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No. 72235-2-I

IN THE COURT OF APPEALS OF THE STATE OF WASHINGTON

DIVISION ONE

COMMON SENSE ALLIANCE, P.J. TAGGARES COMPANY, and FRIENDS OF THE SAN JUANS,

Appellants,

v.

GROWTH MANAGEMENT HEARINGS BOARD, WESTERN WASHINGTON REGION, and SAN JUAN COUNTY,

Respondents,

BRIEF OF APPELLANT

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I. INTRODUCTION

Under the Growth Management Act ("GMA"), counties enjoy substantial discretion in choosing how to designate and protect critical areas ("CAs") like wetlands and fish and wildlife habitat conservation areas ("FWHCAs"). However, the end result must protect the functions and values of CAs, and it must include the Best Available Science ("BAS") in doing so. Friends of the San Juans ("Friends") brings this appeal of seven (7) discrete Critical Areas Ordinance ("CAO") exemptions and exceptions that authorize development of CAs and their buffers and thus prevent their protection and depart from BAS without reasoned analysis.

On December 3, 2012, seven (7) years after the original deadline, San Juan County ("County") adopted its CAO. The CAO designated for protection important wetlands and FWCAs throughout the San Juans. However, the CAO's overly narrow buffers and numerous exceptions warranted appeal to the Growth Management Hearings Board ("Board"), which issued a decision September 6, 2013 that confirmed the need to increase buffers and decrease exceptions. Notwithstanding the BAS recommendations for largely undisturbed, well-vegetated buffers, though, the Board approved much of the buffer development permitted by the CAO. While many of these exceptions have not been appealed and thus

will allow activities in CAs and buffers, Friends respectfully requests that the Court reverse the Board on issues 9, 27, 28, 29, 34, 37, and 38 as described below, and that it remand those provisions to the County for action consistent with the GMA direction to protect critical areas.

II. ASSIGNMENTS OF ERROR & PERTAINING ISSUES

A. Assignment No. 1. The Board erred in finding and concluding that Friends failed to meet its burden of proving Issue 34 below, that excluding uncounted smaller wetlands from protection conflicts with the GMA. Administrative Record certified by the Board ("AR") 6313-15, 6348.

Pertaining Issues

1. Did the Board erroneously interpret or apply GMA requirements to protect wetlands and include BAS or rely on substantial evidence when it upheld the exclusion of uncounted wetlands from CAO protection?

2. Did the Board erroneously interpret or apply the GMA requirement to include BAS or rely on substantial evidence when it found that the County had addressed Ecology comments about the wetland exclusion?

B. Assignment No. 2. The Board erred in finding and concluding that Friends failed to meet its burden of proving Issue 29 below, that future shoreline buffer reductions dictated by historic, non-confirming development conflict with the GMA. AR 6309, 6348.

Pertaining Issues

1. Did the Board erroneously interpret or apply GMA requirements to protect FWHCAs and to include BAS when it approved buffer reductions dictated by non-conforming development patterns?

2. Is the Board's approval of buffer reductions dictated by non-conforming development patterns supported by substantial evidence where it departs from BAS without reasoned analysis?

C. Assignment No. 3. The Board erred when it found and concluded that Friends failed to meet its burden of proving Issue 27 below, that tree and vegetation removal in the Tree Zone conflict with the GMA. AR 6306, 48.

Pertaining Issues

1. Did the Board erroneously interpret or apply GMA requirements to protect FWHCAs and include BAS when it upheld a Tree Zone that does not protect the functions and values unaddressed by water quality buffers due to its permission to remove trees and eliminate other vegetation?

2. Is the Board's approval of incomplete FWHCA buffers supported by substantial evidence in the absence of BAS to support a Tree Zone that authorizes significant devegetation, absent a reasoned analysis?

D. Assignment No. 4. The Board erred when it found and concluded that Friends failed to meet its burden of proving Issue 28 below, that unnecessary buffer averaging that departs from the BAS without reasoned analysis conflicts with the GMA. AR 6306, 6348.

Pertaining Issues

1. Did the Board erroneously interpret or apply GMA requirements to protect FWHCAs and include BAS when it upheld up to a 40% averaging of nearly 70% of the length of the Tree Zone?

2. Is the Board's approval of up to 40% averaging of nearly 70% of Tree Zone length supported by substantial evidence where it departs from the BAS without a reasoned analysis?

E. Assignment No. 5. The Board erred when it found and concluded that Friends failed to meet its burden in proving Issues 37 (exceptions m and o) and 38 (exception o) below, that annual removal of 20% of buffer foliage and 50% of buffer tree canopy conflicts with the GMA. AR 6322, 6348.

Pertaining Issues

1. Did the Board erroneously interpret or apply GMA requirements to protect CAs and include BAS when it approved the annual removal of 20% of buffer foliage and 50% of buffer tree canopy?

2. Is the Board's approval of the annual removal of 20% of buffer foliage and 50% of buffer tree canopy supported by substantial evidence where it departs from BAS recommendations to retain largely intact buffers, absent reasoned analysis?

F. Assignment No. 6. The Board erred when it found and concluded that Friends failed to meet its burden in proving Issues 37 (exception h) and 38

(exception j) below, that converting 4,000 sq. ft. of buffers into orchards and gardens conflicts with the GMA. AR 6320-21, 6348.

Pertaining Issues

1. Did the Board erroneously interpret or apply GMA requirements to protect CAs and include BAS when it approved the conversion of 4,000 sq. ft. of buffers into orchards and gardens?

2. Is the Board's approval of the conversion of 4,000 sq. ft. of buffers into orchards and gardens supported by substantial evidence where it departs from BAS recommendations to avoid disturbance of buffers, absent reasoned analysis?

G. Assignment No. 7. The Board erred when it found and concluded that Friends failed to meet its burden in proving Issue 9 below, that the Reasonable Use Exception ("RUE"), as designed, allows impacts that conflict with the GMA. AR 6274-75, 6348.

Pertaining Issues

1. Did the Board erroneously interpret or apply GMA requirements to protect CAs and include BAS when it upheld a RUE that allows either unmitigated impacts or significant impacts with attempted mitigation?

2. Is the Board's approval of unmitigated impacts or significant impacts subject to attempted mitigation supported by substantial evidence where it departs from BAS and does not include reasoned analysis?

III. STATEMENT OF THE CASE

A. Procedural History.

On December 3, 2012, the County completed its CAO update, approximately seven (7) years after the deadline established by the GMA. RCW 36.70A.130(4)(b); AR 4228. Friends submitted twenty-two (22) public comment letters during the three-and-a-half years of hearings that shaped the CAO's: (1) general provisions; (2) frequently flooded areas; (3) geologically hazardous areas; (4) wetlands; and (5) FWHCAs. *E.g.*, AR 4383-4426. As the CAO navigated the legislative process, it permitted an increasing amount of development in CAs and their buffers, with a final tally of eight (8) general exemptions and twenty-one (21) specific exceptions for activities in CAs and buffers, whose maximum width shrank from 300 or 450 feet to 205 feet. AR 4269-273 & 4276-77 (Appendix ("App.") A), 4321-22 & 4331-35 (App. B), 4362-68 (App. C).[1]

On January 31, 2013, Friends appealed the CAO to the Board with an ambitious fifty-two (52) issues. AR 1, 82, 99, 149. In early February, the Common Sense Alliance, P.J. Taggares Company, San Juan Builders Association, and William Wright also appealed the ordinance. AR 199, 258, 305, 352, 414, 463, 512, 589. The Board granted Friends' appeal on

[1] Friends has attached pertinent CAO provisions as follows: (1) Appendix A -- general ordinance provisions, Ordinance 26-2012; (2) Appendix B – Wetlands provisions, Ordinance 28-2012; (3) Appendix C – FWHCA provisions, Ordinance 29-2012. The remainder of this brief cites to "AR", which can be found within these Appendices.

eight (8) issues, including the size of the water quality buffers for wetlands and FWHCAs. AR 6243. Due to a concern about the activities that the Board upheld for CAs and buffers, on October 13, 2014, Friends appealed to San Juan County Superior Court the same seven (7) exceptions challenged here. On June 19, 2014, the court upheld the Board's decision on all assignments of error; Friends now seeks review of those errors.

B. Ecology Expressed Concerns About Appealed Provisions.

During the CAO adoption process, the Washington Department of Ecology ("Ecology") provided several recommendations to protect CAs.[2] For example, Ecology recommended that the County significantly reduce the number of exceptions for activities allowed in CAs and their buffers, and that it place a greater emphasis on avoiding and minimizing impacts before authorizing activities. AR 4208, 4434 (App. D). Ecology guidance also states that "local governments should regulate all activities with a potential to affect the functions of a wetland and its buffer." AR 4140.

Per Ecology, the following provisions would not protect CAs:

(1) the wetland exclusion. Ecology stated that "[t]he minimum size thresholds for regulated wetlands listed in this section are not consistent with best available science and will not protect wetland functions. To determine cumulative impacts, the County needs to account for wetland

[2] The Ecology comment letters with these recommendations are attached at Appendix D.

losses over time. An outright regulatory exemption will make tracking these wetland losses difficult, if not impossible." AR 4435-36;

(2) pruning of up to 20% of buffer vegetation. Ecology noted that "[o]ne of the most critical elements of the buffer widths recommended in any of the buffer alternatives presented in Ecology's guidance documents is the assumption that the buffers are well-vegetated with a relatively intact, native plant community." Ecology concluded that "[a]llowing pruning of up to 20% in the buffer, let alone the wetland, will have potentially serious impacts on wetland functions," and opined that the 20% limit appeared unenforceable given the County's current and future staffing levels. AR 4211-12; *also* AR 4436;

(3) reduced buffers and buffer averaging. Ecology stated that "[a]llowing a minimum of a 30-foot habitat buffer will not protect wetland functions, particularly on high habitat importance wetlands." AR 4442. Ecology also confirmed that "there is no scientific evidence indicating that buffer averaging will continue to protect wetland functions," and recommended that the reductions be limited to 25% and that the County authorize averaging only after an applicant demonstrates the absence of a feasible alternative to site design. AR 4211-12;

(4) orchards and gardens in buffers. In addressing the numerous exceptions for allowed activities in wetlands and buffers, Ecology stated

that "[t]he most troubling of these allowed activities is orchards and gardens in Category II, III, and IV wetlands…and buffers…." AR 4211; *also* AR 4436, 4442; and

(5) reasonable use exception without mitigation and without a mechanism for determining the long-term cumulative impacts; AR 4209.

The County declined these recommendations, adopting a CAO that authorizes numerous additional activities in CAs and buffers, like ponds, fences, walkways, roads, wells, and septic systems. AR 4330-34, 4364-66.

C. Evidence of Impaired Critical Areas in San Juan County.

Although still largely rural, the San Juans' CAs have suffered impacts like habitat and species loss, a degraded physical environment, and impaired and marginal water quality. AR 3700-04, 4219-20, 4223-26, 4492 n.94, 4539-49, 4667-674. From 1995 to 2004, the San Juans lost roughly 82 acres of critical eelgrass in 11 small embayments. AR 3659. Between 1977 and 2006, San Juan, Orcas, Lopez, and Stuart Islands lost an average of 25% of their marine shoreline forest cover. AR 3704. And a 2009 survey of shoreline development found: bulkheading of 18 of the County's 80 miles of non-rock shorelines; the construction of 472 docks; and numerous other shoreline alterations. AR 4671.

IV. ARGUMENT

In 1990, the Legislature adopted the GMA to address

uncoordinated and unplanned growth that threatened the environment, sustainable economic development, and the health, safety, and high quality of life enjoyed by Washington residents. RCW 36.70A.010. The GMA directs counties to designate and protect CAs and delegates to them the discretion in fashioning locally appropriate approaches. RCW 36.70A.060. Here, however, the County exceeded that discretion in adopting authorizing the elimination of smaller wetlands, incomplete buffers for streams and shorelines, and significant reductions and clearing of buffers.

The Board upheld these exceptions, and must be reversed under the Administrative Procedures Act ("APA") because it did not discharge its duty to ensure the protection of CAs. The Board erroneously interpreted the GMA when it upheld those provisions without assessing whether they protect CA functions or include BAS, and it did not rely on substantial evidence where it upheld exceptions contrary to the BAS without identifying a reasoned analysis for that departure.

A. Standard of Review.

Under the APA, a Board decision should be reversed where it: (1) erroneously interprets or applies the law; or (2) is not supported by evidence that is substantial when viewed in light of the whole record before the court. RCW 34.05.570(3). The Board's legal conclusions are reviewed de novo, giving weight to the agency's interpretation of the

GMA because it administers that statute. King County v. Cent. Puget Sound Growth Mgmt. Hearings Bd., 142 Wn.2d 543, 553, 14 P.3d 133 (2000). Substantial evidence is a sufficient quantity of evidence to persuade a fair-minded person of the truth or correctness of the decision. King County, 142 Wn.2d at 553.

Although the GMA affords counties broad discretion to fashion local approaches, and presumes the validity of ordinances upon adoption, that local discretion must be exercised consistent with the goals and requirements of the GMA. RCW 36.70A.3201; King County, 142 Wn.2d at 561; see also Stevens County v. Futurewise, 146 Wn. App. 493, 509, 192 P.3d 1 (2008) (noting that the Board properly foregoes deference to county actions inconsistent with GMA). Where a CAO is "clearly erroneous in view of the entire record before the board and in light of the goals and requirements of [the GMA]," it must be overturned. RCW 36.70A.320; Swinomish Indian Tribal Cmty. v. W. Wash. Growth Mgmt. Hearings Bd., 161 Wn.2d 415, 423, 166 P.3d 1198, 1203 (2007). An action is "clearly erroneous" if the Board is left with "'the firm and definite conviction that a mistake has been committed.'" King County, 142 Wn.2d at 552 (citation omitted). The clearly erroneous standard requires a "critical review," which is a "'more intense standard of review'" than the arbitrary and capricious standard. Swinomish Indian Tribal

Cmty., 161 Wn.2d at 435 n.8 (citation omitted).

B. The GMA Requires Designation and Protection of Critical Areas.

The mandate to protect CAs is a cornerstone of the GMA. The Legislature emphasized the fundamental importance of protecting CAs by requiring counties to designate and protect critical areas before addressing any other GMA mandate. RCW 36.70A.040(3), .060(2-3), .070(5)(c)(iv), .130(1), .170. The Board has noted that "[i]t is significant that the [GMA] required cities and counties to identify and conserve resource lands and to identify and protect CAs before the date that IUGAs had to be adopted. This sequence illustrates the fundamental axiom of growth management: 'the land speaks first.'" Bremerton v. Kitsap County, CPSGMHB No. 95-3-0039, FDO, 28 (Oct. 6, 1995).[3] This primacy "underscores the paramount importance that [the legislature] intended for this statutory mandate." See Pilchuck v. Snohomish County, CPSGMHB No. 95-3-0047, FDO, 16-17 (Dec. 6, 1995). In Pilchuck, the Board recognized the "higher order of directiveness" and "higher order of urgency" that the legislature placed on CAs, and that "[e]ven the legislature's choice of the term 'critical' to describe these areas conveys an importance greater than, for example, 'natural systems' or 'environmentally sensitive' areas." See id. at 16.

[3] Although not controlling, Friends offers citation to Board decisions that explore relevant GMA doctrines.

The GMA's planning goals and express requirements reflect this substantial concern for protecting CAs. Planning goals 9 and 10 set forth goals to: "retain open space, enhance recreational opportunities, conserve fish and wildlife habitat, increase access to natural resource lands and water, and develop parks and recreation facilities" and "[p]rotect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water." RCW 36.70A.020(9), (10). The GMA then directs counties to designate CAs, adopt development regulations that protect them, and update those regulations regularly. RCW 36.70A.060(2); .070(5)(c)(iv); .170(1).

The GMA requires the protection of all functions and values of critical areas. Whidbey Envtl. Action Network v. Island County, 122 Wn. App. 156, 175, 93 P.3d 885 (2004) ("WEAN"). Protection means the "preservation of the functions and values of the natural environment or safeguarding the public from hazards to health and safety." WAC 365-190-830(3). Hence, the court in WEAN struck stream buffers sized solely for water quality, rather than the "entirety of functions attributed to stream buffers," because the regulations had not protected "all functions and values" of CAs. WEAN, 122 Wn. App. at 175 (emphasis added). And although a county need not maintain all individuals of all species at all times, the "goal of fish and wildlife habitat conservation is to manage land

so as to maintain species in suitable habitats within their natural geographic distribution" and avoid creating isolated subpopulations. Stevens County, 146 Wn. App. at 511. Thus, "local governments must either be certain that their critical areas regulations will prevent harm or be prepared to recognize and respond effectively to any unforeseen harm that arises." Swinomish Indian Tribal Cmty, 161 Wn.2d at 436.

C. A CAO Update Must Include BAS.

In 1995, the Legislature added the requirement that counties "include the best available science in developing policies and development regulations to protect the function and values of critical areas." RCW 36.70A.172(1). Counties must also "give special consideration to conservation or protection measures necessary to preserve or enhance anadromous fisheries." *Id.* The purpose of the BAS requirement is to ensure that CA regulations are based on meaningful, reliable, and relevant evidence, rather than speculation or surmise. Honesty in Envtl. Analysis and Legislation v. Cent. Puget Sound Growth Mgmt. Hearings Bd., 96 Wn. App. 522, 531, 979 P.2d 864 (1999) (hereafter "HEAL").

To include BAS, a county must both: (1) gather or develop valid scientific information produced by a scientific methodology; and (2) analyze that information in a reasoned process. WAC 365-195-900--925; Ferry County v. Concerned Friends of Ferry County, 155 Wn.2d 824, 834-

39, 123 P.3d 102 (2005). Valid scientific information typically bears the following hallmarks: (1) peer review; (2) replicable methods that reach logical conclusions; and (3) appropriate statistical or quantitative methods. WAC 365-195-905(5)(a)(1)-(3).

A county includes BAS by identifying: (1) the specific regulations adopted to protect the CA; (2) the relevant sources of BAS included in the decision-making; and (3) any nonscientific information in the record used to justify a departure from BAS recommendations, as well as the rationale, potential risks, and measures to limit risks associated with that departure. WAC 365-195-915. Although a county may balance the BAS with GMA goals, it ultimately must protect critical areas. RCW 36.70A.060(2); HEAL, 96 Wn. App. at 532-33.

BAS plays a central role in adopting provisions that protect CAs. See HEAL, 96 Wn. App. at 532-33. In HEAL, the court stated that

> [w]hile the balancing of the many factors and goals could mean the scientific evidence does not play a major role in the final policy in some GMA contexts, it is hard to imagine in the context of critical areas. The policies at issue here deal with critical areas, which are deemed "critical" because they may be more susceptible to damage from development. The nature and extent of this susceptibility is a uniquely scientific inquiry. It is one in which the best available science is essential to an accurate decision about what policies and regulations are necessary to mitigate and will in fact mitigate the environmental effects of new development.

Id. (emphasis added).

Regulations that depart from BAS typically contravene the GMA. In Ferry County, the county did not use a scientific methodology or analyze information in a reasoned process when it omitted numerous species from its CAO. 155 Wn.2d at 837-38. Instead, the county relied on advice from a consultant who did not visit the county and who cited only a 1997 birding manual and a discussion with a wildlife biologist about pygmy rabbits. Id. Further, nothing in the record suggested that the county vetted the information provided by the consultant or compared it to any other sources, such as science from state, federal, and Tribal agencies. Id. at 838. The court noted that "a '[c]ounty cannot choose its own science over all other science and cannot use outdated science to supports its choice.'" Id. (quoting Island County Citizens' Growth Mgmt. Coalition v. Island County, No. 98-2-0023c, 2000 WL 268939, at *7 (WWGMHB March 6, 2000) ("ICCGMC")). Similarly, in Department of Ecology v. City of Kent, Kent failed to conduct a reasoned analysis when it declined Ecology's science-based wetlands rating system in favor of an outdated, 1979 wetland classification system that relied upon wetland size and number of vegetation classes without determining wetland functions. CPSGMHB No. 05-3-0034, FDO, 14-16, 43 (April 19, 2006).

Lastly, when scientific evidence is unavailable, a county should

adopt a precautionary or no risk approach. Yakima County v. E. Wash. Growth Mgmt. Hearings Bd., 168 Wn. App. 680, 693, 279 P.3d 434 (2012) (citing WAC 365-195-920(1)). In Yakima County, the court held that Yakima County failed to use a no-risk approach when it responded to scientific uncertainty with minimal stream buffers. 168 Wn. App. at 693. Similarly, in Swinomish Indian Tribal Community, the court declared that "local governments must either be certain that their critical area regulations will prevent harm or be prepared to recognize and respond effectively to any unforeseen harm that arises." 161 Wn.2d at 436.

D. The CAO Leaves Functions Unprotected Without Including BAS.

The CAO authorizes development of smaller wetlands, shoreline buffer reductions dictated by nonconforming development, and significant clearing and tree cutting, orchards and gardens, and an RUE that allows significant unmitigated impacts. AR 4269-272, 4321, 4330-35, 4362-68. Notably, the CAO does not independently limit the cumulative amount of buffer and CA development allowed by the individual exceptions. Id.

1. The Board incorrectly upheld the wetland exclusion. AR 6313-15

The CAO excludes from its protection: (1) medium habitat importance-sensitivity wetlands up to 1,000 sq. ft.; and (2) low habitat importance-sensitivity wetlands up to 2,500 sq. ft. AR 4321. The CAO recitals assert that the ordinance would apply to 97% of mapped wetlands,

but acknowledge that the County did not map wetlands smaller than 1,000 sq. ft. AR 4314. The County did not estimate the number of excluded wetlands and concedes that the exclusion is a potential departure from BAS. Id. It suggests that most jurisdictions establish a minimum size for reasonable and cost effective application of the regulations and that "[t]he Planning Commission and County Council expressed a desire to retain exemptions for some small wetlands." AR 4314. The record does not identify jurisdictions that exclude wetlands, offer a scientific reason for excluding wetlands, or analyze the likely impact to wetland functions.

a. Erroneous interpretation and application of the law.

The Board erred in upholding the wetland exclusion without evaluating whether it protects wetlands or includes BAS. AR 6314. The Board acknowledged that "[t]he BAS does not support a general exemption for small wetlands," and cited a County consultant letter that opines that "[e]xclusion of small wetlands is not consistent with the BAS…." AR 6314 (citing AR 5760). The Board concluded by suggesting that the County addressed Ecology comments. AR 6314-15. However, the Board erred when it halted its inquiry before analyzing whether wetland functions can be protected when their development is allowed, or whether the County offered a reasoned analysis.

Moreover, the Board erred when it broke sharply from its previous

rulings striking wetland exclusions. E.g., Hood Canal Envtl. Council, et al., v. Kitsap County, CPSGMHB No. 06-3-0023c, FDO, 19-20 (Aug. 28, 2006). In Hood Canal, the Board rejected an exemption for very small, truly isolated and poorly functioning wetlands where there was no evidence of the likely number of exempt wetlands, the potential cumulative impacts to those wetlands, adaptive management, or monitoring to assure no net loss. CPSGMHB No. 06-3-0012c, FDO, 19-20 (Aug. 28, 2006). Similarly, in Larson Beach Neighbors v. Stevens County, the Board held that exemptions for certain wetland sizes did not comply with the GMA in the absence of BAS showing that such actions would protect their functions and values. EWGMHB No. 03-1-0003, FDO at 20-22 (Feb. 10, 2004). And in Pilchuck, the Board held that the structure, value, and functions of CAs are inviolate and that a county's discretion to craft regulations that might result in some localized impacts or even loss should be "wielded sparingly and carefully for good cause" and that no circumstances would allow "the net loss of the structure, value and functions of such natural systems within a watershed or other functional catchment area." See CPSGMHB Case No. 95-3-0047, FDO, at 16.

Washington courts have upheld the Board's invalidation of exemptions from wetland protect. In WEAN, the court upheld the Board's invalidation of Island County's exemption of agricultural lands from

critical areas protections on the ground that the county had not offered evidence, such as acres farmed, location, or cumulative impacts, to support the need for an agricultural exemption on all lands. 122 Wn. App. at 183-84. Here, the Board erred by upholding a wetland exclusion without any evidence of its necessity, its impacts, or a means for addressing impacts.

b. Failure to rely on substantial evidence.

Although the County stated that its legislators desired a wetland exemption and deemed it useful for unidentified "practical purposes," these assertions do not offer a reasoned analysis for the exclusion and the Board did not rely on substantial evidence in upholding it. AR 4314, 6314.

The development of smaller wetlands would impact each of the four basic functions and values they perform: (1) water purification;[4] (2) maintenance of hydrologic functions and soil stability;[5] (3) providing habitat;[6] and (4) landscape beautification. AR 3513. Development adversely impacts these functions by altering hydrology with impervious surfaces, removing vegetation, constructing ponds, grading, and disturbing

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[4] Wetlands improve water quality by: (1) decreasing contaminant loads; (2) removing excess nutrients like nitrogen and phosphorous; (3) retaining or killing harmful bacteria and viruses; (4) maintaining stream temperature; and (5) filtering out and stabilizing fine sediments suspended. AR 3513-520.

[5] Wetlands: (1) promote infiltration of runoff into aquifers; (2) decrease erosion in gullies and small channels; (3) store water; (4) help sustain summer flow in small streams; and (5) maintain elevated humidity in uplands. AR 3520-21.

[6] Wetlands provide habitat for at least 162 bird species, 22 mammal species, 7 amphibians, 6 reptiles, fish, invertebrates, and plants in the county, including 73 Washington Department of Fish & Wildlife ("WDFW") Priority Species. AR 3518-20. About 16 of these species rely almost exclusively on wetlands, ponds, and lakes. Id.

soil. AR 3522-25, 29-30, 4168-4185. Wetlands can also lose their capacity to filter pollutants once overloaded. AR 3524.

The BAS strongly supports protecting wetlands of all sizes, and emphasizes the importance of smaller wetlands. The County's BAS Synthesis document states that "[a]lthough some wetlands are too small to encompass the entire daily home range of many animals, they may nonetheless support rare wetland plants, as well as serve as corridors or hospitable resting stops for animals moving between larger but more distant wetlands." AR 3534-35. And Semlitsch, cited for other work by the BAS Synthesis (e.g., AR 5612) concludes that "[s]mall wetlands…are extremely valuable for maintaining the biodiversity of a number of plant and animal species" and "healthy populations of many species depend on not just a single wetland but a landscape densely covered by a variety of wetlands." AR 4635.

Indeed, smaller wetlands warrant protection because they often are more vulnerable to impacts than larger wetlands, suffering more from edge effects like windthrow of trees, altered microclimate, and increased wildlife exposure to predation and human disturbance. AR 3535. The BAS Synthesis confirms that "[m]ost vulnerable are the smaller wetlands (e.g., vernal pools), especially those on smaller islands and peninsulas, whose underlying aquifers and runoff-contributing areas are typically small." AR

3523. And smaller wetlands suffer greater impacts in the San Juans--the BAS Synthesis confirms that "[i]llegal pond construction and drainage of small wet areas near residences are perhaps more common than elsewhere." AR 3512 (emphasis added).

The science in the record roundly rejects small wetland exclusions. The County's wetlands consultant opined that "[e]xclusion of small wetlands is not consistent with the BAS...." AR 5760. Ecology submitted comments that the exemptions were not consistent with the BAS and that they would not protect wetland functions. AR 4435-36. Ecology's Wetlands Guidance states unambiguously that "we do not believe it is appropriate to recommend a general threshold for exempting small wetlands in Washington because the scientific literature does not provide support for such a general exemption," and that "the loss of small wetlands is one of the most common cumulative impacts on wetlands and wildlife in Washington. AR 4142. The BAS Synthesis also recommends against developing wetlands, to protect their open space values and to prevent the additional long-term maintenance costs associated with building in wetlands. AR 3521.

The Board did not acknowledge this ample scientific evidence or offer countervailing evidence. AR 6314. Instead, the Board repeated a County statement that for "practical purposes, local jurisdictions may want

to vary" wetland size thresholds. AR 6314. The record, however, does not identify these "practical purposes." Nothing suggests that it is easier for a lay person to divine the exact type and size of a wetland than the mere existence of a wetland. On the contrary, the arbitrarily chosen 1,000 sq. ft. and 2,500 sq. ft. size thresholds likely will *increase* the difficulty in administering the CAO by forcing landowners to delineate their wetlands. And as in City of Kent, no unique local circumstance justifies the exclusion; conversely, the vulnerability of island wetlands warrants greater protection. See CPSGMHB No. 05-3-0034, at 45 (rejecting minimal buffers because, like Kent, many central Puget Sound cities were built in river valleys and flood plains).

The evidence also does not support the Board's statement that "the County appears to have addressed comments from [Ecology]." AR 6314. Ecology comments unambiguously state that:

> [t]he minimum size threshold for regulated wetlands listed in this section are not consistent with best available science and will not protect wetland functions. To determine cumulative impacts, the County needs to account for wetland losses over time. An outright regulatory exemption will make tracking these wetland losses difficult, if not impossible.

AR 4435-36. Thus, the County expressly rejected Ecology's comments by excluding wetlands and omitting a mechanism to count their losses over time. Indeed, the CAO recitals concede that the County cannot know the

impact of the exclusion because "[w]etlands smaller than 1,000 sq. ft. were not tallied because most could not be identified using aerial imagery." AR 4314. Likewise, the Board incorrectly implies that the CAO implemented Ecology's back-up recommendation that any exempt wetlands be limited to those that are hydrologically isolated, not associated with a riparian area or buffer, and not part of a wetland mosaic--yet the CAO states only that wetland mosaics larger than 2,500 sq. ft. are not exempt and does not limit the exclusion to hydrologically isolated wetlands or those not associated with a riparian area or buffer. AR 4321.

The local legislature's desire to exclude smaller wetlands does not offer a sufficient reasoned analysis for departing from BAS.

2. The Board incorrectly upheld buffer reductions dictated by non-conforming neighboring setbacks. AR 6309

The Board upheld the shoreline buffer reduction without evaluating whether it protects CAs or includes BAS. AR 6309. The CAO directs the County to reduce shoreline FWHCA buffers solely based on past, nonconforming development, where "existing houses on adjoining waterfront parcels are closer to the water than what is specified in this section." AR 4367-68. The revised buffers are the greater of the waterward side of a line drawn between the most waterward point of the neighboring houses or the average setback of the neighboring parcels from

the Ordinary High Water Mark. Id. Although the CAO calls for compensation for adverse impacts, it does not address the BAS that reveals the low likelihood of replacing lost functions. Id.; see AR 4407-4414, 4427 (letter from County Marine Resources Committee ("MRC"), stating that "[r]esearch has shown that marine mitigation attempts are often unsuccessful."), 5520 ("[m]itigation projects are, however, often unsuccessful, avoidance of impacts is more likely to protect [CAs].") The CAO does not identify this exception as a departure from BAS or offer a reasoned analysis for the departure.

In upholding the reduction, the Board stated that "[v]iew protection in the San Juan islands is a significant issue," and noted that where avoidance is not an option, a jurisdiction may allow impacts when it follows a mitigation sequence. AR 6309. The Board did not note that the CAO does not require avoidance or reduction of impacts before authorizing the buffer reduction—indeed, the CAO does not even require that views be blocked—instead, it requires only the existence of non-conforming neighboring development.[7] Id. Like the County, the Board did not address the absence of science to support this exception.

a. Erroneous interpretation and application of the law.

[7] Although the exception's introductory language references water views, the operative language mandates reduced buffers only where "existing houses on adjoining waterfront parcels are closer to the water than what is specified in this section." AR 4367.

The Board erred in upholding the shoreline buffer reduction without evaluating whether it protects FWHCAs or includes BAS. AR 6309. The Board did not identify the likely impacts of developing shoreline buffers or assess the feasibility of compensation. The Board also did not evaluate whether any science supports the reduction, or whether the County engaged in a reasoned analysis in departing from BAS.

The Board also erred by authorizing infill that perpetuates past, nonconforming development patterns and infringes upon CAs. See ICCGMC v. Island County, WWGMHB No. 98-2-0023c, Compliance Order, 10-11 (Dec. 6, 2000). In ICCGMC, the Board held that "[n]either the Act's requirement for use of BAS nor the protection of critical areas is met with this provision to allow infill development to continue the pattern of impinging on critical areas." Id. at FDO, 51-52 (June 2, 1999). Similarly, in Clark County Natural Resources Council v. Clark County, the Board held that a development regulation that impacts CAs by averaging a riparian zone based on historic development patterns does not comply with the GMA. WWGMHB Case No. 96-2-0017, Compliance Order, 8 (Nov. 2, 1997) (noting that "[t]he clear impact of such an averaging is obvious. When existing residences have already degraded portions of the habitat areas, the ordinance allows new development to further degrade them."). Thus, the Board erred.

Moreover, the Board erred in elevating a goal for private views over the GMA requirement to protect CAs. Before balancing GMA goals, jurisdictions must first achieve GMA requirements. Weyerhaeuser, et al v. Thurston County, GMHB No. 10-2-0020c, Amended FDO, 30-31 (June 17, 2011). In City of Kent, the Board rejected Kent's attempt to "balance" housing and economic goals with CA requirements, stating that "the GMA mandate to designate CAs and protect their functions and values using BAS is a requirement, not a goal; pursuant to the admonition of the Supreme Court in Quadrant, goals do not override requirements." CPSGMHB No. 05-3-0034, FDO, at 3, 13, 50-54 (emphasis in original). Views likewise do not justify impacts to FWHCAs.

b. Failure to rely on substantial evidence.

The Board did not identify science to support the buffer reduction. AR 6309. It also did not identify a reasoned analysis for its departure from BAS. Conversely substantial evidence in the record explains: (1) the importance of intact riparian buffers; (2) threats to FWHCAs from diminished buffers; and (3) the ineffectiveness of efforts to replace FWHCA functions.

Riparian buffers serve as a separation zone that protects ecological processes, structures, and functions in adjacent streams, marine shorelines,

and other FWHCAs. AR 4076 (App. E).[8] Riparian areas provide the following essential functions: (1) water quality; (2) fine sediment control; (3) large woody debris; (4) shade/microclimate; (5) litter fall/organic matter; (6) hydrology and slope stability; and (7) fish and wildlife habitat. Id. Streamside setbacks also increase property values. AR 4522-24.

One of the primary threats to FWHCAs is the alteration of riparian areas through the development, agriculture, and tree and shrub cutting and removal. AR 4077-4101.[9] The BAS demonstrates that the conversion of natural, vegetated shorelines to areas developed with impervious surfaces and pollutant sources adversely impacts FWHCAs and can promote future shoreline modifications like bulkheading that arrest the natural functioning of shorelines. Id. Residential development, including on-site septic systems, ditching, roads, chemical use, untreated stormwater runoff, domestic animals, excavated ponds, vegetation removal, and shoreline modifications, can: (1) significantly alter the amount, timing, frequency, and duration of flow in streams and water level in lakes and welands; (2) increase pollutant loads and concentrations; (3) disrupt channel configurations; (4) shift local air and water temperature regimes; and (5)

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[8] Appendix E sets forth pages AR 4073-4102, WDFW's *Protection of Marine Riparian Functions in Puget Sound, Washington* (June 15, 2009), which provides comprehensive recommendations for marine FWHCA protection and is cited throughout the next two sections.

