based on a physical and biological inventory. Cumulative effects have been defined as "the changes to the environment caused by the interaction of natural ecosystem processes with the effects of two or more forest practices." These changes may be taken to include effects on water quality, wildlife, fish habitat, and other public resources. More information available at:
http://www.dnr.wa.gov/Publications/fp_wsa_manual_toc.pdf.

Local governments administering non-commercial forest practices can influence salmonid habitat protection as follows:

- Follow management recommendations outlined in Forest and Fish Report and Watershed Analysis Manual.
- Adopt forested riparian buffers to reduce the delivery of eroded suspended material to streams. See WDFW Riparian Management Recommendations for more information (Knutson and Naef 1997).
- Follow the same example policy and provisions outlined above under "Recommendations for Protecting Salmonid Habitat in Local Planning"

(maintaining riparian protection zones, protecting water quality, reducing sediment input, leaving large woody debris, prohibiting in-stream alterations such as roads and bridges and coordinating mitigation with salmon recovery plans).

- Encourage salmonid habitat protection when forest land is converted to non-forestry use. A county, city, town, or regional government must place a six-year development moratorium on lands converted to non-forestry use (RCW 76.09.060). This moratorium may be lifted if mitigation measures, approved by the jurisdiction, are followed. These mitigation measures could include riparian restoration on potential or known salmonid bearing streams as identified in salmon recovery plans. Local forest land conversion rules must be consistent with critical areas rules.

3.3.9 Rule Exceptions (Exemptions, Reasonable Use Exceptions and Variances). Most codes include standards that allow a landowner to do something they could not otherwise do. Permitting an otherwise unacceptable use on a property will likely fall into one of three categories: exemption (often used to accommodate emergency situations), reasonable use exception (often used to accommodate circumstances when allowed uses would deny a landowner all reasonable use of their property), or variance (often used when special conditions and circumstances exist). Exemptions, reasonable use exceptions, and variances should be used sparingly and only permitted if extraordinary circumstances are shown and the public interest suffers no detrimental effect. Below is a list of recommendations for managing rule exceptions.

- Require a public hearing and public review process for variances and reasonable use exceptions. Regional salmon recovery boards and other watershed organizations can be added to mailing lists for hearing notices, as these groups can provide perspective on how a variance or RUE may relate to local salmon recovery goals or projects.
- Limit exceptions to salmonid habitat protection rules in accordance with Washington State Department of Commerce Critical Areas Assistance Handbook recommendations (WDCTED 2003).
- Use reasonable methods as determined in a habitat management plan prepared by a qualified professional to avoid potential impacts to

salmonid habitat conservation areas consistent with best available science for all rule exceptions.

- Require a Shoreline Variance consistent with Chapter 90.58 RCW for Shoreline Master Program variances requests.
- In situations where a reasonable use or variance cannot be avoided, determine and mitigate cumulative impacts using a habitat management plan prepared by a qualified professional. Mitigation is used to further restoration and protection objectives.

3.3.10 Incentive Programs. Policies can also be adopted that direct county departments to use incentives and flexible approaches to encourage wetland and riparian protection (e.g., proper use of buffer averaging[22], long-term stewardship incentives). Incentives and innovative approaches to salmonid protection and recovery include tax reductions, transfer and purchase of development rights, fee reduction programs, streamlined permitting for stewardship activities, and financial assistance for stewardship activities, to name a few. Example incentive policies are listed here:

- Use transfer of development rights or other easement programs or incentives to encourage retention of appropriate agriculture, forestry, and open space uses of the floodplain and infill of urban lands.

> ***Incentive Program Example (TDR):***
> H***King County Transfer of Development Rights Program***H
> *protects habitat for federal listed endangered or threatened species (King County Code 21A.37).*

- Direct mitigation, including off-site and compensatory mitigation, towards critical habitat areas and recovery needs for salmon.

[22] Flexibility in buffer widths is sometimes appropriate for riparian or wetland habitat protection in the developed landscape. Processing buffer reduction/averaging as variances, with a hearing, allows citizens and agencies to be notified about the proposed reduction or averaging and provide comment about potential, unforeseen impacts to fish and wildlife resources. It also allows the buffer reduction or averaging to be reviewed for consistency with best available science.

- Where shorelines have been modified, provide incentives to encourage redevelopment activities to include salmonid habitat restoration.
- Support removal and control of noxious weeds in shoreline areas (consult with local conservation districts for native species for replacement).
- When habitat impacts cannot be mitigated on-site, participate in off-site mitigation programs to prevent habitat loss in a subbasin. Off-site mitigation programs should be limited to the subbasin and be consistent with watershed and salmon recovery plan priorities.

> ***Mitigation Program Example:***
> *Clark County has developed a H**Mitigation Opportunities Project**H to provide off-site mitigation when avoidance and on-site mitigation to prevent or reduce development impacts cannot be achieved. Examples of off-site mitigation include voluntary contributions to a cumulative effects fund (in-lieu fee), finding and restoring a site through a mitigation marketplace, or using wetland banking credits. The mitigation marketplace allows landowners to shop for off-site mitigation in the sub basin that matches the characteristics of the on-site impacted parcel. The matching sites must have similar environmental character, meet watershed restoration plan goals, and be registered in the system by a landowner interested in selling, donating, or leasing to other parties looking for mitigation sites.*

- Adopt a Public Benefit Rating System (PBRS) Open Space Tax Program (RCW 84.34.055) to allow property owners a tax incentive to protect critical salmonid habitat on their property.

> ***Incentive Program Example (PBRS): HThurston County Public Benefit Rating System**H offers a tax reduction (50-90%) for 5 acres or more of open space in critical areas*

- Adopt incentives (such as lower or no impact fees, fast track permitting to streamline and simplify the permitting process) for green building,

redevelopment, brownfields development and infill, that would protect or improve salmonid habitat.

- Adopt a Conservation Futures (RCW 84.34.230) tax levy to secure funds for critical salmonid habitat.
- Coordinate with landowner incentive programs (local, state and federal) including Farm Bill and Lead Entity identified restoration sites and other Watershed mitigation and restoration efforts such as watershed characterizations coordinated by the State of Washington Department of Ecology and Local Habitat Assessments coordinated by the Washington Department of Fish and Wildlife. More information on these planning tools is listed below under zoning information.

3.3.11 Outreach Programs. Outreach programs educate the public about the importance of salmonid protection and recovery. They can also be used to educate landowners, realtors and builder and developer organizations about ways they may assist through low impact development practices. Example outreach policies are listed here:

- Build awareness, capacity, and support for stewardship of healthy watersheds and salmonid populations through outreach, partnerships, training, education, community events, and recognition awards; provide technical assistance and encourage stewardship involving builder and developer organizations, landowners, citizens, associations, realtors, community groups, and others.
- Conduct public outreach and education: develop and distribute educational materials, promote active school participation in salmon-related activities, host classes and workshops for citizens and community groups, coordinate volunteer activities, maintain a website containing watershed information.

3.4 Implementation and Monitoring

Once a jurisdiction has adopted policies and provisions to protect and restore salmonid habitat, successful implementation occurs during project review. Experienced, well-trained permit writers and planners will enable the implementation of special considerations to protect anadromous fish resources

and all salmonids. These planners will ensure that exemption, reasonable use exception and variance language is implemented consistently and tied to mitigation to ensure no net loss to salmonid habitat functions. There are numerous opportunities for advanced training in environmental science (such as salmonid ecology, shoreline ecology) and land use (GMA/SMA) for planners. Example training programs include:

- ***Department of Commerce short course on local planning***
- ***State of Washington Department of Ecology Coastal Training Program***
- ***Northwest Environmental Training Center***
- ***Planning Association of Washington***
- ***American Planning Association Conferences***.

Monitoring land use activities (especially mitigation projects), is an important action local governments can take to ensure regulations are succeeding at protecting salmonid habitat. One way to measure the success of salmonid protection programs is to conduct an annual audit of development permits that includes a ground-truth component. The audit can be used to inform adaptive management recommendations to improve the implementation of existing policies and rules.

Monitoring components to consider include:

1) Are regulations achieving no net loss to salmonid habitat protection? If not, why not?
2) How many exemptions, reasonable use exceptions and variances have been granted?
3) What types of development permits were granted exemptions?
4) What are the cumulative impacts associated with these exemptions?
5) Were habitat management plans administered to offset cumulative impacts? Was the result no net loss to salmonid habitat function? If not, why not.
6) Were mitigation measures coordinated with salmonid recovery and watershed management plan priorities?

7) Were mitigation measures enforced? If not, why not? Establishing and funding an enforcement program demonstrates a willingness to defend the policies and regulations adopted and implemented by the local government to protect public natural resources, such as salmonid habitat.

> ***Monitoring Program Examples:***
> H*The*H *effectiveness of specific habitat restoration actions is being evaluated in nine H**Intensively Monitored Watersheds***H, *including the Asotin watershed in southeast Washington. Intensively monitored watershed projects are designed to tie cumulative restoration actions within a basin or watershed to the actual improvement in fish production and carrying capacity.*
>
> *The H**San Juan Initiative***H *has evaluated the combined effectiveness of the various existing programs and efforts to manage shoreline development in San Juan County. To identify management program gaps and how to address them, the Initiative completed a report comparing existing shoreline development to permitted development and reviewed a small field sample to assess percent of projects out of compliance with permit conditions.*
>
> *As the regional salmon recovery entity for Puget Sound Chinook, the H**Puget Sound Partnership***H *is also working to implement a monitoring and adaptive management strategy within each*

In addition to salmonid specific policies and regulations, a local jurisdiction needs to have adequate performance and review procedures in place to make salmonid protection and recovery a reality. The Washington State Department of Commerce has developed example language in the *Critical Areas Assistance Handbook* (WDCTED 2003) that addresses general provisions necessary to ensure enforcement of salmonid specific provisions.