[9] Riparian and aquatic ecosystems are being altered, impacted, or destroyed at a greater rate than at any other time in history. AR 4095-E.

introduce chronic noise, predators, and other disturbances. AR 3775-76, 3815-17, 4095-F-97. Modeling indicates that air temperature in a forest may be affected up to 230 feet from an edge; a warming of only 7° F could change relative humidity from 94% to about 77%, affecting mosses, lichens, amphibians, and other organisms. AR 3817. And forest practices impact all FWHCA functions, including increased erosion and sedimentation and impacts to shade and microclimate from logging and thinning that opens the understory and ground to increased light and air flow. AR 4099-4101; *also* AR 3776.[10]

To address these threats, WDFW recommends actions in riparian areas adjacent to streams, lakes, and marine shorelines that: (1) retain, restore, and enhance native vegetation with multi-layered canopy and understory; (2) avoid pollutant use; (3) avoid impervious surfaces and septic tank drain fields; (4) limit disturbance of buffers with agricultural and pasture lands; (5) avoid grading, compaction, and removal of native

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[10] In addition to these general FWHCA impacts, development of the shoreline buffer poses the following threats to nearshore CAs:

- Kelp beds – through adverse changes in water quality, substrate composition, siltation, increased run-off, pollutants, and turbidity; AR 3657-68;
- Eelgrass beds – water quality, disease, shoreline agriculture, low oxygen, thermal and salinity stress, and bioturbation; AR 3659-60;
- Surf smelt and other forage fishes – loss of vegetation over-hanging the upper beach, bulkheads, and pollution runoff; AR 3663; and
- Threatened Salmonids – nearshore vegetation disturbance that reduces or alters leaf litter and insect drop, reduced eelgrass, vegetation removal, impervious surfaces, agricultural practices, and streambank erosion. AR 3680.

soils; (6) prohibit cutting and topping of trees and limbing of trees; (7) avoid engineering approaches that encroach on buffers; (8) avoid "loading" bluffs with excessive moisture from irrigation, septic fields, impervious surfaces; (9) maximize wildlife habitat connectivity with riparian corridors; and (10) allow for natural disturbances such as floods, windthrow and landslides. AR 4077-4095-E.

The reduction upheld by the Board rejects these recommendations on the ground that a mitigation sequence could replace the functions lost to developed buffers. AR 6309. However, there is no evidence in the record that mitigation can effectively do so. On the contrary, the science demonstrates that mitigation projects rarely replace lost CA functions and values. One study found that mitigation projects: (1) did not adhere to established mitigation policies; (2) were frequently unsuccessful; and (3) often missed the deadline. AR 4407 (stating that "[b]ased on over a decade of survey results, the cumulative record of past mitigation projects remains undeniably poor overall, with disappointingly few examples of success," and noting that exemptions virtually guarantee incremental loss of wetlands). The County MRC acknowledged the poor success of mitigation projects and commented during the CAO process that "[m]itigation for marine habitat areas…should not be allowed. Impacts to these critical areas must be avoided." AR 4444. In the wetland context, one study found

that after 100 years, 621 wetland sites continued to suffer biological structure and biogeochemical functioning 26% and 23% below reference sites. AR 4571-78. A 2008 study of 23 wetland mitigation projects found similarly that: (1) 67% of the projects did not meet permit requirements for wetland areas; (2) open-water/emergent wetlands were exchanged for scrub/shrub forested wetlands; (3) wetlands decreased in number from 134 to 65; and (4) smaller wetlands were lost. AR 4416.

In addition, because the buffer reduction is triggered by adjoining, nonconforming development, the reduction avoids the mitigation sequence, for which Ecology states that applicants "must first avoid and minimize impacts to wetlands and their buffers as much as practicable before proposing compensation for the impacts." AR 6063. For rare, sensitive, or hard to replace wetlands, including eelgrass beds, avoidance is usually the only step allowed in the mitigation sequence. AR 6066.

The Board did not rely on substantial evidence when it approved shoreline buffer development that disregards the BAS emphasis on avoidance. Like the exclusion above and most of the exceptions below, this decision departed from the Board's holding in Pilchuck that a county's discretion to craft development regulations that might result in some localized impacts or even loss should be "wielded sparingly and carefully for good cause," and that it should not allow "the net loss of the

structure, value and functions of such natural systems within a watershed or other functional catchment area." CPSGMHB Case No. 95-3-0047, FDO, at 16. Instead, it authorizes impacts first, seeking mitigation second.

3. The Board incorrectly upheld a Tree Zone that leaves FWHCA functions unprotected. AR 6306

While the Tree Zone manages tree cutting and development outside the CAO's water quality buffer, it fails to fully protect FWHCA functions like: (1) fine sediment control;[11] (2) shade and microclimate;[12] (3) large woody debris ("LWD");[13] (4) litter fall/organic matter;[14] (5) hydrology and slope stability;[15] and (6) habitat.[16] Rather than adhering to

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[11] A properly functioning marine riparian area manages fine sediment in run-off so that it nourishes beaches and waters without overloading them, through vegetation that intercepts rainfall, binds soil with roots, slows surface runoff, and moderates soil moisture levels. AR 4081-84, 4102.

[12] Riparian microclimates rely on overstory trees, understory shrubs, and ground-level plants that intercept sun and affect microclimate conditions like soil and ambient air temperature, soil moisture, wind speeds, and humidity. AR 4084-87, 4102. Shade is essential to prevent desiccation in the intertidal zone. Vegetation also screens impacts like noise, glare, and human activity.

[13] Marine and freshwater shorelines contribute LWD of downed trees that benefits riparian areas by: (1) moderating water and soil temperature and moisture; (2) accumulating detritus for invertebrate food and habitat; (3) supporting terrestrial vegetation like nurse logs; (4) adding structure; and (5) controlling erosion. AR 4087-91.

[14] Litter fall, such as leaves, bark, needles, and twigs, serves as habitat and food for fish and aquatic invertebrates. It is particularly important for juvenile salmon in the San Juans, which feed on terrestrial insects. AR 4091-94, 4102.

[15] Vegetation is essential for maintaining hydrologic processes and slope stability. Tree and shrub root strength maintains slope stability and vegetation intercepts and absorbs water; loss of root strength due to tree removal may increase erosion and landslides. Vegetation also reduces runoff volume and velocity. AR 4094-95.

[16] Riparian areas contribute to the high productivity and species diversity of aquatic and upland wildlife by providing areas for feeding, roosting, breeding, refuge, migration corridors, and clean water. AR 4095-C--95-D. In return, wildlife shapes riparian ecosystems by exchanging nutrients as they breed and rear in upland areas while foraging in intertidal areas. The size of riparian buffers varies based on each species' need; buffers greater than 660 feet will "protect some wildlife habitat functions." AR 4095-D.

BAS recommendations to establish naturally-vegetated buffers, the Tree Zone authorizes: (1) the construction of houses and their associated driveways and other development in Zone 2; (2) with the exception of vegetation overhanging aquatic FWHCAs, clearing of all vegetation other than trees; (3) removal of 20% of tree foliage every year; and (4) in Zone 2, the removal of 40% of the volume of trees over 6 inches at diameter breast height every 10 years. AR 4363. Zone 1 extends inland 35 feet from the waterward edge of the beach or stream and Zone 2 extends from 35 feet to 50 feet for perennial streams and to 110 feet for fish-bearing streams, lakes, or marine waters. AR 4362.

The Board upheld the Tree Zone against Friends' argument that it fails to protect water infiltration, fine sediment, shade and microclimate, LWD, litter fall and organic matter, and fish and wildlife habitat functions left partially unaddressed by the water quality buffer. AR 6305-07. The Board recited several instructions for the Tree Zone and concluded summarily that Friends did not meet its burden. AR 6305-06. The Board did not analyze whether the Tree Zone's substantial clearing and defoliation protects the FWHCA functions listed above. Id. The Board also did not assess the adequacy of the size of the Tree Zones, or whether they include BAS. AR 6306.

Although the CAO recitals suggest that the County considered

shade/microclimate, LWD, and litterfall, they omit mention of fine sediment control, hydrology, or habitat, and do not justify a departure from the BAS emphasis to maintain existing native vegetation, and avoiding impervious surfaces, building, and septic systems. Compare AR 4348-50,[17] 4363 with AR 3704-710, 4945, 4978-79, 5111-12.

a. Erroneous interpretation or application of the law.

The Board did not evaluate whether the Tree Zone protects functions not addressed by the water quality or coastal geologic buffer. See e.g., AR 3680 (threats to salmon), 3776, 4081-4095-E, 4211 (Ecology concerns); see WEAN, 122 Wn. App. at 175; see also City of Kent, CPSGMHB No. 05-3-0034, at 43 (wetland ratings system did not fall within BAS or protect wetlands because it did not account for their hydrology or water quality functions). The Board did not address the BAS recommendation to retain a well-vegetated permanent buffer with trees, shrubs, and herbaceous vegetation (AR 3812-18), or the effects of removing riparian vegetation on wildlife (AR 3788-94). The Board erred when it failed to identify the functions performed by FWHCAs and evaluate whether the Tree Zone protects them or includes BAS. AR 6306.

b. The Board did not rely on substantial evidence.

Neither the Tree Zone provisions referenced by the Board nor the

[17] Noting that "shrubs are not protected in Tree Protection Zones."

absence of rationale for departing from BAS offers the substantial evidence necessary to uphold the Board's decision. AR 6306. Instead, BAS recommendations for protecting marine riparian functions in Puget Sound include: avoiding disturbance to native vegetation, retaining, restoring, and enhancing native vegetation with a multi-layered canopy and understory, avoiding grading and compaction, and prohibiting cutting and topping of trees and avoiding limbing for view corridors and other purposes within buffers. AR 4080, 4084, 4087, 4091, 4094, 4095-C, 4095-E. Not only is the full suite of vegetation necessary to protect non-water quality functions like water infiltration, fine sediment, shade and microclimate, large woody debris, litter fall and organic matter, and fish and wildlife habitat, but so are undisturbed soils, maintained hydrologic conditions, and retention of important buffer components like LWD. AR 4081-4095-E. The type of buffer is important as well--amphibians avoid lawns, croplands, grazed grasslands, and clearcuts when possible and fewer amphibians may survive when forced to pass through those areas. AR 3825. And Wenger and Fowler determined generally that the most effective buffers are at least 100 feet wide and are composed of native forest. AR 3721. In addition, forest practices like the tree removal authorized for the Tree Zone impact all FWHCA functions, including increased erosion and sedimentation from logging, burning and road

building, and impacts to shade and microclimate from logging and thinning that opens the understory and ground to increased light and air flow. AR 4099-4101; *also* AR 3776. For salmon, vegetation disturbance along marine shorelines reduces leaf litter and insects that sustain foraging salmon. AR 3680. Early in the CAO adoption process, on June 10, 2009, Ecology contacted the County to identify harm from devegetating buffers near wetlands, stating, "One of the most critical elements of the buffer widths recommended in any of the buffer alternatives presented in Ecology's guidance documents is the assumption that the buffers are well-vegetated with a relatively intact, native plant community…[a]llowing pruning of up to 20% in the buffer, let alone the wetland, will have potentially serious impacts on wetland functions." AR 4211.

In addition to recommendations to avoid vegetation removal, the BAS identifies average buffer widths well above the 110-foot maximum Tree Zone to achieve 80% effectiveness in protecting FWHCA functions, as follows:

- Water quality and infiltration – 358 feet. AR 4077-081, 4102;
- Fine sediment control – 190 feet. AR 4081-84, 4102;
- Shade & microclimate – 79 feet. AR 4084-87, 4102;
- Large woody debris – 180 feet. AR 4087-91, 4102;[18]
- Litter fall and organic matter – 79 feet. AR 4102;

[18] One study found that that a total no-cut zone of at least 4 to 5 tree heights' width was necessary to maintain woody debris inputs at rates similar to undisturbed forested channels. AR 4482 (citing Reid & Hilton, *Buffering the Buffer*, USDA Forest Serv. Gen. Tech. Rprt. PSW-GTR-168, 79 (1998) (this attachment disappeared from record)).

- Fish and wildlife habitat – 571 feet. AR 4655.

The Board did not identify science to rebut this BAS. Instead, the Board "observes no [tree] removal is allowed within the first 35 feet (only limited trimming and pruning is authorized)" and that one primary structure and tree removal is allowed beyond the first 35 feet. AR 6306. The Board did not identify a rationale to support the CAO's divergence from the BAS recommendation to retain well-vegetated buffers, or address the cumulative effect of allowing the removal of an additional 20% of the foliage from the remaining trees. Id.; see AR 3812-18, 3788-94.

Furthermore, the Board did not identify a rationale for the Tree Zone's profound departure from the Kleinschmidt study that allegedly provided its template. For example, that report expressly recommended *against* "residential and commercial development, septic disposal systems, roads, and agriculture," in either Zone 1 or Zone 2. AR 4111 (emphasis added). In addition, Kleinschmidt calls for fully-vegetated buffers, rather than mere tree zones, and would: (1) prohibit *any disturbance* in Zone 1; (2) limit zone 2 activities to light tree harvesting and recreational uses and prohibit any development in Zone 2 that would result in impervious surfaces, removal of the organic soil horizon, fertilizer or chemical use, significant alterations to the infiltration capacity of the soils, or tree removal that could jeopardize wind-firm conditions. AR 4111; Compare

AR 4363 (FWHCA Ordinance at 19) with AR 4108-13.[19] Consequently, without any evidentiary support for the County's departure from the BAS that identifies the need for well-vegetated, undisturbed buffers that protect all riparian functions, the Board failed to rely on substantial evidence.

4. The Board incorrectly upheld Tree Zone averaging. AR 6306

The CAO authorizes averaging that could reduce the Tree Zone from 110 feet to 70 feet along nearly 70% of a parcel's FWHCA shoreline where "necessary to accomplish the purposes of the proposal, and no reasonable alternative is available." AR 4362. The averaged Tree Zone must cover the same amount of land, but because trees 200 feet from the shoreline can replace the lost trees, the zone can be narrowed along 70% of the shoreline. Id. Un upholding the averaging, the Board did not note that: (1) the averaging need not replace the lost functions; (2) the CAO does not limit the length of shoreline to be averaged; (3) the CAO does not direct reductions to the least sensitive area; (4) there is no process for determining the objective necessity for the development; and (5) there is no process for identifying reasonable alternatives. AR 6306.

a. Erroneous interpretation and application of the law.

The Board failed to evaluate whether the impacts authorized by Tree Zone averaging protect CAs or include BAS, even while striking

[19] This lone study to propose bifurcating buffers into two zones, also proposes much wider overall buffers, ranging from seventy (70) to more than three hundred (300) ft.

similar water quality buffer averaging provisions that allowed averaging to reduce the buffer by more than 25%. Compare AR 6306-07 with AR 6300-01. The averaging also conflicts with the Board's decision in ReSources, Inc. v. City of Blaine, where it rejected buffer averaging that allowed reductions of 40% and 60% where, "all anticipated impacts to the critical area and its required buffer have been mitigated and, for averaging, the total buffer area is not reduced below the area that would result from use of the standard buffer." WWGMHB No. 09-2-0015, FDO, 17 (March 29, 2010). The Board also noted the lack of BAS to justify the buffer reductions, and quoted with approval Ecology recommendations that

> [t]he widths of buffers may be averaged if this will improve the protection of wetland functions, or if it is the only way to allow for reasonable use of a parcel. There is no scientific information available to determine if averaging the widths of buffers actually protects functions of wetlands."

Id. (emphasis in original). In addition, Ecology recommended a 25% limit for averaging. Id. In light of this legal and scientific precedent, the Board erred in approving the averaging subject to incomplete conditions.

The Board also erred in upholding averaging that relies on ambiguous terms like "accomplish the purposes of the proposal" and "when no reasonable alternative is available" rather than an objective standard. As the Board noted in English/Project for Informed Citizens v. Bd. of County Commissioners of Columbia County, "there must be a

specific, objective standard of review in the ordinance that will protect with reasonable certainty." EWGMHB No. 93-1-0002, FDO, issue no. 4 (Nov. 12, 1993). The CAO's "reasonable alternative" and subjective "purposes of the proposal" standards likewise fail to protect FWHCAs.

b. Failure to rely on substantial evidence.

The Board did not rely on substantial evidence because it upheld buffer averaging that departs from the BAS without identifying a reasoned analysis for that departure. AR 6306. For wetlands, the BAS Synthesis declares that the "[b]est available science does not support narrowing a buffer on one side of a wetland just to accommodate development or parcel boundaries." AR 3537. Likewise, Ecology would approve averaging only to improve protection and only if: (1) the wetland has significant differences in characteristics that affect its habitat functions; (2) the buffer is increased adjacent to the higher-functioning area of habitat or more sensitive portion of the wetland and decreased adjacent to the lower-functioning or less sensitive portion; (3) the total area of the buffer after averaging is equal to the area required without averaging; and (4) the buffer at its narrowest point is never less than ¾ of the required width. AR 4156-57. Because the CAO's limited conditions fail to: (1) improve the functions of FWHCAs; (2) direct reductions to lower functioning areas and increases to higher functioning areas; or (3) limit the

averaging to just 75% of the required width, the Board did not rely on substantial evidence in approving the nearly 40% averaging or identify a reasoned analysis for this departure from BAS.

5. The Board incorrectly upheld buffer devegetation. AR 6321-22

In addition to other exceptions, the Board upheld exceptions for: (1) devegetation of wetland buffers through the removal of enough trees to eliminate 35-50% of the canopy cover and annual cutting of 20% of the buffer's foliage; and (2) the annual removal of 20% of a FWHCA buffer's foliage. AR 6321-22; 4332-33 (wetlands), AR 4365 (FWHCAs). The CAO establishes these exceptions for views or fire hazard reduction, but does not define those terms. AR 4333, 4365. The CAO does not identify these exceptions as a departure from BAS.

a. Erroneous interpretation and application of the law.

The Board erred when it upheld a uniform exception for the removal of 20% of buffer foliage and up to 50% of buffer tree canopy, and presumably more of their tree volume, without assessing whether such devegetation protects wetland and FWHCA functions. The Board did not identify the water quality, habitat, LWD, shade/microclimate, and other functions performed by the CAs and their buffers or determine whether removal of at least half of the trees and 20% of the remaining foliage would protect those functions. It also did not identify a reasoned analysis

for the departure from BAS. Thus, the Board erred.

b. Failure to rely on substantial evidence.

Protection of naturally-vegetated buffers is necessary for such CA functions as: (1) habitat; (2) shade and microclimate; (3) large organic matter like logs, root wads, and limbs; and (4) smaller organic matter that provides food for invertebrates. AR 4186-87, 4196-97, 4940-41. For example, the Kleinschmidt paper defines a "riparian buffer" as "a naturally vegetated terrestrial area bordering streams and rivers." AR 4995 (emphasis added). Wenger and Fowler address "riparian buffers" that are "strip[s] of naturally vegetated land along a stream or river which is protected to maintain healthy aquatic ecosystems and to provide a range of other environmental, economic, and social benefits." AR 5111. And Brennan defines buffers as "separation zones…that are relatively undisturbed by humans and thus represent mature vegetation consistent with the potential of the site." AR 4945 (emphasis added). Thus, buffers function best where they: (1) retain, restore, or enhance native vegetation; and (2) avoid disturbance. AR 4978.

Moreover, significant devegetation of buffers interferes with buffer width recommendations. As Ecology noted, "[o]ne of the most critical elements of the buffer widths recommended in any of the buffer alternatives presented in Ecology's guidance documents is the assumption

that the buffers are well-vegetated with a relatively intact, native plant community." Consequently, Ecology concluded that "[a]llowing pruning of up to 20% in the buffer, let alone the wetland, will have potentially serious impacts on wetland functions," and opined that the 20% limit appeared unenforceable given the County's current and future staffing levels. AR 4211-12; also AR 4436.

Moreover, "[b]uffers can help to protect wetlands for as long as the buffers themselves remain intact." AR 4196. One study concludes that "some degree of measurable resource degradation can be seen at virtually any level of urban development" and "control of watershed land-cover changes, including limits to both imperviousness and clearing, must be incorporated." AR 4934. Another study determined that removing as little as 3.5% of the forested cover in a rural, low-density residential area altered important water flow patterns. AR 4172. In addition, forest practices like tree cutting impact all FWHCA functions, including increased erosion and impacts to shade and microclimate from logging and thinning that opens the understory and ground to increased light and air flow. AR 4099-101; also AR 3776.

The County's BAS Synthesis further supports the need to maintain largely undisturbed buffers. It states that "for most species, 'suitable wetland habitat' is predicted by characteristics including vegetation

structure…size of a patch of vegetation or water…the amount and distribution of standing and fallen dead wood." AR 3519. Vegetation also helps protect streambanks and slopes from erosion. AR 3520. And the BAS Synthesis notes that tree removal activities like logging decrease the amount of water that the trees take up and then transpire, causing water tables in wetlands to rise toward the surface. AR 3524.

Notwithstanding this science, the Board upheld the buffer devegetation based on unsupported speculation by a County consultant that "[i]t is not necessary that a buffer always be wooded (dominated by trees and shrubs) in order for it to benefit local biodiversity, but that often helps," and "[t]he suggestion that forest cover in the [buffer] landscape benefits amphibians may not apply to all species that are fully aquatic or that depend on nonforested upland habitat." AR 6322 (citing AR 3548-49, which does not cite to scientific literature for support) (emphasis added). Yet those statements merely reflect the truism that species ***that do not depend on forested areas*** **may not require forested areas**. Thus, in upholding the buffer devegetation, the Board did not rely on substantial evidence for either protection of CAs or the departure from BAS.

6. The Board incorrectly upheld development of orchards and gardens in buffers. AR 6320-21

The CAO authorizes the development of 4,000 square feet of the

outer 25% of low or medium-habitat importance-sensitivity wetland buffer and any FWHCA buffer with orchards and gardens. AR 4332 (Wetlands Ord. at 27 (Exception h)); AR 4365 (FWHCA Ord. at 21 (Exception j)). The conversion could occur as close as 30 feet from CAs. Id. The exception requests that undefined "synthetic chemicals" not be used and that Best Management Practices ("BMP"), also unenumerated, be implemented. Id. In upholding this exception, the Board curtly acknowledged that although the exception departed from BAS, the County explained its rationale for departure and identified possible risks and measures to limit risk. AR 6320-21. The Board did not question the County's suggestion that residents need to produce food in buffers, even in the absence factual support like a survey of the amount of land outside buffers that would support orchards and gardens, an analysis of the amount of farmland currently in production in the County and its capacity to feed residents, or even an assessment of the likelihood of losing access to food sources from off-island. AR 4314. The Board also did not question: (1) the unidentified BMPs requested for the orchards and gardens; (2) the enforceability of a prohibition on the use of synthetic chemicals (or even what that means); (3) the reasonableness of mowing windows; and (4) whether a remaining 30-foot buffer would actually protect habitat functions or provide sufficient vegetative screening. Id.

a. Erroneous application or interpretation of the law.

The Board erred when it did not assess whether gardening buffers, particularly in conjunction with the other uses authorized in CAs and buffers (AR 4269-73, 4331-35, 4364-68), would protect wetland and FWHCA functions. In addition, the Board erred by failing to evaluate the County's justification to determine whether a "unique local condition" required gardening in buffers. See City of Kent, CPSGMHB No. 05-3-0034, FDO, at 42, 45. The Board also did not assess whether the conditions proposed by the CAO are enforceable or even ascertainable. AR 6320-21. Lastly, the Board erred to the extent that it elevated a GMA goal for gardening above the requirement to protect critical areas. City of Kent, CPSGMHB No. 05-3-0034, FDO, at 3, 13.

b. Failure to rely on substantial evidence.

The Board failed to rely on substantial evidence when it upheld an exception for agricultural activities in buffers. The Board correctly noted that converting buffers to orchards and gardens departs from the BAS, which states that such agricultural practices can lead to the removal of riparian vegetation, add nutrients and pesticides, and compact and otherwise disturb soil, thereby impacting all FWHCA functions. AR 4097-99, also AR 3776. Ecology identified this exception as one of the most harmful, stating "[t]he most troubling of these allowed activities is

orchards and gardens in Category II, III, and IV wetlands…and buffers…." AR 4211. However, the Board did not analyze whether the CAO ultimately protects CAs, or whether the County offered a reasoned analysis for the departure. The Board did not analyze whether lands outside of buffers are suitable for gardening, or note that the exception does not direct the development to the least sensitive portion of the buffers, or even require compensation for the impacts. Consequently, the Board did not rely on substantial evidence for this exception.

7. The Board incorrectly upheld the RUE. AR 6275

Where standard application of the CAO would deprive a landowner of all economic and beneficial use of a property, she can choose between two options for development: (1) undefined "low impact development" of up to 2,500 sq. ft. in CAs and buffers without mitigation; or (2) "[u]p to 10% of the parcel, or up to one half (1/2) acre, or the minimum necessary to allow for reasonable use of the property, whichever is more," with mitigation. AR 4270-72. The CAO confirms that this provision "may pose some risk to critical areas," but avers without support that it would apply to a limited number of the most constrained properties and that other measures would reduce the risk. AR 4231. In upholding the RUE, the Board found that Friends had failed to identify "specific results that would rise to the level of a GMA violation." AR 6275.

a. Erroneous interpretation and application of the law.

The Board erred when it failed to examine whether the RUE protects CAs and includes the BAS. AR 6275. The RUE would not protect critical areas because it allows applicants to choose the net loss of functions. AR 4017, 4021-22, 4052; see Pilchuck, CPSGMHB Case No. 95-3-0047, FDO, 16 (Dec. 6, 1995))).

b. Failure to rely on substantial evidence.

The Board did not identify science for allowing unmitigated impacts up to 2,500 sq. ft. of CA and buffer or development of up to ½ acre of development subject to attempted mitigation. AR 6275. The BAS identifies numerous impacts to wetlands and FWHCAs from development, including vegetation removal, drain installation, septic systems, pond construction, wells, and added toxins, nutrients, and temperature. E.g., AR 3775-795.

In addition to the uncompensated impacts, the BAS acknowledges that compensatory mitigation typically does not replace lost functions. AR 4407, 4416, 4444, 4571-78.[20] Moreover, the County conceded in its Prehearing Brief that "San Juan County is a small jurisdiction with no expertise in enhancement of the functions of wetlands and aquatic

[20] In a document discussing the RUE, the County conceded that "[m]itigation projects are, however, often unsuccessful, avoidance of impacts is more likely to protect critical areas...." AR 6027.

FWHCAs." (emphasis added). AR 4825-26.

The RUE also does not draw the exception as narrowly as possible or create a mechanism for determining long-term impacts. The Department of Commerce recommended: (1) a Conditional Use Permit ("CUP") process, or (2) other reasonable siting criteria to guide RUE development to the location likely to cause the fewest impacts. AR 4034.[21] The CAO also omits a cumulative impacts analysis for the unmitigated impacts to 2,500 sq. ft. of CAs and buffers, or a mechanism to compensate for those impacts. WAC 365-195-915; *WEAN*, 122 Wn. App. at 183.

V. CONCLUSION

For the reasons stated above, Friends respectfully requests reversal of the Board's conclusions on Issues 9, 27, 28, 29, 34, 37, and 38 that the challenged provisions are consistent with the GMA and remand to the County for action consistent with the GMA requirements to protect critical areas and include BAS.

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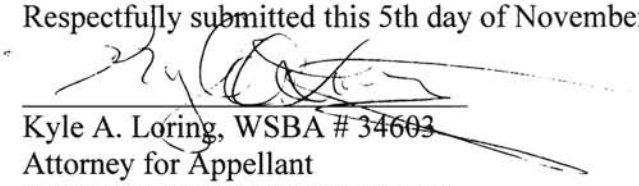
[21] Similarly, County staff recommended a process "*...consistent with the advice of legal counsel and with a site specific approach to applying Critical Area protection measures*," that would have required that:

> (1) no other reasonable use has less impact on the Critical Area;
> (2) the proposed development is the minimum necessary to allow for reasonable use of the property;
> (3) the proposal does not pose an unreasonable threat to the public health, safety or welfare on or off the property;
> (4) the proposal will not result in a net loss of critical area functions or values considering BAS.

AR 4473.

Respectfully submitted this 5th day of November, 2014.



Kyle A. Loring, WSBA # 34603
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FRIENDS OF THE SAN JUANS

APPENDIX

A

Ordinance No. 26 - 2012

AN ORDINANCE REGARDING GENERAL REGULATIONS FOR CRITICAL AREAS; AMENDING SAN JUAN COUNTY CODE SECTIONS 18.10.040, 18.20.010, 18.20.020, 18.20.030, 18.20.040, 18.20.060. 18.20.070, 18.20.080, 18.20.090, 18.20.110, 18.20.120, 18.20.130, 18.20.140, 18.20.160, 18.20.170, 18.20.180, 18.20.190, 18.20.200, 18.20.220, 18.20.230, 18.30.110, 18.80.010, 18.80.020, 18.80.070, and 18.80.090, AND ADDING A NEW SECTION TO SJCC CHAPTER 18.80

BACKGROUND

A. The County was scheduled to review, and where necessary, update its development regulations regarding critical areas by December 1, 2006, to ensure consistency with RCW 36.70A (the Growth Management Act, or GMA). A review of the County's critical areas regulations, including General regulations, was adopted in Resolution 98-2005. Although some updates to critical areas regulations were adopted in Ordinance 15-2005, further action was reserved for a later time.

B. San Juan County adopted a public participation plan for the revision of its development regulations regarding critical areas in Resolution 56-2006; the plan was most recently updated in Resolution 32-2011.

C. The applicable science related to critical areas was reviewed and is summarized in the *Best Available Science Synthesis for San Juan County, May 2011*, adopted in Resolution 22-2011.

D. Additional review of the County's General regulations for critical areas was undertaken and is described in the document "Review and Recommendations on SJCC 18.30.110 – General Regulations Applicable to all Critical Area Types", dated June 2, 2011. This review was discussed and public comment heard at a County Council workshop held on June 13, 2011.

E. An environmental checklist was prepared evaluating potential effects of the proposed amendments and a notice of Determination of Non-significance was issued on July 26, 2011 and published on July 27, 2011. The notice was provided to federal, state and local agencies in accordance with San Juan County Code 18.80.050 and WAC 197-11-340.

F. The 60-day notice on the proposed amendments to the General critical area regulations, as required by RCW 36.70A.106, was provided to the Washington State Department of Commerce on August 24, 2011, and was assigned Material ID No. 17298.

G. Efforts to involve and inform the public included:

I. A public workshop held in March of 2006.
II. County Council appointment of a citizens committee in 2007, which reviewed the GMA requirements, the applicable science and the existing regulations, and developed a draft set of amendments.
III. Public meetings held in June of 2009.
IV. A public workshop held in August 2009.
V. Request for Best Available Science (BAS) submittals from the public in June-July 2010.
VI. Public workshops on San Juan Island, Orcas Island, and Lopez Island in September 2010, to address "hot button" issues.
VII. Joint Planning Commission/County Council public workshops in February 2011, to review and discuss the first draft Best Available Science Synthesis, and County Council workshops in May 2011 to discuss the second draft. Public comment was accepted at all meetings.
VIII. Public workshops in June 2011 to discuss the review of existing regulations and determine policy direction for the revision of regulations.

IX. A mailer on the update to the critical area regulations was included in the 2012 tax statements.
X. Advertisements of Planning Commission and County Council meetings in local papers, including online media.
XI. Notice of the availability of the proposed ordinance and staff report was e-mailed to residents, property owners, and interested parties who requested to be kept informed prior to the Planning Commission and County Council hearings.

H. The Planning Commission conducted a duly advertised public hearing on August 10 and August 19, 2011.

I. The County Council held a facilitated public conversation regarding the general regulations for critical areas on November 28, 2011.

J. The County Council conducted a duly advertised public hearing on December 5, 2011 that was continued to December 12, 2011 and January 24, 2012; along with an additional duly advertised public hearing conducted on November 27, 2012.

K. The County Council makes the following findings:
I. The Best Available Science was included in developing the proposed amendments, which will protect critical areas in conformance with the requirements of the Growth Management Act.
II. The proposed regulations are consistent with the goals and policies of the San Juan County Comprehensive Plan.
III. Clarifying that the purpose of the regulations includes conformance with the Growth Management Act will enhance consistency with those requirements.
IV. Revising the applicability provisions to establish five separate critical area overlay districts will help prevent over regulation and help ensure consistency with GMA goals 6 (property rights), and Comprehensive Plan Land Use Element Section B.2.5.B goals 2 and 3 and policy 6. Expanding the applicability to include activities that are not subject to a permit will help prevent adverse impacts to critical area functions and values.
V. Removing the unnecessary cross-reference to SJCC Chapter 18.30 Tables 3.1 and 3.2 will reduce confusion, particularly with regard to areas of the County that are governed by a subarea or activity center plan that takes the place of Tables 3.1 and 3.2.
VI. Removing an overly broad exemption allowing the establishment of new lawns, gardens and orchards will help reduce risks to critical area functions and values;
VII. Transferring the procedures for mitigation of adverse impacts from the wetlands section of the regulations into the General section establishes a single procedure for mitigating those impacts to critical area functions and values. Updating the provisions should improve protection of critical area functions and values.
VIII. Adding provisions for nonconforming structures and uses will help ensure consistency with GMA goals 4, 5, and 6 as well as Comprehensive Plan Land Use Element Section B.2.5.B goals 2 and 3 and policy 11.
IX. This ordinance improves consistency by updating the term "discretionary use" to "provisional/conditional use", the term "environmentally sensitive area" to "critical area", and the term "administrator" to "director"; removing "critical aquifer recharge areas" and associated high and medium classes to be consistent with the CARA portion of the code that was updated in 2008; and, in Table 8.2 updating the reference to "High" level of impact activities to include any adverse impacts to wetlands or fish and wildlife habitat conservation areas that cannot be mitigated.
X. Adding provisions for financial guarantees will help ensure adequate and timely completion of improvements that are necessary to offset adverse impacts to the functions and values of critical areas. The proposal does not apply to any state agency or unit of local government and is consistent with RCW 36.32.590.

XI. Actions that depart from the BAS and associated risks. WAC 365-195-915 provides guidance on including the best available science in the development of critical area regulations. When departing from science based recommendations, this guidance specifies that the County should identify any information in the record that supports the decision, explain the rationale for departing from science based recommendations, identify potential risks to the functions and values of critical areas, and identify any measures chosen to limit such risk. The following is a description of areas of potential departure from the Best Available Science.

Exemptions.

Exemptions to critical area regulations are necessary to ensure reasonable and cost effective administration of the regulations. Some activities are exempt because they are necessary and are not expected to have adverse impacts on critical area functions and values; other activities are exempt contingent upon mitigation of adverse impacts and associated monitoring. Although the Best Available Science generally recognizes avoidance of critical areas as the preferred option for protecting critical area functions and values, mitigation is also an option described in the Best Available Science and is appropriate in certain circumstances. The rationale for changes to exemptions, and description of any associated risks is summarized below:

a. Emergencies. Emergencies are inevitable, and it is necessary to allow for expedient action to deal with them. Though there is some potential risk to critical area functions and values, the proposed changes will help reduce that risk by ensuring that the effects of emergency actions are mitigated;
b. Operation, maintenance, repair, remodel, or replacement of existing structures, facilities, and infrastructure systems and development areas. An exemption is necessary to ensure that existing development can be maintained. To help reduce risk to critical area functions and values, new requirements are added that preclude further intrusion into critical areas or their buffers and require that: soil erosion is controlled, disturbed areas are stabilized, and that actions do not have an additional adverse effect on critical area functions and values;
c. Utilities. In San Juan County utilities are small in scale. With a year-round growing season, associated disturbed areas can be easily and quickly revegetated with no long term adverse impacts to critical area functions and values. To reduce risk, the exemption of electrical facilities (which could include things like substations) has been removed. Also removed is an unnecessary plan review procedure for the installation of utility lines;
d. Defensible space and hazardous trees and vegetation. To prevent harm to people and property, an exemption is needed to allow for the removal of hazard trees, and to allow for the maintenance of defensible space around existing buildings. According to the Best Available Science (BAS), some tree removal is possible without adversely affecting critical area functions and values. Risk to critical areas is minimized by narrowing the scope of the existing exemption for removal of hazardous trees and vegetation.
e. State regulated forest practices. A new exemption is added to eliminate unnecessary duplicate regulation of forest practice activities that are governed by State regulations. This should not increase risk to critical area functions and values because any potential risks should be addressed through application of the State regulations;
f. Navigation aids and survey markers. An exemption is added to allow for the installation of navigation aids and survey markers. Because they are small in scale they should have no adverse effect on critical area functions and values; and
g. Site investigative work. An exemption is added to allow for site investigative work associated with land use applications provided critical areas are protected and disturbed areas are immediately restored. As with underground utility installation, this work in the San Juans is small in scale, and disturbed areas can be promptly revegetated so there will be no lasting adverse impacts on critical area functions and values.

Reasonable Use Exception

This provision is adopted to prevent regulatory taking of property and to help ensure consistency with GMA goals 1, 2, 4, 5 and 6, and Comprehensive Plan Land Use Element Section B.2.5.B goals 2 and 3 and policy 11. While development under this provision may pose some risk to critical areas, these exceptions only apply to a limited number of the most constrained properties, and measures have been taken to reduce this risk including a) establishing a clearer review and approval process that includes review of applicable BAS as recommended by WAC 365-195-915(2); b) implementing new mitigation, monitoring and financial guarantee requirements and procedures for larger projects; c) adding requirements for use of low impact development practices; and d) tracking of the types of critical areas that are being adversely affected by the small "without mitigation" projects so that County sponsored offsite improvements can be made to mitigate the impacts.

Public Agency/Utility Exception

This exception is necessary so that public agencies and utilities can provide the services necessary to support existing and new development consistent with GMA goals 1, 2, 3, 4, 5 and 12. Measures taken to reduce risk to critical areas include the requirement to mitigate impacts in accordance with the new procedures.

XII. This ordinance completes the 2006 update to the County's development regulations regarding General provisions for critical areas as required by RCW 36.70A.130 and WAC 365-196-610(1)(e), based upon the review and evaluation described in Resolution No. 98-2005 and the additional review in the "Review and Recommendations on SJCC 18.30.110 – General Regulations Applicable to all Critical Area Types". The County Council generally agrees with the findings and recommendations of the Planning Commission, but finds that modifications are needed for clarity and consistency and to better comply with the GMA based on local circumstances. These changes are included in this ordinance.

XIII. After considering the evidence in the record, and adopting an evaluation of consistency with the Comprehensive Plan, the County Council approved the ordinance.

NOW, THEREFORE BE IT ORDAINED by the County Council of San Juan County, State of Washington, as follows:

SECTION 1. SJCC 18.10.040 and Ord. 52-2008 § 16 are each amended to read as follows:

18.10.040 Establishment of land use designations ~~districts~~ and official maps.
A. Land Use Designations ~~Districts~~. This Unified Development Code applies to the land use designations ~~and map symbols in Table 1.1, below,~~ that are established by the San Juan County Comprehensive Plan, subarea and activity center plans, and official maps. Some regulations for subareas and activity centers are included in SJCC Title 18 while others are in separate documents. Within subarea and activity centers, both this UDC and the regulations for the area apply. The boundaries of the various land use designations, activity centers and subareas are shown on the San Juan County Comprehensive Plan official maps.

Land use designations for areas that are not within an adopted subarea or activity center are shown below in Table 1.1.

45. Removal of hazard trees as defined in SJCC 18.20.080. ~~hazardous, diseased, or dead trees and vegetation and, when necessary, measures to control a fire or halt the spread of disease or damaging insects.~~ In addition, to allow for defensible space for fire protection purposes, 30 feet of vegetation may be cleared around buildings lawfully existing on the effective date of this ordinance.

56. ~~Land divisions exempt from the land division requirements as specified in SJCC 18.70.010(C).~~ The divisions of land specified in 18.70.010(C) are exempt from critical area compliance review. Parcels created via 18.70.010(C) are, however, subject to compliance with critical area protection requirements, and if created subsequent to the effective date of this ordinance, they are not eligible for reasonable use exceptions.

67. Forest practices regulated under the provisions of RCW Chapter 76.09 and WAC Title 222.

78. Installation of navigation aids and survey markers.

89. Site investigative work associated with land use applications, such as surveys, soil borings, and test holes, provided that critical area functions and values are protected and disturbed areas are immediately restored.

ED. Reasonable Use Exception.

It is the policy of San Juan County that private property shall not be taken for public use without just compensation having been made. The property rights of landowners shall be protected from arbitrary and discriminatory actions.

To avoid the taking of property without just compensation, this subsection establishes a reasonable use exception from standard critical area protection regulations. (Also see SJCC section 18.80.100 on the procedures and requirements for approval of a variance). Reasonable use shall be liberally construed to protect the constitutional property rights of the applicant. ~~A reasonable use exemption may only be secured by using the county's conditional use process.~~ THIS SENTENCE NOT ADOPTED JRM

~~If the application of this section would result in denial of all reasonable use of a property (*i.e.*, denial of all economically beneficial or productive use of the land), development may be allowed which is consistent with the general purposes of this code, this section, and the public interest. "Reasonable use," for the purposes of this section, shall include improved area(s) totaling not more than 21,780 square feet or 80 percent of the parcel, whichever is less, on any parcel which constituted a legal building site prior to the adoption of these regulations. Within the improved area(s) the critical area may be cleared, filled, drained, excavated or otherwise altered by development. All improvements, including parking and driving areas, with the exception of a driveway for a single family residence, shall be included in the improved area(s) unless the improvements are otherwise exempt under this section. Reasonable Use Exceptions from the provisions of this section shall be subject to all of the following criteria:~~

~~1. The application of this section would deny all reasonable use of the property so that there is no reasonable use, other than that proposed, with a lesser impact on the critical area;~~
~~2. The proposed development does not pose an unreasonable threat to the public health, safety or welfare; and~~
~~3. Any proposed improved area shall be located in such a way as to minimize the impact to the critical area.~~

1. Reasonable use exceptions only apply to compliance with critical area requirements. They do not relieve the applicant of the duty to comply with other local, State, or Federal requirements.

2. The burden of proof is on the applicant to provide adequate information for the director to make a finding of compliance with the requirements of this subsection (D).

3. Reasonable use exceptions may only be granted for parcels created before the effective date of this ordinance. Reasonable use exceptions cannot be used to justify building on parcels not intended to be used as a building site (e.g. recreational lots including those platted as common area).

4. Two sets of options are available under the reasonable use exception.
   Option One – No Mitigation:
   a. A development area of up to 2,500 s.f. of development constructed using Low Impact Development practices may be located in a critical area buffer.
   b. A development area of up to 1,500 s.f. of development constructed using Low Impact Development practices may be located in a critical area.
   c. A combined development area of 2,500 s.f. of low impact development, with no more than 1,500 s.f. located in the critical area and the balance located in the critical area buffer.

   And;

   Option Two – With Mitigation
   a. Up to 10% of the parcel, or up to one half (1/2) acre, or the minimum necessary to allow for reasonable use of the property, whichever is more, may be developed if adverse impacts to critical area functions and values are mitigated in accordance with subsection 18.30.110.F of this section.
   b. Low impact development practices are encouraged in all development under the reasonable use exception and are required for all reasonable use exception development creating a footprint greater than 10,890 s.f. in size.

5. Applications for reasonable use exceptions are project permits, which are reviewed and approved by the director as a provisional use permit.

6. Application for a reasonable use exception shall include:
   a. The applicable items listed in SJCC Section 18.80.020.C (Project Permit Applications-Forms) along with photos of the site and a detailed site plan showing the location of frequently flooded areas within the proposed development area; geologically hazardous areas in or within 200 feet of the proposed development area; wetlands and fish and wildlife habitat conservation areas in or within 205 feet of the proposed development area; the location of any golden eagle nests in or within 1,000 feet of the proposed development area; and the location of any peregrine falcon or great blue heron nests in or within ¼ mile of the proposed development area;
   b. Any related project documents such as applications to other agencies or environmental documents prepared pursuant to the State Environmental Policy Act;
   c. Required critical area reports, critical area delineations, and, for the "with mitigation" option, Best Available Science documents supporting the proposal;
   d. A copy of proposed or approved storm water and erosion control plans as required by SJCC 18.60;
   e. A narrative describing anticipated adverse impacts to the functions and values of critical areas, based on Best Available Science, and explaining how the proposal meets the reasonable use exception approval criteria;
   f. Mitigation, Monitoring and Adaptive Management Plans. For the "With Mitigation" option, plans meeting the requirements of subsection 18.30.110.F for mitigating any adverse impacts or harm that would result in a net loss of the functions and values of critical areas, for monitoring the effectiveness of mitigation actions, and when necessary for adaptively managing the mitigation project to ensure its success;

g. For the "With Mitigation" option, a cost estimate, prepared by a qualified professional, for implementing mitigation and monitoring plans;
h. Financial Guarantee. For the "With Mitigation" option, a financial guarantee covering 115% of the cost of implementing mitigation and monitoring plans. This guarantee and the associated agreement must meet the requirements of SJCC 18.80.

7. Reasonable Use Exception Approval Criteria.
   a. The application is complete and includes all applicable items listed in SJCC 18.30.110.D.6.
   b. The parcel was created before the effective date of this ordinance and was established as a building site.
   c. The applicant is unable to meet standard critical area protection regulations and the application of SJCC 18.30.110-160 would deprive the land owner of all economic or beneficial use of the property.
   d. The need for the exception is not the result of action by current or previous property owners after the effective date of this ordinance (e.g., creating new parcels without a feasible building site or means of access).
   e. Where possible, proposed development areas are located in such a way as to avoid adverse impacts to the functions and values of critical areas, considering the Best Available Science.
   f. The proposed development meets the requirements of either option One (No Mitigation) or Two (With Mitigation).
   g. The proposal is consistent with the requirements of subsections D.3 and D.4.

8. Recording of Approved Exception, Site Plan, and Notice to Title.
   The County shall record a copy of the approved exception and site plan, along with a Notice to Title referencing the plan, with the cost of recordation included in the application fee.

E. Optional Public Agency and Utility Exception .

The following provisions are available to public agencies and utilities that have difficulty meeting standard critical area protection requirements:

1. If the application of standard critical area regulations would preclude a development proposal by a public agency; public utility; or private utility regulated by the Washington Utilities and Transportation Commission or serving an Urban Growth Area; the development may be allowed if it is consistent with this subsection (E) and other applicable regulations and will benefit public health, safety, or welfare.

2. Public Agency and Utility Exceptions only apply to compliance with critical area requirements. They do not relieve the applicant of the duty to comply with other local, State, or Federal requirements.

3. In determining eligibility for Public Agency and Utility Exceptions, the burden of proof is on the applicant to provide adequate information for the decision maker to determine compliance with the requirements of this subsection (E).

4. Applications for Public Agency and Utility Exceptions are P/C uses.

5. Application for a Public Agency and Utility Exception shall include:
   a. The applicable items listed in SJCC Section 18.80.020.C (Project Permit Applications-Forms) along with photos of the site and a detailed site plan showing the location of frequently flooded areas within the proposed development area; geologically hazardous areas in or within 200 feet of the proposed development area; wetlands and fish and wildlife habitat conservation areas in or within 205 feet of the proposed development area; the location of any golden eagle nests in or

APPENDIX

B

Ordinance No. 28 - 2012

AN ORDINANCE REGARDING CRITICAL AREA REGULATIONS FOR WETLANDS; AMENDING SAN JUAN COUNTY CODE SECTIONS 18.30.150 and 18.60.170; AND REPEALING APPENDICES A-C OF SJCC 18.30.150

BACKGROUND

A. The County was scheduled to review and, where necessary, update its development regulations regarding critical areas by December 1, 2006, to ensure consistency with RCW 36.70A (the Growth Management Act, or GMA). A review of the County's critical areas regulations, including regulations regarding Wetlands, was adopted in Resolution 98-2005. Although some updates to critical areas regulations were adopted in Ordinance 15-2005, further action was reserved for a later time.

B. Wetlands are defined in RCW 36.70A.030 and WAC 365-190-090 and are further described in WAC 365-190-130.

C. San Juan County adopted a public participation plan for the revision of its development regulations regarding critical areas in Resolution 56-2006; the plan was most recently updated in Resolution 32-2011.

D. The applicable science related to Wetlands and stormwater management was reviewed and is summarized in the *Best Available Science Synthesis for San Juan County, May 2011 (BAS Synthesis),* which was adopted in Resolution 22-2011.

E. Additional review of the County's critical areas regulations was undertaken and is described in the documents "Analysis of Existing San Juan County Regulations Pertaining to Wetlands" prepared by Dr. Paul Adamus, and letters provided by the Washington State Department of Ecology on June 9, 2011 and September 14, 2011. The review was discussed and public comment heard at a County Council workshop held on June 13 and 14, 2011.

F. The 60-day notice on the amendments to the Wetland protection regulations, as required by RCW 36.70A.106, was provided to the Washington State Department of Commerce on August 24, 2011, and was assigned Material ID No. 17298.

G. An environmental checklist was prepared evaluating potential effects of the amendments and a notice of Determination of Non-significance was issued on August 30, 2011 and published on August 31, 2011. The notice was provided to federal, state and local agencies in accordance with San Juan County Code 18.80.050 and WAC 197-11-340.

H. Efforts to involve and inform the public included:

I. A public workshop held in March of 2006.
II. County Council appointment of a citizens committee in 2007, which reviewed the GMA requirements, the applicable science and the existing regulations, and developed a draft set of amendments.
III. Public meetings held in June of 2009.
IV. A public workshop held in August 2009.
V. Request for Best Available Science (BAS) submittals from the public in June-July 2010.
VI. Public workshops on San Juan Island, Orcas Island, and Lopez Island in September 2010, to address "hot button" issues.

VII. Joint Planning Commission/County Council public workshops in February 2011, to review and discuss the first draft Best Available Science Synthesis, and County Council workshops in May 2011 to discuss the second draft. Public comment was accepted at all meetings.

VIII. Meetings and public workshops in June 2011 to discuss the review of existing regulations and determine policy direction for the revision of regulations.

IX. Town hall meetings in September 2011, to discuss the regulations (on San Juan, Orcas, and Lopez Islands), and field trips on Orcas Island and San Juan Islands.

X. A mailer with the 2012 tax statements.

XI. Advertisements of Planning Commission and County Council meetings in local papers, including online media.

XII. Notice of the availability of the proposed drafts of ordinance and staff reports was e-mailed to residents, property owners, and interested parties who requested to be kept informed prior to the Planning Commission and County Council hearings.

I. The Planning Commission conducted duly advertised public hearings on September 16 and 28, 2011, November 10, 2011, and March 6 and 16, 2012.

J. The County Council conducted duly advertised public hearings on July 21 and November 27, 2012.

K. The County Council makes the following findings:

I. The Best Available Science was included in developing the amendments, which will protect Wetlands in conformance with the requirements of the Growth Management Act.

II. Implementing a site-specific approach to sizing wetland buffers will effectively protect wetlands, while minimizing costs and maximizing the allowable use of property, which supports other goals found in the San Juan County Comprehensive Plan and the Washington Growth Management Act.

III. Agriculture in San Juan County is a vital part of our heritage and an integral part of the county's landscape, culture and economy. Our quality of life depends on the successful integration of sustainable agriculture and ecological health.

IV. Of the scientific documents that were reviewed, the following references were the most important in the development of the site-specific buffer sizing procedure:

Baker, M.E., D.E.Weller, and T.E. Jordan. 2006. Improved methods for quantifying potential nutrient interception by riparian buffers. Landscape Ecol. 21(8):1327-45.

Booth, D.B., D. Hartley, and R. Jackson. 2002. Forest cover, impervious-surface area, and the mitigation of storm water impacts. Journal of American Water Resources Association 38:835-845.

Castelle, A.J., A.W. Johnson, and C. Conolly. 1994. Wetland and stream buffer size requirements: a review. J. Environ. Qual. 23 (5): 878-882.

Mayer, P.M., S.K. Reynolds, M.D. McCutchen, and T.J. Canfield. 2007. Meta-analysis of nitrogen removal in riparian buffers. J. Environ. Qual. 36(4):1172-80.

Murphy, M.L. 1995. Forestry Impacts on Freshwater Habitat of Anadromous Salmonids in the Pacific Northwest and Alaska – Requirements for Protection and Restoration. NOAA Coastal Ocean Program Decision Analysis Series No. 7. NOAA Coastal Ocean Office, Silver Spring, MD. 156 pp.

National Research Council. 2008. Urban Stormwater Management in the United States. National Academies Press, Washington, DC.
Painter, L. 2009. Redefining old-growth in forested wetlands of western Washington. Environmental Practice 11(2):68-83.

Semlitsch, R.D., B.D. Todd, S.M. Blomquist, A.J.K. Calhoun, J.W. Gibbons, J.P. Gibbs, G.J. Graeter, E.G. Harper, D.J. Hocking, M.L. Hunter Jr., D.A. Patrick, T.A.G. Rittenhouse, and B.B. Rothermel, 2009. Effects of Timber Harvest on Amphibian Populations: Understanding Mechanisms from Forest Experiments. BioScience, Vol.59 No. 10.

Walsh, C.J. and J. Kunapo. 2009. The importance of upland flow paths in determining urban effects on stream ecosystems. Journal of the North American Benthological Society 28(4):977-990.

Washington State Department of Ecology. 2005. Stormwater Management Manual for Western Washington. Olympia, Washington.

Washington Department of Fish and Wildlife. 2009. Landscape Planning for Washington's Wildlife: Managing for Biodiversity in Developing Areas (A Priority Habitats and Species Guidance Document).

Wigington, P.J. Jr., S.M. Griffith, J.A. Field, J.E. Baham, W.R. Horwath Owen, J.H. Davis, S.C. Rain and J.J. Steiner. 2003. Nitrate removal effectiveness of a riparian buffer along a small, agricultural stream in Western Oregon. Journal of Environmental Quality 32:162-170.

V. This ordinance will replace the existing rating and prescriptive buffer system (which was modeled after the Washington State Dept. of Ecology's previous rating system) with a site-specific buffer sizing procedure that factors in both the natural characteristics of the site and the characteristics of the development. The ordinance also: increases the minimum sizes of regulated wetlands; allows for the reduction of some buffers for areas that do not drain to a wetland; allows some reduction in buffer size in conjunction with low impact and green development practices; outlines activities that are allowed and prohibited in wetlands and their buffers; and establishes requirements for the delineation of wetlands and for the content of wetland reports. Compensatory mitigation procedures have been relocated to the General section (SJCC 18.30.110). Additionally, changes have been made to the County's lighting standards to ensure consistency within the regulations.

VI. The functions and values of wetlands include benefits to people such as providing aesthetically pleasing views; decreasing contamination of ground and surface water and fish and shellfish that may be consumed by people; reducing flooding, erosion, and siltation; increasing wildlife viewing opportunities; and maintaining the desirability of properties adjacent to wetlands.

VII. Despite broad outreach for BAS, very little local science is available for San Juan County.

VIII. The BAS provides little peer reviewed, direct evidence that San Juan County's existing regulations are not protecting the functions and values of wetlands.

IX. The County has developed and obtained funding for a County wide water quality monitoring program as well as a program to address any water quality issues that are identified. This will begin to fill data gaps in the local BAS and help improve water quality over time.

X. The nature of land development in San Juan County is generally light intensity with very limited manufacturing, industrial, and commercial development.

XI. Following is a discussion of the scientific principles associated with the regulations. Additional discussion can be found in the *BAS Synthesis* and the underlying references adopted to guide this review and update.

a. Wetlands are complex biological systems that support important ecological processes and many different habitats and species. Wetlands are often connected to streams, which eventually discharge into marine waters. In addition to directly supporting species that live in or near wetlands, they can also be an important source of organic material, food, and nutrients which support the stream and marine food webs upon which salmon, rockfish, marbled murrelet, orca, and other listed species depend. Vegetative buffers adjacent to wetlands are a recognized means of protecting water quality, quantity and habitat functions within wetlands, as well as in down gradient streams, lakes, ponds, and marine waters.

b. The proposed approach to sizing wetland buffers is intended to protect wetland functions and values consistent with the requirements of the GMA without creating the need for monitoring and adaptive management programs. None-the-less, the County is undertaking a water quality monitoring program.

c. For situations with little land development and no drainageways, most runoff flows below the ground surface and within the root zone.

d. For situations with high intensity development and drainageways connecting the development to the wetland, a significant portion of the runoff flows above-ground.

e. As discussed in the *BAS Synthesis,* runoff from areas influenced by human development is well characterized (National Research Council, 2008) and is often contaminated with an array of pollutants, including: those from lawn and garden chemicals (containing both active ingredients and surfactants that can negatively affect aquatic species); building materials including pressure treated lumber (containing copper chromated arsenate), zinc and copper impregnated shingles and roofing strips, and roofing materials containing phthalates (plastic gutters and downspouts, roofing felt, roof membranes); fertilizers; rodent poisons; termite spray and other insecticides; moss control products; deicers; contaminants associated with automobiles, including oil, antifreeze, rubber and metals from the wear of tires, brakes and other parts; and sediment from dirt and gravel driveways. Many of these contaminants are directly associated with the choices and practices of the property owner and are difficult or impossible to regulate. If they are allowed to enter surface water bodies, these pollutants can contaminate and become concentrated in the food web, negatively affecting aquatic habitats and species.

f. The quantity of pollutants exported from a site is based on the concentration of those pollutants multiplied by the total quantity of runoff. As the volume of surface runoff from a site increases, so does the total amount of pollutants washed away from the site. The concentration of a pollutant in runoff varies depending on a number of factors, including: the intensity and type of development; the period of time since the last rainfall/ runoff event (i.e., allowing more contaminants to build up on hard surfaces); the temporal relationship between the application of the pollutant and irrigation or a rainfall event (e.g., the rainfall occurs within a few days of application, with pollutants applied/ present during the fall, winter, and spring being most likely to end up in runoff); the quantity and type of pollutant present and/or applied; how the pollutant is applied (e.g., fertilizer falling onto walkways and hard surfaces); the intensity, duration, and total amount of irrigation or rainfall/ runoff during a storm; and, if samples are obtained for analysis, the point during the runoff event when the sample is collected.

g. Dissolved contaminants and those associated with fine sediment (which often contains adsorbed contaminants) are the most difficult constituents to remove from runoff. Under ideal conditions, buffers of only a few feet can remove coarse sediment carried by diffuse sheet flow. But buffers must be larger to remove fine sediment and dissolved contaminants, which are commonly found in runoff from developed areas.

h. The factors influencing the efficacy of buffers where flow is primarily subsurface are more complex than those for surface flow on gentle slopes. In addition to buffer size, these factors include: soil texture, permeability, and chemical composition; carbon content; depth of root zone; saturated vs. unsaturated soils; type of chemical pollutants that are present; and whether pollutants are in a dissolved or particulate state. In general, vegetative buffers are more effective at removing contaminants in runoff when the flow is primarily below the ground surface and within the root zone. Saturated soils with healthy soil bacteria are better at removing some contaminants such as nitrogen. Unsaturated soils are better at removing other contaminants, such as the break down products associated with surfactants. Soils in buffers will experience both saturated and unsaturated conditions, resulting in varying levels of treatment, depending on the pollutant and time of year.

i. In addition to actively removing stormwater contaminants, vegetative buffers also exclude pollutant sources from wet-soil areas where pollutants are more likely to be transported to wetlands. Excluding development from those areas also helps the buffer infiltrate runoff, which helps recharge groundwater and maintain normal hydrologic functions.

j. While they cannot completely replicate the complex biological and hydrological processes occurring in undisturbed watersheds, engineered storm water systems (particularly those that mimic natural biological processes such as rain gardens and constructed wetlands) can help.

k. High intensity development with more smooth, graded, compacted, and impervious surfaces and fewer trees provides poorer quality habitat for pond breeding amphibians, more runoff, and higher export of pollutants. References that discuss these principles include Booth et al. (2002), National Research Council (2008), and Semlitsch et al. (2009).

l. In general, surfaces with severely limited permeability (paved or unpaved), generate more surface runoff and pollutants than vegetated gardens and lawns, and vegetated gardens and lawns generate more surface runoff and pollutants than areas with undisturbed soils and vegetation. This can, however, vary greatly depending on soil type, management practices, and other site-specific factors.

m. The water quality buffer sizing procedure assumes that most of a development's potential for generating surface runoff and associated pollutants can be represented by the "flow path," a single line running down the slope, passing through the area with the most concentrated development to the wetland. This line is assumed to represent the path where the greatest quantity of runoff and pollutants will collect and flow downhill.

n. The buffer sizing procedure uses "Rational Method" runoff coefficients that are described in civil engineering and hydrology texts and manuals and is discussed in *Urban Stormwater Management in the United States* (National Research Council, 2008), which was cited as a BAS document adopted by the County Council. The coefficients listed in the buffer sizing procedure for coniferous forest are reduced from published coefficients for vegetated areas, based on the conclusion from Booth et al. (2002) that published Rational Method runoff coefficients are too high for forested areas of Puget Sound.

o. The buffer sizing procedure includes two components: a Water Quality Buffer and a Habitat Buffer. The Water Quality Buffer sizing procedure uses Rational Method runoff coefficients to predict whether runoff will flow primarily above or below ground, and then using Figure 1 of the Mayer et al. (2007) meta-analysis to determine appropriate buffer sizes for a given level of pollutant removal. Figure 1 is based on a compilation of data from many buffer studies and, though it is focused on nitrogen removal and does not provide detailed information on all factors that affect pollutant retention in vegetative buffers, it can be used as a general guide for sizing buffers. (Note: On page 46 of *BAS Synthesis* Chapter 2, fourth paragraph, there are errors in the stated buffer sizes. Mayer et al. 2007, Figure 1 should be referenced for the correct values).

The pollutant removal capabilities of the proposed buffers range from 60% to 70%, which is similar to the treatment levels for water quality buffers supported by the Dept. of Ecology (Wetlands in Washington State, Vol. 2, Appendix 8E, Section 8E.2.3.1, page 5). For situations with low runoff and pollutant transport potential (i.e., low runoff coefficients and no drainageways present), the buffers are approximately based on the "subsurface" line on Figure 1 of the Mayer study and those with high runoff coefficients and drainageways present are approximately based on the "surface" line of that figure, with intermediate values distributed between these two points.

Finally, some additional adjustments were incorporated into Table 3.6 (the table depicting required Water Quality Buffer sizes):

i. To minimize the risk to wetlands, the smallest allowable buffer is 30 ft.
ii. To prevent over-regulation of land use activities, the maximum discharge factor shown is .80, representing a situation where approximately 80% of a flow path is impervious, something that is unlikely to be encountered in San Juan County.
iii. All values are rounded to increments of 5.

p. The Water Quality Buffer sizing procedure includes adjustments for drainageways. The presence of a drainageway connecting a development with a wetland increases the likelihood that runoff will be above-ground and accelerates the transport of pollutants from the development area to the wetland, making the removal of pollutants more difficult (Wigington et al. 2003, Baker et al. 2006, Walsh and Kunapo 2009). The magnitude of this effect depends on several site-specific factors, such as slope.

q. The Water Quality Buffer sizing procedure includes a slope adjustment. Adjustment of the composite runoff coefficient (in this ordinance referred to as the "stormwater discharge factor") is largely based on Table 4-11 of the October 2011 Hydraulic Design Manual produced by the Texas Department of Transportation.

r. The Water Quality Buffer sizing procedure includes a Green Development option. The buffers for this option are reduced based on an incoming pollutant load that is approximately 20 % lower than that from normal development, resulting in the same pollutant load entering the buffer. This option is focused on achieving the 20% reductions through regulation of construction materials and development components that can be observed, rather than the regulation of day to day activities such as the application of pesticides.

s. To help support other GMA goals and facilitate the concentration of development within Urban Growth Areas, the Water Quality Buffer sizing procedure includes a reduced buffer option in conjunction with mitigation of adverse impacts.

t. Factors not included in some options of the Water Quality Buffer procedure can also influence runoff, pollutant loads, and the transport of pollutants to wetlands. Pollutant loads can be affected by the types of building materials and products people use on their property; the effectiveness of

on-site stormwater management practices and other BMPs; the number of people, pets, and livestock per unit area; adequacy of septic system design and maintenance; number of facilities on other parcels that potentially contribute runoff to the same wetland and the adequacy of their buffers, septic systems, stormwater management practices and BMPs; type of land use activities; season, and other factors.

Transport is affected by the type of pollutant, its ambient state (dissolved or particulate), how it is introduced (above- or below-ground), amount of irrigation, annual precipitation amount and intensity, subsurface geology, soil chemical composition and organic content, and other factors.

The above-listed pollutant loading and transport factors are, in some cases, left out of the procedure not only for the sake of maintaining simplicity in the regulations, but also because of the high variability of these factors within a single parcel, the need for staff with advanced geomorphic and geochemical skills and knowledge, and the cost to analyze discharge rates, water quality, and wetland exposure to contaminants. To a large degree, major differences in pollutant transport can be accounted for by slope and vegetative cover and the presence of drainageways – which are all included in the procedure, and are easier for the non-specialist to evaluate consistently.

u. In San Juan County, true Bogs are rare (perhaps only four) and they are highly sensitive to slight changes in water quality and hydrology. For this reason, they require a minimum Water Quality Buffer of 200 feet, which is anticipated to remove 80% of incoming contaminants.

v. The habitat component of buffers is based on consideration of habitat needs that are addressed within the Habitat Importance-Sensitivity ratings and the associated Habitat Buffers. Additional protection measures are included for wetlands containing clusters of trees, in order to protect those trees from excessive blow down and to minimize other microclimate-related impacts to wetland vegetation and wildlife. Figure 6.2 of Murphy (1995) illustrates the functions of forested buffers compared to tree height. Six tenths (0.6) of a site's potential tree height (SPTH) is a common buffer recommendation to protect basic functions associated with forested riparian areas.

w. Although vegetative buffers are beneficial to most wetland species, there are few scientific studies from the Pacific Northwest that define specific buffer sizes that are biologically advisable. Thus, it is not possible to provide the same specificity of buffer sizes that would be essential to sustain viable populations of San Juan County plant or animal species, therefore guidance was provided by the County's wetland consultant.

x. Based on a review of the related science and the professional opinion of San Juan County's consultant, a wildlife scientist with many years of field experience, to protect habitat functions and values the entire circumference of a wetland should retain a Habitat Buffer. The purpose of this buffer is to protect the area surrounding the wetland from modifications and from the intrusion of humans and domestic animals that would adversely affect wetland species.

y. For habitat purposes, some wetland animals prefer dense vegetation around wetlands, while others prefer more open vegetation with sunnier/warmer microclimates and better visibility of predators.

z. Wetland trees attract wildlife species not found in herbaceous wetland vegetation. Although wetland trees grow more slowly than upland trees and may die sooner, they provide foraging and nest sites for many wetland-dependent birds and mammals, as well as supporting distinctive lichens and mosses that thrive in the moist microclimate associated with wetlands. In San Juan County, common trees that grow in wetlands include red alder, western red cedar, western hemlock, Sitka spruce, lodgepole pine, quaking aspen, and black cottonwood.

aa. Under certain conditions, limited tree removal within wetland buffers can occur without significantly affecting habitat, water quality, or the quantity of runoff. Trees, especially those over 12" dbh, provide important wildlife habitat and should be retained. Adequate numbers and configurations of trees are important to preserve wind firm conditions (to prevent blow down of trees in the wetland) and to preserve moisture levels needed by some wetland plants and pond-breeding, forest-dwelling amphibians.

Where a cluster of 5 or more trees are present in a wetland, retention of trees surrounding the cluster helps protect microclimate and prevent excessive wind throw or blow down. The minimum threshold of trees triggering this requirement is based on the number of trees rather than acreage because it is easier to determine.

Table 3-3 of the *BAS Synthesis,* states that a buffer equivalent to .6 Site Potential Tree Height (SPTH) will be approximately 80% effective for protecting microclimate. This figure also provides information on distances necessary to reduce wind speed, with a buffer equivalent to one SPTH approximately 70-75% effective at reducing wind speed.

Calculations made from measurements of 134 wetland tree species in wetlands elsewhere in the Puget Sound Lowlands determined that 87.4 feet is the average height reached by a 100-year old wetland tree in this region (Painter 2007). No measurements were available for 100-year old wetland trees measured specifically in San Juan County wetlands.

In San Juan County, the SPTH for Douglas fir (from the *Forests and Fish Report, 1999,* that is the basis for the Washington State forest practices regulations) ranges from 90 ft. for forests in site class 5 soils, to 110 feet for site class 4 soils (the predominant soil class in San Juan County), to 140 feet for site class 3 soils. San Juan County does not have class 1 or 2 soils.

According to the 1962 San Juan County soil survey, the following are approximate percentages of the land area in each soil site class. (Note: There is a more current soil survey, but it does not include information on the site class of soils):

Soil Site Class	Percentage of Land Area Within SJ County
3	19.1 %
4	36.8 %
4 & 5	23.1 %
Unclassified	21 %

Based on the average height of trees within Puget Sound wetlands and within San Juan County, it appears that a 70 foot Tree Protection Zone around wetlands containing clusters of trees will be adequate to protect microclimate and prevent excessive blow down.

XII. Actions that depart from the BAS. WAC 365-195-915 provides guidance on including the best available science in the development of critical area regulations. When departing from science based recommendations, this guidance specifies that the County should identify any information in the record that supports the decision, explain the rationale for departing from science based recommendations, identify potential risks to the functions and values of critical areas, and identify any measures chosen to limit such risk. The following is a description of areas of potential departure from the Best Available Science.

a. Regulatory Exemptions. To allow for reasonable and cost effective application of the regulations, most jurisdictions, including San Juan County, have a minimum size under which wetlands will not be regulated. The Planning Commission and County Council expressed a desire to retain exemptions for some small wetlands. Using aerial and LiDAR imagery, the County performed an analysis and estimated the size distribution of the County's small wetlands as follows. Wetlands smaller than 1,000 sq. ft were not tallied because most could not be identified using aerial imagery.

848 wetlands (32% of total) are smaller than 10,000 sq. ft
387 wetlands (15% of total) are smaller than 5000 sq. ft
91 wetlands (3% of total) are smaller than 2500 sq. ft.

It is anticipated that with the proposed exemptions, the regulations will protect more than 97% of the County's mapped wetlands, which is a significant change from the existing regulations. In addition to reducing the size of the exemptions, to provide better protection, some wetlands that are in close proximity are combined for purposes of determining square footage, and no exemptions are allowed for wetlands that are part of a wetland mosaic or that have a High Habitat-Sensitivity Rating.

In addition, to improve protection of wetlands an existing exemption for parcels less than one acre in size was removed from the regulations.

b. Buffers in Urban Growth Areas. Throughout the process the public expressed concern that imposing large buffers in the County's two small, non-municipal urban growth areas would make it difficult to achieve other GMA goals, and could significantly affect the character of those communities as well as those who own property adjacent to wetlands. To help accommodate growth within Urban Growth Areas, and to support other GMA goals, the proposed regulations include a reduced buffer option in those areas if adverse impacts are identified and mitigated in accordance with the new mitigation and financial guarantee procedures. In addition to requiring mitigation of impacts, which is an acceptable alternative when impacts cannot be avoided, the County and other service providers have and continue to expand water, wastewater and stormwater infrastructure that will help reduce ongoing impacts to wetlands in UGAs. These improvements include a stormwater treatment system recently completed in Eastsound.

c. Gardens and orchards. Testimony was provided regarding the importance of wetlands and surrounding areas for food production in a community that is isolated from the mainland and has dry summers and limited supplies of fresh water. To balance the need to protect wetlands with the need to produce food, gardens and orchards are allowed in the outer 25% of buffers. Performance standards are included to minimize the risk of harm to wetlands, including the use of appropriate BMPs; a prohibition on the use of synthetic chemicals; restrictions on mowing until after ground nesting birds have left the nest (July 15); and a requirement that trees within Tree Protection Zones be retained. With regard to water quality functions, it is anticipated that the soils in gardens and orchards will, in most cases, maintain high levels of organic material, and as a result will remain permeable and able to absorb runoff from upland areas. With regard to habitat functions, vegetative screening and Tree Protection Zones will still be retained immediately adjacent to wetlands.

d. Wells. The existing regulations allow wells in wetland and their buffers, and the Planning Commission and County Council supported the retention of this option. To allow property owners to maximize the use of their land, and to help prevent conflicts between wells, stormwater systems and septic systems, wells are allowed in the outer 25% of buffers. Performance standards are included to minimize the risk of harm to wetlands including a requirement that measures are taken to avoid compaction of soils during drilling and development of the well, that there be no anticipated adverse impacts to adjoining wetlands, and that disturbed areas be immediately stabilized and replanted with the type of vegetation found in the buffer.