3.5 Conclusion: Protecting a Northwest Icon

Salmonids are an icon of Northwest tribal culture and intertwined in the identity of many communities. They contribute to our economy, inform us of the health of our environment, and are linked to the abundance of other species in both aquatic and terrestrial ecosystems. They sustain fisheries, food distribution and retail jobs to support our economy. They act as an indicator of ecosystem health because just like humans, they need clean water, food, shelter, safety and access to resources to subsist and prosper. They support the existence of many other species such as orca whales and bald eagles and contribute to creating habitat functions both in streams by moving substrate and in riparian zones by fertilizing vegetation with their carcasses.

> *When we try to pick out anything by itself, we find that it is bound fast, by a thousand invisible cords that cannot be broken, to everything in the universe."*
> *– John Muir*

Local governments, particularly land use planning departments, are in a unique position to restore and protect salmonid habitat and help return these iconic fish to thriving numbers by implementing policies and regulations modeled in this guidance document.

LITERATURE CITED

Aetkin, J.K. 1998. The Importance of Estuarine Habitats to Anadromous Salmonids of the Pacific Northwest: A Literature Review. US Fish and Wildlife Service. 25 pp.

Bargmann, G. 1998. Forage Fish Management Plan: A Plan for Managing the Forage Fish Resources and Fisheries of Washington. Washington Department of Fish and Wildlife. *http://wdfw.wa.gov/fish/forage/manage/foragman.pdf*. 77 pp.

Beechie, T.J., and Sibley, T.H. 1997. Relationship between Channel Characteristics, Woody Debris, and Fish Habitat in Northwestern Washington Streams. Transactions of the American Fisheries Society 126: 217-229.

Beschta, R.L., M.R. Pyles, A.E. Skaugset, and C.G. Surfleet. 2000. Peakflow Responses to Forest Practices in the Western Cascades of Oregon, USA. Journal of Hydrology 233: 102-120.

Bisson, P.A., R.E. Bilby, et al. (1987). Large Woody Debris in Forested Streams in the Pacific Northwest: Past, Present, and Future. *In* O.E. Salo and T.W. Cundy, Eds. Streamside Management: Forestry and Fish Interactions. College of Forest Resources, University of Washington. Seattle, WA. Pp. 143-190.

Bjornn, T.C. and D.W. Reiser. 1991. Habitat Requirements of Salmonids in Streams. *In* W.R. Meehan ed. Influences of Forest and Rangeland Management on Salmonid Fishes and their Habitats. American Fisheries Society Special Publication 19: 83-138.

Booth, Derek B. 2000. Forest Cover, Impervious-Surface Area, and the Mitigation of Urbanization Impacts in King County, Washington. King County Water and Land Resources Division. 18 pp.

Brennan, J.S. and H. Culverwell. 2004. Marine Riparian: An Assessment of Riparian Functions in Marine Ecosystems. Published by Washington Sea Grant Program, Seattle, WA. 34 pp.

Brennan, J.S., K.F. Higgins, J.R. Cordell, V.A. Stamatiou. 2004. Juvenile Salmon Composition, Timing, Distribution, and Diet in Marine Nearshore Waters of Central Puget Sound 2001-2002. King County Department of Natural Resources and Parks, Seattle, WA. 164 pp.

Buchanan, J.B., D.H. Johnson, E.L. Greda, G.A. Green, T.R. Wahl, and S.J. Jeffries. 2001. Wildlife of Coastal and Marine Habitats. *In* Wildlife-Habitat Relationships in Oregon and Washington, Oregon State University: 389-417.

Carnefix, G. and C. A. Frissell.2009. Aquatic and Other Environmental Impacts of Roads: The Case for Road Density as Indicator of Human Disturbance and Road-Density Reduction as Restoration Target; A Concise Review. Pacific Rivers Council Publication 09-001, Portland, OR and Polson, MT.
http://pacificrivers.org/science-research/resources-publications/roads.

Cederholm, C.J., D.H. Johnson, R.E. Bilby, L.G. Dominguez, A.M. Garrett, W.H. Graeber, E.L. Greda, M.D. Kunze, B.G. Marcot, J.F. Palmisano, R.W. Plotnikoff, W.G. Pearcy, C.A. Simenstad, and P.C. Trotter. 2000. Pacific Salmon and Wildlife – Ecological Contexts, Relationships, and Implications for Management. Special Edition Technical Report, Prepared for D.H. Johnson and T.A. O'Neil (managing directors), Wildlife-Habitat Relationships in Oregon and Washington. Washington Department of Fish and Wildlife, Olympia, Washington.
http://wdfw.wa.gov/hab/salmonwild/. 138 pp.

Chamberlin, T.W., R.D. Harr, and F.H. Everest. 1991. Timber Harvesting, Silviculture, and Watershed Processes. *In* W.R. Meehan [ed.]. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Society Special Publication 19: 181-205.

Crispin, V. House, R., and D. Roberts. 1993. Changes in Instream Habitat, Large Woody Debris, and Salmon Habitat after the Restructuring of a Coastal Oregon Stream. North American Journal of Fisheries Management 13: 96-102.

EnviroVision, Herrera Environmental, and Washington State Aquatic Habitat Guidelines Program. 2007. Protecting Nearshore Habitat and Functions in Puget Sound: An Interim Guide. *http://wdfw.wa.gov/hab/nearshore_guidelines/*. 129 pp.

Everest, F.H., R.L. Beschta, J.C. Scrivener, K.V. Koski, J.R. Sedell, and C.J. Cederholm. 1987. Fine Sediment and Salmonid Production: A Paradox. *In* Salo and Cundy ed. Streamside Management: Forestry and Fishery Interactions. University of Washington, Institute of Forest Resources Contribution 57: 98-142.

Fresh, K.L. 2006. Juvenile Pacific Salmon in Puget Sound. Puget Sound Nearshore Partnership Report No. 2006-06. Published by Seattle District, U.S. Army Corps of Engineers, Seattle, Washington.
http://pugetsoundnearshore.org/technical_reports.htm. 21 pp.

Gende, S.M., R.T. Edwards, M.F. Wilson, and M.S. Wipfli. 2002. Pacific Salmon in Aquatic and Terrestrial Ecosystems: BioScience, v.52, No.10: 917-928.

GeoEngineers. 2005. Examples of Regulatory Language for Nearshore and Marine Shoreline Protection. Published by the Puget Sound Action Team.
http://www.mrsc.org/subjects/environment/criticalpg.aspx. 53 pp.

Good, T.P., R.S. Waples, and P. Adams (editors). 2005. Updated Status of Federally Listed ESUs of West Coast Salmon and Steelhead. U.S. Department of Commerce, NOAA Technical Memorandum: NMFS-NWFSC-66. 598 pp.

Governor's Salmon Recovery Office (GSRO). 1999. Statewide Strategy to Recover Salmon, Extinction is not an Option.
http://www.governor.wa.gov/gsro/publications/strategy/default.asp. 324 pp.

Granger, T., T. Hruby Ph.D., A. McMillan, D. Peters, J. Rubey, D. Sheldon, S. Stanley, and E. Stockdale. 2005. Wetlands in Washington State - Volume 2: Guidance for Protecting and Managing Wetlands. State of Washington Department of Ecology, Lacey, Washington.
http://www.ecy.wa.gov/biblio/0506008.html. 394 pp.

Grant, Gordon E.; Lewis, Sarah L.; Swanson, Frederick J.; Cissel, John H.; McDonnell, Jeffrey J. 2008. Effects of Forest Practices on Peak Flows and Consequent Channel Response: A State-of-Science Report for Western Oregon and Washington. Gen. Tech. Rep. PNW-GTR-760. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 76 p.

Hicks, M. 2000. Evaluating Standards for Protecting Aquatic Life in Washington's Surface Water Quality Standards Temperature Criteria Draft Discussion Paper and Literature Summary. State of Washington Department of Ecology, Lacey, Washington. *http://www.ecy.wa.gov/biblio/0010070.html*. 207 pp.

Hinman, C. 2005. Low Impact Development: Technical Guidance Manual for Puget Sound. Puget Sound Action Team and Washington State University Extension. *http://www.psparchives.com/publications/our_work/stormwater/lid/LID_manual2005.pdf*. 256 pp.

Interagency Committee for Outdoor Recreation (IAC). 2001. The 1999 Public and Tribal Lands Inventory Final Report. 60 pp.

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: The Physical Science Basis. Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Johannessen, J. and A. MacLennan. 2007. Beaches and Bluffs of Puget Sound. Puget Sound Nearshore Partnership Report No. 2007-04. Published by Seattle District, U.S. Army Corps of Engineers, Seattle, Washington.

Johnson, S.L, Rodgers, J.D., Solazzi, M.F., and T.E. Nickelson. 2005. Effects of an increase in large wood on abundance and survival of juvenile salmonids (Oncorhyncus spp.) in an Oregon coastal stream. Canadian Journal of Fisheries Aquatic Science 62: 412-424.