Areas of risk to wetlands include the risk that disturbed areas will be compacted, that buffer vegetation will not be restored, and that the withdrawal of water will adversely affect the wetland.

e. On-site sewage systems. To minimize conflicts and confusion, the local Health Department requested that on-site sewage disposal systems be regulated under the State standards without additional local standards. To allow property owners to maximize the use of their land, and to allow for the installation of on-site sewage disposal systems when there is no practicable alternative, components of sewage disposal systems are allowed in wetlands and their buffers provided they are in conformance with State regulations.

Areas of risk include the risk that State regulations are not adequate and that some contaminants will reach and adversely affect the wetland (e.g. pharmaceuticals and household chemicals). These risks are limited by requirements that appropriate BMPs be used to minimize erosion, sedimentation and soil disturbance; that for new systems, trees within Tree Protection Zones are retained in accordance with this section; and for replacement systems where there is no other alternative that will meet State requirements, that trees within Tree Protection Zones are retained to the greatest extent possible. For replacement of failing systems, adverse impacts are offset by the improvement in water quality that will result from installation of a system meeting current standards.

f. Stormwater systems. The existing regulations allow some stormwater management systems in wetland buffers and the Planning Commission and County Council supported the retention of this option. To allow property owners to maximize the use of their land, when there is no practicable alternative, components of stormwater management facilities are allowed in buffers. Areas of risk include the risk that the buffer will not be large enough to adequately remove pollutants and that the pollutants will adversely affect the wetland. This risk is limited by requirements that the system conform to local and State stormwater management requirements and the requirements for Tree Protection Zones.

g. Habitat buffers and ponds. To minimize the effect of the regulations on property owners, the County Council did not support increased habitat buffers for wetlands that adjoin ponds. There is some question as to whether the proposed regulations will be adequate to provide the upland habitat needed by pond breeding amphibians and turtles, especially in the case of wetlands with a low Habitat Importance-Sensitivity Rating that are smaller than the 2,500 s.f. regulatory threshold. This risk is limited through protection of water quality buffers uphill from regulated wetlands that in some cases will exceed the size of the habitat buffers.

XIII. Measures have been taken throughout the update of these provisions in order to minimize the costs associated with compliance, for both the property owner and the County, while still meeting the legal requirements of the Growth Management Act.

XIV. In some cases, extending buffers across roads and driveways may not provide support for the wetlands functions and values, and in these cases it is appropriate to reduce the extent of the buffer.

XV. Existing structures and impervious areas do not support wetland functions and values, and to avoid labeling this development as non-conforming, it is appropriate to exclude it from buffer requirements.

XVI. The amendments are consistent with the applicable goals and policies of the *San Juan County Comprehensive Plan.*

XVII. This ordinance completes the 2006 update to the County's development regulations regarding Wetlands as required by RCW 36.70A.130 and WAC 365-196-610(1)(e).

f. Normal maintenance, but not construction, of drainage ditches.
g. Use of existing nature trails.
h. Installation of navigation aids and boundary markers.
i. Site investigative work necessary for land use application submittal, such as surveys, soil logs, percolation tests, and other related activities. In every case, wetland impacts shall be minimized and disturbed areas shall be immediately restored.
j. Drilling or digging and maintenance of wells; provided, that wetland impacts are minimized and disturbed areas are immediately restored.

2. **Wetland Buffers.** In addition to those activities allowed in subsection (D)(1) of this section, the following activities are allowed within wetland buffers without having to meet the protection standards, or requirements for wetland studies or mitigation set forth in subsections (E) through (H) of this section; provided, that impacts to buffers are minimized and that disturbed areas are immediately restored except as specifically allowed in subsection (D)(2)(a) of this section.
a. In association with a single family residence only, the establishment and expansion of lawns, landscaping, orchards, gardens, and fences; provided, that:
i. Lawns, landscaping, orchards, and gardens shall be allowed within the outer 25 percent of the buffer width where no reasonable alternative is available. No structure other than fences nor any impervious surface shall be included in the above; and
ii. Fences shall be designed to allow the unimpeded passage of surface water beneath them.
b. Activities having minimal adverse impacts on buffers and no adverse impacts on regulated wetlands. These include low intensity, passive recreational activities, such as pervious trails, nonpermanent wildlife watching blinds, scientific or educational activities, and sports fishing or hunting. Trails within buffers shall be designed to minimize impacts to the wetland, shall be no wider than five feet, shall not include any impervious surfaces, and shall not totally circumnavigate the wetland perimeter.
c. Within the buffers of Category III and IV wetlands only, vegetation lined swales designed for stormwater management or conveyance when topographic restraints determine there are no other upland alternative locations. Swales used for detention purposes may only be placed in the outer 25 percent of the buffer. Conveyance swales may be placed through the buffer, if necessary.
d. All legal parcels less than one acre in size as of the date of adoption of this code are exempt from the wetland buffer provisions.

D. Minimum Size Thresholds for Regulated Wetlands. To allow for the reasonable administration of these regulations, some wetlands are exempted from the requirements of this section based on their size and Habitat Importance-Sensitivity Rating (see subsection (C.2) of this section). Regulated wetland mosaics greater than 2,500 s.f. in size, collective or cumulative wetland area, are not exempt.

Wetlands exceeding the following size thresholds, and those that are part of a wetland mosaic greater than 2,500 square feet in size, are regulated under SJCC 18.30.150:

1. High Habitat Importance-Sensitivity wetlands: no exemption - all wetlands are regulated
2. Medium Habitat Importance-Sensitivity wetlands: 1,000 square feet
3. Low Habitat Importance-Sensitivity wetlands: 2,500 square feet

E. Protection Standards. A development permit or land division may be conditioned to provide for the continued protection of the wetland resource and reasonable use of the property. Conditions may include, but are not limited to, wetland buffers, setbacks, limits on clearing and grading, conditions on the land title, best management practices for erosion control and maintenance of water quality, or other conditions appropriate to avoid or mitigate identified adverse impacts.

1. **Standard Buffer Zone Widths.**

activities are consistent with the requirements outlined in Table 3.8 and subsections E.6 and E.7 of this section, it may not be necessary to identify the edge of the wetland and the size of the habitat buffer.)

Table 3.7

Habitat Buffers[1]	
Habitat Importance-Sensitivity Rating	**Required Buffer (in Feet)**
Low	30
Medium	50
High	80

[1] **Tree Protection Zone.** If the wetland contains a cluster of ten (10) or more trees more than 20 feet in height and more than 9 inches dbh, all trees within the cluster and within a distance of 50 feet from the cluster, are included in a Tree Protection Zone. The purpose of protecting these trees is to maintain wetland habitat including the microclimate; to prevent wind throw of trees within the wetland; and to provide young trees that will eventually replace the older trees. A cluster of trees is defined as a group of trees where the trunk of any one tree is within 50 feet of the trunk of another tree in the cluster. Within Tree Protection Zones, trees may not be removed except in accordance with the exemptions of SJCC 18.30.110.

Step 3. Habitat Buffer Averaging. Habitat Buffer averaging allows reduction of the required Habitat Buffer in specified locations on the property proposed for development, vegetation removal or other modification, in conjunction with increases of the buffer in other areas, so that the total area of the Habitat Buffer is unchanged. Averaging of the Habitat Buffer will be allowed only if the applicant demonstrates that all of the following criteria are met:

(A) Averaging is necessary to accomplish the purposes of the proposal, and no reasonable alternative is available;

(B) If the wetland contains variations in habitat sensitivity due to existing physical characteristics, the reduction from standard Habitat Buffer sizes will occur only contiguous to the area of the wetland determined to be least sensitive;

(C) The total area contained within the Habitat Buffer after averaging is no less than that contained within the standard Habitat Buffer prior to averaging;

(D) Averaging of required Tree Protection Zones is not allowed.

(E) In no instance shall the Habitat Buffer be reduced to less than 30 feet, and the reduced Habitat Buffer must not occur along more than one-half the circumference of the wetland; and

(F) If a portion of the buffer is to be reduced, the remaining Habitat Buffer area will be enhanced using native vegetation and fencing where appropriate to improve the functional attributes of the buffer, and to provide additional protection for wetland functions and values. A proposal to enhance a buffer shall not be used as justification to reduce an otherwise functional standard Habitat Buffer, unless such buffer reduction complies with all other criteria for buffer averaging.

2. **Buffers, Tree Protection Zones, and Roads.** Buffers and Tree Protection Zones shall not extend across public roads. For private roads, buffers and Tree Protection Zones shall not extend across the road when the road design, flow of runoff, quantity of traffic, and/or gap in tree canopy result in an area that does not support the functions and values of the wetland being protected as determined by a qualified professional.

3. **Structures, Uses and Activities Allowed and Prohibited in Wetlands and Wetland Buffers.** Structures, uses and activities that are listed as "yes" uses in Table 3.8 below are allowed in wetlands or wetland buffers, subject to compliance with the San Juan County Code. State or federal requirements

administered by the WA Department of Ecology, WA Dept. of Fish and Wildlife, WA Dept. of Natural Resources, or U.S. Army Corps of Engineers may also apply to these areas.

Table 3.8

Structures, Uses and Activities Allowed in Wetlands and Wetland Buffers		
Activity	**Allowed Within Wetland**	**Allowed Within Wetland Buffers**
a. Outdoor activities that do not involve modifying the land or vegetation, and that will not adversely affect the functions and values of wetlands.	YES	YES
b. The harvesting of wild plants and foods in conformance with applicable regulations and in a manner that is not injurious to the natural reproduction of wetland plants, provided the harvesting does not require tilling soil, planting, or changing existing topography, water conditions, or water sources except when allowed as an agricultural activity under (e) or (f), below.	YES	YES
c. Removal of invasive plants; planting of native wetland plants; and vegetation management activities implemented as part of a habitat management plan developed or approved by a local, state, federal or tribal agency.	YES	YES
d. Agricultural activities conducted in accordance with a voluntary stewardship program developed pursuant to RCW 36.70A.705, with the exception of the construction of agricultural structures which are subject to the same provisions as other structures.	YES	YES
e. With the exception of the construction of agricultural structures, agricultural activities, including seasonal and recurrent activities existing or in development during the year prior to the effective date of these regulations, provided they do not result in additional adverse impacts to the functions and values of wetlands. This can include changing the type of farming, management practices, and crops within the existing geographic area already in use (such as in the rotational management of farmland) as long as the change does not result in additional adverse impacts to wetland functions and values. Agricultural structures are subject to the same provisions as other structures. (Note: See definition of "garden" in SJCC 18.20.070.)	YES	YES
f. With the exception of the construction of agricultural structures, new and expanding agricultural activities that are consistent with appropriate best management practices (BMPs) that will ensure no net loss of wetland functions and values. The BMPs must be described in a farm management plan or other comprehensive agricultural management document prepared or approved by the WSU Cooperative Extension Service or the San Juan Islands Conservation District. New and expanding agricultural activities must not result in additional adverse impacts to wetland functions and values. Agricultural structures are subject to the same provisions as other structures. (Note: See definition of "garden" in SJCC 18.20.070.)	YES	YES

Structures, Uses and Activities Allowed in Wetlands and Wetland Buffers		
Activity	**Allowed Within Wetland**	**Allowed Within Wetland Buffers**
g. Noncompensatory enhancement. Wetland restoration or enhancement activities not required as project mitigation, provided the activity is approved by the U.S. Fish and Wildlife Service, the Washington State Department of Ecology, Washington Department of Fish and Wildlife, or other responsible local, state, federal, or tribal jurisdiction.	YES	YES
h. Within the buffers of wetlands with Low or Medium Habitat Importance-Sensitivity, the establishment and expansion of orchards and gardens, cultivated and managed with appropriate BMPs and without the use of synthetic chemicals provided that: i. They will occupy no more than 4,000 square feet of the buffer; ii. They are installed within the outer 25% of the buffer; iii. Other than fences, no structures or impervious surfaces are constructed or created and fences will not impede the flow of water or prevent the movement of wetland animals; iv. A buffer of at least 30 feet is retained; v. Mowing does not occur in the habitat portion of the buffer until after July 15; and vi. Trees within Tree Protection Zones are protected in accordance with this section.	NO	YES
i. Construction of new ponds in or adjacent to wetlands with a Habitat Importance-Sensitivity Rating of Low, as part of a wetland mitigation or noncompensatory enhancement project approved by the County or other responsible state, federal, or tribal jurisdiction. (Note: Construction of new ponds is not allowed in or adjacent to wetlands with Medium or High Habitat Importance-Sensitivity.)	YES	YES
j. The construction of trails, stairs, or raised walkways provided that the improvement: i. Is designed to direct sheet flow runoff into adjacent vegetation; ii. Prevents adverse impacts to the wetland from runoff and eroding soil; iii. Does not exceed five feet in width; iv. Is constructed of non-toxic materials; v. Does not totally circumnavigate the wetland perimeter; vi. Does not include the placement of fill; and vii. Is consistent with the applicable requirements of subsection E.6 of this section.	YES	YES
k. Temporary wildlife watching blinds.	YES	YES
l. Drilling and digging of wells provided they are located within the outer 25% of the buffer, that there are no anticipated adverse impacts to adjoining wetlands, that measures are taken to avoid compaction of soils during drilling and development of the well, and that disturbed areas are immediately stabilized and replanted with the type of vegetation found in the buffer.	NO	YES
m. Outside of Tree Protection Zones, limited tree removal to allow for a filtered	NO	YES

Structures, Uses and Activities Allowed in Wetlands and Wetland Buffers		
Activity	**Allowed Within Wetland**	**Allowed Within Wetland Buffers**
view from the primary structure, provided: i. Stumps are retained and disturbance of the soil and duff layer is minimized; ii. The remaining forest consists of trees that are multi-aged and well distributed across the buffer and the canopy cover for the remaining forest is at least 65%, except directly between the primary structure and the wetland, where the canopy cover may be reduced to not less than 50%; and iii. All vegetation overhanging streams, ponds, lakes, wetlands, and marine waters is retained; and iv. Trees ≥ 12 inches dbh are retained.		
n. Limited removal of other species of trees in order to prevent shading of aspens in and adjacent to an Aspen/cottonwood wetland, provided that at least 65% of the canopy cover is retained.	NO	YES
o. To allow for a view or for fire hazard reduction, minor trimming and pruning of the foliage of trees and shrubs, provided the health of the trees and shrubs is maintained, trees are not topped, and all vegetation overhanging streams, ponds, lakes, wetlands, and marine waters is retained. In no case shall more than 20% of the foliage of individual trees or shrubs be removed during a 12 month period.	NO	YES
p. If no practicable alternative exists, components of stormwater management facilities in conformance with local and State stormwater management requirements and any applicable Tree Protection Zone requirements.	NO	YES
q. Fences, provided they do not impede the flow of water or prevent the movement of wetland animals.	YES	YES
r. Road and trail crossings in conformance with subsection E.6 of this section.	YES	YES
s. Development allowed pursuant to an exemption, a reasonable use exception, a public agency/ utility exception, or provisions for non-conforming structures, uses and activities outlined in SJCC 18.30.110.	YES	YES
t. Maintenance to support or improve the functions and values of wetlands.	YES	YES
u. If no practicable alternative exists, components of on-site sewage disposal systems in conformance with local and State requirements, provided: i. Appropriate BMPs are used to minimize erosion, sedimentation and soil disturbance; ii. For new systems, trees within Tree Protection Zones are retained in conformance with subsection (E.1) of this section. iii. For replacement of existing, failing systems where there is no other alternative that will meet State requirements (including locating the new system in the same place as the old system), trees within Tree Protection Zones are retained to the greatest extent possible.	YES	YES
v. Other uses that will not adversely impact wetland functions and values,	P/C[1]	P/C[1]

Structures, Uses and Activities Allowed in Wetlands and Wetland Buffers		
Activity	Allowed Within Wetland	Allowed Within Wetland Buffers
considering the Best Available Science.		

[1] "P/C" means Provisional or Conditional Use Permit depending on the level of impacts (see SJCC 18.80.090).

4. **Field Marking of Wetland, Wetland Buffer and Tree Protection Zone.** Prior to building permit approval, the location of the outer extent of the wetland and any wetland buffer or Tree Protection Zone adjacent to the area that will be developed shall be marked in the field, and the Director may require field approval prior to the commencement of permitted activities. Markings for wetlands, buffers and Tree Protection Zones shall be maintained throughout the duration of construction activities.

5. For recorded plats, short plats and binding site plans the applicant shall show the boundary of required buffers and Tree Protection Zones on the face of the plat or plan.

6. **Road and Trail Crossings.** The construction of new or expanded roads, driveways, trails, and associated culverts and bridges across wetlands and their buffers and Tree Protection Zones is allowed, provided they are in conformance with SJCC 18.60.080 - 100 and the following. Road and driveway crossings may also be approved through the reasonable use exception process outlined in SJCC 18.30.110.

   a. New roads and driveways may only be constructed across wetlands, their buffers or their Tree Protection Zones if there is no practicable alternative.

   b. When practicable, new roads, driveways, trails and walkways must be located on existing road grades, utility corridors, or previously disturbed areas.

   c. When required, permits and approvals must be obtained from appropriate state and federal agencies, including but not limited to: Washington Department of Fish and Wildlife; Washington State Department of Ecology; Washington State Department of Natural Resources; U.S. Army Corps of Engineers; U.S. Coast Guard; NOAA Fisheries Service; and U.S. Fish and Wildlife Service.

   d. Roads must cross wetlands, buffers and Tree Protection Zones at, or as close as possible to, a ninety degree angle.

   e. Crossings must not interfere with the flow and circulation of water or other wetland processes. The location and design of the road or driveway crossing must be evaluated by a qualified wetland professional or other qualified professional, to ensure that wetland processes will not be adversely affected.

   f. Construction must occur during any work windows and time limits established by the state or federal agencies with jurisdiction.

   g. All crossings must be designed to accommodate 100-year flood flows.

   h. Whenever practicable, crossings must serve multiple properties.

i. When expanding existing crossings that do not meet these standards, the crossing must be upgraded as necessary to reduce wetland impacts and meet the requirements of this subsection (E.6). For purposes of this section, an expansion is an increase in the footprint of crossing structures and associated roads or trails.

j. Roads and driveways must be crowned, insloped, or outsloped to sheet flow runoff from the road surface and into vegetated areas such as grass-lined ditches or drainageways.

k. Where roads and trails cross wetlands, adverse impacts must be mitigated in accordance with SJCC 18.30.110.

7. **Lighting.** Exterior lighting fixtures must be shielded and the light must be directed downward and away from wetlands, their buffers, and the habitat of any species listed as endangered, threatened, sensitive, or a San Juan County species of special importance.

8. **Final Inspections and Financial Guarantees.** Unless exempt under SJCC 18.30.110, all development activities, vegetation removal and other site modifications requiring a project permit or a development permit, must have a final inspection to verify compliance with approved plans and the requirements of this section. The property owner shall notify the Department when the work is complete and ready for inspection. For permitted projects that are not complete at the time that any associated building construction is completed, or for those that do not occur in conjunction with a permitted structure, the Director may require a financial guarantee and associated agreement in conformance with SJCC chapter 18.80.

~~2. **Buffer Width Averaging.** Buffer averaging allows limited reductions of buffer width in specified locations on the property proposed for development while requiring increases in others so that the total area of the buffer is unchanged. Averaging of required buffer widths will be allowed only if the applicant demonstrates that all of the following criteria are met:~~

~~a. Averaging is necessary to accomplish the purposes of the proposal, and no reasonable alternative is available;~~

~~b. The wetland contains variations in sensitivity due to existing physical characteristics and the reduction from standard buffer widths will occur only contiguous to the area of the wetland determined to be least sensitive;~~

~~c. Averaging width will not adversely affect the wetland functional values;~~

~~d. The total area contained within the wetland buffer after averaging is no less than that contained within the standard buffer prior to averaging. In no instance shall the buffer width be reduced by more than 25 percent of the standard buffer width; and~~

~~e. If a portion of the buffer is to be reduced, the remaining buffer area will be enhanced, using native vegetation and fencing where appropriate to improve the functional attributes of the buffer, to provide additional protection for wetland functions and values. A proposal to enhance a buffer shall not be used as justification to reduce an otherwise functional standard buffer width, unless such buffer reduction complies with all other criteria for buffer width averaging.~~

~~3. **Buffer Width Decreasing.** Decreasing of required buffer widths will be allowed only if the applicant demonstrates that all of the following criteria are met:~~

~~a. Buffer width averaging pursuant to subsection (E)(2) of this section is not possible due to site characteristics;~~

~~b. A decrease is necessary to accomplish the purposes of the proposal and no reasonable alternative is available;~~

~~c. The wetland contains variations in sensitivity due to existing physical characteristics, and reduction from standard buffer widths will occur only adjacent to the area of the wetland determined to be the~~

APPENDIX

C

Ordinance No. 29 - 2012

AN ORDINANCE REGARDING CRITICAL AREA REGULATIONS FOR FISH AND WILDLIFE HABITAT CONSERVATION AREAS, AMENDING SAN JUAN COUNTY CODE SECTION 18.30.160.

BACKGROUND

A. The County was scheduled to review and, where necessary, update its development regulations regarding critical areas by December 1, 2006, to ensure consistency with RCW 36.70A (the Growth Management Act, or GMA). A review of the County's critical areas regulations, including regulations regarding Fish and Wildlife Habitat Conservation Areas, was adopted in Resolution 98-2005. Although some updates to critical areas regulations were adopted in Ordinance 15-2005, further action was reserved for a later time.

B. Fish and Wildlife Habitat Conservation Areas (FWHCAs) are described in WAC 365-190-130. Some FWHCAs are located within areas subject to the requirements of the Shoreline Management Act or SMA (RCW 90.58). Although this update in undertaken pursuant to the GMA and is not a Shoreline Master Program (SMP) amendment, as part of this required update the County intends to address related protection requirements of the Shoreline Management Act (SMA) including the requirement to protect critical salt water habitats defined in WAC 173-26-221.

C. Specific laws and regulations associated with shoreline development and the protection of shoreline ecological functions are found in RCW 36.70A.481(A) (Land use regulations consistent with SMA); RCW 90.58.020 (Policy Statement); RCW 90.58.100(2)(b) and (c), (Public Access), WAC 173-26-186(8) (maintenance, protection, restoration, preservation of fragile shorelines); WAC 173-26-186(8)(b)(ii) (No-net loss); WAC 173-26-201(2)(c) (Protection of shoreline ecological functions of shoreline); WAC 173-26-201(2)(e) (Mitigation Sequencing); WAC 173-26-221(2)(a)-(c)(iii)(C) (Critical Areas); WAC 173-26-221(4) (Public Access); and for shoreline modifications WAC 173-26-231 (Shoreline Modifications), RCW 90.58.030(3) (Definitions), WAC 173-26-221(2)(iii)(C) (Critical Saltwater Habitats-Standards), and WAC 220-110-285 (Single family residence bulkheads in saltwater areas).

D. San Juan County adopted a public participation plan for the revision of its development regulations regarding critical areas in Resolution 56-2006; the plan was most recently updated in Resolution 32-2011.

E. The applicable science related to FWHCAs and stormwater management was reviewed and is summarized in the *Best Available Science Synthesis for San Juan County, May 2011 (BAS Synthesis),* which was adopted, along with the underlying scientific literature, in Resolution 22-2011.

F. The recommendations of the San Juan Initiative Policy Group, which included 11 citizens appointed by the County Council, were considered in the development of these amendments.

G. Additional review of the County's critical areas regulations was undertaken and is described in the documents "Analysis of Existing San Juan County Regulations Pertaining to Steams and Other Upland Fish and Wildlife Habitat Conservation Areas, May 31, 2011" prepared by Dr. Paul Adamus, and "Analysis of Existing San Juan County Regulations, Marine FWHCAs, May 31, 2011" prepared by the Watershed Company and County staff. Meetings and workshops on this analysis were held on June 14, August 16, and September 12, 2011. Based on this analysis and public testimony, the County Council provided guidance on the draft amendments.

H. The 60-day notice on the proposed amendments to the protection regulations for FWHCAs, as required by RCW 36.70A.106, was received by the Washington State Department of Commerce on May 8, 2012, and was assigned Material ID No. 18073.

I. An environmental checklist was prepared evaluating potential effects of the proposed FWHCA protection amendments and a notice of Determination of Non-significance was issued on May 1, 2012 and published on May 2, 2012. The notice was provided to federal, state and local agencies in accordance with San Juan County Code 18.80.050 and WAC 197-11-340.

J. Efforts to involve and inform the public included:

I. A public workshop held in March of 2006.
II. County Council appointment of a citizens committee in 2007, which reviewed the GMA requirements, the applicable science and the existing regulations, and developed a draft set of amendments.
III. Public meetings held in June of 2009.
IV. A public workshop held in August 2009.
V. Request for Best Available Science (BAS) submittals from the public in June-July 2010.
VI. Public workshops on San Juan Island, Orcas Island, and Lopez Island in September 2010, to address "hot button" issues.
VII. Joint Planning Commission/County Council public workshops in February 2011, to review and discuss the first draft Best Available Science Synthesis, and County Council workshops in May 2011 to discuss the second draft. Public comment was accepted at all meetings.
VIII. Public workshops in June, August and September 2011 to discuss the review of existing regulations and determine policy direction for the revision of regulations.
IX. A mailer with the 2012 tax statements.
X. Field trips on San Juan Island in July 2012.
XI. Advertisements of Planning Commission and County Council meetings in local papers, including online media.
XII. Notice of the availability of the proposed ordinance and staff report was e-mailed to residents, property owners, and interested parties who requested to be kept informed prior to the Planning Commission and County Council hearings.

K. The Planning Commission and County Council conducted a duly advertised joint public hearing on May 18, 2012.

L. The County Council conducted public hearings on July 21 and November 27, 2012.

M. The County Council makes the following findings:

I. The Best Available Science was included in developing the proposed amendments, which will protect FWHCAs in conformance with the requirements of the Growth Management Act.

II. Implementing a site-specific approach to sizing buffers and Tree Protection Zones for aquatic FWHCAs will effectively protect them while maximizing the allowable use of property and including the BAS as required by the Growth Management Act.

III. Agriculture in San Juan County is a vital part of our heritage and an integral part of the county's landscape, culture and economy. Our quality of life depends on the successful integration of sustainable agriculture and ecological health.

IV. The ordinance includes the following: adds a section on applicability; identifies types of FWHCAs; adopts provisions associated with the use of maps; revises the classification system to meet current

state requirements; establishes protection standards including standards for aquatic FWHCAs as well as upland habitats and specific species; and revises the process for nominating species of importance.

V. Of the scientific documents that were reviewed, the following references were the most important in development of these regulations. These and other documents were made available on the County web site.

Booth, D.B., D. Hartley, and R. Jackson. 2002. Forest cover, impervious-surface area, and the mitigation of storm water impacts. Journal of American Water Resources Association 38:835-845.

Brennan, J., H. Culverwell, R. Gregg, P. Granger. 2009. Protection of Marine Riparian Functions in Puget Sound, Washington. Washington Sea Grant. Seattle, Washington. Prepared for Washington Department of Fish and Wildlife. June 15, 2009.

Cassidy & Grue. 2006. Local Conservation Priorities for Western Washington: Suggestions for Effective Conservation Actions for County, City, and Private Landowners and Managers: San Juan County

FEMAT (Forest Ecosystem Management Assessment Team). 1993. Forest ecosystem management: An ecological, economic, and social assessment. U.S. Departments of Agriculture, Commerce, and Interior. Portland, Oregon.

Jensen, 2010. Checklist: Birds of the San Juan Islands.

Kleinschmidt. 1999. Method to Determine Optimal Riparian Buffer Widths for Atlantic Salmon Habitat Protection. Kleinschmidt Associates. Pittsfield, Maine. Prepared for Maine State Planning Office, Augusta, Maine. January, 1999.

Mayer, P.M., S.K. Reynolds, M.D. McCutchen, and T.J. Canfield. 2007. Meta-analysis of nitrogen removal in riparian buffers. J. Environ. Qual. 36(4):1172-80.

Murphy, M.L. 1995. Forestry Impacts on Freshwater Habitat of Anadromous Salmonids in the Pacific Northwest and Alaska – Requirements for Protection and Restoration. NOAA Coastal Ocean Program Decision Analysis Series No. 7. NOAA Coastal Ocean Office, Silver Spring, MD. 156 pp.

Washington Department of Fish and Wildlife. 2009. Landscape Planning for Washington's Wildlife: Managing for Biodiversity in Developing Areas (A Priority Habitats and Species Guidance Document).

U.S. Dept. of Agriculture, Soil Conservation Service, Soil Survey, San Juan County Washington, 1962.

Wenger, S.J. and L. Fowler, 2000. Protecting Stream and River Corridors, Creating Effective Local Riparian Buffer Ordinances. Carl Vinson Institute of Government, The University of Georgia.

VI. The functions and values of FWHCAs include benefits to people such as providing fish, shellfish and other commercial and recreational food sources; supporting wildlife that draw visitors from around the world, which then help support island businesses; decreasing contamination of fish and shellfish that may be consumed by people; providing aesthetically pleasing views; reducing flooding; and maintaining the desirability of properties adjacent to streams, lakes, ponds and the marine shoreline.

VII. Despite broad outreach for BAS, very little local science is available for San Juan County.

VIII. The County has developed and obtained funding for a County wide water quality monitoring program as well as a program to address any water quality issues that are identified. This will begin to fill data gaps in the local BAS and help improve water quality over time.

IX. The nature of land development in San Juan County is generally light intensity with very limited manufacturing, industrial and commercial development.

X. The BAS provides little peer reviewed, direct evidence that San Juan County's existing regulations are not protecting the functions and values of wetlands.

XI. The following waters of the State are designated as FWHCAs: lakes and streams. Other waters, and aquatic FWHCAs planted with game fish by a government or tribal entity, were not designated separately because they are adequately protected under other categories of FWHCAs.

XII. To address the risks associated with sea level rise, the County will develop informational materials to provide to those preparing applications for development and project permits.

XIII. The following scientific principles were used in developing the components of the site-specific buffer and Tree Protection Zone requirements. These principles are discussed in the *Best Available Science Synthesis, San Juan County Washington, May 2011* and the underlying scientific documents adopted by the County Council to guide this review and update.

a. There are many similarities in the function of stream, lake and marine shoreline buffers and Tree Protection Zones and the science related to stream buffers and Tree Protection Zones is applicable to those along marine shorelines. Important functions performed by buffers and Tree Protection Zones include providing structure, shade, and temperature moderation; providing nutrients and organic inputs that support the food web (e.g. leaves, needles, woody debris, terrestrial insects); slowing and storing water during storm events; and maintaining bank stability.

b. In addition to directly supporting species that live in or near streams, well-functioning streams and riparian areas are an important source of organic material, food and nutrients for the marine food web, eventually supporting salmon, rockfish, marbled murrelet, orca and other listed species.

c. Proposed Tree Protection Zones for aquatic FWHCAs are based in part on the Site Potential Tree Height (SPTH) for soil site class 4, which is the predominant soil site class in San Juan County. On page 16 of the *1999 Forests and Fish Report*, which is the basis for Washington's forest practices regulations, 110 feet is identified as one SPTH for soil site class 4. Following are approximate percentages of land area in each soil site class [from 1962 San Juan County Soil survey, (U.S. Dept. of Ag., 1962)].

Soil Site Class	Percentage of Land Area Within SJ County
3	19.1 %
4	36.8 %
4 & 5	23.1 %
Unclassified	21 %

Soil Type (U.S. Dept. of Ag., 1962)	Site Index Rating (feet)	Soil Site Class	Percentage (%) of land area in San Juan County
Alderwood gravelly loam	111	4	.1
Alderwood gravelly sandy loam	114	4	.4
Alderwood stony loam	120	4	1.6
Bow silt loam	114	4	3.5
Bow gravelly silt loam	112	4	8.5
Bow stony silt loam	100	4	1.3
Everett gravelly sandy loam	117	4	3.8
Everett stony sandy loam	112	4	.2
Indianola sandy loam	140	3	1.5
Indianola-Roche complex	119	4	2.1
Norma loam	135	3	.4
Norma loam, moderately deep	106	4	.1
Pickett-rock outcrop complex	140	3	17.2
Roche loam	93	between 4 and5	.8
Roche gravelly loam	111	4	7.3
Roche stony loam	100	4	7.4
Roche gravelly sandy loam	114	4	.5
Roche stony sandy loam	79	5	.5
Roche rock outcrop complex	Not listed	both 4 and 5	22.3

d. Sizes of Tree Protection Zones are based on the requirements of Washington's Forest Practices Act, the FEMAT curves method (FEMAT 1993), Murphy (1995), Wenger and Fowler (2000), and Brennan (2009). Tree Protection Zones for Type F streams, lakes, ponds and marine waters are equivalent to one SPTH for soil site class 4 (110 ft.). For Type Np and Type Ns streams flowing 6 months or more per year they are 50 feet and 30 feet respectively, which is consistent with the requirements under the Forest Practices Act. For type Ns streams flowing less than 6 months per year, a Tree Protection Zone is not required but stream bank vegetation must be retained, which is consistent with Wenger and Fowler (2000). For all except the smallest type Ns streams, functions that will be protected include those associated with shade/microclimate (.6 SPTH needed for 80% effectiveness), large woody debris (.65 SPTH needed for 80% effectiveness), litterfall and insects (.4 SPTH for 80% effectiveness), and reduction of wind speeds (1 SPTH for 70-75% effectiveness). Though shrubs are not protected in Tree Protection Zones, shrubs and the functions they provide are protected within the water quality buffers.

e. Under certain conditions, limited tree removal within Tree Protection Zones can occur without significantly affecting aquatic FWHCAs. Adequate numbers and configurations of trees must, however, be retained to preserve wind firm conditions (to prevent blow down), to provide shade, and to maintain normal habitat functions.

Figure 3-3 of the *BAS Synthesis* provides information on distances necessary to reduce wind speed, with a Tree Protection Zone equivalent to one SPTH approximately 70-75% effective for this function. Kleinschmidt (1999) also provides guidance on the management of buffers and Tree Protection Zones to prevent blow down, with a 35 foot no cut zone required next to the water (Zone 1), and at least another 35 feet (for a total of 70 feet) where some tree removal is allowed if minimum stocking levels are retained (referred to as Zone 2).

f. In the outer zone (Zone 2) where the ordinance allows some tree removal, Kleinschmidt (1999) was used to establish minimum stocking levels necessary to protect wind firm conditions. For softwood stands such as Douglas fir, stocking levels are shown both in terms of basal area (which may be difficult for those without a forestry background to determine) and canopy cover. For softwood stands, 80 s.f./acre of basal area (the amount that needs to be retained) was estimated to be approximately

equivalent to 21% canopy cover based on the ratio of canopy cover to basal area for a fully stocked condition. From the State forest practice regulations, the basal area target at 140 years for all soil site classes is 325 s.f./acre, and the maximum attainable canopy cover for Douglas fir is approximately 85%. Though they differ from the Kleinschmidt recommendations, the proposed regulations allow one primary structure in Zone 2. Any increased risk is limited by the requirement that a qualified professional determine there will be a low probability of increased wind throw to trees in the Tree Protection Zone.

g. While the buffers prescribed under the Forest Practices Act were designed to remove sediment from adjacent forested areas, they were not designed to handle the increased flows and dissolved and fine textured constituents that are commonly associated with runoff from residential and commercial land uses.

For protection of water quality functions, these regulations use the water quality buffer sizing procedure included in the wetland section of these amendments, with a predicted pollutant removal efficiency of 60%. When considered with existing erosion control and stormwater management requirements, particularly those for more intense development, this should adequately protect functions associated with water quality. 60% is the low end of the proposed treatment spectrum and it was selected because in most cases, contaminated runoff flowing in and through these water bodies will receive some dilution with water that is less contaminated, helping to prevent adverse impacts associated with water quality. As with the water quality buffers for wetlands, proposed pollutant removal levels are similar to those for water quality buffers supported by the Dept. of Ecology which specify 70% pollutant removal for high intensity development near wetlands and lower pollutant removal levels for less intense uses (Wetlands in Washington State, Vol. 2, Appendix 8E.2.3.1, pg. 5). The primary scientific documents that were relied upon for the water quality component of FWHCA buffers, and associated findings and discussion, are included in the ordinance updating the wetland protection regulations which will be adopted concurrently with these amendments.

h. Along the marine shoreline, sensitivity of the receiving water (e.g. based on currents and mixing) was considered and rejected as an additional buffer factor. To incorporate this as a separate factor, there would need to be some BAS showing that runoff contaminants are not contributing toxins to the aquatic food chain (which would move independently of the water), and that contaminants are not being transported and deposited in more sensitive locations.

i. The buffers and Tree Protection Zones for aquatic FWHCAs are not intended to provide protection of specific upland species. Protection measures for specific species are included in the amendments to SJCC 18.30.160(F).

j. The stability of banks along the marine shoreline is highly site specific and dependent on a number of factors including surface and sub-surface hydrology, the presence of a geologically hazardous area, whether the shoreline is susceptible to erosion from currents, tidal action or waves, presence of soil stabilizing vegetation, whether drainage from upslope is resulting in erosion, and the lithology of underlying or exposed bedrock. These factors and necessary mitigation actions are best determined on-site by a qualified professional.

XIV. Selection of Species of Local Importance. Potential species of local importance are discussed in Chapter 4 of the *BAS Synthesis*. The County's process for selecting species of local importance included review of the WDFW Priority Habitats and Species list to identify species that are uncommon or rare and currently breed in the County; consultation with Ruth Milner and Anne Potter with WA Dept. of Fish and Wildlife and Barbara Jenson, a local naturalist; and review of the following sources:

- *Birding in the San Juan Islands* (Lewis & Sharpe 1987).
- *Checklist: Birds of the San Juan Islands* (Jensen 2010).
- *Local Conservation Priorities for Western Washington: Suggestions for Effective Conservation Actions for County, City, and Private Landowners and Managers: San Juan County* (Cassidy & Grue 2006).
- *Landscape Planning for Washington's Wildlife: Managing for Biodiversity in Developing Areas (A Priority Habitats and Species Guidance Document)* (Washington Department of Fish and Wildlife 2009).
- *eBird (*a national online database of bird observations) records from the months of June and July for the period 2002 to present (approximately 6,000 records).

The County's consultant, who is a wildlife scientist, then recommended species of local importance based on sufficiency of data, rarity, status and trends of mainland populations, sensitivity to housing development, and typical mobility (potential to recolonize the islands from mainland populations if they become locally extinct). A summary of why particular species were included is provided in an October 29, 2012 memo from County consultant Dr. Paul Adamus.

XV. Additional protection measures for specific species. Tables 3.11 and 3.12 provide specific recommendations and in some cases requirements for protecting specific species and habitats. These protection measures were developed through a) review of WA Dept. of Fish and Wildlife guidance documents; b) consultation with Dr. Adamus; and c) in some cases consultation with other experts including an expert with the Alberta Fish and Wildlife Division.

XVI. Actions that depart from the BAS and associated risks. WAC 365-195-915 provides guidance on including the Best Available Science in the development of critical area regulations. When departing from science based recommendations, this guidance specifies that the County should identify any information in the record that supports the decision, explain the rationale for departing from science based recommendations, indentify potential risks to the functions and values of critical areas, and identify any measures chosen to limit such risk. The following is a description of areas of potential departure from the Best Available Science.

a. Tree Protection Zones and Water Quality Buffers in Urban Growth Areas. Throughout the process the public expressed concern that imposing large buffers and Tree Protection Zones in the County's two small, non-municipal urban growth areas would make it difficult to achieve other GMA goals, and could significantly affect the character of those communities as well as those who own property adjacent to aquatic FWHCAs. To help accommodate growth within Urban Growth Areas, and to support other GMA goals, the proposed regulations include reduced Tree Protection Zones and water quality buffers in those areas if adverse impacts are identified and mitigated in accordance with the new mitigation and financial guarantee procedures. Although the BAS recommends avoidance of adverse impacts when that is feasible, mitigation of impacts is an acceptable alternative.

XVII. The amendments are consistent with the applicable goals and policies of the San Juan County Comprehensive Plan.

XVIII. The purpose of buffers and Tree Protection Zones is to protect existing functions and values of the FWHCA to be protected.

XIX. In accordance with Growth Management Hearings Board and Court rulings, restoration of degraded areas is not required by the GMA, though a property owner may voluntarily choose to provide restoration as a means of offsetting the adverse impacts of new development.

Table 3.9
Tree Protection Zone Evaluation Area

Type of Water Body[1]	Tree Protection Zone Eval. Area (measured horizontally)
Type F (Type 2 or 3) streams, lakes, ponds designated as FWHCAs, and marine waters designated as FWHCAs	110 feet from Ordinary High Water Mark or Bank Full Width[2]
Type Np (Type 4) streams	50 feet from Bank Full Width
Type Ns (Type 5) streams	30 feet from Bank Full Width
Type Ns (Type 5) streams flowing less than 6 months per year	Stream banks must be vegetated.

[1] Stream types under both the new and old classification systems shown (see WAC 222-16-030 and 031).
[2]Within urban growth areas this may be reduced to 50 feet if adverse impacts are identified and mitigated in accordance with SJCC 18.30.110.

Step 5. Averaging of Tree Protection Zones. Averaging of Tree Protection Zones allows reduction of the zone in specified locations on the property proposed for development, vegetation removal or other site modification, in conjunction with increases of the zone in other areas, so that the total area of the zone is unchanged. The applicant may average the Tree Protection Zone if all of the following criteria are met:

a. Averaging is necessary to accomplish the purposes of the proposal, and no reasonable alternative is available;

b. The total total area contained within Tree Protection Zones after averaging is no less than that contained within the Zones prior to averaging;

c. Only areas with trees located within 200 feet of the OHWM or bank full width will be counted toward the required area of the Tree Protection Zones; and

d. In no case shall the Tree Protection Zones be reduced to less than the water quality buffer or 70 feet, whichever is greater;

Step 6. Adjustments.

Buffers and Tree Protection Zones Do Not Cross Some Roads. Buffers and Tree Protection Zones do not extend across public roads. For private roads, buffers and Tree Protection Zones do not extend across the road when the road design, flow of runoff, quantity of traffic, and/or gap in tree canopy result in an area that does not support functions and values of the FWHCA to be protected, as determined by a qualified professional.

Step 7. Proceed to evaluate compliance with protection requirements for other types of FWHCAs in subsection 18.30.160.F.

2. Structures, Uses and Activities Allowed and Prohibited in and over Aquatic FWHCAs and their Water Quality Buffers and Tree Protection Zones.

Development activities, removal of vegetation and other site modifications are limited or prohibited within aquatic FWHCAs and their water quality buffers and Tree Protection Zones. Allowable activities vary depending on whether the activity is within a Tree Protection Zone or a water quality buffer, and are described separately below.

a. Tree Protection Zones are divided into two sections: Zone 1 consists of the first 35 feet adjacent to the water, beginning at the OHWM, or for streams, the bank full width. Zone 2 is the remainder of the Tree Protection Zone.

To allow for a view or for fire hazard reduction, minor trimming and pruning of the foliage of trees within both Zone 1 and Zone 2 is permitted provided the health of the trees is maintained, trees are not topped, and all branches and foliage overhanging aquatic FWHCAs is retained. In no case shall more than 20% of the foliage of a tree be removed during one 12 month period

Within Zone 1 no tree removal is allowed (though pruning is allowed in conformance with the above requirements). Within Zone 2 construction of one primary structure, and/or limited tree removal to allow for a filtered view from the primary structure, are allowed in conformance with all of the following:

i. The structure, impervious areas, and areas where soils will be graded, compacted or where the organic soil horizon will be removed, are located landward of the water quality buffer;

ii. Appropriate BMPs are used to minimize erosion, sedimentation, and soil disturbance;

iii. No more than 40% of the volume of trees over 6 inches dbh are removed in any 10 year period;

iv. Stocking levels for trees ≥ six inches dbh will not be reduced to less than:
(A) Softwood stands such as Douglas fir (>66% softwood volume): 80s.f. basal area per acre including the area covered by any structures (approximately equivalent to 21% canopy cover);
(B) Mixed wood stands (34%-66% softwood volume): 70 s.f. basal area per acre including the area covered by any structures; and
(C) Hardwood stands such as maple (<34% softwood volume): 50 s.f. basal area per acre including the area covered by any structures;

v. The remaining forest consists of trees that are multi-aged and are well distributed across the Tree Protection Zone;

vi. All vegetation overhanging aquatic FWHCAs is retained; and

vii. For primary structures to be located in Zone 2, there is a low probability of increased windthrow of trees within Tree Protection Zones as determined by a qualified professional.

b. Water Quality Buffers. Structures, uses and activities that are listed as "Yes" uses in Table 3.10 below are allowed within aquatic FWHCAs and required water quality buffers, subject to compliance with other sections of the San Juan County Code. State or federal requirements, administered by the WA Department of Ecology, WA Dept. of Fish and Wildlife, WA Dept. of Natural Resources, and U.S. Army Corps of Engineers, may also apply to these areas.

Table 3.10
Structures, Uses and Activities Allowed in and over Aquatic FWHCAs and Their Water Quality Buffers

Activity	Aquatic FWHCA (the area within the water)	Buffer
a. Outdoor uses and activities that do not involve modifying the land or vegetation, and that will not adversely affect the functions and values of FWHCAs.	YES	YES
b. The harvesting of wild plants and foods in conformance with applicable regulations and in a manner that is not injurious to the natural reproduction of native plants, provided the harvesting does not require tilling soil, planting, or changing existing topography, water conditions, or water sources, except when allowed as an agricultural activity under (e) or (f) below.	YES	YES
c. Removal of invasive plants; planting of native plants; vegetation management activities intended to preserve and maintain specific habitats for rare species; and vegetation management activities implemented as part of a habitat management plan developed or approved by a local, state or federal agency.	YES	YES
d. Agricultural activities conducted in accordance with a voluntary stewardship program developed pursuant to RCW 36.70A.705, with the exception of the construction of agricultural structures which are subject to the same provisions as other structures.	YES	YES
e. With the exception of the construction of agricultural structures, agricultural activities, including seasonal and recurrent activities, existing or in development during the year prior to the effective date of this ordinace, provided they do not result in additional adverse impacts to the functions and values of FWHCAs. This can include changing the type of farming, management practices, and crops within the existing geographic area already in use (such as in the rotational management of farmland) as long as the change does not result in additional adverse impacts to FWHCA functions and values. Agricultural structures are subject to the same provisions as other structures. (Note: See definition of "garden" in SJCC 18.20.070.)	YES	YES
f. Aquacultural activities including seasonal and recurrent activities, existing or in development during the year prior to the effective date of this ordinance, provided they do not result in additional adverse impacts to the functions and values of aquatic FWHCAs. This can include changing the type of aquaculture, management practices, and products within the existing geographic area already in use, as long as the change does not result in additional adverse impacts to FWHCA functions and values. Aquacultural structures are subject to the same provisions as other structures. Aquacultural activities are also subject to the requirements of SJCC Chapter 18.50.	YES	YES
g. With the exception of the construction of agricultural structures, new and expanding agricultural activities that are consistent with appropriate best management practices (BMPs) that will ensure no net loss of the functions and values of aquatic FWHCAs. The BMPs must be described in a farm management plan or other comprehensive agricultural management document prepared or approved by WSU Cooperative	NO	YES

Extension Service or the San Juan County Conservation District. New and expanding agricultural activities must not result in additional adverse impacts to FWHCA functions and values. Agricultural structures are subject to the same provisions as other structures. (Note: See definition of "garden" in SJCC 18.20.070.)		
h. New and expanding aquacultural activities that are consistent with appropriate best management practices (BMPs) approved by the Dept. of Ecology. The BMPs must be described in a management plan. New and expanding aquacultural activities must not result in additional adverse impacts to FWHCA functions and values. New aquacultural structures are subject to the same provisions as other structures. Aquacultural activities are also subject to the requirements of SJCC Chapter 18.50.	YES	YES
i. Non-compensatory Enhancement. Restoration or enhancement activities not required as project mitigation, provided the activity is approved by the U.S. Fish and Wildlife Service, the Washington State Department of Ecology, Washington State Department Fish and Wildlife, or other responsible local, state, federal, or tribal jurisdiction.	YES	YES
j. Within the water quality buffers of aquatic FWHCAs, the establishment and expansion of orchards and gardens, cultivated and managed with appropriate BMPs, and without the use of synthetic chemicals, provided that: i. They will occupy no more than 4,000 square feet of the buffer; ii. They are installed within the outer 25% of the buffer; iii. Other than fences, no structures or impervious surfaces are constructed or created, and fences will not impede the flow of water or prevent wildlife access to streams, ponds, lakes or shorelines designated as FWHCAs; iv. A buffer of at least 30 feet is retained. v. Trees within Tree Protection Zones are protected in accordance with this section.	NO	YES
k. The construction of trails, stairs, or raised walkways, provided that the improvement: i. Is designed to direct sheet flow runoff into adjacent vegetation; ii. Does not exceed five feet in width; iii. Is constructed of non-toxic materials; iv. Does not include the placement of fill; v. Is consistent with the applicable requirements of subsection 18.30.160.E.5; and vi. For areas within shoreline jurisdiction, the improvement is consistent with the requirements of SJCC Chapter 18.50 and subsection 18.30.160. E.7.	YES	YES
l. Temporary wildlife watching blinds.	YES	YES
m. Drilling and digging of wells, provided they are located within the outer 25% of the water quality buffer, that there are no anticipated adverse impacts to adjoining FWHCAs, that measures are taken to avoid compaction of soils during drilling and development of the well, and that disturbed areas are immediately stabilized.	NO	YES
o. To allow for a view or for fire hazard reduction, minor trimming and pruning of the foliage of trees and shrubs, provided the health of the trees and shrubs is maintained, trees are not topped, and all vegetation overhanging aquatic FWHCAs is retained. In no case shall more than 20% of the foliage of individual trees or shrubs be removed during one 12 month period.	NO	YES
p. If no practicable alternative exists, components of stormwater management facilities	NO	YES

in conformance with local and state stormwater management requirements and the Tree Protection Zone requirements of this section.		
q. Fences provided they do not impede the flow of water or prevent wildlife access to the shoreline.	NO	YES
r. Stream crossings, and roads and trails in water quality buffers and Tree Protection Zones, in conformance with subsection 18.30.160.E.5.	YES	YES
s. Storage of chemicals.	NO	NO
t. Components of on-site sewage disposal systems in conformance with local and State requirements, provided: i. Appropriate BMPs are used to minimize erosion, sedimentation and soil disturbance; ii. For new systems, trees within Tree Protection Zones are retained in accordance with this section. iii. For replacement of existing, failing systems where there is no other alternative that will meet State requirements (including locating the new system in the same place as the old system), trees within Tree Protection Zones are retained to the greatest extent possible.	YES	YES
u. Development, vegetation removal, or other modification allowed pursuant to an exemption, a reasonable use exception, a public agency/ utility exception, and provisions for non-conforming uses, structures and activities outlined in SJCC 18.30.110.	YES	YES
v. Structures, uses and activities allowed pursuant to an approved variance (see SJCC 18.80.100).	YES	YES
w. Shoreline modifications in conformance with SJCC 18.50 and subsection 18.30.160.E.8.	YES	YES
x. Other uses that will not adversely impact the functions and values of aquatic FWHCAs, considering the Best Available Science.	P/C [1]	P/C [1]

[1] "P/C" means Provisional or Conditional Use Permit depending on the level of impacts (see SJCC 18.80.090.

3. **Field Marking of Buffers and Tree Protection Zones.** Prior to building permit approval, the location of the outer extent of buffers and Tree Protection Zones adjacent to the area that will be developed shall be marked in the field, and the Director may require field approval prior to the commencement of permitted activities. Markings for buffers and Tree Protection Zones shall be maintained throughout the duration of construction activities.

4. For recorded plats, short plats, and binding site plans the applicant shall show the boundary of required buffers and Tree Protection Zones on the face of the plat or plan.

5. **Stream Crossings, Roads, and Trails in Water Quality Buffers and Tree Protection Zones.** The construction of new or expanded roads, driveways, trails and associated culverts and bridges across streams, buffers and Tree Protection Zones are allowed in conformance with SJCC 18.60.080 - 100 and the following:

a. New roads and driveways may only be constructed across streams, or through buffers or Tree Protection Zones, if there is no practicable alternative.

b. For type F streams, bridges, culverts and crossings shall be designed according to the Washington Dept. of Fish and Wildlife "Design of Road Culverts for Fish Passage, 2003". For streams that support fish that are designated for protection under the Federal Endangered Species Act, the following may also apply as determined by the agencies with jurisdiction: the National Marine Fisheries Service "Guidelines for Salmonid Passage at Stream Crossings, 2000"; and "Washington State Fish Passage and Habitat Enhancement Restoration Programmatic", National Marine Fisheries Service Tracking No. 2008-03598.

c. When practicable, new roads, driveways, trails and walkways shall be located on existing road grades, utility corridors or previously disturbed areas.

d. When required, permits and approvals must be obtained from appropriate state and federal agencies, including but not limited to: Washington Department of Fish and Wildlife; Washington State Department of Ecology; Washington State Department of Natural Resources; U.S. Army Corps of Engineers; U.S. Coast Guard; NOAA Fisheries Service; and U.S. Fish and Wildlife Service.

e. The road, culvert or bridge shall be located and designed to minimize adverse impacts, and shall not interfere with fish passage, the movement of water, large woody debris, gravel, or other stream processes. Roads must cross aquatic FWHCAs and buffers at, or as close as possible to, a ninety degree angle. Crossings shall not occur in salmonid spawning areas unless no other feasible crossing site exists. In streams with salmonid breeding habitat, bridges, bottomless culverts or other alternatives that will allow for fish passage are required, and bridge piers or abutments may not be placed within the stream or stream banks unless there is no feasible alternative. The length of conventional culverts shall be the minimum necessary.

f. The location and design of the road or driveway crossing must be evaluated by a qualified professional to ensure that ecological processes will not be adversely affected.

g. Construction must occur during work windows and time limits established by the state and federal agencies with jurisdiction.

h. All stream crossings shall be designed to accommodate 100-year projected flood flows.

i. When practicable, crossings shall serve multiple properties;

j. When expanding existing crossings that do not meet these standards, the crossing shall be upgraded as necessary to reduce stream impacts and meet the requirements of this subsection. For purposes of this section, an expansion is an increase in the footprint of the crossing structures or the associated roads and trails.

k. Roads and driveways must be crowned, in-sloped, out-sloped or otherwise designed to direct runoff from the road surface into vegetated areas.

6. **Within shoreline jurisdiction, reduced water quality buffers and Tree Protection Zones when views of the water are blocked by existing houses on adjoining waterfront parcels.** If existing houses on adjoining waterfront parcels are closer to the water than what is specified in this section, reduced buffer and Tree Protection Zones shall be authorized if:

a. Adverse impacts to aquatic FWHCAs, if any, are identified by a qualified professional;

b. Adverse impacts are mitigated in conformance with SJCC 18.30.110; and

c. The authorized buffer and Tree Protection Zones are the greater of:

i. The waterward side of a line drawn between the most waterward points of the houses on the adjoining parcels; and

ii. The average of the distances from the OHWM to the most waterward points of the houses on the adjoining parcels.

7. **Standards and Requirements for Shoreline Modifications.** Shoreline modifications, including shoreline stabilization measures, are allowed within and over aquatic FWHCAs and their buffers subject to this section and SJCC chapter 18.50. These requirements remain in effect until they are replaced with an approved comprehensive update of the Shoreline Master Program. Unless specifically allowed by this section and SJCC chapter 18.50, construction of new shoreline modifications is prohibited.

a. General Standards.

i. Definitions. Definitions applicable to this subsection (18.30.160.E.7) are found in RCW 90.58.030, WAC 173-26-020, and WAC 173-27-030.

ii. Mitigation Sequencing. Per WAC 173-26-201(2)(e) adverse impacts associated with new, expanded or replacement shoreline modifications must be mitigated consistent with the requirements of SJCC 18.30.110 and the following mitigation sequence:

(A) Avoiding the impact altogether by not taking the action or part of the 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 to avoid or reduce impacts.

(C) Rectifying the impact by using appropriate technology or by repairing, rehabilitating or restoring the affected environment.

(D) Reducing or eliminating the impact over time by preservation and maintenance operations.

(E) Compensating for the impact by replacing, enhancing or providing substitute resources or environments.

(F) Monitoring the impact and compensation projects and taking appropriate corrective measures.

iii. In accordance with WAC 173-26-221(2)(c)(iii)(C), if inventories of critical saltwater habitats have not been completed, overwater and near shore developments in marine waters designated as FWHCAs may not be approved without an inventory of the site and adjacent shoreline parcels to assess the presence of these habitats and their functions. The methods and extent of the inventory shall be consistent with accepted research methodology, in consultation with Department of Ecology technical assistance materials.

iv. Public docks and docks serving five or more single family residences, piers, bulkheads, bridges, fill, floats, jetties, utility crossings, lifts, stairs, ramps, and other human-made structures shall not intrude into or over critical saltwater habitats unless all of the following conditions are satisfied:

APPENDIX

D

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office 3190 160th SE Bellevue, Washington 98008-5452 (425) 649-7000

June 10, 2009

Ms. Shireene Hale, Senior Planner
San Juan County Community Development & Planning
P.O. Box 947
Friday Harbor, WA 98250

Dear Ms. Hale:

RE: San Juan County Critical Areas Ordinance, June 3, 2009 Draft

Thank you for giving the Department of Ecology (Ecology) the opportunity to comment on the wetland provisions of the San Juan County (County) draft Critical Areas Ordinance (CAO) (June 3, 2009 draft). Ecology understands and appreciates the effort that County staff and the CAO Citizen Review Committee have devoted to this update over the past three years. You have obviously spent considerable time trying to construct an ordinance that meets the regulatory requirements for the CAO update.

Despite that effort, however, there are a number of wetland provisions in this draft ordinance that are of serious concern to Ecology. This letter will focus on those sections that are most problematic for wetland protection. Other, less significant issues will be addressed in subsequent comments as the County works through the update. The wetland issues discussed in this letter are those that Ecology believes are not consistent with best available science (BAS) and that will not adequately protect wetlands or their functions. As such, these provisions represent a high-risk approach to wetland protection that is not scientifically or legally defensible. If the provisions in the draft CAO are adopted, Ecology would not be able to support the County upon appeal of the CAO. We look forward to continuing to work with the County in addressing these concerns and providing whatever assistance we can to resolve these issues before the proposed CAO goes to the County Council for final approval.

The purpose of this letter is two-fold: (1) to outline Ecology's remaining concerns about the CAO; and (2) to comment on areas where the Shoreline Master Program (SMP) update's reliance on the CAO will fall short of approval requirements. As currently proposed, the SMP will rely on the CAO or its provisions for protection of wetlands and other critical areas in shoreline jurisdiction. As you know, Ecology does not have an approval role in the CAO adoption process; our role is advisory. The SMP, however, is a joint document of Ecology and the County, requiring Ecology approval. Before the SMP can be approved by Ecology, the SMP may require critical-area protection measures over and above those in the current draft CAO. In its current form, the CAO does not meet the "no net loss of ecological functions" requirement because it contains provisions that represent a high level of risk to wetlands.

As you are aware, Substitute Senate Bill 5248 places a moratorium on adopting critical areas ordinance updates that pertain to agricultural lands or practices until after July 1, 2010. Until that time, agricultural practices are regulated by the existing CAO. The proposed CAO update includes a number of sections that refer to agricultural practices. These revisions are not allowed under the moratorium and need to be removed.

We would like to point out that the "*Summary of Key Scientific Findings Relative to Protection of Critical Areas*," dated May 20, 2009, does not include Ecology's latest guidance on wetland protection. In 2005, Ecology developed BAS documents to assist local governments in preparing critical areas regulations that effectively protect functions and values of wetlands. They are:

- *Wetlands in Washington State - Volume 1: A Synthesis of the Science* (Publication #05-06-006, March 2005)
- *Wetlands in Washington State - Volume 2: Guidance for Protecting and Managing Wetlands* (Publication # 05-06-008, April 2005)
- *Washington State Wetland Rating System for Western Washington* (Washington State Department of Ecology, 2004).
- *Wetland Mitigation in Washington State, Part 1: Agency Policies and Guidance* (Version 1, Publication #06-06-011a, March 2006)
- *Wetland Mitigation in Washington State, Part 2: Developing Mitigation Plans* (Version 1, Publication #06-06-011b, March 2006)

These peer-reviewed documents are the result of an extensive synthesis of the scientific literature on freshwater wetlands. The management strategies in Volume 2 were developed by an advisory team composed of state agency staff and planners from both city and county governments. It is in consideration of and in reference to these documents that the following comments are provided.

To comply with the Growth Management Act, critical areas ordinances must be based on BAS. Washington Administrative Code (WAC) Section 365-195-900(2) requires that jurisdictions must include the "best available science" when developing policies and development regulations to protect the functions and values of critical areas. BAS is defined in WAC 365-195-905, and guidance is provided on how to proceed with the CAO update in the absence of scientific information or uncertainty as to the potential harm to critical areas (WAC 365-195-920). Specifically, WAC 365-195-920(1) requires "a 'precautionary or a no risk approach,' in which development and land use activities are strictly limited until the uncertainty is sufficiently resolved."

The County has offered no scientific research that supports the wetland provisions in its proposed CAO. Ecology believes that there is considerable uncertainty that these measures will protect wetlands and that some of the proposed allowed activities represent a high risk to wetlands and wetland functions, contrary to WAC 365-195-920(1).

Specific concerns with this draft of the CAO include:

- proposed wetland definition
- absence of language emphasizing avoidance and minimization of impacts (mitigation sequencing)
- reasonable use exception standards (18.30.110.E.)
- Critical Area Stewardship Plan provisions (18.30.110.J.)
- allowance of gardens and orchards in wetlands and pruning of up to 20% of wetland vegetation (18.30.150.E.5.) and their buffers (18.30.150.E.6)
- proposed wetland buffers and buffer reductions (18.30.150.E.1 and 7)

Proposed Wetland Definition

The wetland definition provided in Section 18.20.230 states that "ponds, including farm ponds" are artificial wetlands. This is not correct. The definition required by RCW 36.70A.030(21) states that only farm ponds that are intentionally created from nonwetland sites are artificial wetlands, not all ponds. The definition in the proposed CAO should be corrected; specifically:

... Wetlands do not include those artificial wetlands intentionally created from nonwetland 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, ...

For legal guidance on the matter of impermissible statutory exemptions to the definition of wetlands, please refer to the Central Puget Sound Growth Management Hearings Board Case No. 05-3-0034 (Dept of Ecology et al. v. City of Kent) at http://www.gmhb.wa.gov/central/decisions/2006/05-3-0034DOECTEDFDO20060419.pdf.

Mitigation Sequencing

The Washington State Environmental Policy Act (SEPA) (Chapter 43-21C RCW), administered by Ecology, and Section 404 of the federal Clean Water Act (CWA) administered by the Corps and EPA, both require that a sequence of actions be taken for proposals that will impact wetlands (mitigation sequence). The following are the steps in the mitigation sequence according to the implementing rules of SEPA (Chapter 197-11-768 WAC). The purpose of mitigation sequencing is to ensure that impact avoidance and minimization are the first steps in evaluating potential project impacts and that compensatory mitigation is used only for unavoidable impacts. Additional language emphasizing the County's interest in first avoiding and preventing impacts should be included in the CAO. We recommend that the draft CAO require applicants to demonstrate that they have taken these actions:

1. *Avoiding the impact altogether by not taking a certain action or parts of an action;*
2. *Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts;*

3. *Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;*
4. *Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;*
5. *Compensating for the impact by replacing, enhancing, or providing substitute resources or environments; and/or*
6. *Monitoring the impact and taking appropriate corrective measures.*

Reasonable Use Exceptions

Reasonable use exceptions are a means of allowing some development of a parcel when critical areas or other constraints leave no reasonable use of the property. Section 18.30.110.E. of the previous draft of the CAO included "denial of all reasonable use of a property" in the definition of reasonable use. The current draft states "denial of any reasonable use of a property". The need for impact avoidance and minimization should be included in this section as well as the need to mitigate for unavoidable critical area impacts. We recommend that the review criteria in 18.30.110.E.2 include the following:

> *No feasible and reasonable onsite alternative to the proposed activities is possible, including possible changes in site layout, reductions in density, and similar factors that would allow a reasonable economic use with fewer adverse impacts.*

The County has not offered a scientific basis for the reasonable use size thresholds proposed in Section 18.30.110.E. The proximity of the impact to the critical area determines whether functions are degraded, not the size of the parcel. Has the County assessed the potential cumulative impact to critical areas of such an allowance? How will the County monitor this impact over time? This proposed revision could be difficult for County staff to implement and interpret and is not consistent with scientifically sound resource protection. We recommend that this section of the CAO be revised to state that reasonable use exceptions be allowed only where it can be clearly demonstrated that critical areas encumber a parcel to the extent that all reasonable use is denied and only after a mitigation plan has been developed to compensate for impacts to critical areas must be mitigated.

Critical Area Stewardship Plans

Ecology supports the concept of allowing landowners to use a Critical Area Stewardship Plan (CASP) (Section 18.30.110.J.) as an alternative approach to protecting critical areas. These plans are most appropriate for rural properties of 5 acres and larger. For properties less than 5 acres, the potential habitat benefits of the CASP may not be realized because the area of habitat covered by the plan is simply too small. In addition, these plans can be costly to develop and implement and are therefore not suitable for properties smaller than 5 acres. Due to the intensity of development associated with commercial, institutional and industrial sites, a CASP is not appropriate for these land uses or in urban areas. Section 18.30.110.J.1. states that County staff will assist in CASP development and that the Director is responsible for reviewing CASPs

submitted to the County. Given that the County does not currently have any wetlands or fish and wildlife technical staff, Ecology is concerned that the County may not be able to review the adequacy of submitted plans. Compliance monitoring is also an essential element of a stewardship program. Given the County's current staffing levels, it is unclear how the County will carry out CASP compliance monitoring. We recommend that Section 18.30.110.J.2. be revised as follows (suggested changes in italics text):

> a. CASPs may be used in ~~all~~ *Agricultural Resource, Forest Resource, Rural Farm Forest and Rural Residential* land districts. *CASPS may not be used for commercial, institutional or industrial development.* ~~and for all types of development.~~
>
> b. They can only be applied to properties ~~1/4 acre~~ *5 acres* or larger.

Buffers

The minimum wetland buffer widths provided in Table 3.4 (Section 18.30.150.E.1.) are not consistent with the best available science and will not adequately protect wetland functions. The title of this subsection seems to imply that buffers are optional (Options for preventing negative impacts to wetlands). The CAO should clearly state that buffers are required to protect wetlands. Furthermore, the County has offered no rationale or scientific research to justify the narrower buffers proposed in the current draft.

The scientific literature is unequivocal that buffers are necessary to protect wetland functions and values. The literature consistently reports that the primary factors to evaluate in determining appropriate buffer widths are: 1) the wetland type and functions needing protection; 2) the types of adjacent land use and their expected impacts; 3) the characteristics of the buffer area (slope, soils, vegetation); and 4) the functions the buffer must perform (filtering sediment, nutrients, or toxics; screening noise and light; providing forage, nesting, or resting habitat for wetland-dependent species; etc.).

The buffer strategy in the current draft is based on wetland category alone, as determined by using the *Washington State Wetland Rating System for Western Washington* (Revised, Publication #04-06-025, August 2004). Ecology recommends that the County adopt the buffer recommendations in Alternative 3 in Tables 8C-4 through 8C-7 of *Wetlands in Washington State, Volume 2: Managing and Protecting Wetlands* (Publication # 05-06-008, April 2005). The buffer widths listed under Alternative 3 and Alternative 3A in Appendix 8-C have been peer reviewed, are based on best available science, and represent the mid-range for buffer widths reported in the scientific literature. Because the buffer widths in Alternative 3 consider wetland functions (and special characteristic wetlands) and adjoining land-use intensity, the buffer widths listed in Alternative 3 will in many cases be narrower than the standard buffer widths proposed by the County.

The proposed CAO classifies wetlands based on the current Western Washington wetland rating system developed by Ecology, and it requires that applicants submit the wetland rating forms with development applications (Section 18.30.150.B.). Determining the wetland rating is the most difficult step in using Buffer Alternative 3. Since the County will already be requiring use

of the Western Washington rating system, determining the appropriate buffer from the appropriate table (Tables 8C-4 through 8C-7) will be relatively simple.

If the County is not going to consider land use intensity in prescribing the standard buffer widths, the buffer widths in the CAO need to be wide enough to protect wetlands from the highest intensity land use (see Table 8C-1, Appendix 8C of Volume 2 as referenced above).

The proposed buffer widths are considerably narrower than the widths recommended in the best available science and pose a serious risk to wetland functions, particularly to water quality and habitat. Wetland-dependent wildlife species are most likely to be adversely effected by the narrower buffer widths currently proposed by the County. Allowing further decreases in these buffers through averaging or additional reductions will only increase the risk to wetland functions and associated species. We would like to see the scientific or other rationale that supports these higher-risk buffer widths.

Section 18.30.150.E.3.b. offers the option of having County staff determine the wetland boundary and category if sufficient information is available and if the landowner agrees to the buffer widths in Table 3.5 (buffer widths that are half again as wide as the buffers listed in Table 3.4). This also is a high-risk approach to wetland protection, particularly since the County does not currently have a wetland specialist on staff. If the County wishes to provide this option, the estimated buffers should be 50% larger than the simple buffers recommended above in Table 8C-1 in order to allow for the possibility of error in boundary and rating determination.

Allowed Activities and Buffer Reductions

There are several activities allowed within wetlands in Section 18.30.150.E.5 of the current draft CAO that have the potential to adversely impact wetlands (trails and walkways, maintenance, wildlife viewing structures). These same concerns apply to activities allowed within wetland buffers (Section 18.30.150.E.6.) The most troubling of these allowed activities is orchards and gardens in Category II, III and IV wetlands (18.30.150.E.5.a.ix.) and their buffers (18.30.150.E.6.a.ix.). The County offers no scientific research in support of this allowance. Ecology is not aware of any valid scientific research showing that planting orchards and gardens in wetlands or their buffers does not degrade wetland and buffer functions. This is not a scientifically or legally supportable proposal, and we recommend that the County strike any CAO language allowing orchards and gardens in wetlands or their buffers.

The current draft CAO also allows pruning of up to 20% of the vegetation in both wetlands and their buffers. One of the most critical elements of the buffer widths recommended in any of the buffer alternatives presented in Ecology's guidance documents is the assumption that the buffers are well-vegetated with a relatively intact, native plant community. This guidance explicitly states that, if a buffer area is not well-vegetated then the buffer should either be widened or restored with appropriate vegetation. Allowing pruning of up to 20% in the buffer, let alone the wetland, will have potentially serious impacts on wetland functions. The County will need to provide the science that supports vegetation pruning while at the same time maintaining wetland

functions. Again, given the County's current and future staffing levels, it seems unlikely that limiting pruning to 20% is enforceable.

The general buffer requirements allow for up to a 75% reduction in buffer width (18.30.150.E.7.iii.). This is not at all consistent with the scientific literature on buffer widths. Ecology recommends that at most, buffers be reduced by no more than 25%. However, the County should be aware that there is no scientific evidence indicating that buffer averaging will continue to protect wetland functions. A buffer reduction of 75% is not legally or scientifically defensible. We recommend that 18.30.150.E.7.iii. be revised to state that the buffer width is not to be reduced by more than 25%. In addition to the criteria given in the proposed CAO, it should be demonstrated that no feasible alternatives to the site design could be accomplished without buffer averaging.