Kauffman, J.B., M. Mahrt, L.A. Mahrt, and W.D. Edge. 2001. Wildlife of Riparian Habitats. In Wildlife-Habitat Relationships in Oregon and Washington, Oregon State University: 361-383.

Knutson, K.C. and V.L. Naef. 1997. Management Recommendations for Washington's Priority Habitats: Riparian. Washington Department of Fish and Wildlife, Olympia, Washington. *http://wdfw.wa.gov/hab/ripxsum.htm*. 181 pp.

May, C.W., R.R. Horner, J.R. Karr, B.W. Mar, and E.B. Welch. 1996. The Cumulative Effects of Urbanization on Small Streams in the Puget Sound Lowland Ecoregion. University of Washington, Seattle, WA. 24 pp.

May, C.W. 2003. Stream-Riparian Ecosystems in the Puget Sound Lowland Eco-Region: A Review of Best Available Science. Watershed Ecology LLC. 76 pp.

May, C.W. 2009. Watershed Processes and Aquatic Resources: A Literature Review. Washington Department of Fish and Wildlife. *http://wdfw.wa.gov/hab/phsrecs.htm*. 70 pp.

McElhany, P., Rucklelshaus, M.H., Ford, M.J., Wainwright, T.C., and Bjokstedt, E.P. 2000. Viable Salmonid Populations and the recovery of Evolutionary Significant Units. NOAA Technical Memorandum: NMFS –NWFSC-42. 127pp.

McMillan, A. 1997. Washington State Wetlands and Delineation Manual. State of Washington Department of Ecology, Lacey, Washington. *http://www.ecy.wa.gov/biblio/9694.html*. 143 pp.

Merz, J.E., J. Setka, and A. Gray. 2008. The Ecology of Pacific Salmonids: Bio 303, Port Hadlock, Washington. December 2-3, 2008. Presented by the Northwest Environmental Training Center.

Mote P., A. Petersen, S. Reeder, H. Shipman, and L. W. Binder. 2008. Sea Level Rise in the Coastal Waters of Washington. University of Washington Climate Impacts Group and the State of Washington Department of Ecology. *http://cses.washington.edu/db/pdf/moteetalslr579.pdf*. 11 pp.

Mumford, T.F. 2007. Kelp and Eelgrass in Puget Sound. Puget Sound Nearshore Partnership Report No. 2007-05. Published by Seattle District, U.S. Army Corps of Engineers, Seattle, Washington. *www.pugetsoundnearshore.org*. 27 pp.

National Marine Fisheries Service (NMFS). 2007. Adaptive Management for ESA-Listed Salmon and Steelhead Recovery: Decision Framework and Monitoring Guidance. *http://www.nwr.noaa.gov/Salmon-Recovery-Planning/ESA-Recovery-Plans/upload/Adaptive_Mngmnt.pdf*. 56 pp.

National Marine Fisheries Service (NMFS). 2008. Implementation of the National Flood Insurance Program in the State of Washington Phase One Document – Puget Sound Region. NMFS Tracking No.: 2006-00472. 213 pp.

National Research Council (NRC). 1996. Upstream, Salmon and Society in the Pacific Northwest. National Academy Press, Washington, D.C. 452 pp.

National Research Council (NRC) 2002. Riparian Areas: Functions and Strategies for Management. The National Academies Press. Washington D.C.

Pentilla, D. 2007. Marine Forage Fishes in Puget Sound. Puget Sound Nearshore Partnership Report No. 2007-03. Published by Seattle District, U.S. Army Corps of Engineers, Seattle, Washington.
http://www.pugetsoundnearshore.org/technical_reports.htm. 23 pp.

Quinn, TP. 2005. The Behavior and Ecology of Pacific Salmon and Trout. University of Washington Press, Seattle. 378 pp.

Rosenberg, A.A. 2008. Aquaculture: The Price of Lice. Nature 451: 23-24.

R2 Resource Consultants, CH2M HILL, and Shapiro & Associates. 2000. Tri-County Urban Issues ESA Study: Guidance Document. Prepared for the Tri-County Urban Issues Advisory Committee, Bellevue, Washington.

Scholz, N.L, N.K. Truelove, B.L. French, B.A. Berejikian, T.P. Quinn, E. Casillas, and T.K. Collier. 2000. Diazinon Disrupts Antipredator and Homing Behaviors in Chinook Salmon (Oncorhynchus tshawytscha). Canadian Journal of Fisheries Aquatic Science 57: 1911-1918.

Simenstad, C. A., K. L. Fresh, and E. O. Salo. 1982. The Role of Puget Sound and Washington Coastal Estuaries in the Life History of Pacific Salmon: An Unappreciated Function. In Kennedy, V.S. ed. Estuarine Comparisons, Academic Press, New York, New York: 343-363.

Smith, Carol J., Ph.D. 2005. Salmon Habitat Limiting Factors in Washington State. Washington State Conservation Commission, Olympia, Washington. *http://www.scc.wa.gov/index.php/174-Salmon-Habitat-Limiting-Factors-Reports/View-category/Page-6.html*. 222 pp.

Spence, B.C., G.A. Lomnicky, R.M. Hughes, and R.P. Novitzki. 1996. An Ecosystem Approach to Salmonid Conservation. ManTech Environmental Technology, Inc. http://www.nwr.noaa.gov/Publications/Reference-Documents/ManTech-Report.cfm?renderforprint=1. 356 pp.

Washington Department of Fish and Wildlife (WDFW). 2008. Statewide Steelhead Management Plan. http://wdfw.wa.gov/fish/steelhead/management_plan.htm. 42 pp.

Washington State Aquatic Habitat Guidelines Program. 2002. Integrated Streambank Protection Guidelines. http://wdfw.wa.gov/hab/ahg/ispgdoc.htm.

Washington State Aquatic Habitat Guidelines Program. 2003. Design of Road Culverts for Fish Passage. http://wdfw.wa.gov/hab/ahg/. 110 pp.

Washington State Aquatic Habitat Guidelines Program. 2004. Stream Habitat Restoration Guidelines. http://wdfw.wa.gov/hab/ahg/.

Washington State Climate Advisory Team. 2007. Preparing for the Impacts of Climate Change in Washington: Draft Recommendations of the Preparation and Adaptation Working Groups. http://community.csc.noaa.gov/climateadaptation/index.php?option=com_docman&task=doc_details&gid=125&Itemid=32. 52 pp.

Washington State Department of Community, Trade and Economic Development (WDCTED). 2003. Protecting Critical Areas within the Framework of the Washington Growth Management Act. http://www.commerce.wa.gov/site/745/default.aspx. 77 pp.

Williams, G.D. and R.M. Thom. 2001. Marine and Estuarine Shoreline Modification Issues: White Paper. Battelle Marine Sciences Laboratory for the State of Washington Department of Fish and Wildlife, Department of Ecology, and Department of Transportation. 99 pp.

Wofford, J. E. B., R. E. Gresswell, and M.A. Banks. 2005. Influence of Barriers to Movement on within-Watershed Genetic Variation of Coastal Cutthroat Trout. Ecological Applications 15: 628-637.

GENERAL REFERENCE

The Climate Impacts Group University of Washington. 2009. Evaluating Washington's Future in a Changing Climate: Executive Summary (In Draft). The Climate Impacts Group University of Washington. *http://cses.washington.edu/cig/*. 30 pp.

Green/Duwamish and Central Puget Sound Watershed Resource Inventory Area 9 (WRIA 9) Steering Committee. 2005. Salmon Habitat Plan – Making Our Watershed Fit for a King. Prepared for the WRIA 9 Forum.

Shared Strategy for Puget Sound. 2007. Puget Sound Chinook ESA Salmon Recovery Plan. Prepared for and adopted by the National Marine Fisheries Service. 470 pp.

Tri-County Assembly. 2000. Regulation of Near-shore and Aquatic Development: A Proposal to Help Protect Salmonid Habitat in the Puget Sound Region Report from the Technical Committee. Management Zone Technical Committee Report to the King, Pierce, Snohomish Tri-County Assembly. King County Department of Natural Resources, Seattle, WA.

U.S. Army Corps of Engineers. 2006. Regional General Permit No. 6. Maintenance, Modification and Construction of Overwater Structures in Inland Marine Waters in the State of Washington. U.S. Army Corps of Engineers, Seattle District. Effective February 14, 2005. *http://www.nws.usace.army.mil/publicmenu/DOCUMENTS/REG/RGP6FinalText(7-13-05).pdf*.

Washington Department of Fisheries, Washington Department of Wildlife and Western Washington Treaty Indian Tribes. 1993. 1992 Washington State Salmon and Steelhead Stock Inventory. *http://wdfw.wa.gov/fish/sassi/sassi.htm*. 210 pp.

Washington Department of Fish and Wildlife (WDFW). 1997. Final Joint WDFW/Tribal Wild Salmonid Policy.: *http://wdfw.wa.gov/fish/wsp/wsp.htm*.

PHOTO CREDITS

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APPENDIX A
SALMONID RECOVERY IN WASHINGTON STATE

A.1 Salmonid Recovery Programs

The Salmon Recovery Act (SRA), Engrossed Substitute House Bill 2496 (RCW 77.85), was enacted by the Washington State legislature in 1998 to address the listings of salmon and steelhead runs as threatened or endangered under the federal endangered species act (ESA). The legislative intent was to begin activities required for the recovery of salmonid stocks as soon as possible.