Conclusion

We recognize the considerable effort that has gone into developing the current draft CAO. We also hope that you will find these comments helpful in modifying the CAO so that it is based on best available science, and practical to implement. We appreciate the County's efforts to better protect and manage wetlands in San Juan County. As we have said, there are a number of wetland provisions in the current draft that are not protective of wetlands and will not be legally defensible for the County. We look forward to continuing to work with County staff in revising the current draft CAO and crafting an ordinance that protects wetland functions and values.

Thank you for providing us the opportunity to work with you in updating the CAO and in voicing our concerns with specific wetland provisions. If you would like to discuss Ecology's concerns, or if you have any questions, please give me a call at (425) 649-7148 or send email to paan461@ecy.wa.gov.

Sincerely,

Paul S. Anderson

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Wetland Specialist
Shorelands and Environmental Assistance Program

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cc: Donna Bunten, Ecology CAO Review Coordinator
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DEPARTMENT OF ECOLOGY

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August 20, 2012

San Juan County Council
350 Court Street, #1
Friday Harbor, WA 98250

RE: Proposed Revisions to Critical Areas Ordinance Wetland Provisions

Dear Members of the County Council:

Thank you for notifying the Department of Ecology (Ecology) of the upcoming hearing on the proposed wetland amendments to the County's Critical Areas Ordinance (CAO). We appreciate having another opportunity to comment on the CAO as you deliberate on the amendments. It has been a long process for all involved (citizens, staff, Planning Commission, and Council), longer than our experience with most local governments. We appreciate the level of effort and resources the County has put forth in developing a legally defensible and scientifically based CAO that will protect critical areas.

Ecology respectfully offers the following comments for your consideration as you review the proposed wetland amendments[1]. While in general, we concur with the best available science analysis in the Ordinance Background, there are specific provisions of the CAO (detailed below) that we have determined are not consistent with wetland scientific literature and a medium-risk approach to resource protection. If implemented as proposed, these provisions will likely result in a cumulative loss of wetlands and wetland functions, a high-risk approach. We believe these are the minimum changes necessary to bring the ordinance up to a level of protection required by state law. If the Council chooses to move forward with a high-risk approach, it should be prepared to monitor and track these impacts.

Five specific areas where we feel the CAO represents a high-risk approach to wetland protection are:

1) Assuming that a 50% probability is a moderate risk for buffers;

[1]Ecology has commented on numerous versions of the CAO wetland provisions since 2007. Most recent comment letters in the record are dated February 4, 2011, May 13, 2011, June 9, 2011, November 10, 2011, and March 5, 2012

2) Providing inadequate buffers for wetland-dependent species known to occur in the County;

3) Proposed buffer widths for water quality buffers in urban growth areas, Table 3.6 and those for habitat, Table 3.7;

4) Several of the allowed wetland and buffer activities listed in Table 3.8; and

5) Equating the Growth Management Act (GMA) requirement to protect critical areas with balancing the listed goals of the Act.

We do not agree with the conclusion that the *"probability that the buffers will not be adequate is relatively low; between 5% and 50%"* (§ K.VI.b, pp.3-4, Background). The document misquotes Dr. Hruby (Ecology senior wetland scientist) as having stated that this level of risk is acceptable and will adequately protect wetland functions. Please correct this misattribution.

While a 5% probability of risk is low, a 50% risk is considered high risk. In a May 18, 2012 e-mail, Dr. Hruby indicated that establishing the level of risk is a policy decision, not that a 50% level of risk is acceptable and would protect wetland functions. This is based on the conclusions of the wetland scientists who developed Ecology's wetland guidance on buffers (Ecology Publication #05-06-008). The consensus of the group was that a 50% chance that buffers will not adequately protect functions presents a high risk to the wetland resources in the state. This high-risk approach is not compliant with the GMA that requires local governments to protect wetland functions and values.

In addition, the statement that there are no scientific studies that define buffer widths for animals that occur in San Juan County is not entirely accurate, as detailed below. For example, there are regionally applicable studies for the red-legged frog (*Rana aurora*) and Northwestern salamander (*Ambystoma gracile*) documenting habitat use around wetlands. For red-legged frogs, a protected riparian area of 30 meters (98 feet) surrounded by a 20-meter (66 feet) management zone is recommended in British Columbia (Maxcy 2004); while a California study (Bulger et al., 2003) concluded that suitable habitat should be protected within at least 100 meters (328 feet) of occupied breeding sites to sustain populations. Stringer (1996) found Northwestern salamanders in uplands up to 45 meters (148 feet) from breeding sites. Based on the documented needs of these species in these references as well as the published literature, an 80-foot buffer would protect less than half the recommended habitat – a high-risk approach.

Wetland buffer widths should be based on the wetland category, proposed land use and existing buffer condition, not on prospective development potential. While we understand the desire (and GMA goal) to concentrate development in designated Urban Growth Areas, relatively highquality wetlands with intact buffers still occur in those areas (e.g., Eastsound UGA). As development continues in those areas, having adequate buffers is all the more

important to maintaining the existing level of wetland function. We recommend deleting the last column in Table 3.6 and basing wetland buffers on the existing functions, sensitivity and land use.

We hope that with the suggested changes to a few key sections, the CAO that you are preparing to adopt will result in a level of protection that will protect the remaining wetlands in the County while allowing for reasonable use of property and comply with the Growth Management Act.

Thank you again for all of your work on the CAO update and for considering our comments.

Sincerely,

Erik Stockdale

Erik C. Stockdale, PWS
Wetlands/401 Unit Supervisor
Shorelands & Environmental Assistance Program

Cc: Tom Hruby, Donna Bunten, Bob Fritzen and Paul Anderson, Department of Ecology Commerce GMA Review Team
Shireene Hale, San Juan County via email (shireeneh@sanjuanco.com)

Specific Wetland Comments, August 6, 2012 CAO Draft (Ordinance Background and UDP Chapters 18.20 and 18.30)

Ordinance Background

1. § K.VI.b, pp.3-4, Background. We do not entirely agree that the proposed approach to sizing wetland buffers is a medium-risk alternative nor that there is clear and convincing proof that the proposed buffers will protect remaining wetland functions and values. While some of the proposed water quality buffer widths may be consistent with current science on protecting wetland functions, the proposed habitat buffer widths and several of the provisions related to allowed activities are not.

   Several wetland-dependent or wetland-associated wildlife species (e.g., waterfowl, northern harrier, amphibians) require intact buffers for at least a portion of their life cycle. Recent literature highlights the importance of adequate buffers to maintaining populations of turtles (Steen, et al. *Biological Conservation* 150:121–128) and amphibians (Harper, et al. *Conservation Biology* 22(5):1205–1215). Harper et al. concluded that buffers of 30 meters or less were not adequate to sustain viable populations of pond-breeding amphibians. As another example, many birds are sensitive to disturbance during nesting season. Currently, the Washington Department of Fish and Wildlife recommends a minimum buffer of 197 feet around great blue heron nesting colonies (Azerrad, J. M. 2012. Management recommendations for Washington's priority species: Great Blue Heron. Washington Department of Fish and Wildlife, Olympia, Washington).

   We recommend substantial revisions to the habitat buffers in Table 3.7, especially for medium and high habitat importance wetlands, to be more reflective of the scientific literature and consistency with best available science. The adopted habitat buffers in the Island County CAO (§ 17.02A.090F.2, Tables 1 and 2, p. 829; enclosed) are based on best available science, as confirmed by the Western Washington Growth Management Hearings Board (Case No. 08-2-0026c)[2]. These buffers were developed for an area ecologically and geographically close to San Juan County and would be applicable to the County. We realize that the proposed wetland classification for San Juan County differs from the Island County rating system but since Dr. Adamus is familiar with both systems, adapting the Island County habitat buffers to the San Juan County wetlands should not be too difficult.

2. § K.VI.u, p.7, Background. Contrary to the conclusions in this section (i.e., supporting other GMA goals), the County has not adequately documented the best available science (or mitigation measures) supporting the reduced wetland buffers allowed in Urban Growth Areas. The proposed buffers are not consistent with best available science and will not protect critical area functions as required by the GMA.

[2] Available at: http://www.gmhb.wa.gov/CaseSearch.aspx

The Growth Management Hearings Boards and courts have reviewed the question of balancing the GMA requirement to protect critical areas with the stated goals of the Act and have consistently ruled that the requirement takes precedence. Once critical areas have been designated and protected, then the other GMA goals can be balanced. Below are excerpts from recent Growth Board and court decisions on this question, beginning with Ecology & CTED's (Commerce's) appeal of the City of Kent's CAO (available at http://www.gmhb.wa.gov/searchdocuments/cpsgmhb/2006/cpsgmhb%2005-3-0034%204-19-2006%20doectedfdo.pdf). Several pages to note:

Page 11
"There are several reasons for the Legislature's mandate for early designation and protection of critical areas – preclusion of urban development in areas unsuitable because of risks to human life and property, prevention of irreversible environmental harm such as species loss, avoidance of the high cost of substituting for lost hydrological and other environmental services. Regardless of reasons, the statutory priority is unambiguous.

Pages 12-13
"Commenting on *King County* in *Quadrant*, the Court explained:
In *King County*, this Court considered both the goals and the requirements of the GMA in determining whether allowing active recreation on designated agricultural lands violated the GMA. However, *King County* did not rely on the applicable goal in isolation nor did it hold the goals to independently create substantive requirements.

"*Quadrant*, 154 Wn.2d at 246. The *Quadrant* Court stated that GMA requirements provide substance to GMA goals, *citing Skagit Surveyors & Engineers, LLC v. Friends of Skagit County*, 135 Wn.2d 542, 548, 958 P.2d 962 (1998). The Supreme Court explained that **a city or county's discretion to balance GMA goals is not a license to ignore the GMA's explicit requirements**. Thus "balancing" and "deference" come into play when GMA mandates have been satisfied. *Quadrant*, 154 Wn.2d at 246-247. (emphasis added)

"In *City of Bellevue v. East Bellevue Community Municipal Corporation (Bellevue)*, 119 Wn.App. 405, 81 P.3d 148 (2003), the city had attempted to exempt a shopping center redevelopment from GMA transportation concurrency requirements because the project fulfilled other goals of the Act. The Court of Appeals upheld the Board's invalidation of the exemption, stating: "Bellevue argues that the concurrency requirement cannot trump all other goals of the GMA. ... But concurrency is *not a goal, it is a requirement*." *Id.* At 414 (emphasis supplied).

"The Board reads these decisions of the Supreme Court and Court of Appeals as establishing the rule that **a jurisdiction may not assert the need to balance competing GMA goals as a reason to disregard specific GMA requirements**." (emphasis added)

3. § K.VI.ii, p.11, Background. This section acknowledges that the proposed buffer widths and allowed uses will result in a cumulative loss of wetland function:

"Some of these options require mitigation of adverse impacts, and some identify requirements that will help minimize impacts. When considered together however, these options may result in the removal of too much vegetation, and too much development too close to wetlands, cumulatively resulting in adverse impacts to the functions and values of the wetlands."

To ensure the protection of wetland functions (habitat and water quality), we believe adequate wetland buffer are essential, that there should be a greater emphasis on avoidance and minimization in the CAO and that unavoidable impacts be mitigated (see Table 3.8 Activities Allowed). Allowing a cumulative loss of wetlands and wetland functions does not comply with the GMA requirement to protect critical areas. To ensure that wetland functions are protected and to improve the clarity and enforceability of the CAO, we recommend that the number of outright exemptions (allowed activities, Table 3.8) be significantly reduced and that unavoidable impacts be mitigated.

4. § K.VIII, p.11, Background. While true that paved roads may be a barrier to some wildlife species and constitute a break in a buffer, this may not be the case for gravel roads that are infrequently used or driveways serving a single residence. We recommend that this section be revised to clarify that "...extending buffers across paved roads ~~will~~ may not provide support for the wetlands...".

18.20.010 Definitions

As a general statement, we recommend that statutory definitions from the GMA and the Shoreline Management Act be used.

5. § 18.20.010, p. 16, "A" Definitions. "Agricultural activities" The proposed definition is not consistent with the definition in WAC 173-26-020(3) and will need to be revised for inclusion in the Shoreline Master Program. "Land preparation for agricultural purposes, such as clearing, grading, contouring, ditching" would bring new or abandoned lands into agricultural use and would be a conversion (i.e., "development") subject to regulatory review and approval if within a critical area.
6. § 18.20.040, p. 23, "D" Definitions. "Development" We recommend including "clearing" as a development activity. We are concerned with the County's ability to implement and enforce the proposed exemption of "activities with duration of less than 24 months which do not adversely alter critical areas". What standards will the County use to determine the duration of the activities and associated impacts and the impact to critical areas? For example, if a mature forested buffer is cleared it will be decades before forest functions are restored, even if replanted within 24 months.

7. § 18.20.170.1, p. 30, "Q" Definitions. "Qualified professional[3]" We recommend adding the following underlined text to the definition of a qualified wetland professional: "...These qualifications include specialization in wetland soils, botany, or hydrology, with appropriate education and a minimum of two years full-time experience working as a wetland professional."
8. § 18.20.180.1, p. 30, "R" Definitions. "Rare species wetland" (b) bighead sedge (*Carex macrocephala*); Bighead sedge is now classified as a FACU species in the National Wetland Plant List (6/12), indicating that it is only occasionally found in wetlands, and usually occurs in non-wetlands. Based on the updated wetland indicator status for bighead sedge, we recommend removing reference to this species as comprising a rare wetland species.
9. § 18.20.190, p. 33, "S" Definitions. "Scrub-shrub wetland" For consistency with state and federal definitions[4], we recommend the following revisions to this definition: means a regulated wetland with at least 30 percent of its surface area covered by woody vegetation less than ~~20 feet in height~~ 3 inches dbh as the uppermost strata, regardless of height."
10. § 18.20.190, p. 34, "S" Definitions. "Shorelands" This definition is not entirely consistent with that in the Shoreline Management Act (see RCW 90.58.030(2)(d)), and we recommend adding the following underlined text: "...means lands extending landward for 200 feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward 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; the same to be designated as to location by the Department of Ecology." The underlined text is from the SMA and cannot be modified.

18.30. 150 Wetlands

11. § 18.30.150.B, p. 41, Wetlands. The minimum size thresholds for regulated wetlands listed in this section are not consistent with best available science and will not protect wetland functions. To determine cumulative impacts, the County needs to account for wetland losses over time. An outright regulatory exemption will make tracking these wetland losses difficult, if not impossible. As Ecology commented in our March 5, 2012 letter, the CAO needs to stipulate that the County shall determine whether a wetland meets the minimum size and condition (i.e., isolated) thresholds based on a current wetland delineation. We recommend this

[3] Contrary to spurious claims by some members of the community, the Office of the Attorney General has determined that wetland delineation is not the practice of geology, and licensure as a geologist is not required (AGO letter enclosed).
[4] Page 22, *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* available at: http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/reg_supp/west_mt_finalsupp.pdf .

section be revised accordingly: In addition to the size and habitat importance criteria below, exempt wetlands shall be limited to those which are hydrologically isolated, are not associated with a riparian area or buffer, and/or are not part of a wetland mosaic. The County shall determine when a wetland meets the exemption criteria based on submittal of a current delineation.

12. § 18.30.150.C, p. 42, Wetlands. While we understand a desire to encourage voluntary wetland enhancement and restoration, basing the wetland classification on *"the wetland type that existed prior to the modification"* is inconsistent with state and federal permitting standards and will be difficult for the County to implement. What documentation will be required for the enhancement (and when would it be submitted) and how will the County track the enhancement projects? Unless it is an enforcement action, the current wetland conditions (e.g., forested vs. scrub-shrub) are reviewed for state and federal applications. We recommend striking the last sentence of this paragraph.

13. § 18.30.150.D.1.a, p. 48, Protection Standards. We do not believe that the stormwater discharge factor for lawns (0.09) accurately reflects the runoff or pollution generating potential for lawns and believe that it should be increased (comparable to permeable pavement). The 2005 Ecology stormwater manual for Western Washington[5] classifies lawn as a pollution-generating pervious surface (Volume I, p. 2-6), and we believe increasing the stormwater discharge factor in Table 3.3 would be more consistent with that designation.

14. § 18.30.150.D.1.a, p. 50, Protection Standards. The buffer widths in Table 3.6 for Lopez Village and Eastsound UGAs do not account for wetland category (or habitat value) and are not consistent with best available science. The proposed buffers appear to be a high-risk approach that will not protect wetland functions. For example, the large wetland complex to the west of the Orcas Airport still includes areas of intact buffer that would not be protected under the current proposal.

15. § 18.30.150.D.1.a, p. 51, Protection Standards. The maximum habitat buffer width in Table 3.7 is 80 feet for High Habitat Importance wetlands, which we do not believe is consistent with best available science and will not adequately protect habitat (see detailed response on p. 2, above). The same comment applies to allowing a reduction of the habitat buffer to 30 feet. The County should provide the current science in support of a 30-foot (or 80-foot) wetland buffer maintaining habitat function.

16. § 18.30.150.D.3, pp. 52-55, Protection Standards. Table 3.8 Activities Allowed in Wetlands and Wetland Buffers. Many of the allowed activities listed in this table will impact wetland and buffer functions. We recommend that the County clarify that mitigation is required for those unavoidable impacts to wetlands and buffers. It is unclear what other activities would be allowed under paragraph v. "Other uses" and who will decide (the County or applicant) if those activities will impair wetland functions.

[5] Available at; http://www.ecy.wa.gov/programs/wq/stormwater/2005manual.html

17. § 18.30.150.E.1, p. 59, Determination of Wetland Boundary. In order to accurately assess wetland impacts (and the required mitigation) and for consistency with state and federal delineation standards, we recommend revising this section. A wetland reconnaissance level determination may be adequate if proposed development is outside the required wetland buffer. In most cases, it is not accurate enough for calculating the area of impact, particularly if wetland fill is involved. An accurate wetland delineation is typically required for state and federal permitting, as explained in § 3.1 *Wetland Mitigation in Washington State - Part 2*, (Ecology Publication No. 06-06-011b), the mitigation standard cited in UDC 18.30.110.F.5.k (November 22, 2011 Draft).[6]
18. § 18.30.150.E.2, p. 60, Determination of Wetland Boundary. As worded, this section only requires wetland reports for approval of mitigation projects, but apparently not for the wetland impacts. We recommend that language be added to the first paragraph that wetland reports are required for projects impacting wetlands. Requiring a map that only shows "the general location" of the wetland will not be detailed enough to accurately calculate wetland and buffer impacts. To ensure that wetland functions are protected and unavoidable impacts are adequately compensated, we recommend requiring that wetland reports include figures that accurately depict site features, typically through a professional survey. When wetlands will be impacted, a survey of the delineated wetland boundary is typically required for state and federal permitting.
19. § 18.30.150.E.2.c, p. 61, Determination of Wetland Boundary. The National Wetland Plant List has been adopted by the U.S. Army Corps of Engineers, and effective June 1, 2012, is the plant list to be used for wetland delineations. We recommend striking reference to the 1988 plant list.
20. § 18.30.150.E.2.h, p. 61, Determination of Wetland Boundary. We recommend adding the following underlined text to this section: "Wetland reports are valid for a period of five (5) years <u>following verification by resource agencies</u>."

CAO will be incompatible with State and Federal Standards for some projects

21. We are on record supporting the Council's decision to develop its own approach to critical area protection and management. One of the consequences of this, however, is that an applicant that proposes impacts to wetlands and waters that trigger state or federal permitting requirements will be required to comply with two different sets of standards: The San Juan County Critical Areas regulations, and the State/Federal Interagency Wetland Mitigation Guidance.[7] Projects that trigger

[6] Available at https://fortress.wa.gov/ecy/publications/summarypages/0606011b.html
[7] Ecology, US Army Corps of Engineers, and US Environmental Protection Agency. 2006. Wetland Mitigation in Washington State. Part 1: Agency Policies and Guidance; and Part 2: Developing Mitigation Plans. Ecology publication #06-06-011a and #06-06-011b. Available at http://www.ecy.wa.gov/programs/sea/wetlands/mitigation/guidance.

Nationwide Permits[8] or Individual Section 404/401 Permits will need to comply with these standards. Please consider providing a notice to applicants and/or consultants to verify consistency with state and federal wetland permitting standards.

References

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STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

November 26, 2012

San Juan County Council
350 Court Street
Friday Harbor, WA 98250

RE: Proposed Amendments to the Critical Areas Ordinance (November 13, 2012 Draft)

Dear Members of the County Council:

Thank you for providing the Department of Ecology (Ecology) with an opportunity to comment on the most recent amendments to the critical areas provisions of the San Juan County (County) Code (SJCC 18.20, SJCC 18.10.040 and SJCC 18.30.150). We respectfully ask that you consider the following comments during your deliberations and that these comments be entered into the record. We understand that the amendment before you may be the final draft of the County's Critical Areas Ordinance (CAO) and that you will soon be voting on adoption of the ordinance.

We understand that the CAO update has been a lengthy and demanding process for County staff and for the Council. It is unfortunate (and unnecessary) that for many in San Juan County this has also become a contentious and divisive process. That divisiveness does not make your job any easier or contribute meaningfully to the CAO discussion.

For wetlands, Ecology has been actively engaged in the CAO update since 2007 as a technical resource as well as a State agency with subject expertise. The proposed CAO amendments are a significant improvement over the current CAO, which is simply outdated and inadequate in light of research on wetland functions since its adoption (Ecology June 9, 2011 letter). While we appreciate the time and effort that County staff and the County Council have devoted to the CAO update, there are still significant elements of the CAO that we find to be inconsistent with the scientific literature on protecting wetland functions (or Fish and Wildlife Habitat Conservation Areas [FWHCA]). The CAO provisions of greatest concern, which we will comment on below, continue to represent a high-risk approach to wetland protection. To ensure that wetlands and wetland functions are protected, and for compliance with the Growth Management Act (GMA; WAC 365-195-900), we respectfully request that you make the essential changes recommended below to the CAO prior to adoption.

In one of our recent letters (August 20, 2012; enclosed) we pointed out five specific areas where we felt the proposed CAO would not adequately protect wetlands. Unfortunately, most of these concerns (inadequate buffers for wetland-dependent species and habitat, inadequate buffer widths for water quality buffers in urban growth areas, allowed wetland and buffer activities, and equating the GMA requirement to protect critical areas with balancing the listed GMA goals) have not been meaningfully addressed in the draft before you and we cannot support these provisions of the CAO.

Providing adequate buffers and limiting activities allowed in wetlands and buffers are essential to protecting wetlands. The wetland buffers and allowed uses in the proposed CAO amendment are not consistent with the scientific literature or the County's BAS review and will degrade wetlands over time. While we do not wish to prolong the CAO update, we do believe that there are serious deficiencies with the amendments before you and we would hope that you will incorporate Ecology's recommendations. The changes that we offer will help clarify language in the CAO that we believe is ambiguous. When CAO standards are subject to multiple interpretations it complicates project review for County staff and applicants alike, delaying permit approval and possibly exposing the CAO (and County) to additional legal challenges.

Thank you for taking time to consider our comments. We hope that making the few suggested changes will strengthen critical areas protection (wetlands and FWHCA) while at the same time providing greater certainty to property owners as to the continued reasonable use of their property. We believe these changes are necessary to protect wetland functions and, perhaps as importantly, to reduce ambiguity in the CAO so that it is easier to understand and implement. Please let me know if you have any questions on these comments

Sincerely,

Paul S. Anderson, PWS
Wetland Specialist
Shorelands and Environmental Assistance Program

PSA: ca

Enclosure

Cc: Erik Stockdale, Donna Bunten and Bob Fritzen, Department of Ecology
Ike Nwankwo, Department of Commerce

051667

Ecology's Comments on Essential Changes to the Proposed Wetland CAO Amendments (11-13-12 Draft)

SJCC 18.20 Definitions

§ SJCC 18.20.090 ("I" Definitions), p.23. For clarity and so that a lay person can understand the definition, we recommend that the stricken examples of impervious surfaces be reinstated in the definition. "'Impervious surface' means a surface area with a Rational Method runoff coefficient greater than .35, that creates a barrier to the entry of water into the soil in comparison with natural conditions prior to development, or that causes water to run off the surface in greater quantities or at an increased rate of flow in comparison with the flow prior to development. Common impervious surfaces include roofs, driveways, patios, packed earth, and oiled surfaces. However, open, uncovered retention/ detention facilities are not considered as impervious surfaces."

Buffer Adequacy

There are a number of areas within the draft CAO where the proposed wetland buffer widths depart significantly from the scientific literature, perhaps to support other GMA goals, rather than to satisfy the critical areas protection requirement (§18.30.150 BACKGROUND K.XII.b, p. 9; K.XII.e and K.XII.g, p. 10). We believe that many of the listed wetland buffer widths are too narrow to be consistent with the wetland literature. As we have pointed out in our previous comments (August 20, 2012), the proposed habitat buffer widths (Table 3.7, p. 25) deviate significantly from published and adopted standards (Appendix 8-C, Ecology #05-06-008; Island County CAO, ICC 17.02A.090.F.4, Table 2) and pose a serious risk to the wetland habitat function.

The significantly reduced buffers proposed for the Lopez Village and Eastsound UGAs (§ 18.30.150.E.1, Table 3.6, p. 23,) are not consistent with best available science (BAS) and represent a high-risk approach to wetland protection. Even with mitigation, it is unclear how the specified buffer widths will protect and support wetland functions.

We understand the belief by some in the County that the San Juan Islands are a unique area and that studies from outside the County should not be used as the basis for the CAO. The desire for a site specific method in determining wetland buffers led to the proposed procedures for calculating buffer widths. Methods and procedures tailored to local conditions are always desirable to more generalized models. However, to be scientifically valid the local model needs to be grounded in accepted scientific methods and inferences. While the method proposed by the County to calculate buffer widths has merit, we believe that overall the water quality buffer procedure is unnecessarily complex and components of the procedure are not consistent with published models.

Specifically, the Stormwater Discharge Factors listed in Table 3.3 are too low and consideration of the site soils needs to be included in the procedure (see Stormwater Management in Western Washington, Vol. III, § 2.3.2, Ecology Publication # 05-10-31; also http://www.sdcounty.ca.gov/dpw/floodcontrol/floodcontrolpdf/hydro-evalcvalues.pdf). The referenced standards classify the runoff coefficient by soil hydrologic group, which are based largely on soil permeability. Not including soil type in the County's water quality

buffer calculation is inconsistent with other published rational method models. As an example of where the discharge factor in the County method is lower than published runoff coefficients, 0.9 is the Stormwater Discharge Factor listed for lawns in CAO Table 3.3. Yet, the runoff coefficients (basis for the Stormwater Discharge Factors) for lawn in the San Diego County guidance range from 0.5 for lawns on sandy soils and slopes less than 2% to 0.35 for lawns on heavy soil and slopes greater than 7%. Using the procedure listed in the CAO, A lawn coefficient of 0.35 is nearly four times that listed in CAO Table 3.3, which translates to a 98-foot wide water quality buffer (assuming an 8% slope) versus the 46-foot wide buffer using the proposed CAO method. We recommend replacing the Stormwater Discharge Factors in CAO Table 3.3 with published runoff coefficients that account for soil type, such as the San Diego County model (enclosed).

The proposed habitat buffer averaging is not consistent with BAS, and reducing the width of buffers that are already inadequate should not be allowed. Allowing a minimum of a 30-foot habitat buffer will not protect wetland functions, particularly on high habitat importance wetlands (a 63% reduction in the required buffer width). To protect wetland functions, we recommend that the width of the buffer not be reduced by more than 25%. For habitat purposes (§ 18.30.150.B.12, p. 14; § 18.30.150.E.2, p. 25), the buffer should be considered intact unless it is bisected by a paved road or the existing developed footprint (houses or buildings) of a site.

Allowed Uses

Several of the allowed activities proposed in the CAO (§ 18.30.150.E.3 Table 3.8, pp. 26-29) are of concern and the County has not adequately documented how allowing these uses will protect wetland (and FWHCAs) functions. Activities of greatest concern in Table 3.8 are the allowance of new and expanded agricultural activities (Row f), establishment and expansion of orchards and gardens (Row h), and the construction of new ponds (Row i) and components of stormwater management facilities (Row p) and on-site sewage disposal systems (Row u). All of these activities pose a risk to wetland and buffer functions through the physical alteration of habitat, alteration of wetland hydrology and the increased discharge of pollutants. The County will need to substantiate how these activities are consistent with the GMA mandate to protect critical areas. Allowing installation of a septic drainfield in a wetland draining directly to marine water with commercial or recreational shellfish beds poses a serious health risk as well as ecological degradation.

To protect wetland functions, we respectfully recommend that these activities be removed from the list in Table 3.8.

Recommended Changes to the Proposed FWHCA CAO Amendments (11-13-12 Draft)

1) Several marine mammals and fish are listed in the ordinance as endangered, threatened and sensitive species found in the waters of San Juan County. The ordinance states that these species establish Fish and Wildlife Habitat Conservation Areas (FWHCAs). Step two in Figure 3.2, *Procedure for Determining Buffers and Tree Protection Zones for Aquatic FWHCAs,* does not include areas with which priority species have a primary association. Steps two and seven direct the reader to section 18.30.160.F for other types of FWHCAs. However, this subsection does not

address marine mammals and fish. Please explain how the ordinance ensures protection of these listed marine mammals and fish.

2) In Table 3.10 several activities indicated to be allowed in the aquatic environment are questionable. Items "d" and "e" allow agriculture activities over water. Item "g" also allows construction of agricultural structures over water. Item "t" allows on-site sewage disposal systems. While there may be rare occasion where such structures and uses could be allowed over water, the broad allowance suggested by the table should be better qualified or the allowance removed.

3) Table 3.10 item "q" allows fences in FWHCA buffers. The following additional language is suggested consistent with other references to the shoreline master program in the table:

> "Fences provided they do not impede the flow of water or prevent wildlife access to the shoreline. For residential areas within shoreline jurisdiction, the development must be consistent with SJCC 18.50.330E.1.

4) The following change to 18.30.160E.7.a.iii is suggested:

> iii. ~~In accordance~~ Consistent with WAC 173-26-221(2)(c)(iii)(C), if inventories of critical saltwater habitats have not been completed, overwater and near shore developments in marine waters may not be approved without an inventory of the site and adjacent shoreline parcels to assess the presence of these habitats and their functions.

5) The following change to 18.30.160E.7.b is suggested since it promotes the intent to minimize the number of shoreline structures and provides a greater area to avoid critical habitat:

> i. Private, noncommercial docks and associated piers and floats for individual residential use, or for community use by the owners of no more than four adjacent or nearby residences, two of which must be on the shoreline, will be permitted over critical salt and freshwater habitats if the application complies with the applicable federal and state regulations and shows that:

6) Subsections 18.30.160E.7.c.i.(A) & (D) talk about shoreline stabilization on bedrock. The County should clarify under what scenarios this would occur.

APPENDIX

A

APPENDIX

E

PROTECTION OF MARINE RIPARIAN FUNCTIONS IN PUGET SOUND, WASHINGTON

Prepared for:
Washington Department of Fish and Wildlife
(WDFW Agreement 08-1185)

Prepared by:
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Rachel Gregg, Washington Sea Grant
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June 15, 2009

Section I. Introduction

Purpose of this document

This document was developed to provide shoreline planners and managers with a summary of current science and management recommendations to inform protection of ecological functions of marine riparian areas (defined in Section III). Washington Administrative Code (WAC 173-26-186(8)) directs that Shoreline Master Programs (SMPs) "include policies and regulations designed to achieve no net loss of those ecological functions." The Washington State Department of Ecology has produced guidelines to help achieve this standard on marine shorelines of Washington (http://www.ecy.wa.gov/programs/sea/sma/guidelines/index.html). In addition, the state's Aquatic Habitat Guidelines (AHG) program developed recommendations for protecting marine riparian functions: Protecting Nearshore Habitat and Function in Puget Sound: An interim Guide (2007) (http://wdfw.wa.gov/hab/nearshore_guidelines/). The AHG program is a partnership of state agencies dedicated to providing science guidance for protection of marine, freshwater, and riparian ecosystems. The AHG program develops guidance documents that can aid local governments updating Shoreline Master Programs (SMP) and Critical Areas Ordinances (CAO).

This information contained in this report will help inform local decisions regarding what is needed to protect ecological functions of marine riparian areas. Specifically, we summarize the range of marine riparian buffer widths (Appendix G) needed to meet particular levels of ecosystem function based on a literature review and input from an expert panel workshop.

Protection of marine riparian areas

Puget Sound's marine shorelines and riparian areas have been altered over the last 160 years by human activities including agriculture, forestry and development. Nearly all of the merchantable timber along the marine shorelines of Puget Sound was harvested or burned by 1884 (Chasan, 1981). Although natural regeneration of riparian vegetation occurred in the years that followed, human manipulation of vegetation continues to influence marine shorelines today.

During the past three decades, an extensive body of research has emerged documenting the importance of riparian areas in providing ecological functions. These functions include:

- Water quality maintenance
- Fine sediment control
- Large woody debris (LWD) delivery and retention
- Microclimate moderation
- Nutrient delivery and retention

- Fish and wildlife habitat creation and maintenance
- Hydrology/slope stability

Most riparian research has focused on stream and riverine ecosystems. Attention to marine riparian processes and functions has only emerged in the literature during the past decade, and research in this area is increasing. Nevertheless, riparian areas provide ecological functions regardless of whether they are adjacent to freshwater or marine water bodies (Desbonnet et al. 1994, 1995; NRC 1996; NRC 2002; Brennan and Culverwell 2004).

Organization of document

In addition to the Introduction above, this document contains the following sections:

- Methodology used to compile information.
- Overview of marine riparian areas.
- Description of the seven most ecologically important riparian functions and recommendations for protecting (sustaining?) these functions.
- Impacts to riparian functions from activities associated with development, agriculture and forest practices.
- Recommendations to protect and sustain marine riparian functions.

Section III. Overview: Riparian Areas and Riparian Buffers

Riparian areas

As defined by the National Research Council (NRC 2002):

> Riparian areas are transitional between terrestrial and aquatic ecosystems and are distinguished by gradients in biophysical conditions, ecological processes and biota. They are areas through which surface and subsurface hydrology connect water bodies with their adjacent uplands. They include those portions of terrestrial ecosystems that influence exchanges of energy and matter with aquatic ecosystems (i.e., zone of influence). Riparian areas are adjacent to perennial, intermittent, and ephemeral streams, lakes, and estuarine–marine shorelines.

Riparian buffers

Riparian buffers are generally recognized as a "separation zone" between a water body and a land use activity (e.g., timber harvest, commercial or residential development) for the purposes of protecting ecological processes, structures, functions) and/or mitigating the threat of a coastal hazard on human infrastructures (National Wildlife Federation 2007). As used here, buffers are defined as separation zones (as above) that are relatively undisturbed by humans and thus represent mature vegetation consistent with the potential of the site.

Why are marine riparian areas important?

Based in large measure on our understanding of fresh water riparian ecosystems marine riparian areas likely play a central role in maintaining the health and integrity of aquatic and terrestrial ecosystems (Desbonnet et al 1994; NRC 2002; Brennan and Culverwell 2004). Many of the functions of freshwater riparian areas are similar to marine riparian areas, although marine riparian areas also provide functions that are unique to nearshore ecosystems due to differences in biogeochemical processes, ocean influences and differences in the biota between fresh and marine environments. Marine riparian areas provide a broad suite of functions, seven of which are the focus of this document. These include water quality (filtration and processing of contaminants); fine sediment control; inputs of large woody debris (LWD); shade/microclimate; litter fall/organic matter input; hydrology and slope stability; and fish and wildlife habitat (see Section IV). There are a number of other functions provided by marine riparian areas which were not reviewed nor discussed here e.g., recreation, cultural and aesthetic resources, carbon sequestration, and providing protection from threats of coastal hazards.

Section IV. Riparian Functions

1. Water quality

a. Technical overview: riparian influence on water quality function

Of the seven riparian functions addressed in this document, water quality is perhaps best understood. Riparian areas provide water quality benefits through a variety of mechanisms including:

- Infiltration and corresponding reduction of surface runoff rates/volumes;
- Intercepting nutrients, fine sediments and associated pollutants from surface water runoff;
- Binding dissolved pollutants with clay and humus particles in the soil;
- Conversion of excessive nutrients, pollution, and bacteria from surface and shallow groundwater into less harmful forms by riparian vegetation; and
- Regulating water temperature.

The water quality function of riparian areas is facilitated by vegetation and soils, which slow the flow of surface and subsurface water and increases retention or "treatment" time. Vegetation, geology, landform, and soil characteristics can affect the manner and rate at which water flows over and through the riparian area and the extent to which groundwater remains in contact with plant roots and soil particles (Klapproth and Johnson 2000). Microorganisms found in riparian soils and sediments, including bacteria, fungi, and other biota, are capable of metabolizing pesticides and transforming nutrients and other chemicals into less toxic forms (Ettema et al. 1999; Klapproth and Johnson 2000). They can also perform chemical reduction reactions such as denitrification (Adamus et al. 1991; Schoonover and Williard 2003; Rich and Myrold 2004). In addition to reducing the pollutant load to receiving waters, microorganisms cycle nutrients including carbon, nitrogen, and phosphorus. Soils high in very fine materials (e.g., clay) tend to be less permeable and may facilitate greater runoff, while sand-dominated soils can facilitate rapid draining and therefore limited sediment retention (Hawes and Smith 2005). Fine mineral soils or soils with high levels of aluminum or iron may be more likely to perform the nutrient removal/transformation function than other soil types (Adamus et al. 1991).

Trees, shrubs and herbaceous plants can trap and retain pollutants from the atmosphere, sediments, surface runoff and groundwater (Correll 1997). Plants also help lengthen the residence time of water by decreasing flow and velocity, which can increase filtration and soil retention potential (Evans et al. 1996; Klapproth and Johnson 2000; Ducros and Joyce 2003). Vegetation can help mediate nutrient and pollutant input into receiving waters by stabilizing banks to reduce erosion, storing runoff, trapping sediment, and transforming nutrients (Omernik et al. 1981; Smith 1992; Osborne and Kovacic 1993; Arthington et al. 1997).

b. Key findings from buffer literature and science panel on water quality

Numerous studies have investigated the role of riparian buffers composed of vegetation such as grass and forest in controlling the transport of sediment, nutrients, pesticides, metals, microorganisms, and other contaminants to receiving waters (NRC 2002). Most research focuses on nonpoint source pollution, particularly nutrients (phosphates/phosphorus, nitrates/nitrogen), TSS, and sediments. To a lesser degree, research has also addressed bacteria and other pathogens along with oils, pesticides, and herbicides. Appendix C, Table 1 provides a summary of water quality buffer recommendations reviewed for this document.

Our review suggests that:

- The range of buffer widths that met a minimum 80% effectiveness for this function was 5 – 600 m (16-1920 ft; Appendix G). This wide range relates to the breadth of water quality issues. See Appendix C to get more specific widths related to specific water quality parameters.
- Minimum buffer widths to achieve 80% effectiveness for different elements of water quality functions can be extrapolated from the literature and are listed in Appendix G.
- Site characteristics and the amount and nature of the contaminant in the water influence the buffer's capacity to ameliorate those contaminants.

A riparian function curve for water quality was developed for review by the science panel to determine its application to the marine environment. Summary data from Desbonnet et al. (1995) (Table 1) were used to generate a series of curves for four commonly studied contaminants including sediment, TSS, nitrogen and phosphorus (Figure 1). These curves, which are similar to those developed by FEMAT (1993), demonstrate function (in terms of % removal of contaminant) based on a number of studies at different locations and under different site conditions. Note that curves are contaminant-specific despite similarity of shape.

Panelists generally agreed that the function curves are conceptually valid for water quality issues originating in marine riparian areas. However the panel distinguished marine riparian from freshwater riparian function on the basis of drainage area and relative contribution to Puget Sound water contamination. Relative to the dynamics affecting water quality in Puget Sound at the watershed and landscape scales, undisturbed marine riparian area's contribution to maintaining water quality is limited to the area that drains directly into Puget Sound. Anthropogenic activities in marine riparian areas include the generation and routing (via water) of pathogens, nutrients, toxics, heat, and fine sediment (above normal background levels) that can affect water quality. However, the marine riparian area is limited in spatial extent; that is, it constitutes a small fraction of the Puget Sound drainage basin. Most contaminants reach Puget Sound via streams or drainage networks discharging into the Puget Sound Basin, or pathways

that concentrate rainfall and snowmelt from impervious surfaces associated with human residential and commercial development and transportation infrastructure. Washington State Department of Ecology, United States Environmental Protection Agency, Puget Sound Partnership Publication Number 07-10-079 (http://www.ecy.wa.gov/pubs/0710079.pdf); and waste water entering Puget Sound from municipal and industrial facilities. The panel did not address nutrient or pathogens from agricultural sources or residential septic systems.

Table 1. Summary data adapted from Desbonnet et al. (1994, 1995) used to generate generalized curve for removal effectiveness of various pollutants at different buffer widths. This data is identical to Desbonnet et al (1995) with the exception of the zero point which we added for illustrative purposes.

% Removal	Buffer Width in Meters (ft)			
	Sediment	TSS	Nitrogen	Phosphorus
0	0	0	0	0
50	0.5 (1.6)	2 (6.6)	3.5 (11)	5 (16)
60	2 (6.6)	6 (20)	9 (30)	12 (39)
70	7 (23)	20 (66)	23 (75)	35 (115)
80	25 (82)	60 (197)	60 (197)	85 (279)
90	90 (296)	200 (656)	150 (492)	250 (820)
99	300 (984)	700 (2297)	350 (1148)	550 (1804

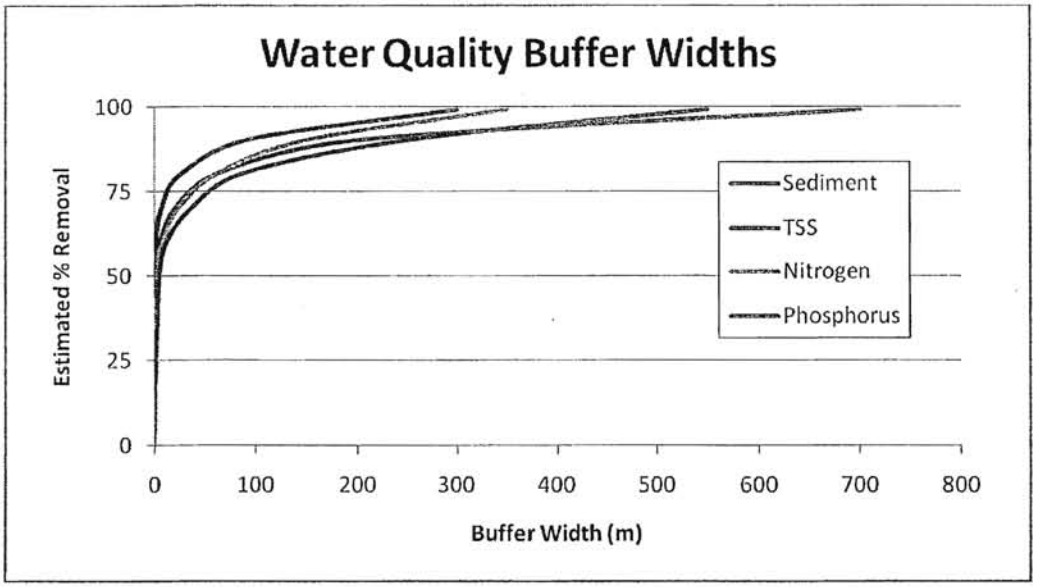

Figure 1. Contaminant removal effectiveness of four water quality parameters at various buffer widths (adapted from Desbonnet et al. 1995).

c. Conclusions and Recommendations for water quality

The literature review (see Appendix C) shows removal effectiveness as a function of buffer widths. In general, the larger the buffer, the greater its effectiveness in performing a water quality function. Long-term studies suggest that contaminant loading can increase over time (depending on the site conditions and type of contaminant), thereby reducing the overall effectiveness of the buffer.

This document focused on four major water quality contaminants that have received the most attention from researchers: nitrogen, phosphorous, total suspended solids and fine sediment. Soil characteristics, slope and vegetation cover type are the most important determinants of buffer effectiveness to protect water quality. To maximize the buffer's effectiveness to remove contaminants, the following actions are recommended in order of priority:

- Retain, restore, or enhance vegetation, particularly native vegetation.
- Manage drainage to ensure that water is moving evenly through the buffer to maximize retention time and infiltration, rather than flowing through pipes, culverts, rills, or other conveyance mechanisms. Avoid routing drainage to adjacent streams that may transect marine riparian areas.
- Avoid the use of pollutants (petroleum, toxics, pesticides, etc) in or near riparian areas.
- Avoid construction of impervious surfaces and septic tank drain fields in riparian areas.

- Manage agricultural and pasture lands to minimally disturb buffers.
- Limit or prohibit the application of pesticides and herbicides in or near riparian areas.
- Avoid disturbance (e.g., grading, compaction, removal) of native soils.

2. Fine Sediment Control

a. Technical overview: riparian influence on fine sediment control function

Riparian areas can play an important role in controlling fine sediment transport into local water bodies (fine sediments include fine-grained particles such as silt, clay, sand, and mud particles). As described previously, fine sediment plays an important role in ameliorating the effect of toxic chemicals and excessive nutrients in water quality. Fine sediment also is important in maintaining soil characteristics necessary for the growth and maintenance of riparian vegetation. However, maintaining natural erosion and sediment transport processes is critical to maintaining Puget Sound beaches and much of the sediment nourishing these beaches originates in marine riparian areas. The delivery of sediment to marine beaches is facilitated by natural driving forces (wind and wave action, bluff saturation, leading to slope failures) and it is very important to maintain these natural sediment inputs. Thus, there is a need to distinguish between "normative" sedimentation rates in marine riparian areas as opposed to human-induced changes to sediment inputs.

Fine sediments originate from a number of terrestrial sources, both natural and anthropogenic, however, the focus of this section is fine sediments originating from development, forestry, and agriculture, which can increase fine sediment delivery beyond normative rates. As used here, normative rate refers to the rate of sediment delivery in riparian areas undisturbed by human activity. Fine sediments become exposed and subject to erosion as a result of vegetation removal, excavation and compaction of soils. Once sediments are suspended in surface water, they can be delivered through run-off to adjacent waterways unless they settle out or become trapped. Undisturbed soils and vegetation in riparian areas act in concert to reduce erosion and slow the transport of fine sediment by the following mechanisms (adapted from Greenway 1987; Gray and Leiser 1992; and Gray and Sotir 1996):

- Riparian vegetation intercepts rainfall energy, helping prevent soil compaction;
- Roots and soils help bind and restrain soil particles and increase sheer strength of the soil;
- Vegetation slows surface runoff allowing for increased localized sediment deposition and decreasing off-site transport;
- Porous and permeable soils improve water absorption reducing surface flow; and
- Transpiring vegetation helps moderate soil moisture levels, which increases infiltration and decreases saturation that leads to increased surface water run-off.

Riparian vegetation can play an even more significant role in sediment and erosion control in steep areas through mechanical reinforcement of sediment via roots and stems and by modifying hydrology through soil moisture extraction (Gray and Sotir 1996). Mature plant communities can be more effective in maintaining slope stability than immature communities. Benefits of vegetation increase in areas with several layers of vegetative cover such as herbaceous growth, shrubs, and trees (Menashe 2001).

b. Key findings from buffer literature and science panel

Most studies include fine sediment control as a component of the water quality function because many contaminants adhere to sediments and increasing inputs of sediments to water bodies can be considered a water quality problem. Appendix C, Table 1 provides a summary of fine sediment control buffer recommendations reviewed for this document.

Our review suggests that:

- The range of buffer widths that met a minimum 80% effectiveness for this function was 25-91 meters (Appendix G).
- Wider buffers are needed in areas with steep slopes.
- Site specific conditions should be considered when determining buffer width (e.g. soils, vegetation type and density, upland/adjacent land uses, and loading).

Two riparian function curves (one for sediment and one for TSS) were developed for review by the science panel (Figure 2) using summary data from Desbonnet et al. (1995) (Table 2). Note that these curves were included in the water quality section. The data were selected because Desbonnet et al's (1995) work was one of the few sources of summary data for fine sediment control at various buffer widths, and represents a number of studies at different locations and site conditions. The data show that roughly 90 percent of sediment can be effectively removed by 30-60 meters (100-200 foot) buffers and roughly 90 percent of TSS can be effectively removed by 200 meter (650 foot) buffers.

There was general consensus by panelists that function curves for sediment control are conceptually valid. Panelists ranked the importance of this function relative to other marine riparian functions as low, largely because of the differences in effects of increased sediment inputs between freshwater and marine systems. Panelists noted that maintaining natural erosion and sediment transport processes is critical to maintaining Puget Sound beaches and much of the sediment nourishing these beaches originates in marine riparian areas. Further, they noted that delivery of this sediment is facilitated by natural driving forces (wind and wave action, bluff saturation, leading to slope failures) and it is very important to maintain these natural sediment inputs. Perhaps the biggest current threat to marine riparian systems from human activity is the reduction of sediment inputs by armoring shorelines and disrupting natural erosion of bluffs.

This is in contrast to freshwater systems, where riparian areas and roads are managed to minimize human-induced fine sediment inputs which can impact habitat and water quality of freshwater streams. Thus, the panel recognized the need to distinguish between "normative" sedimentation rates in marine riparian areas as opposed to human-induced changes to sediment inputs. Further, the panel recognized marine riparian areas should provide for "normative" sediment processes while reducing potentially harmful levels of fine sediments from anthropogenic activities.

Table 2. Summary data adapted from Desbonnet et al. (1994, 1995) used to generate generalized curve for removal effectiveness of various pollutants at different buffer widths. This data is identical to Desbonnet et al (1995) with the exception of the zero point which we added for illustrative purposes. Note that this table is identical to Table 1.

% Removal	Buffer Width in Meters (ft)			
	Sediment	TSS	Nitrogen	Phosphorus
0	0	0	0	0
50	0.5 (1.6)	2 (6.6)	3.5 (11)	5 (16)
60	2 (6.6)	6 (20)	9 (30)	12 (39)
70	7 (23)	20 (66)	23 (75)	35 (115)
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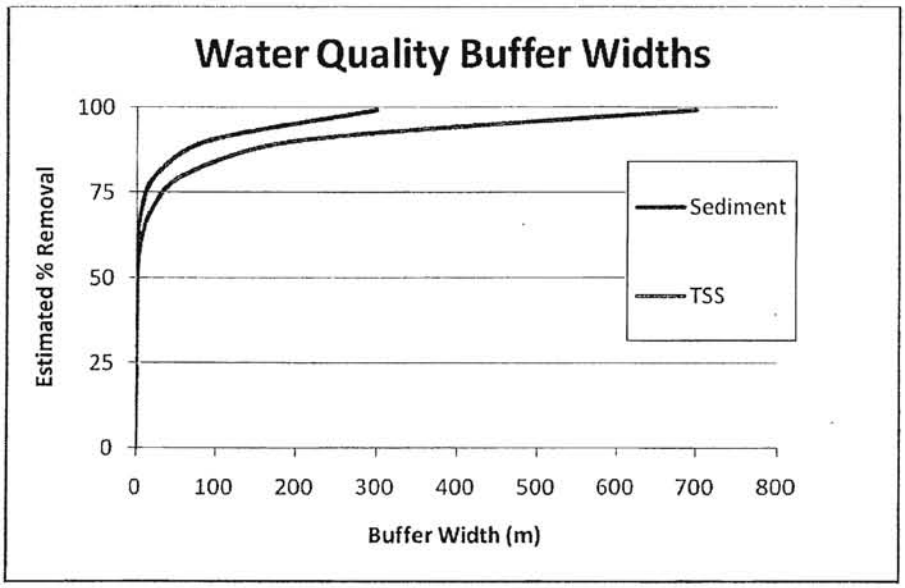


Figure 2. Sediment and total suspended sediment (TSS) removal effectiveness of two water quality parameters at various buffer widths (adapted from Desbonnet et al. 1995).

c. Conclusions and Recommendations for sediment

The literature reviewed for this document (see Appendix C) indicates a range of buffer width recommendations. In addition to buffer width, sediment transport through riparian areas is highly dependent on slope, land use, rainfall, and vegetation and soil type (Hawes and Smith 2005).

Based on the FEMAT-style figure presented in this section, to achieve 100% effectiveness of the buffer to control total suspended solids (TSS) requires a nearly 700 meter (2300 ft) buffer width, but will vary depending upon site specific conditions and fine sediment loading.

To maximize the buffer's effectiveness to control sediment transport, the following actions are recommended:

- Maintain native vegetation cover.
- Minimize soil disturbance including compaction, plowing, grading and soil removal activities.
- Manage drainage and hydrologic conditions as described for other water quality functions.

3. Shade/Microclimate

a. Technical overview: riparian vegetation influence on shade function

Riparian areas can have microclimates that differ from upland areas and which influence physical and biological conditions at a local scale. Marine riparian areas are strongly influenced by marine water temperatures during both summer and winter months (warmer in the winter and cooler in the summer than upland areas). Living riparian (overstory trees, understory shrubs, and ground) vegetation, in turn, can intercept solar inputs and affect microclimate conditions such as soil and ambient air temperature, soil moisture, wind speeds, and humidity (FEMAT 1993; Knutson and Naef 1997; May 2003; Parkyn 2004). Terrestrial and aquatic microclimates are influenced by shade, and temperature fluctuations that can negatively impact both aquatic and terrestrial organisms, particularly those that can only survive within a relatively narrow range of temperature and moisture conditions.

Solar radiation has long been considered an important limiting factor for organisms in the upper intertidal zone of marine environments. Solar radiation affects distribution, abundance, and species composition (e.g., Ricketts and Calvin 1968; Connell 1972). Although research is limited, studies have quantified the influence of shade on marine organisms such as surf smelt (eggs) and talitrids (amphipods) on Puget Sound beaches. In their literature review of causes of spatial and temporal patterns in intertidal communities, Foster et al. (1986) found that desiccation is the most commonly reported factor responsible for setting the upper elevational limits of survival for intertidal animals. More recent studies (Pentilla 2001; Rice 2006) showed that a lack of shade on surf smelt spawning beaches results in higher temperatures, drier conditions, and increased egg mortality.

b. Key findings from buffer literature and science panel

Recommended buffer widths for the shade function in forested riparian areas include a range of values. Appendix C, Table 3 provides a summary of shade buffer recommendations that were derived from seven review documents and other literature.

Our review suggests that the range of buffer widths that met a minimum 80% effectiveness for this function was 17-38 meters (56 – 125 ft; Appendix G).

The FEMAT curve was selected to represent the shade function because it was the only data that depicted shade effectiveness as a continuous function of forested riparian buffer width. The values in Table 3 generally agree with values provided by other riparian review and synthesis reports. One method for comparing different recommendations among authors is to describe the buffer width at a given effectiveness level, such as 80 %. For example, the FEMAT curve suggests approximately 80 percent effectiveness at about 37 meters. Other recommendations for achieving 80 percent effectiveness include Wenger (1999) (10-30 meters); Castelle et al. (1992): (30 meter minimum); May (2000): (30 meter minimum); and Knutson and Naef (1997) (11-46 meters to achieve 50-80 percent (Table 3).

Science panelists agreed that shade is an important function for a number of organisms in the upper intertidal areas during low tide (when exposed upper intertidal areas are subject to heating; see above). On the other hand shade in marine environments is potentially less important in moderating water temperature than shade in freshwater systems. Puget Sound water temperatures as a whole are unlikely to be affected much by shade cast by riparian vegetation, given the mass of water and the exchange rates with water from the Pacific Ocean, primarily through tidal actions. Further, shade from riparian areas is likely to cover only a small fraction of the upper intertidal area given the shallow gradients on many beaches and mudflats. Panelists noted that while increases in solar radiation due to loss of riparian shade could warm shallow intertidal waters, particularly pocket estuaries, the amount of warming and effects on biota have not been quantified.

Table 3. Data used to create generalized curve in Figure 3 indicating percent of riparian shade function occurring within varying distances from the edge of a forest stand (adapted from FEMAT 1993).

Effectiveness (%)	Buffer Width (SPTH)	Buffer Width SPTH m (ft)
0	0.00	0 (0)
10	0.07	4 (14)
20	0.15	9 (30)
30	0.22	13 (44)
40	0.29	18 (58)
50	0.36	22 (72)
60	0.42	26 (84)
70	0.50	31 (100)
80	0.60	37 (122)
90	0.73	45 (146)
93	0.80	49 (160)
95	1.00	61 (200)

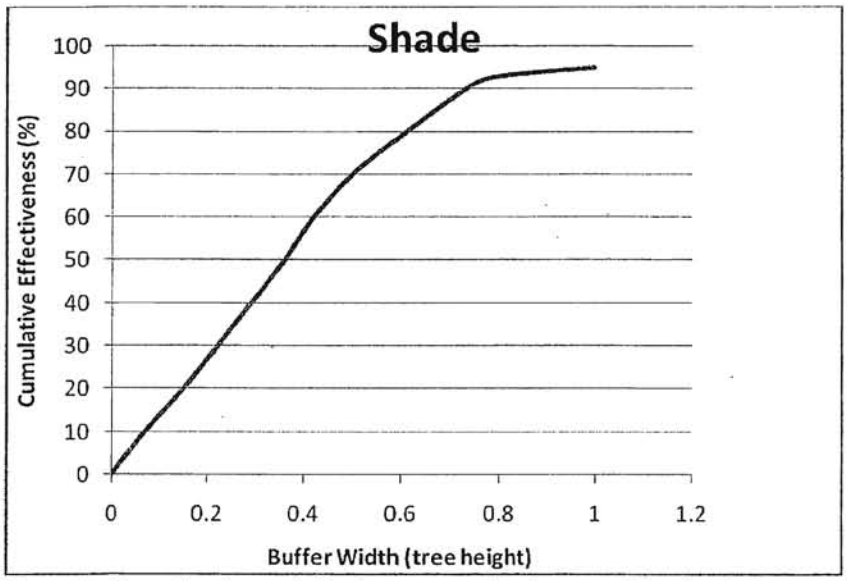


Figure 3. Generalized curve indicating percent effectiveness of riparian shade occurring within varying distances from the edge of a forest stand. Tree height (SPTH) is used to indicate buffer width where one SPTH = 61 meters (200 ft) (adapted from FEMAT 1993).

c. Conclusions and Recommendations

The literature review (see Appendix C) indicates a range of buffer width recommendations for protecting the shade function. Based on the FEMAT curve reported in this section of the report, approximately 1 SPTH (estimated at 61 meters or 200 ft) will provide nearly 100 percent

effectiveness of the buffer to protect the intertidal from desiccation, elevated temperatures, and other shade-related functions. Of course, in nonforested community types (e.g., prairie and grasslands) the shade function from overstory trees may be unattainable.

To maximize the buffer's effectiveness to provide the shade function, the following actions are recommended:

- Avoid disturbance to native vegetation in riparian areas, especially nearer the water's edge.
- Retain, restore, and enhance mature trees and a multi-layered canopy and understory of native vegetation at sites that support these types of plant communities.
- Ensure that riparian areas can be maintained in mature, native vegetation through time.
- Prevent modifications to banks and bluffs (e.g., armoring) that could disrupt natural processes (such as soil creep, development of backshore and overhanging vegetation, recruitment of wood and other organic matter to riparian area including beaches and banks.)
- Prohibit cutting and topping of trees and avoid "limbing" (selective branch cutting to enhance views) of trees for view corridors and other purposes within buffers.

4. Large Woody Debris

a. Technical overview: riparian influence on large woody debris function

Forested riparian areas are a significant source of large woody debris (LWD) in freshwater systems (Harmon et al. 1986; Sedell et al. 1988; Bilby and Bisson 1998; Hyatt and Naiman 2001). In marine environments, LWD (also known as 'driftwood') originates from both freshwater and marine riparian sources. Marine riparian areas contribute LWD to shorelines through natural recruitment processes, including windstorms, fires, wave action, and landslides (NRC 1996). Most of Puget Sound's bluffs are naturally unstable and landslides are a common occurrence throughout the region (Johannessen and MacLennan 2007).

Large woody debris provides numerous benefits to shorelines and riparian areas including:

- Moderation of local water temperature and soil moisture;
- Accumulation of detritus serving as a food source and habitat for invertebrates;
- Support of terrestrial vegetation (such as nurse logs);
- Structural complexity that provides habitat for fish and wildlife;
- Sediment trapping and bank erosion control.

Recent research in the Puget Sound region has shown that marine LWD serves similar functions including provision of structural complexity; moderation of local water and soil temperatures; and habitat creation. An overview of the marine research by topic area follows.

LWD and Substrate Temperature: Several studies conducted in Puget Sound have shown that LWD has a significant effect on substrate temperatures (Higgens et al. 2005; Rice 2006; Tonnes

2008). For example, in a study conducted in north Puget Sound, Tonnes (2008) found that mean sediment surface temperatures under LWD on accretionary beaches were 7.7° C cooler than beach sediments lacking LWD. Mean surface temperatures under driftwood on bluff-backed beaches were 2.4° C cooler than nearby sediment. LWD influences sediment temperatures below the surface. Mean temperatures were cooler at depths of 5 centimeters and 15 centimeters under LWD on both accretionary and bluff-backed beaches (Tonnes 2008).

Detritus: Driftwood accumulates detritus from both marine and upland sources, which is consumed by invertebrates, birds and other organisms (Polis and Hurd 1996; Pank 1997; Dugan et al. 2003; Rodil et al 2008).

Invertebrate biomass: Detritus entrained in driftwood has been linked with increased invertebrate biomass which, in turn, supports higher level prey for species such as shorebirds. Amphipods (Talitridae) are the most abundant macroinvertebrate on Puget Sound beaches. In a study of north Puget Sound beaches, Tonnes (2008) found that amphipods represent the predominant biomass of invertebrates within the supratidal zone (e.g. within driftwood). Amphipods are strongly associated with driftwood, where they find refuge from predators, favorable temperature and moisture conditions, and organic matter for consumption. Higher densities of amphipods have been found associated with wood than bare sediment.

Structural support: Marine LWD also provides structural support for vegetation similar to nurse logs in upland settings. In a survey of >1 meter (3.28 ft) diameter wood along 3.9 kilometers (2.3 miles) of Puget Sound beaches, Tonnes (2008) found that 71 percent supported at least one species of terrestrial vegetation. In addition, large wood supported a mean of 2.4 species of vegetation with up to 11 species on a single log. Backshore areas can be relatively dry, exposed and nutrient deficient, and driftwood may play an important role in providing structural stability, moisture and nutrients for establishment of other plant species.

Habitat: Increased vegetation provided by driftwood also increases primary productivity and increases structural complexity for fish and wildlife. May et al. (1997) found wood to be one of the most important factor in determining habitat for salmonids in fresh water systems. Driftwood embedded in beach berms and/or at the toe of banks helps dissipate wave energy and retain sediments that, collectively, act to buffer the effects of storm waves and longshore currents by moderating or reducing bank erosion. It also provides potential roosting, nesting, refuge and foraging opportunities for wildlife; foraging, refuge and spawning substrate for fish; and foraging refuge, spawning attachment substrate for aquatic invertebrates and algae.

b. Key findings from buffer literature and science panel

Numerous studies have investigated the role of riparian areas in providing LWD to adjacent water bodies. Appendix C, Table 4 provides a summary of LWD buffer recommendations that

were derived from seven review documents and other research. Most studies find that LWD originates from within one site potential tree height of the riparian area, although steeper slopes may provide LWD from greater distances. Establishing appropriate buffers to maintain the LWD function must therefore account for processes affecting the potential for the land-water interface to change through time such as sea level rise.

A number of studies and reviews of riparian buffers note that, in addition to considering the benefits of LWD in adjacent water bodies, it is important to consider LWD benefits within the terrestrial environment, specifically for its contribution of ecological functions e.g., nurse logs, habitat, nutrient recycling, and helping maintain soil moisture. Appendix C, Table 1 provides a summary of fine sediment control buffer recommendations reviewed for this document.

Our review suggests that:

- The range of buffer widths that met a minimum 80% effectiveness for this function was 17-38 meters (Appendix G).
- Buffer width effectiveness is strongly influenced by site conditions (such as slope) and potential height of mature trees.

The curve adapted from FEMAT (1993) (Appendix D) generally agree with values provided by other riparian review and synthesis reports. The FEMAT curve reveals approximately 80% effectiveness at about 40 meters; the science panel generally agreed that the curve is conceptually valid.

Table 4. Approximated data used to create generalized curve (Figure 4) indicating percent of LWD recruitment function occurring within varying distances from the edge of a forest stand (adapted from FEMAT 1993).

Effectiveness (%)	Buffer Width (SPTH)	Buffer Width m (ft)
0	0.00	0 (0)
10	0.07	4 (14)
20	0.15	9 (30)
30	0.22	13 (44)
40	0.29	18 (58)
50	0.36	22 (72)
60	0.42	26 (84)
70	0.50	31 (100)
80	0.61	37 (122)
90	0.73	45 (146)
93	0.80	49 (160)
95	1.00	61 (200)

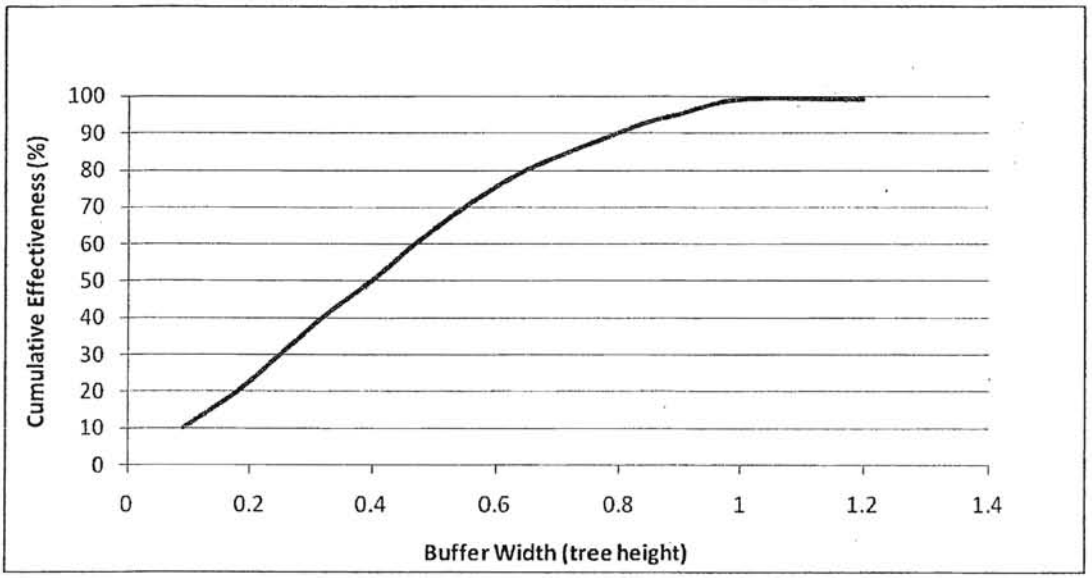


Figure 4. Generalized curve indicating percent effectiveness of LWD recruitment from riparian areas occurring within varying distances from the edge of a forest stand. Tree height (SPTH) is used to indicate buffer width. One SPTH = 61 meters (200 ft) (adapted from FEMAT 1993).

c. Conclusion and Recommendations

The literature reviewed for this document (see Appendix C) indicates a range of buffer width recommendations for protecting the LWD function. Buffer width effectiveness is strongly influenced by site conditions (such as slope, vegetation type and age structure, and natural disturbance regimes).

There are a range of buffer widths for achieving high levels of effectiveness based on the literature in Appendix C ranging from 10 to 130 m (33 – 427 ft). The FEMAT (1993) riparian function curve indicates 100 percent effectiveness of the LWD function at approximately 60 meters (200 ft).

To maximize the buffer's effectiveness to provide the LWD function, the following actions are recommended:

- Avoid human disturbance in riparian areas.
- Allow for the accrual of drift wood and other upland sources of LWD on beaches and shorelines.
- Protect, restore, and enhance marine riparian trees to help ensure a long-term source of LWD.
- Provide buffers that allow for long-term source and recruitment of trees (LWD) as shorelines retreat, or as a result of soil creep and landslides, and increasing sea levels.

5. Litter Fall/Organic Matter

a. Technical overview, riparian influence on litter fall/input of organic matter

Riparian vegetation provides litter that serves as habitat and food for fishes and aquatic invertebrates (Adamus et al. 1991; Levings and Jamieson 2001; Vigil 2003; Lavelle et al. 2005) and influences the amount and type of terrestrial invertebrates that fall into aquatic systems. Terrestrial invertebrates serve as a major food source for fishes (including salmon) birds, mammals, reptiles, and amphibians. Terrestrial insects have recently been shown to be a large component of the diet of juvenile salmonids residing in nearshore waters of Puget Sound. In addition, some fish and invertebrates feed directly on vegetative detritus (McClain et al. 1998; King County DNR 2001; NRC 2002; Vigil 2003; Brennan et al 2004; Lavelle et al. 2005; Fresh 2007; Duffy et al *in review*). Nutrient exchange occurs in two directions from the terrestrial to aquatic systems and vice versa. Examples of nutrient-energy exchange (marine to terrestrial and terrestrial to marine) include:

1. Atmospheric input via wet or dry deposition, which can occur through fires, intensive farming and agricultural activities, and wind erosion (Lavelle et al. 2005).
2. Lateral transfers of nutrients through tidal and wave action, including microalgae and macroalgae washed ashore (Adamus et al. 1991).

3. Decomposing secondary consumers, such as juvenile Pacific herring, Pacific sand lance, longfin smelt, surf smelt, sole, salmon, seabirds, and marine mammals, which also contribute nutrients. For example, Pacific salmon nutrients are deposited by predators and scavengers in excreta, or as carcasses and skeletons (Cederholm et al. 1999; Naiman et al. 2002; Drake et al. 2006).
4. Secondary consumers can transport nutrients to upland areas, facilitating nutrient and energy exchange between terrestrial and aquatic food webs (Ballinger and Lake 2006). For example, Elliott et al. (2003) examined the relationship between bald eagles and Plainfish Midshipman, a demersal fish and intertidal spawner. Between May and June of 2001, the authors found that eagles consumed about 22,700 ± 3,400 midshipman, representing large transfers of nitrogen into upland areas, and the potential to enhance community productivity along the shoreline.

b. Key findings from buffer literature and science panel

A number of references identify the contributions of organic matter (e.g., forest litter, terrestrial insects, woody debris) and food web linkages between freshwater and marine riparian areas and adjacent water bodies (Appendix C, Table 5). Most studies conclude that the delivery of leaf and other organic matter declines at greater distances away from the water's edge, and that most contributions are made within 30-60 meters (100-200 ft) of the shoreline. Appendix C, Table 5 provides a summary of litter fall buffer recommendations that were derived from seven review documents and other research.

Our review suggests that:

- The range of buffer widths that met a minimum 80% effectiveness for this function was 17-38 meters (Appendix G).
- Most litter contributions are made within 30-60 meters (100-200 ft) of the shoreline.
- As in fresh water riparian systems, the delivery of leaf and other organic matter delivered to the marine intertidal areas declines with distance away from the water's edge.

A riparian function curve for litter fall was adapted from the original FEMAT curve (Appendix D). The FEMAT curve reveals approximately 80 percent effectiveness at about 25 meters. The science panel generally accepted that the litter fall curve is a valid representation of marine riparian environments. Panelists also generally agreed that riparian areas are likely to produce insects that fall into the adjacent waters

Table 5. Approximated values for cumulative effectiveness of buffer width for litter fall/organic matter inputs used to create Figure 5, based on the original FEMAT curve.