The SRA called for the integration of local and regional activities into a statewide strategy and established a coordinated framework for responding to the salmonid crisis. Provided below is a list of the agencies and programs involved in the statewide strategy to recover salmon. This information is included to help local governments 1) understand the state's approach to recover and protect salmonids, and 2) coordinate restoration and protection priorities with state programs.

Salmon Recovery Funding Board

The SRA created the Salmon Recovery Funding Board (SRFB). The SRFB provides grant funds to protect or restore salmon habitat and assist related activities. (*http://www.rco.wa.gov/srfb/board/board.htm*)

Lead Entities for Salmon Recovery

The SRA provided direction for the development of lead entities (LEs). There are currently 27 lead entity organizations in the state. LEs are a key resource for local governments on salmon recovery activities at the local level. LEs provide local leadership in the development of local salmon recovery strategies based on science and assessments in their local areas. Based on their strategies, LEs identify and sequence habitat projects to be funded by SRFB. LEs compile annual lists of salmon-related habitat projects in their area, and submit projects based on these lists and community needs for funding through the SRFB. LEs develop local salmon recovery strategies (based on science and assessments in their local areas). These strategies serve as the foundation of the recovery planning process. LEs play a critical role in the effective implementation of recovery plans statewide and have a strong voice in each of the regional recovery boards planning processes. (*http://www.rco.wa.gov/srfb/leadentities.htm*)

Regional Recovery Boards

Regional Recovery Boards were established because the ESA requires the federal government to develop recovery plans for listed salmon. Regional recovery organizations prepare a recovery plan that gains regional consensus on measurable fish population results, integrates actions necessary in harvest, habitat, hydropower, and hatcheries, and gains commitments to achieve results. They coordinate a multitude of plans across watersheds into one regional plan and help connect local social, cultural, and economic needs and desires with science and ESA goals. The regional recovery plans are discussed in Chapter One. (*http://www.governor.wa.gov/gsro/regions/recovery.asp*)

Recreation and Conservation Office

The Recreation and Conservation Office (RCO) provides staff support to the SRFB and administers grant funding and contracts, including coordinating the Lead Entity Program and works closely with Regional Recovery Boards. In July 2009, under SHB 2157, the Governor's Salmon Recovery Office (GSRO) was moved to the RCO. The GSRO coordinates and assists in the development, implementation, and revision of regional salmon recovery plans as part of a statewide strategy for salmon recovery. (*http://www.rco.wa.gov/*)

Regional Fisheries Enhancement Groups

In 1989, the legislature authorized the formation of regional fisheries enhancement groups (RFEGs). There are 14 RFEGs throughout the state covering a specific geographic region based on watersheds. These groups have a legislative mandate specific to salmon and steelhead, although salmon is the main focus (RCW 77.95). RFEGs are operated on a strictly nonprofit basis, and seek to maximize the efforts of volunteer and private donations to improve the salmon resource for all citizens of the state. Originally, the groups received most funding through WDFW. However, RFEGs have been applying for and receiving more and more outside funding. (*http://wdfw.wa.gov/volunter/index.htm*)

A.2 WDFW's Role in Salmonid Recovery

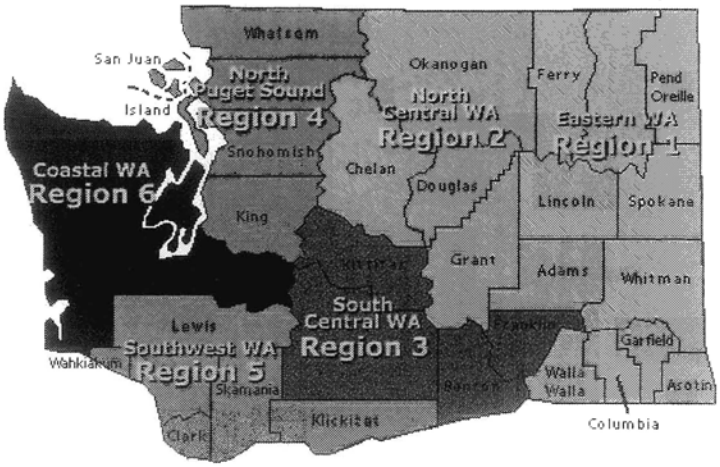
The Washington State Department of Fish and Wildlife (WDFW) is directed to seek resolution to the many conflicts that have critically reduced salmonid resources from their sustainable level; to restore and improve habitat; or identify ways to increase the survival of salmonids (RCW 77.95). WDFW is recognized as

the state leader in providing the science that will make wild salmonid recovery a reality. Over the last decade, WDFW has worked with tribal governments and salmon recovery partners to restore salmonids, provide recreational opportunities, and support economically viable and sustainable fisheries. Harvest management, hatchery reform, hydropower agreements and habitat management technical guidance are some examples of how the Department is achieving wild salmonid recovery. (*http://wdfw.wa.gov/recovery.htm*)

WDFW Technical Assistance

WDFW regional biologists, including Watershed Stewards (WSTs), are available in each of the six regions (shown in Figure A.1) to provide technical assistance to lead entities, RFEGs and the recovery regions to develop and implement the Regional Recovery Plans for federally listed salmon[23]. WSTs work on implementing watershed planning, are the primary WDFW point of contact for public on salmonid recovery issues, and provide a critical link between regional and local recovery efforts. WDFW also provides environmental engineering technical assistance for hydraulic projects. For more information contact WDFW Habitat Program at (360) 902-2534 or visit the website for regional office contact information: *http://wdfw.wa.gov/about/contact/*.

Figure A.1: WDFW Regions



Graphic courtesy of Washington Department of Fish and Wildlife

[23] The Washington Coastal regional recovery plan will go beyond federally listed species. Non-listed species will also be included.

WDFW also has regional staff assigned to provide technical assistance to local governments in the development of rules and regulations to implement salmon recovery plans. Regional staff that work with Growth Management Act, Shoreline Management Act and Priority Habitats and Species are available to provide mapping data to identify salmonid habitat conservation areas and management recommendations to inform policy and rule development. For the most recent contact information for regional staff, please consult the Fish and Wildlife Planner newsletter at: *http://wdfw.wa.gov/hab/fw_planner/index.htm* or contact WDFW Habitat Program at (360) 902-2534.

A.3 Salmonid Protection and Restoration Resources

Habitat Limiting Factors Analysis

The SRA defined a habitat work schedule that included a habitat limiting factors analysis for salmon in streams, rivers, tributaries, estuaries, and subbasins in the region. Between 1998 and 2003, habitat limiting factors analyses were developed for 45 basins in Washington State (Smith 2005). These reports identify habitat factors limiting production of salmonids in waters shared by salmon, steelhead and trout. (*http://www.scc.wa.gov/index.php/174-Salmon-Habitat-Limiting-Factors-Reports/View-category/Page-6.html*)

Habitat Work Schedule (HWS)

HWS is a centralized web-based tool that helps LEs and others interested in salmon recovery, map habitat restoration projects and track the progress of recovery plan implementation. Because the HWS System is centralized and web-based with public access, non-sensitive information is available for anyone to take a local, regional, or statewide view of salmon habitat projects in Washington State. (*http://hws.ekosystem.us/*)

Marine Resources Committees

Marine Resources Committees in several counties (Clallam, Grays Harbor, Island, Jefferson, Pacific, San Juan, Skagit, Snohomish and Whatcom) are doing projects to restore nearshore, intertidal and estuarine habitats, improve shellfish harvest areas, support salmon and bottom fish recovery and identify and carry out protection strategies for marine species and habitats. General MRC information available at: *http://www.nwstraits.org/*. Coastal MRC information available at: *http://wdfw.wa.gov/about/volunteer/mrc/*.

Priority Habitats and Species (PHS) Data

WDFW maintains GIS data that includes anadromous fish distribution throughout the state. PHS also includes potential and documented forage fish habitat, kelp and eelgrass beds, wetlands, and other indicators of salmonid habitat. (*http://wdfw.wa.gov/hab/phspage.htm*)

Puget Sound Nearshore Partnership

In 2001, WDFW partnered with the U.S. Army Corps of Engineers to convene the Puget Sound Nearshore Partnership (PSNP) to build and implement an ecosystem restoration strategy. The PSNP includes state, federal, local, and tribal governments as well as academic scientists, ports, non-profits, industry representatives and citizens. PSNP produces and organizes scientific resources, including a series of *technical reports* that can aid local government decision-making. PSNP developed a *change analysis*, which is a geodatabase created to inform land use analysis and investigate the fundamental causes of ecosystem decline due to human change to natural nearshore processes along Puget Sound's shoreline. PSNP also initiated a *grant program*, the Estuary and Salmon Restoration Program (ESRP) awarded to restoration projects in the nearshore environment. Protection and restoration alternatives are considered in the context of the whole ecosystem. (*http://www.pugetsoundnearshore.org/*)

Puget Sound Partnership

The Puget Sound Partnership is a state agency that also serves as the recovery board for the Puget Sound salmon recovery region. The Partnership works to implement the Puget Sound recovery plan as well as develop and implement actions to restore the health of the Puget Sound. To reach this goal, the Partnership works with citizens, governments, tribes, scientists and businesses and has drafted several resource reports including the Puget Sound Action Agenda, watershed plans, and low impact development management recommendations, to name a few. (*http://www.psp.wa.gov/*)