Effectiveness (%)	Buffer Width (SPTH)	Buffer Width m (ft)
0	0	0
10	0.04	2.4 (8)
20	0.08	4.9 (16)
30	0.12	7.3 (24)
40	0.17	10.3 (34)
50	0.22	13.4 (44)
60	0.27	16.5 (54)
70	0.33	20.0 (66)
80	0.40	24.4 (80)
90	0.50	30.5 (100)
95	0.65	40.0 (130)
98	0.90	55.0 (180)

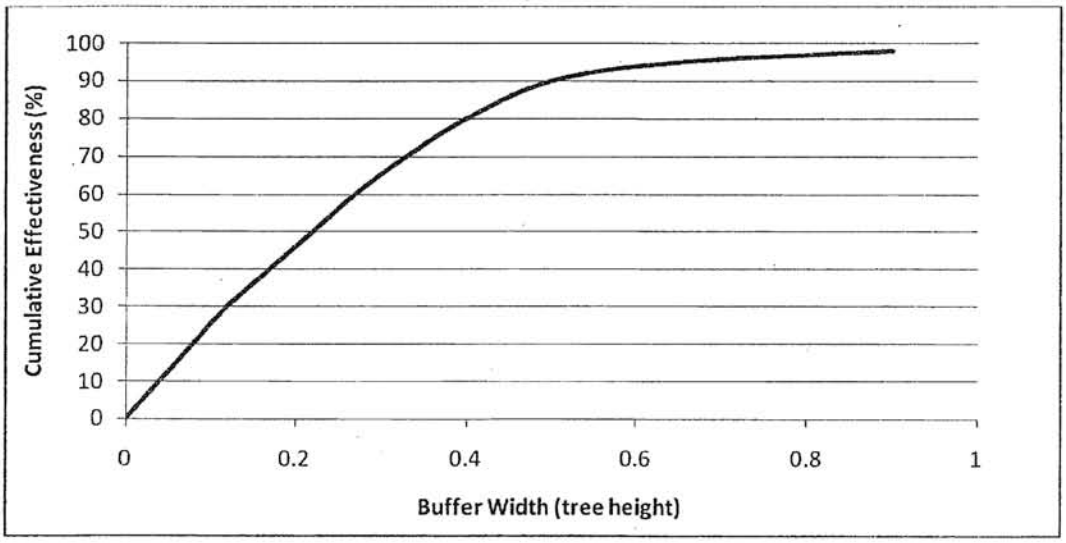


Figure 5. Effectiveness of riparian litter fall/organic matter input as a function of distances from the water's edge (adapted from FEMAT 1993) where one site potential tree height is approximately 60 meters or 200 ft.

c. Conclusion and Recommendations for litter fall/organic matter inputs

The literature reviewed for this document (see Appendix C) indicates a range of buffer widths to achieve this function. In addition, the function curve derived from FEMAT indicates that approximately 100 percent of the litter fall function is achieved at 60 meter (200 ft).

To maximize the riparian function for litter fall/organic matter inputs the following actions are recommended:

- Maintain native riparian vegetation in the riparian area.
- Avoid human disturbance to vegetation.
- Allow for natural succession of plant communities and maintain sources and accumulations of organic matter within riparian areas and on beaches.

6. Hydrology/Slope Stability

a. Technical overview: riparian influence on hydrology/slope stability function

The role of vegetation in protecting hydrologic processes and slope stability is well documented. The information generally falls into two areas: research focusing on the impacts of sediment inputs to streams and wetlands; and research focused on protecting human infrastructure from anthropogenic disturbances such as logging, agriculture and development.

Sidle et al. (1985) found that tree and shrub root strength contributes to slope stability, and loss of root strength following tree death or removal may lead to increased incidence of erosion and slides. Vegetation also helps lengthen the residence time of soil moisture by decreasing runoff volume and velocity. This in turn can increase filtration and soil retention potential (Evans et al. 1996; Klapproth and Johnson 2000; Ducros and Joyce 2003) and slope stability (Williams and Thom 2001).

Vegetation plays an important role in affecting hydrologic processes and slope stability in the following ways (adapted from Gray and Leiser 1982):

Interception: Foliage and plant litter absorb the energy of precipitation, reducing direct impacts on soil.

Restraint: Root systems bind soil particles and blocks of soils, and filter sediment out of runoff.

Retardation: Plants and litter increase surface roughness, and reduce runoff volume and velocity, thereby reducing channelization.

Infiltration: Roots and plant litter help maintain soil porosity and permeability.

Transpiration: Plants absorb moisture, delaying the onset of soil saturation and surface runoff.

Root Reinforcement: Roots mechanically reinforce soil by transferring shear stresses in the soil to tensile resistance in the roots.

Soil Moisture Depletion: Interception of raindrops by foliage and evapotranspiration limit buildup of soil moisture.

Buttressing and Arching: Tree trunks can act as buttress piles or arch abutments in a slope, counteracting shear stresses.

Surcharge: The weight of vegetation on a slope may exert a destabilizing down slope stress and a stress component perpendicular to the slope that increases resistance to sliding.

Root wedging: Roots invade cracks and fissures in soil or rock that could add restraint stability or cause local instability by wedging action.

Wind throw: Strong winds cause trees to blow down that can disturb slope soils

Soil saturation strongly influences erosion potential on a slope. The more water that can be intercepted, absorbed, or otherwise controlled by vegetation, the greater the slope stability. Soil composition and slope geometry (slope height and angle) are also major factors determining slope stability. Studies have shown that decreasing vegetation cover results in increased soil saturation and slope failure during rainfall events. Some slope failures are unrelated to vegetation cover, usually as a result of unusually high precipitation, undercutting, strong winds, or other factors. However, in studies of slope failures in urbanized areas such as Seattle, over 80 percent of slope failures were attributed to human influence such as vegetation removal and poor drainage management (Tubbs 1975; Laprade et al. 2000).

b. Key findings from buffer literature and science panel

None of the buffer research reviewed for this paper provided buffer recommendations for maintaining slope stability and natural hydrologic processes see Appendix C, Table 6). However, two documents include some analysis that could be helpful in determining buffer widths to protect hydrologic functions. Knutson and Naef (1997) include relevant discussion regarding erosion control. Additionally, FEMAT (1993) identified the relationship of tree root strength to slope stability and provides a generalized effectiveness curve for root strength.

Since a riparian function curve for hydrology and slope stability was not found in the literature, data from Griggs et al 1992 as cited in Macdonald and Witek (1994) were used to describe setbacks on bluffs or other unstable slopes to protect against property loss. The minimum setbacks for different bluff heights and various levels of stability are illustrated in Table 6 and Figure 6. These setbacks do not account for ecological functions but rather focus solely on protection against property loss. The FEMAT curve developed for this function is estimated based on extent of root systems adjacent to a slide scar margin, or "soil stabilizing zone of influence" (equal to slide scar width plus half a tree crown diameter). Such information is not easily interpreted into a buffer width or under the variable site conditions existing on marine

shorelines. It appears that neither FEMAT (1993) nor other literature makes buffer recommendations. Much of the shoreline in Puget Sound is composed of bluff-backed beaches, which are naturally eroding. Buffers should be based on site-specific slope conditions, with steeper slopes having wider buffers. This approach is similar to establishing stream buffers from the outside edge of the 100-year floodplain. However, the variability and multitude of factors that need to be considered in determining slope stability in the marine shoreline make it difficult to develop specific buffer width recommendations for this function. We offer information from Griggs et al 1992 as a way of conceptualizing the idea of maintaining riparian function on unstable slopes.

All science panel members agreed that the hydrology/slope stability curve developed with data from Griggs et al. 1992 as cited in Macdonald and Witek (1994) is applicable in the marine environment. Panelists discussed the importance of hydrology, geomorphology, soil type, and vegetation type in supporting slope stability functions in Puget Sound, in addition to the human safety concerns about slope stability in the region.

Geomorphology

- Landforms and geology can be more important here than buffer width. For example, in the San Juan Islands, there can be a 45° slope on basalt form that can be very stable.
- Geomorphic shore form is an important consideration – geologic legacy, landscape position, density, slope, etc. Use of Shipman (2008) geomorphic classification system may be useful (Appendix F).

Soil and Vegetation

- Riparian areas can increase slope stability (through root structure) and increase water interception and absorption. Protecting natural rates of sediment delivery and protecting processes and functions of nearshore ecosystems may be achieved by establishing and maintaining adequate riparian buffers.
- Upslope alterations can be contributing factors to slope instability.
- It is important to consider flow paths; for example, slope stability may be associated more with altered upland drainage patterns or precipitation patterns. Buffer width versus landform may be the most important factor. For example, steeper slopes, particularly those with underlying geologic instability, require wider buffers.

Table 6. Setback distances (in ft) from Griggs et al 1992 as cited in Macdonald and Witek (1994) for different bluff heights at various levels of stability where geologic stability for 50-years cannot be demonstrated.

Bluff Height (ft)	Stable $(1:1)(45^0)$	Moderately Stable $(2:1)(30^0)$	Unstable $(1:1)(45^0)+(2:1)(30^0)$
20	20	40	60
40	40	80	120
60	60	120	180
80	80	160	240
100	100	200	300
120	120	240	360
140	140	280	420
160	160	320	480
180	180	360	540
200	200	400	600

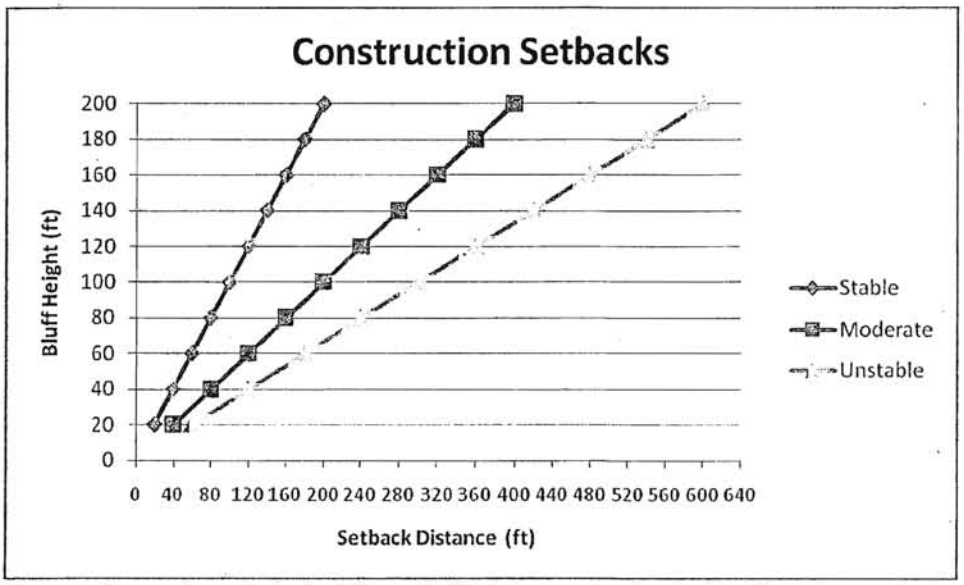


Figure 6. Construction setbacks for different bluff heights at various levels of stability, where geologic stability for 50-years cannot be demonstrated (after Griggs et al 1992 as cited in Macdonald and Witek 1994).

c. Conclusion and Recommendations

No riparian function curve was developed for this section, due to the high variability of site specific conditions that may be encountered and the lack of summary data that could be generally applied.

To maximize the buffer's effectiveness to maintain hydrologic functions and slope stability, the following actions are recommended:

- Avoid development near naturally eroding bluffs.
- Avoid engineering approaches that encroach on buffers to create more stable slope conditions.
- Avoid impervious surfaces and compacted soils.
- Maintain riparian vegetation especially on steep slopes to prevent excessive erosion and allow for evapotranspiration.
- Avoid 'loading' of bluffs whereby excessive moisture (from irrigation, septic fields, impervious surfaces, and other sources of water) can exacerbate the instability and erosion potential of the site.

7. Fish and Wildlife Habitat

a. Technical overview, riparian influence on wildlife function

Provision of wildlife habitat has been well documented for freshwater riparian systems (e.g., Knutson and Naef 1997; Cederholm et al 2000; NRC 2002, Buchanan et al. 2001). Riparian areas provide the resources and structure to meet important life history requirements such as feeding, roosting, breeding, refuge, migration corridors and clean water for a variety of wildlife species. Knutson and Naef (1997) report that riparian areas contribute to the high productivity and species diversity in aquatic and upland areas.

The wildlife function of marine riparian areas is not well documented, although Buchanan et al. (2001) Brennan and Culverwell (2004) described a wide variety of fish and wildlife associations for marine riparian areas of Puget Sound. Wildlife species have adapted to the natural processes, structure, and functions of marine riparian areas and have also played an important role in shaping the structure and character of riparian areas. For example, many birds and mammals that breed and rear in upland areas forage in intertidal areas. Thus, these species provide marine derived nutrients to uplands in the form of feces and carcasses. These marine derived nutrients play an important role in forest ecosystem health (Cederholm et al 2000).

b. Key findings from buffer literature and science panel

A number of studies have examined the role of riparian buffers in supporting wildlife. All studies reviewed for this document report that marine riparian areas function as important wildlife habitat. Appendix C, Table 7 provides a summary of wildlife buffer recommendations that were derived from seven review documents and other research.

Our review suggests that buffer requirements for fish and wildlife depend on different species' individual habitat requirements and may be influenced by season, upland habitat quality and connectivity with other habitat areas.

The science panel generally agreed that marine riparian areas provide habitat for many wildlife species. Some participants pointed out that without buffers, numerous species would not utilize marine nearshore areas or cross onto beaches from upland areas. Perhaps more importantly, riparian buffers and other nearby relatively undisturbed areas provide habitat for riparian obligates (i.e., those that require habitat in close proximity to water bodies such as great blue heron). All panel members agreed that marine riparian areas provide a suite of important services for wildlife. Pertinent information from that discussion follows.

Obligate/Optimal Use Species: The science panel was uncertain if obligate species in Puget Sound's marine riparian areas had been identified (but see Buchanan et al. 2001). They suggested that most wildlife in marine riparian areas are probably generalists in their habitat use, and the marine riparian environment supports a number of important functions and processes that create and maintain wildlife habitat. Larger buffers would increase the number of wildlife species using the area and benefit animals with larger home ranges.

Invasive species within riparian areas may reduce buffer effectiveness. Buffers can harbor nuisance wildlife species which is a cause for concern with respect to local wildlife and human populations.

c. Conclusion and Recommendations

The literature (see Appendix C) provides a range of buffer width recommendations, although few report 100 percent effectiveness. Relative to the other riparian functions discussed in this guidance document, wildlife needs are widely variable.

The ability to recommend a buffer width that would provide 100 percent effectiveness for wildlife is limited at this time because inventories of marine riparian wildlife species and their habitat requirements are lacking. Based on the literature surveyed for this guidance document, a buffer width greater than 200 meters (660 ft) will protect some wildlife habitat functions. Buffer requirements for fish and wildlife depend on the species' individual requirements and these may change or be influenced by season, upland habitat quality and connectivity with other habitat

areas. To maximize the buffer's effectiveness to support wildlife, the following actions are recommended:

- Ensure that wildlife habitat connectivity is maximized though maintenance of riparian corridors.
- Ensure native vegetation diversity is maintained (both species composition and age structure) along buffers to offer maximum habitat opportunities to the broadest range of species.
- Allow for natural disturbances such as floods, wind throw and landslides to provide snags, LWD and other complex habitat structural features in the buffer.
- Understand which local species use marine riparian areas by consulting with WDFW Priority Habitat and Species lists or other sources so that buffers can be designed with those species' habitat needs in mind.

Section V. Impacts to Marine Riparian Functions

1. Introduction

Riparian and aquatic ecosystems are currently being altered, impacted, or destroyed at a greater rate than at any time in history (Good et al. 1998). Although no comprehensive study has been conducted to document the rate and extent of marine riparian loss across the Puget Sound basin over time, three studies conducted between 1980 and 2006 provide some perspective on the region's riparian losses. Bortelson et al. (1980 *in* Levings and Thom 1994) studied eleven major river deltas in Washington and documented a 76 percent loss in tidal marshes and riparian habitat during the preceding century. The major losses were within highly developed estuaries including the Puyallup and Duwamish River deltas (Bortelson et al. 1980 *in* Levings and Thom 1994). In 1995, scientists with the Puget Sound Assessment and Monitoring Program (PSAMP) found that approximately 33 percent (or 800 miles) of Puget Sound shoreline had been physically altered by bulkheads, docks, or other structures. These structures typically impact riparian areas through vegetation removal, soil removal and compaction. MacLennan and Johannessen (2008) conducted geographically-focused research in the San Juan Islands and found an average 25% loss of marine riparian forest cover on San Juan, Orcas, Lopez and Stuart islands between 1977 and 2006.

Impacts to riparian function from activities associated with development, agriculture and forestry are well documented in the literature and are summarized in Appendix E, Tables 1-2. As described in Section IV, the level of disturbance to riparian soils and vegetation are key factors determining riparian function. A more detailed description of each of these activities and its impact on riparian function is included in the next three sections.

2. Development

Modern development along marine shorelines usually involves the removal of native vegetation, topsoil and organic matter and the compaction of soils which result from clearing and grading, construction of buildings, pavement, and roads. Additional impacts include the introduction of nonnative plant species associated with landscaping. Loss of natural vegetation in riparian and stream habitats in developed areas is usually permanent, (Booth 1991 *in* Knutson and Naef 1997) and activities associated with development impact all riparian functions (See Appendix E, Tables 1-2). Thus riparian areas are more highly altered in developed landscapes than in agricultural and forested landscapes on a per acre basis (Booth 1991 *in* Everest and Reeves 2006) although agriculture and forestry typically occur over a larger proportion of the landscape than develop areas do. Below we provide a summary of literature addressing development activities and their impacts on riparian function.

a. Water quality

Development activities within riparian areas can affect water quality. Alteration within the riparian areas causes "changes in loading of nutrients, organic matter, and sediments (Valiela et al. 1992; Wahl et al. 1997; Jones et al. 2000; Jordan et al. 2003); increased loading of contaminants and pathogens (Siewicki 1997; Inglis and Kross 2000; Mallin et al. 2000); and changes in water flow (Hopkinson and Vallino 1995; Jones et al. 2000)" (*in* Hale et al. 2004). The shoreline and upland development of residential, business, and industrial facilities and utilities can result in altered topography, removal of vegetation, soil compaction and grading, and rerouting of surface and groundwater flows (Knutson and Naef 1997; NRC 2002; Ekness and Randhir 2007; Schiff and Benoit 2007). In general, habitat alteration and development creates impervious surfaces, which prevents water from infiltrating into the ground and thus the ability of soil to intercept toxic substances; increases the volume of surface water; increases the magnitude of local flooding (Montgomery et al. 2000 *in* Johannessen and MacLennan 2007); and increases flooding potential (Glasoe and Christy 2005).

b. Fine sediment control

Development impacts to the fine sediment/erosion control function of riparian areas are well documented. Concentration/ channelization of surface runoff can lead to increased soil erosion along and downslope of the path of concentrated flow. Clearing of land for development produces the largest amount of sediment to aquatic resources (U.S. EPA 1993 *in* Stanley et al. 2005), and developed areas can produce 50-100 times more sediment than agricultural areas (Jones and Gordon 2000 *in* Stanley et al. 2005) on a per acre basis. Direct alteration of soils and vegetation within riparian areas can change nutrient loading rates, amounts and types of organic matter, and sediment dynamics (Valiela et al. 1992; Wahl et al. 1997; Jones et al. 2000; Jordan et al. 2003 *in* Hale et al. 2004). In sloped areas, these activities can also result in higher frequencies of slope failure, a relationship demonstrated through many field and laboratory studies (Gray and Sotir 1996; OSB 2007). Permanent loss of vegetative cover increases soil saturation and surface

water runoff, causing increased loading of fine sediments. While undisturbed mature native vegetation on slopes provides erosion control and slope stabilization benefits, disturbed or degraded sites can undergo continual erosion, which may hinder the development of effective vegetation cover. Competition by invasive, exotic plants, such as Himalayan blackberry, can also retard or preclude natural establishment of "effective" vegetation (Menashe 2001).

c. Shade/microclimate

The shade function of riparian areas is affected by many activities in the riparian area, particularly those occurring near the water's edge. Vegetation removal can decrease shade (Macdonald et al. 1994; Thom et al. 1994; Macdonald 1995; Penttila 1996; Williams and Thom 2001) and increase water and beach substrate temperatures (Beschta et al. 1987; Williams and Thom 2001; Bereitschaft 2007). Rice (2006) and Sobocinski et al. (2003) demonstrated that shoreline modifications (such as boat ramps, bulkheads, roads, and parking lots) that involve vegetation removal close to the water's edge not only reduce shade but also lower species diversity and abundance. Maintaining native vegetation in the form of mature trees in riparian areas can provide more shade than low-lying shrubs and grasses. Decreased shade, via removal of trees can result in increased egg mortality of beach-spawning forage fishes (Pentilla 2001; Rice 2006) and reductions in diversity and abundance of invertebrate species, as well as loss of habitat structure that supports climate sensitive species (Sobocinski et al. 2003; Brennan and Culverwell 2004; Tonnes 2008).

d. Large Woody Debris (LWD)

The reduced supply of LWD to nearshore ecosystems from marine riparian areas is largely the result of historic activities; however, impacts from ongoing development activities also affect this riparian function. Activities linked to development that affect marine LWD provision include tree removal for development within riparian areas (including shoreline armoring); wood removal (e.g., for fire fuel, landscaping, artwork, furniture); controlled and uncontrolled beach fires; salvage logging; drift log removal from open water; and vegetation removal.

Shoreline armoring can reduce or eliminate the upper intertidal and supratidal zones. This is turn may mobilize LWD and prevent it from settling on the shore. Low levels of LWD have been found on armored beaches compared to unaltered beaches (Sobocinski et al. 2003; Higgins et al. 2005; Dugan and Hubbard 2006; Defeo et al. 2009). Changes in wood abundance and elevated beach temperatures have been documented in several studies around Puget Sound (Higgins et al. 2005; Rice 2006; Tonnes 2008).

e. Litter fall/organic matter inputs

Alteration of riparian habitats can cause changes in nutrient loading, organic matter, and sediments (Valiela et al. 1992; Wahl et al. 1997; Jones et al. 2000; Jordan et al. 2003 *in* Hale et al. 2004). In freshwater systems, dams and other water control structures have caused changes in

nutrient cycling (Knutson and Naef 1997) through vegetation removal and soil compaction. Studies in marine systems show lower levels of terrestrially derived organic litter on armored versus unarmored beaches (Sobocinski et al. 2003; Higgins et al 2005; Dugan and Hubbard 2006; Defeo et al. 2009).

f. Wildlife

Shoreline modifications can have direct and indirect impacts on wildlife including interfering with species behavior, lowering survival, and decreasing habitat quality and quantity.

Habitat Loss/Quality

Shoreline modifications result in habitat loss, reduction, and or alteration (Paulson 1992; Levings and Thom 1994; Williams and Thom 2001; Toft et al. 2004), lower bird biodiversity (Donnelley and Marzluff 2004), altered food webs and benthic community composition (Dauer et al. 2000; Lerberg et al. 2000 *in* Hale et al. 2004), creation of passage barriers for salmon and other aquatic species (Williams and Thom 2001), and fragmented habitat (Williams and Thom 2001). The installation of shoreline armoring structures reduces beach width (decreases habitat), and can impede wildlife migration through shoreline corridors (NRC 2002). A reduction in habitat can lower diversity and abundance of wildlife, especially in upper intertidal areas. This can in turn cause change trophic relationships (Sobocinski et al. 2003; Defeo et al. 2009); for example, changes in the nearshore habitat can reduce potential spawning grounds for surf smelt and sand lance, which are a main component of the Pacific salmon diet (Johannessen and MacLennan 2007), and a primary food source for marine bird and marine mammals.

e. Hydrology/Slope Stability

Impacts to the hydrology/slope stability function of marine riparian areas have been widely documented in Puget Sound. Urbanization often causes compaction or removal of top soil, reducing infiltration and soil storage and increasing runoff. Erosion may increase downslope of concentrated flow outlet (e.g., pipe outfalls, impervious surface runoff) and may increase slope failure when this flow discharges to the top of the slope. Vegetation is a critical component in maintaining stable slopes (Morgan and Rickson 1995 *in* Parker and Hamilton 1999; Menashe 1993), and trees above the top of the slope contribute significantly to the geotectonic stability of the slope below (Parker and Hamilton 1999). Tree roots often anchor thin layers of soil to the bedrock or provide lateral stability through intertwined roots (Sidle et al. 1985 and Chatwin et al. 1994 *in* Stanley et al. 2005). In addition, changes to hydrology from the installation of onshore and offshore modifications affects sediment conditions.

3. Agriculture

Agriculture practices like other land use activities can result in the removal of riparian vegetation, addition of pesticides, soil disturbance and thus altered riparian functions. Many riparian areas became disconnected from the aquatic environment when tidelands and

wetlands/salt marshes were diked and filled to create farmland. In addition, agricultural sources of bacterial contamination, fertilizers and pesticides can threaten local water quality.

a. Water Quality

Water quality problems associated with agricultural activities include fecal coliform pollution, higher water temperatures, and nutrient and pesticide loading from surface and groundwater flows (Hashim and Bresler 2005). In some cases, excessive fertilizer use has led to increased nutrient levels in aquatic environments, causing algal blooms and eutrophication (Caffrey et al. 2007). Studies in the Puget Sound region show that agricultural activities can increase phosphorus levels in soils and surface runoff (Carpenter et al. 1998 *in* Stanley et al. 2005) and contribute 40 times the amount of nitrogen than forested areas and twice the nitrogen levels of developed areas (Ebbert et al. 2000 *in* Stanley et al. 2005). Agricultural activities that occur within, or drain to, riparian areas can negatively impact riparian soils and sediments by causing soil loss and erosion (Hashim and Bresler 2005), reductions in native vegetation (Spence et al. 1996), and altered flow paths leading to increased sediment, nutrient, pathogen, and pesticide loading (Sedell and Froggatt 1984). In addition, studies have shown that the conversion of riparian areas to cropland has decreased the infiltration potential of riparian soils (NRC 2002).

b. Fine sediment control

Agricultural activities can negatively affect the soil and sediment stability of marine riparian areas. Agricultural activities along Puget Sound shorelines typically result in a loss of native vegetation close to the water's edge because the land is valued for crop production. This loss of vegetative cover and root structure can increase erosion rates into receiving waters (Seddell and Froggatt 1984).

c. Shade/Microclimate

Removal of trees within marine riparian areas reduces the amount of shade available (Hashim and Bresler 2005). Shade and temperature influence photosynthesis rates of plants and metabolic rates of animals. Fluctuations in temperature can alter fish community structure and composition (Baltz et al. 1987; Dambacher 1991; Hillman 1991; Reeves et al. 1987). High water temperatures can cause behavioral changes in fish by affecting migration timing and patterns (Spence et al. 1996).

d. Large Woody Debris

Agricultural activities within riparian areas have resulted in a loss of native vegetation and large woody debris, bank instability, and loss of flood-plain function (Spence et al. 1996).

e. Litter fall/organic matter inputs

Agricultural practices have impaired nutrient regulation in riparian areas. For example, the conversion of riparian areas to cropland has decreased the infiltration potential of riparian soils (NRC 2002), and agricultural activities often require vegetation removal (Everest and Reeves 2006). Excessive fertilizer use has led to increased nutrient levels in aquatic environments, causing algal blooms and eutrophication (Caffrey et al. 2007).

f. Hydrology/slope stability

Land clearing, tillage, wetland drainage, irrigation and grazing can lead to increased surface runoff and greater sediment delivery. Changes in hydrology as a result of agricultural activities can result in altered flow regimes, increased sedimentation, and modified and consolidated stream channels (Sedell and Froggatt 1984), as well as bank instability (Spence et al. 1996).

Permanent loss of vegetation cover, or replacement by monocrops or other non-native vegetation increases soil saturation and surface water runoff. While undisturbed mature native vegetation on slopes provides erosion control and slope stabilization benefits, disturbed sites (such as tilled or over-grazed land) can undergo continual erosion, and may not establish an effective cover. Competition by invasive, exotic plants such as Himalayan blackberry can also retard or preclude natural establishment of effective riparian vegetation (Menashe 2001).

g. Wildlife

Agricultural activities within riparian zones have simplified aquatic and riparian habitats (Spence et al. 1996) and may result in lower biodiversity within these areas.
Grazing practices in riparian areas can damage aquatic habitat through shoreline erosion, disturbance (when large animals disrupt stream channels and pools), and deposition of excess nutrients and fecal coliform.

4. Forest Practices

Coniferous forests are the dominant forest type throughout the Puget Sound basin, with the exception of areas with relatively frequent natural disturbance (e.g., landslides, wind stress), or soils that would not support conifers (e.g., rocky headlands, shallow soils). The age structure, density, diversity, and connectivity of existing riparian forests are important characteristics that determine the types and level of functions provided.

a. Water Quality

Industrial forest practices, including the use of fertilizers and pesticides, timber harvesting, and road construction and maintenance, can degrade water quality and cause changes in hydrology and riparian vegetation (Jones et al. 2000). Forestry activities within riparian areas negatively affect that area's ability to perform its water quality functions in much the same way that

agricultural practices do. Specifically, the removal of riparian vegetation may limit the ability of riparian areas to decrease flows and filter, break down, and slow the flow of pollutants. Pesticides can be transported to riparian areas via surface and groundwater flows.

b. Shade/Microclimate

The removal of canopy through logging and thinning practices opens the understory and ground to increased light and air flow. The resulting microclimate changes can change the character of the plant species, expose soils and beach sediment to desiccation, and/or alter the temperature of water bodies below through the removal of shade-inducing foliage. Timber harvesting within riparian areas reduces shade and can increase water temperatures (Hashim and Bresler 2005).

c. Large Woody Debris

Large old-growth trees within marine riparian areas were historically among the first harvested in the region because of their close proximity to water and low transport costs (Prasse 2006; Brennan 2007; Chiang and Reese undated). Along Puget Sound shorelines and rivers, the number, size and species composition of trees has changed dramatically since the mid 1800s due to tree harvest, levee construction, development and invasive species colonization (Spence et al. 1996; Collins et al. 2002; Brennan 2007). As a result, the composition and volume of LWD on beaches has changed, with larger, mature logs occurring with less frequency. In a survey of 3.9 kilometers of beaches in north Puget Sound, fewer than 5 percent of large logs documented were considered 'new' recruits to the beach. The remaining 95 percent were severely weathered, and carbon dating revealed that many were delivered to the aquatic environment between 1700 and 1920 (Tonnes 2008).

The amount of new wood, especially large logs, delivered to beaches appears to be declining (Gonor et al. 1988; Maser and Sedell 1994; MacLennan 2005; Tonnes 2008), Old growth logs are decomposing and gradually disappearing from beaches. In addition, much of the wood currently being recruited to beaches consists of end-cut logs, which are more mobile (due to their smaller size and lack of a root wad and branches) and therefore provide somewhat different functions over shorter temporal and spatial scales (Tonnes 2008).

e. Fine sediment control

Road construction in forested areas increases sedimentation and reduces bank stability (Everest and Reeves 2006). Construction and maintenance activities can increase fine sediment loads and mass wasting processes (e.g., debris avalanches, debris flow, and debris torrents), which in turn can cause erosion and changes in stream channel (or beach) morphology (Hashim and Bresler 2005; Everest and Reeves 2006). Logging and burning can destabilize soils, increase the frequency and magnitude of erosion, and cause sedimentation (Knutson and Naef 1997).

f. Wildlife

Forest composition, structure and age class strongly influence type of wildlife habitat available and the diversity of wildlife that utilize the habitat. Old-growth rain forests of the Olympic Peninsula are among the most productive ecosystems in the world (Franklin and Dryness 1973), while younger second and third-growth forests provide fewer habitats and harbor a fewer numbers of species (Ruggiero et al 1991). Removal of forest cover and associated structure (such as snags and downed logs) can lower the habitat quality in riparian areas, reduce the input of nutrients into waterways (an essential food source for aquatic invertebrates) and eliminate important wildlife migration corridors.

Forestry practices can cause changes in the abundance and diversity of wildlife in riparian areas. This occurs through the loss of LWD, canopy and shrub cover, interior forest habitat within and adjacent to the riparian zone, sedimentation of the aquatic habitat, and habitat fragmentation (Knutson and Naef 1997).

g. Hydrology/Slope stability

Intact coniferous forests provide a perennial canopy and extensive root structure, which intercepts substantial amounts of precipitation, moderates surface and subsurface flows, and reduces erosion potential. Removal of forest cover and structure changes the character of the surface flow, particularly on steeper slopes where surface run-off accelerates and erosion and flash-flooding of small streams can occur.

5. Other Impacts of Concern

Development, agriculture and forest practices are only three of numerous potential impacts to riparian ecosystems. Additional impacts that were outside the scope of this guidance document include:

- Atmospheric deposition of pollutants.
- Harmful Algal Blooms (HABs) and other marine-borne pathogens and diseases.
- Non-native/nuisance Species.
- Recreation (harvest/collection of organism, trampling, wildlife disturbance).
- Climate change (changes in air/ocean temperature, sea level rise, changes in hydrology. and erosion from increased wave action, shoreline retreat, inundation, flooding).
- Oil and fuel spills from commercial shipping and tanker traffic.

APPENDIX G. A summary of buffer width recommendations from Appendix C.

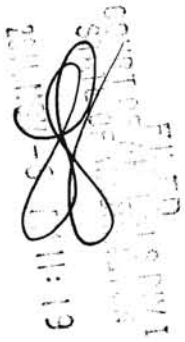
See Section II for a description of how this table was created.

Function	Buffer width recommendation to achieve ≥ 80% effectiveness	Literature cited	Average of all literature (to achieve ≥ 80% effectiveness)	Minimum buffer width (approximate) based on FEMAT curve to achieve ≥ 80% effectiveness
Water quality	5-600 m (16 – 1,968 ft) (Appendix C contains specific buffer widths for different water quality parameters)	5 m (16 ft): Schooner and Williard (2003) for 98% removal of nitrate in a pine forest buffer 600 m (1969 ft): Desbonnet et al (1994/1995) for 99% removal	109 m (358 ft)	25 m (82 ft) sediment 60 m (197 ft) TSS 60 m (197 ft) nitrogen 85 m (279 ft) phosphorus
Fine sediment control	25-91 m (92 – 299 ft)	25 m (82 ft): Desbonnet et al (1994/1995) for 80% removal 91 m (299 ft): Pentec Environmental (2001) for 80% removal	58 m (190 ft)	25 m (82 ft) (sediment) 60 m (197 ft) (TSS)
Shade	17-38 m (56 – 125 ft)	17 m (56 ft): Belt et al 1992 *IN* Eastern Canada Soil and Water Conservation Centre (2002) for 90% 38 m (125 ft): Christensen (2000) for 80% temperature moderation	24 m (79 ft)	37 m (121 ft) (.6 SPTH*)
LWD	10-100 m (33 – 328 ft)	10 m (33 ft): Christensen (2000) for 80-90% effectiveness 100 m (328 ft): Christensen (2000)	55 m (180 ft)	40 m (131 ft) (.65 SPTH*)

No. 72235-2-I

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

COMMON SENSE ALLIANCE, P.J. TAGGARES COMPANY, and FRIENDS OF THE SAN JUANS Appellants, v. GROWTH MANAGEMENT HEARINGS BOARD, WESTERN WASHINGTON REGION, and SAN JUAN COUNTY, Respondents.	)	**CERTIFICATE OF SERVICE**



Jana G. Marks declares and states:

That I am now, and at all times hereinafter mentioned was, a citizen of the United States and a resident of San Juan County, state of Washington, over the age of 18 years, competent to be a witness in the above-entitled proceeding and not a party thereto; that on August 28, 2014, I caused to be delivered in the manner indicated below a true and correct copy of: **Friends of the San Juans BRIEF OF APPELLANT** in the above-entitled cause to:

Alexander W. Mackie Perkins Coie, LLP 1201 Third Avenue, Suite 4900 Seattle, WA 98101-3099 amackie@perkinscoie.com	By First-Class Mail and Email
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I make the foregoing statement under penalty of perjury of the laws of the state of Washington.

Dated the 5th day of November, 2014, at Friday Harbor, Washington.

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