Salmonscape

Salmonscape is another mapping program maintained by WDFW. This mapping application for the Salmon and Steelhead Habitat Inventory and Assessment Program (SSHIAP) characterizes salmonid habitat conditions and distribution of salmonid stocks in Washington. Data is co-managed by WDFW and the NW Indian Fisheries Commission. Salmonscape includes Fish Bits and SaSI data as well as the

Ecosystem Diagnosis and Treatment (EDT) model establishing restoration and protection priorities within some watersheds.
(*http://wdfw.wa.gov/mapping/salmonscape/index.html*)

Salmon Smart: A Guide to Help People Help Salmon
In 2000, WDFW published this guidance to provide an introduction to salmon recovery projects and activities and an overview of how people can get involved. The document includes management recommendations as well as resources and organizations involved in recovery efforts. Although much of the contact information is outdated, this guidance has useful tips for improving behaviors that degrade salmonid habitat.
(*http://wdfw.wa.gov/outreach/salmon/salmonsmart/*)

SaSI
WDFW maintains the Salmonid Stock Inventory (SaSI), a compilation of data on all wild stocks and a scientific determination of each stock's status as: healthy, depressed, critical, unknown, or extinct. (*http://wdfw.wa.gov/fish/sasi/*)

State of Washington Department of Ecology Shoreline Management Program
The Department of Ecology shoreline management program includes links to several sources of technical assistance including data sets and cataloged shoreline information as well as guidance for implementing the shoreline management act in local shoreline master programs.
(*http://www.ecy.wa.gov/programs/sea/sma/index.html*)

State of Washington Department of Ecology Coastal Zone Atlas
The Coastal Zone Atlas includes aerial photographs of marine shorelines, habitat types, physical features, changes in land cover, etc. near Puget Sound, the outer coast, and the estuarine portion of the Columbia River.
(*http://www.ecy.wa.gov/programs/sea/sma/atlas_home.html*)

Subbasin Planning: Bonneville Power
In 2005 the Northwest Power and Conservation Council completed one of the largest locally led watershed planning efforts of its kind in the United States, an effort that resulted in separate plans for 58 tributary watersheds or mainstem segments of the Columbia River. These subbasin plans were developed collaboratively by state and federal fish and wildlife agencies, Indian tribes, local planning groups, fish recovery boards, and Canadian entities where the plans

address transboundary rivers. Subbasin plans identify priority restoration and protection strategies for habitat and fish and wildlife populations in United States portion of the Columbia River system. (*http://www.nwcouncil.org/fw/subbasinplanning/Default.htm*)

Bonneville Model Watershed Plans: Asotin, Pataha and Tucannon

*In 1991 the local conservation districts in Asotin, Garfield and Columbia Counties worked with the Natural Resource Conservation Service, WDFW, WDOE, Nez Perce Tribe, WCC and most importantly local landowners to develop Model Watershed Plans for Asotin and Pataha Creeks and the Tucannon River. The H**Asotin Creek Model Watershed Plan**H was completed in 1995 and it was the first salmonid restoration plan completed in the state with emphasis on habitat protection and restoration. It was a comprehensive Ridge-top-to-Ridge-top approach to salmonid restoration. The three watersheds listed above have completed upland BMP's to reduce sedimentation, riparian planting and fencing to help protect stream temperatures and reduce streambank sedimentation, instream habitat projects for resting and rearing salmonids, irrigation efficiency projects that have provided increased flows in some instances and screening of irrigation intakes.*

Washington State Department of Natural Resources Aquatic Resources Program A resource for technical assistance and management of state-owned aquatic lands. The program develops policies and provides technical assistance, and scientific research and resources for the aquatic lands. Technical assistance includes data on kelp and eelgrass beds as well as landscape prioritization identifying protection and restoration priorities specific to listed species. (*http://www.dnr.wa.gov/AboutDNR/Divisions/ARD/Pages/home.aspx*)

Washington State Department of Natural Resources Forest Practices Application Review System (FPARS) Many local governments rely on the FPARS water type maps to indicate stream type (fish bearing) and location. Caution should be taken when using these maps as they can often underestimate fish habitat in urbanized areas. A site visit should always be conducted to confirm stream type and location. (*http://fortress.wa.gov/dnr/app1/fpars/viewer.htm*)

Washington State Department of Natural Resources Shorezone Inventory

This data covers all of Washington's saltwater shorelines from the Canadian border to the mouth of the Columbia River. It describes the geomorphic and biological resources of the intertidal and nearshore habitats. Features such as eroding cliffs, sand and gravel beaches, sandflats and wetlands are some of the geomorphic forms mapped. Visible macrobiotic, such as wetland grasses, intertidal algae, and subtidal vegetation such as eelgrass or kelp, are also mapped.
(*http://www.dnr.wa.gov/ResearchScience/Topics/AquaticHabitats/Pages/aqr_nrsh_publications.aspx*)

Watershed Management Plans

The Watershed Planning Act (ESHB 2514/RCW 90.82) gives local citizens the opportunity to work with local, state, and tribal governments to write watershed plans for their community's present and future water needs. Developed by Water Resource Inventory Area (WRIA) planning units, plans must include water quality and may include in-stream flows, water quality, storage and fish habitat needs. Plans adopted by county council may then receive funds from the State of Washington Department of Ecology for drafting and implementing a Detailed Implementation Plan. (*http://www.ecy.wa.gov/watershed/index.html*)

A.4 Management Recommendations

WDFW has produced numerous management recommendations that are recognized sources of best available science. These include:

- ***Pacific Salmon and Wildlife – Ecological Contexts, Relationships, and Implications for Management*** (Cederholm et al. 2000). A technical report synthesizing scientific information linking salmon with wildlife species and the broader aquatic and terrestrial habitat functions in which they coexist. (*http://wdfw.wa.gov/hab/salmonwild/*)

- ***Protecting Nearshore Habitat and Functions in Puget Sound: An Interim Guide*** (Envirovision et al. 2007). Science briefs on key nearshore habitats and recommendations for regulating common shoreline modification activities. (*http://wdfw.wa.gov/hab/nearshore_guidelines/*)

- ***Washington State Aquatic Habitat Guidelines Program***. An integrated approach to marine, freshwater, and riparian habitat protection and restoration. Guidelines include a series of white papers and guidance documents related to shoreline protection and restoration. (*http://wdfw.wa.gov/hab/ahg/*)

- ***Watershed Processes and Aquatic Resources: A Literature Review*** (May 2009). A summary of the literature on hydraulically driven processes: the delivery and routing of water, sediment, large and small wood, nutrients and toxicants in natural environments and those altered by human development. (*http://wdfw.wa.gov/hab/phsrecs.htm*)

- ***WDFW Forage Fish Management Recommendations*** (Bargmann 1998). Management plan of forage fish resources and fisheries in Washington State. (*http://wdfw.wa.gov/fish/forage/manage/foragman.pdf*)

- ***WDFW Management Recommendations for Washington's Priority Habitats: Riparian*** (Knutson and Naef 1997). Statewide riparian management recommendations based on the best available science. Nearly 1,500 pieces of literature on the importance of riparian areas to fish and wildlife were evaluated, and land use recommendations designed to accommodate riparian-associated fish and wildlife were developed. These recommendations consolidate existing scientific literature and provide information on the relationship of riparian habitat to fish and wildlife and to adjacent aquatic and upland ecosystems. (*http://wdfw.wa.gov/hab/phsrecs.htm*)

WDFW has also provided consultation on the production of other management recommendations. These include:

- ***Critical Areas Assistance Handbook: Protecting Critical Areas Within the Framework of the Washington Growth Management Act*** (WDCTED 2003). The Washington State Department of Commerce (formerly the Department of Community Trade and Economic Development) published this guidance to provide local governments with model policies and regulations to protect critical areas. The guidance includes recommendation for special consideration for anadromous fish resources. (*http://www.commerce.wa.gov/site/745/default.aspx*)

- ***Examples of Regulatory Language for Nearshore and Marine Shoreline Protection*** (GeoEngineers 2005). This document contains a compilation of examples of existing regulatory language from Puget Sound jurisdictions that define, classify, protect and mitigate the functions, values and processes of the Puget Sound nearshore and marine shorelines. (*http://www.mrsc.org/subjects/environment/criticalpg.aspx*)

- ***Puget Sound Nearshore Partnership Technical Reports***. The Nearshore Partnership is collecting and organizing technical information to maximize the effectiveness of nearshore restoration and protection projects being undertaken now and in the near future around the Puget Sound. (*http://www.pugetsoundnearshore.org./technical reports.htm*)

- ***Puget Sound Nearshore Project Priorities***. In 2006, WDFW funded a project to evaluate Puget Sound Salmon Recovery Plan actions in the nearshore to assess the consistency between nearshore recovery strategies developed at local and regional scales. The report includes strategies to improve nearshore recovery in each county and associated watershed throughout the Puget Sound. (*http://wdfw.wa.gov/grants/lead entities/puget sound nearshore projec t priorities.pdf*)

- ***State of Washington Alternative Mitigation Policy Guidance for Aquatic Permitting Requirements from the Departments of Ecology and Fish and Wildlife***. The intent of this guidance is to represent consensus on mitigation policy among the disciplines and the agencies responsible for evaluating, approving, implementing and enforcing aquatic resource mitigation. Provides regulators and applicants with watershed ecosystem management recommendations when considering impacts and the use of preservation, mitigation banking, and off-site or out-of-kind mitigation as tools for salmon and watershed recovery. (*http://wdfw.wa.gov/hab/ahg/altmtgtn.pdf*)

- ***State of Washington Department of Ecology Guidance for Protecting and Managing Wetlands: Volume 2*** (Granger et al. 2005). This document is the second part of a two-part document addressing wetlands in Washington and their protection and management. Volume 2 contains guidance

primarily for local governments on protecting and managing wetlands and their functions based on the synthesis of the science in Volume 1. (*http://www.ecy.wa.gov/biblio/0506008.html*)

- ***Statewide Strategy to Recover Salmon*** (GSRO 1999). The goal of the Strategy is to "Restore salmon, steelhead and trout populations to healthy and harvestable levels and improve the habitats on which fish rely." The Strategy was designed as the state's long-term vision or guide for salmon recovery. The section titled "Linking Land Use Decisions and Salmon Recovery" is most applicable to local government planning programs. (*http://www.governor.wa.gov/gsro/publications/strategy/default.asp*)

A.5 Additional Resources

Adopt-a-Stream

The Adopt-A-Stream Foundation Fish & Wildlife Division was created to address degraded stream and wetland ecosystems. Drawing upon the expertise of its members, the team has surveyed multiple watersheds and successfully identified areas of erosion, fish passage barriers, and pollution sources, and other problem areas. The crew has rectified many of the issues found by successfully completing stream and wetland restoration projects. (*http://www.streamkeeper.org/*)

American Rivers

American Rivers is a nonprofit organization working to protect and restore America's rivers for the benefit of people, wildlife, and nature. (*http://www.americanrivers.org/*)

Earth Economics Ecosystem Valuation Program

Natural systems and the services they provide have dollar values. A report titled *"Ecosystem Services Enhanced by Salmon Habitat Conservation in the Green/Duwamish and Central Puget Sound Watershed"* provides a socio-economic analysis on the economic impacts of salmon habitat restoration. The study concludes that implementation of the habitat plan will enhance the economy and quality of life for citizens within WRIA 9 by enhancing natural capital. (*http://www.eartheconomics.org/*)

Long Live the Kings

Long Live the Kings (LLTK) is a nonprofit organization committed to restoring wild salmon to the waters of the Pacific Northwest. LLTK helps those who make decisions about salmon to be successful. This organization pursues projects and partnerships that compel coordinated, scientifically-credible, and transparent changes to harvest, hatchery, and habitat management to protect and restore wild salmon. (*http://www.lltk.org/*)

Municipal Research and Services Center of Washington

The Municipal Research and Services Center (MRSC) mission is "working together for excellence in local government through professional consultation, research and information services." In addition to other functions, this organization provides information on environmental and natural resources issues that relate to Washington cities and counties, including links to governmental agencies and other environment-oriented Web sites.
(*http://www.mrsc.org/subjects/environment/*)

Northwest Indian Fisheries Commission

The Northwest Indian Fisheries Commission (NWIFC) is a support service organization for 20 treaty Indian tribes in western Washington. The commission is composed of representatives from each member tribe. The role of the NWIFC is to assist member tribes in their role as natural resources co-managers. The commission provides direct services to tribes in areas such as biometrics, fish health and salmon management to achieve an economy of scale that makes more efficient use of limited federal funding. The NWIFC also provides a forum for tribes to address shared natural resources management issues and enables the tribes to speak with a unified voice in Washington, D.C.
(*http://www.nwifc.org/*)

People for Puget Sound

People for Puget Sound is a citizens' group established to protect and restore the health of Puget Sound land and waters through education and action.
(*http://www.pugetsound.org/*)

Salmon Safe

Salmon-Safe is an independent nonprofit organization devoted to restoring agricultural and urban watersheds so that salmon can spawn and thrive. (*http://www.salmonsafe.org/*)

Soils for Salmon

Soils for Salmon is a nonprofit organization dedicated to educating builders, developers, landscapers, and local governments in practices that preserve and improve the soil on building sites and protect waterways. (*http://www.soilsforsalmon.org/*)

StreamNet

StreamNet is a cooperative information management and data dissemination project focused on fisheries and aquatic related data and data related services in the Columbia River basin and the Pacific Northwest. A variety of data are provided in tabular format and as maps and GIS layers maintained and disseminated through the Pacific States Marine Fisheries Commission (PSMFC). (*http://www.streamnet.org/*)

Washington Nature Mapping

A biodiversity database and layers of information about birds, mammals, reptiles, amphibians, fish, insects, and plants that provides information about the biological health of an area, a neighborhood, city, county, and state. (*http://depts.washington.edu/natmap/*)

Wild Fish Conservancy

Wild Fish Conservancy (WFC) is a nonprofit conservation organization dedicated to the recovery and conservation of the region's wild-fish ecosystems. Through science, education and advocacy, WFC promotes technically and socially responsible habitat, hatchery and harvest management to better sustain the region's wild-fish heritage. (*http://www.wildfishconservancy.org/*)

Wild Salmon Center

The mission of the Wild Salmon Center is to identify, understand and protect the best wild salmon ecosystems of the Pacific Rim. The Center devises and implements practical strategies, based on the best science, to protect wild salmon ecosystems and their biodiversity. (*http://www.wildsalmoncenter.org/*)

APPENDIX B
DEFINITIONS

Anadromous Fish – Fish that spawn and rear in freshwater and mature in the marine environment. While most Pacific salmonids die after their first spawning, adult char (bull trout), cutthroat trout and steelhead can live for many years, moving in and out of saltwater and spawning each year. The life history of Pacific salmonids contains critical periods of time when these fish are more susceptible to environmental and physical damage than at other times. The life history of salmonids, for example, contains the following stages: upstream migration of adults, spawning, inter-gravel incubation, rearing, smoltification (the time period needed for juveniles to adjust their body functions to live in the marine environment), downstream migration, and ocean rearing to adults (WDCTED 2003).

Anadromous Fish Habitat – Habitat that is used by anadromous fish at any life stage at any time of the year, including potential habitat likely to be used by anadromous fish that could be recovered by restoration or management and includes off-channel habitat (WDCTED 2003).

Alevin – Newly hatched salmon; yolk sac is still attached (Merz et al. 2008).

Benthic – Pertaining to the bottom (of estuaries, rivers, streams, and lakes) (Merz et al. 2008).

Best Available Science – Current scientific information used in the process to designate, protect, or restore critical areas that is derived from a valid scientific process as defined by WAC 365-195-900 through 925. Sources of the best available science are included in Citations of Recommended Sources of Best Available Science for Designating and Protecting Critical Areas published by the Washington State Department of Commerce (WDCTED 2003). Other sources of best available science included the state aquatic habitat guidelines program, WDFW priority, habitats, and species management recommendations, Puget Sound Nearshore Ecosystem Restoration Project, the National Academy of Science Report and the State of Washington Department of Ecology best available wetland science document, to name a few.

Best Management Practices (BMPs) – Conservation practices or systems of practices and management measures that: (A) Control soil loss and reduce water quality degradation caused by high concentrations of nutrients, animal waste, toxics, and sediment; (B) Minimize adverse impacts to surface water and ground water flow and circulation patterns and to the chemical, physical, and biological characteristics of wetlands; (C) Protect trees and vegetation designated to be retained during and following site construction and use native plant species appropriate to the site for re-vegetation of disturbed areas; and (D) Provide standards for proper use of chemical herbicides within critical areas. The [city/county] shall monitor the application of best management practices to ensure that the standards and policies of this Title are adhered to (WDCTED 2003).

Buffer or Buffer Zone – An area that is contiguous to and protects a critical area which is required for the continued maintenance, functioning, and/or structural stability of a critical area (WDCTED 2003).

Channel Migration Zone (CMZ) – The lateral extent of likely movement along a stream or river during the next one-hundred (100) years as determined by evidence of active stream channel movement over the past one-hundred (100) years. Evidence of active movement over the one-hundred (100) year time frame can be inferred from aerial photos or from specific channel and valley bottom characteristics. The time span typically represents the time it takes to grow mature trees that can provide functional large woody debris to streams. A CMZ is not typically present if the valley width is generally less than two (2) bankfull widths, if the stream or river is confined by terraces, no current or historical aerial photographic evidence exists of significant channel movement, and there is no field evidence of secondary channels with recent scour from stream flow or progressive bank erosion at meander bends. Areas separated from the active channel by legally existing artificial channel constraints that limit bank erosion and channel avulsion without hydraulic connections shall not be considered within the CMZ (WDCTED 2003).

Channelized stream – A stream that has been straightened, runs through pipes or revetments, or is otherwise artificially altered from its natural, meandering course (Knutson and Naef 1997).

Chinook – The largest species of the Pacific salmon, also commonly called "King." Adults weigh about 22 pounds (10kg) and are generally 36 inches (91cm) long. Some Chinook can exceed 100 pounds (Merz et al. 2008).

Chum – A species of Pacific salmon. Chum are also referred to as dog salmon because they were commonly dried and used for feeding dog teams during winter. Chum migrate to sea shortly after spawning in lower river systems. Normal/max size is 26 inches (65cm) and 13 pounds (6kg) (Merz et al. 2008).

Coho – A species of Pacific salmon. Coho typically spawn in coastal streams. Historically coho spawned in Idaho, but due to dams are now extinct everywhere but coastal streams. Normal/max size is 30 inches (75cm) and 13 pounds (6kg) (Merz et al. 2008).

Cumulative Impacts or Effects – The combined, incremental effects of human activity on ecological or critical areas functions and values. Cumulative impacts result when the effects of an action are added to or interact with other effects in a particular place and within a particular time. It is the combination of these effects, and any resulting environmental degradation, that should be the focus of cumulative impact analysis and changes to policies and permitting decisions (WDCTED 2003).

Dissolved oxygen (DO) – The amount of oxygen dissolved in a liquid, such as water (Merz et al. 2008).

Drift Cell – Littoral drift, or shore drift, is the process by which beach sediment is moved along the shoreline. Drift results primarily from the oblique approach of wind-generated waves and can therefore change in response to short-term (daily, weekly, or seasonally) shifts in wind direction. Over the long term, however, many shorelines exhibit a single direction of net shore drift. Net shore-drift is determined through geomorphologic analysis of beach sediment patterns and of coastal landforms (State of Washington Department of Ecology, *http://www.ecy.wa.gov/services/GIS/data/shore/driftcells.htm*).

Ecosystem – A biological community made up of land and water and organisms all interacting together (Merz et al. 2008).

Emergence – The time when the fry leave their gravel nest and move into the water column (Merz et al. 2008).

Estuary – A semi-protected coastal body of water where saltwater is measurably diluted with fresh water (Pritchard 1967 within Simenstad et al. 1982).

Evolutionarily Significant Unit (ESU): The smallest biological unit that can be considered to be a species under the Endangered Species Act as administered by the National Marine Fisheries Service (NMFS). A population or population group is considered to be an ESU if 1) it is substantially reproductively isolated from other conspecific population units, and 2) it represents an important component in the evolutionary legacy of the species. USFWS uses a similar term and concept called the distinct population segment (DPS), which is the wording used in the ESA itself. Thus, the ESU is the NMFS' interpretation of a DPS (WDFW 2008).

Fines – Ambiguous definition of small sediment (roughly <6mm diameter) that may clog inter-gravel pores, impacting permeability and hyporheic water quality (Merz et al. 2008). Fine sediment suffocates eggs and entombs alevins.

Fingerling – Salmonids usually at the parr stage of development (Merz et al. 2008).

Flood or Flooding – A general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland waters and/or the unusual and rapid accumulation of runoff of surface waters from any source (WDCTED 2003).

Floodplain – The total land area adjoining a river, stream, watercourse, or lake subject to inundation by the base flood (WDCTED 2003).

Floodplain connectivity – Connection of river to floodplain features such as riparian forests, side channels, sloughs and wetlands (Merz et al. 2008).

Floodway – The channel of a river or other watercourse and the adjacent land area that must be reserved in order to discharge the base flood without cumulatively increasing the surface water elevation more than one (1) foot. Also known as the "zero rise floodway" (WDCTED 2003).

Flows – The rate at which a volume of water passes a given point in a stream or river; usually measured in cubic feet per second (cfs) (Merz et al. 2008).

Frequently Flooded Areas – Lands in the floodplain subject to a one percent (1%) or greater chance of flooding in any given year and those lands that provide important flood storage, conveyance, and attenuation functions, as determined by the [director] in accordance with WAC 365-190-080(3). Frequently flooded areas perform important hydrologic functions and may present a risk to persons and property. Classifications of frequently flooded areas include, at a minimum, the 100-year floodplain designations of the Federal Emergency Management Agency and the National Flood Insurance Program (WDCTED 2003).

Fry – Early lifestage of salmonids. Typically juveniles that can swim and catch their own food. Next life stage after alevin, and before smolt. The third freshwater stage of salmonid development; when egg mass is no longer present and fish develops characteristic markings usually within weeks of hatching. Upon reaching 1.25 inches in length, fish are sometimes called "fingerlings" or "parr" (Merz et al. 2008).

Functions and Values – The beneficial roles served by critical areas including, but are not limited to, water quality protection and enhancement; fish and wildlife habitat; food chain support; flood storage, conveyance and attenuation; ground water recharge and discharge; erosion control; wave attenuation; protection from hazards; historical, archaeological, and aesthetic value protection; educational opportunities; and recreation. These beneficial roles are not listed in order of priority. Critical area functions can be used to help set targets (species composition, structure, etc.) for managed areas, including mitigation sites (WDCTED 2003).

Geologically Hazardous Areas – Areas that may not be suited to development consistent with public health, safety, or environmental standards, because of their susceptibility to erosion, sliding, earthquake, or other geological events as designated by WAC 365-190-080(4). Types of geologically hazardous areas include: erosion, landslide, seismic, mine, and volcanic hazards (WDCTED 2003).

Gravel – Round rocks (64- 2mm) within the streambed which are sometimes used by salmonids in the building of a redd (Merz et al. 2008).

Ground Water – Water in a saturated zone or stratum beneath the surface of land or a surface water body (WDCTED 2003). Groundwater in the floodplain is called hyporheic.

Habitat – The sum total of all the living and non-living factors that surround and potentially influence a plant or animal. Most salmonid habitats are described in terms of physical features such as water depth, temperature, velocity or sediment type (Merz et al. 2008).

Habitat Management Plan – A habitat management plan is prepared by a qualified professional and must identify existing conditions and how the management plan will improve habitat functions over existing conditions to ensure no net loss of salmonid habitat functions. A five year monitoring plan must be included.

Homing – The behavior of returning to the stream where an individual salmonid was hatched (Merz et al. 2008).

Hydraulic Project Approval (HPA) – A permit issued by the Washington Department of Fish and Wildlife for modifications to waters of the state in accordance with Chapter 75.20 RCW (WDCTED 2003).

Hyporheic Zone – The saturated substrata beneath a stream or river channel and under the riparian zone where groundwater and surface water mix (May 2003).

Impervious Surface – A hard surface area that either prevents or retards the entry of water into the soil mantle as under natural conditions prior to development or that causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, rooftops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled macadam or other surfaces which similarly impede the natural infiltration of stormwater (WDCTED 2003).

Incubation – The period of time (variable dependent on temperature) from when an egg is fertilized until swim-up (Merz et al. 2008).

Landslide Hazard Areas – Areas that are potentially subject to risk of mass movement due to a combination of geologic landslide resulting from a combination of geologic, topographic, and hydrologic factors. These areas are typically susceptible to landslides because of a combination of factors including: bedrock, soil, slope gradient, slope aspect, geologic structure, ground water, or other factors (WDCTED 2003).

Large Woody Debris – Logs or rootwads typically >1 m in length and >10 cm in diameter. Provide important features that support several salmonid life stages and macroinvertebrate production (Merz et al. 2008).

Littoral zone – The region of land bordering a body of water (Merz et al. 2008).

Migrating – Moving from one place to another to live, mate or breed (Merz et al. 2008).

Mitigation – Avoiding, minimizing, or compensating for adverse critical areas impacts. Mitigation, in the following sequential order of preference, is: (A) Avoiding the impact altogether by not taking a certain action or parts of an action; (B) Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps, such as project redesign, relocation, or timing, to avoid or reduce impacts; (C) Rectifying the impact to wetlands, critical aquifer recharge areas, and habitat conservation areas by repairing, rehabilitating, or restoring the affected environment to the conditions existing at the time of the initiation of the project; (D) Minimizing or eliminating the hazard by restoring or stabilizing the hazard area through engineered or other methods; (E) Reducing or eliminating the impact or hazard over time by preservation and maintenance operations during the life of the action; (F) Compensating for the impact to wetlands, critical aquifer recharge areas, and habitat conservation areas by replacing, enhancing, or providing substitute resources or environments; and (G) Monitoring the hazard or other required mitigation and taking remedial action when necessary. Mitigation for individual actions may include a combination of the above measures (WDCTED 2003).

Natal stream – Stream of birth (Merz et al. 2008).

Native Vegetation – Plant species that are indigenous to the area (WDCTED 2003).

Natural Production: Fish that spawn or rear entirely in the natural environment. These fish maybe the offspring of natural or hatchery production (WDFW 2008).

Natural Stock: Fish that are produced by spawning and rearing in the natural habitat, regardless of parentage (WDFW 2008).

No Net Loss – No net loss means that the impacts of land use and/or development, whether permitted or exempt from permit requirements, be identified and mitigated such that there are no resulting adverse impacts on ecological functions, habitats or processes (Jefferson County Draft SMP, December 2008).

Ordinary High Water Mark (OHWM) – That mark which is found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, that the soil has a character distinct from that of the abutting upland in respect to vegetation (WDCTED 2003).

Parr – Young salmonid with large, oval, dark marks (that may or may not be present) on sides. Parr marks are believed to be used for camouflage. Parr usually live in freshwater for 1 to 2 years. Parr marks usually disappear during the smolting process (Merz et al. 2008).

Pelagic – Of or in the open ocean or open water (Merz et al. 2008).

Pink - A species of Pacific salmon with very large spots on back and large oval block blotches on both lobes of tail. Spawning adults take on a dull gray coloration on back and upper side with a creamy-white color below. Also known as humpbacks or "humpies", males develop a pronounced hump on backs as they near spawning (Merz et al. 2008). Pink salmon live for only two and a half years.

Pool – A relatively deep, still section in a stream (Merz et al. 2008).

Population: A group of interbreeding salmonids of the same species of hatchery, wild, or unknown parentage that have developed a unique gene pool, that breed

in approximately the same place and time, and whose progeny tend to return and breed in approximately the same place and time. They often, but not always, are separated from another population by genotypic or demographic characteristics (WDFW 2008).

Qualified Professional – A person with experience and training in the pertinent scientific discipline (fisheries, wetland science, freshwater biology, marine biology, or hydrogeology). A qualified professional must have obtained a B.S. or B.A. or equivalent degree in biology, environmental studies, fisheries, geomorphology or related field, two years of related professional work experience, and experience assessing habitat impacts and drafting management recommendations to avoid no net loss (WDCTED 2003).

Rearing habitat – Rivers, streams, estuaries, or nearshore areas where juvenile fish find the food and shelter they need in order to grow (Merz et al. 2008).

Redd – A salmonid nest; dug out of the streambed's gravel by adult female (Merz et al. 2008).

Refugia – Habitat sanctuaries from extreme environmental events (Merz et al. 2008).

Restoration – Measures taken to restore an altered or damaged natural feature including: (A) Active steps taken to restore damaged wetlands, streams, protected habitat, or their buffers to the functioning condition that existed prior to an unauthorized alteration; and (B) Actions performed to reestablish structural and functional characteristics of the critical area that have been lost by alteration, past management activities, or catastrophic events (WDCTED 2003).

Riffle – A shallow gravel area of a stream that is characterized by increased velocities and gradients (Merz et al. 2008). Riffle crests/pool tailouts are where most salmonid spawn.

Riparian Habitat – Areas adjacent to aquatic systems with flowing water that contain elements of both aquatic and terrestrial ecosystems that mutually influence each other. The width of these areas extends to that portion of the terrestrial landscape that directly influences the aquatic ecosystem by providing shade, fine or large woody debris, nutrients, organic and inorganic debris,

terrestrial insects, or habitat for riparian-associated wildlife. Widths are measured from the ordinary high water mark or from the top of bank if the ordinary high water mark cannot be identified. It includes the entire extent of the floodplain and the extent of vegetation adapted to wet conditions as well as adjacent upland plant communities that directly influence the stream system. Riparian habitat areas include those riparian areas severely altered or damaged due to human development activities (WDCTED 2003).

Riparian vegetation – Vegetation that requires the continuous presence of water, or conditions that are more moist than normally found in the area (Knutson and Naef 1997).

Run – (A)The movement of fish inshore or upstream for spawning, usually at a specific time period (e.g., fall-run, spring-run, winter-run) (Merz et al. 2008); or (B) An area of a stream characterized by smooth surface, moderate depth, and moderate current velocity (intermediate between a pool and a riffle).

Salmonid – Fish that belong to the Salmonidae family, including salmon, trout, char, whitefish, grayling, as well as similar Eurasian species (Merz et al. 2008).

Shorelines – All of the water areas of the state as defined in RCW 90.58.030, including reservoirs and their associated shorelands, together with the lands underlying them except: (A) Shorelines of statewide significance; (B) Shorelines on segments of streams upstream of a point where the mean annual flow is twenty cubic feet per second (20 cfps) or less and the wetlands associated with such upstream segments; and (C) Shorelines on lakes less than twenty (20) acres in size and wetlands associated with such small lakes (WDCTED 2003).

Shorelands or Shoreland Areas – Those lands extending landward for two hundred (200) feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward two hundred (200) feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of Chapter 90.58 RCW, Shoreline Management Act (WDCTED 2003).

Smolt – Life stage when young salmonids often migrate downstream from freshwater to saltwater. When parr become smolts, they lose their spots and

turn silvery. Distinct physiological change allows the smolting salmonid to live in saltwater (Merz et al. 2008).

Smoltification – Process of morphological and physiological adjustment that young salmonids of a certain size undergo to live in saltwater. The process includes changes in shape, color and density (Merz et al. 2008).

Sockeye – A species of Pacific salmon also known as the "red" salmon. Dark blue-black back with silvery sides; no distinct spots on backs, dorsal fins, or tails. Spawning adults develop dull, green colored heads with brick red to scarlet bodies. The landlocked version is known as "kokanee" (Merz et al. 2008). Most populations of sockeye include lake or reservoir rearing for at least two years.

Spawn – To bring forth a new generation of salmonid by digging nests in the stream bed and depositing fertilized eggs into them (Merz et al. 2008).

Special Flood Hazard Areas – The land in the floodplain within an area subject to a one percent (1%) or greater chance of flooding in any given year. Designations of special flood hazard areas on flood insurance map(s) always include the letters A or V (WDCTED 2003). Zone A includes areas subject to inundation by the 1-percent-annual-chance flood event and zone V includes areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards associated with storm-induced waves. Mandatory flood insurance purchase requirements apply in both zones. (FEMA National Flood Insurance Program, *http://www.fema.gov/business/nfip/fhamr.shtm*).

Species, Candidate – Any fish or wildlife species that is native to the State of Washington that will be reviewed by the Washington Department of Fish and Wildlife for possible state listing as endangered, threatened, or sensitive. A species will be considered for candidate listing if evidence suggests its status meets the criteria for endangered, threatened, or sensitive listings. Candidate species will be managed by WDFW, as needed to ensure the long-term survival of populations in Washington (Knutson and Naef 1997).

Species, Endangered – Any fish or wildlife species that is native to the State of Washington that is seriously threatened with extinction throughout all or a significant part of its range (Knutson and Naef 1997). (Federal definition in the

1973 Endangered Species Act available at:
http://www.fws.gov/endangered/whatwedo.html.)

Species, Sensitive – Any fish or wildlife species that is native to the State of Washington that is vulnerable or declining, and are likely to become endangered or threatened throughout all or a significant part of its range, without cooperative management or the removal of threats (Knutson and Naef 1997).

Species, Threatened – Any fish or wildlife species that is native to the State of Washington that is likely to become endangered within the foreseeable future throughout all or a significant part of its range (Knutson and Naef 1997). (Federal definition in the 1973 Endangered Species Act available at:
http://www.fws.gov/endangered/whatwedo.html.)

Steelhead – The anadromous form of the rainbow trout. A small percentage are repeat spawners (Merz et al. 2008).

Stock: A group of fish within a species, which is substantially reproductively isolated from other groups of the same species (WDFW 2008).

Turbidity – The measurement of suspended particles within the water column. Turbidity affects the amount of light penetration in the water column and can impair gill functions in fish (Merz et al. 2008).

Urban Growth – "Urban growth" refers to growth that makes intensive use of land for the location of buildings, structures, and impermeable surfaces to such a degree as to be incompatible with the primary use of land for the production of food, other agricultural products, or fiber, or the extraction of mineral resources, rural uses, rural development, and natural resource lands designated pursuant to RCW 36.70A.170 (RCW 36.70A.030 in part).

Velocity – The speed of flowing water (Merz et al. 2008).

Water Resource Inventory Area (WRIA) – One of sixty-two (62) watersheds in the State of Washington, each composed of the drainage areas of a stream or streams, as established in Chapter 173-500 WAC as it existed on January 1, 1997 (WDCTED 2003).

Watercourse – Any portion of a channel, bed, bank, or bottom waterward of the ordinary high water line of waters of the state including areas in which fish may spawn, reside, or through which they may pass, and tributary waters with defined beds or banks, which influence the quality of fish habitat downstream. This definition includes watercourses that flow on an intermittent basis or which fluctuate in level during the year and applies to the entire bed of such watercourse whether or not the water is at peak level. This definition does not include irrigation ditches, canals, stormwater run-off devices, or other entirely artificial watercourses, except where they exist in a natural watercourse that has been altered by humans (WDCTED 2003).

Watershed – The specific land area that drains into a river system or other body of water (Merz et al. 2008).

Wild - A fish stock that is sustained by natural spawning and rearing in the natural habitat, regardless of parentage (includes native) (WDF et al. 1993).

Wetlands – Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands. For identifying and delineating a wetland, local government shall use the Washington State Wetland Identification and Delineation Manual (WDCTED 2003).

APPENDIX C
STAKEHOLDER REVIEW AND INPUT

Before this document was published, it went through an extensive internal and external review process. It was vetted internally by a WDFW cross-program technical review team (see reviewers listed under "Acknowledgements"), endorsed by the Washington State Aquatic Habitat Guidelines Program (AHG is a multi-state agency group that provides guidance on marine, freshwater, and riparian habitat protection and restoration), and circulated for a 45-day public comment period (June 15 – August 1, 2009). The public comment draft was posted on the WDFW Habitat Program webpage and nearly 700 individuals, including local planners, state agency partners, watershed groups and Indian tribes, were notified directly and invited to review.

During the public comment period, 46 comment letters were received from state agencies, Indian tribes, local government planners, private consultants and non-government interest groups. A comment response matrix was posted on the WDFW Habitat Program webpage summarizing all comments received and WDFW staff response. In general, the comments included requests for more mitigation examples, more sources of best available science, more focus on watershed planning and more specific policy and regulatory recommendations. The final draft incorporated many of these amendments.