# Proposed
# Shoreline Master Program Guidelines
# Rule Amendment (WAC 173-26, Sections 170 to 250):
# Supplemental Draft Environmental Impact Statement

**Shorelands and Environmental Assistance Program**

WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

**Washington Department of Ecology**

**July, 2003**

**Publication 03-06-006**

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

*P.O. Box 47600 • Olympia, Washington 98504-7600*
*(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006*

Dear Reader:

I am pleased to present this Supplemental Draft Environmental Impact Statement (EIS) which analyzes WAC 173-26, Sections 170 to 250. This is a proposed administrative rule that will govern the preparation of local government Shoreline Master Programs (SMPs) as required by the Shoreline Management Act (SMA).

You will find that this EIS looks somewhat different than the typical one. Rather than analyze entirely separate, stand-alone alternative proposals, we chose instead to evaluate the different alternative choices within each major policy area. We believe this is a more meaningful way to reflect the choices that were available.

The key environmental issues and options facing environmental decision-makers are:

- Preparing local SMPs that provide enough certainty to meet the requirements under the SMA, yet provide the flexibility for cities and counties to choose their own way of meeting those requirements.
- Identifying and protecting ecological functions performed by our shorelines while accounting for local environmental conditions and needs.
- How to reduce the cumulative adverse impacts of vegetation clearing, bulkheads and other forms of "hard" shoreline armoring, and docks and piers

This Supplemental Draft EIS and the rule it analyzes are a significant milestone in our multi-year effort to adopt a new shoreline master program guidelines rule.

Sincerely,

Gordon White

Gordon White, Manager
Shorelands and Environmental Assistance Program

# Proposed
# Shoreline Master Program Guidelines
# Rule Amendment (WAC 173-26, Sections 170 to 250):
# Supplemental Draft Environmental Impact Statement

July 2003

Publication 03-06-006

Shorelands and Environmental Assistance Program
Washington Department of Ecology
Olympia, Washington

This document was funded in part through a cooperative agreement with the National Oceanic and Atmospheric Administration with funds appropriated for the Coastal Zone Management Act of 1972 through a grant to the Washington department of Ecology. The views expressed herein are those of the authors and do not reflect the views of NOAA or any of its sub-agencies.

If you require this document in alternative format, please contact the Shorelands Program receptionist at 360-407-6600 (voice) or 1-800-833-6388 (TTY).

**Recommended bibliographic citation:**

Shorelands and Environmental Assistance Program. 2003. *Proposed Shoreline Master Program Guidelines Rule Amendment (WAC 173-26, Sections 170 to 250): Supplemental Draft Environmental Impact Statement.* (Publication 03-06-006) Shorelands and Environmental Assistance Program, Washington Department of Ecology, Olympia.

# Fact Sheet

| | |
|---|---|
| Title: | Proposed Shoreline Master Program Guidelines Rule Amendment. |
| Description: | The proposal is for an amendment of WAC 173-26 to add Sections 170 to 250 which provide guidelines for the update of local shoreline master programs adopted under the Shoreline Management Act (RCW 90.58). When adopted, the amended rule will require local governments to update their local Shoreline Master Programs as provided in RCW 90.58.<br><br>Copies of the draft guidelines and related environmental and economic analyses are available on Ecology's web site at http://www.ecy.wa.gov/laws-rules/activity/wac17326.html<br><br>Additional information is on the Shorelands Program web site at http://www.ecy.wa.gov/programs/sea/SMA/guidelines/index.html |
| Proponent: | Shorelands and Environmental Assistance Program, Washington Department of Ecology. |
| Proponent Contact Person: | Peter Skowlund. |
| SEPA Lead Agency: | Shorelands and Environmental Assistance Program, Washington Department of Ecology. |
| SEPA Responsible Official: | Gordon White, Manager<br>Shorelands & Environ. Assistance Program<br>Washington Department of Ecology<br>PO Box 47600<br>Olympia, WA 98504-7600 |
| Lead Agency Contact Person: | Douglas J. Canning |
| Action Required: | Adoption of amendment to WAC 173-26. |
| EIS Authors: | Douglas J. Canning, Editor (see Appendix A for complete list of authors and contributors). |
| SDEIS date of issue: | July 16, 2003. |
| Date SDEIS comments due: | September 15, 2003. |
| Public Meetings and Hearings: | Date: Tuesday, August 5, 2003<br>Place: Seattle Center, Shaw Room<br>Address: 305 Harrison Street, Seattle<br>Informal Open House: 5:30 PM<br>Formal Public Hearing: 7:00 PM |

| | |
|---|---|
| | Date: Wednesday, August 6, 2003<br>Place: Cowlitz County Public Utility District Auditorium<br>Address: 961 – 12th Avenue, Longview<br>Informal Open House: 5:30 PM<br>Formal Public Hearing: 7:00 PM |
| | Date: Tuesday, August 12, 2003<br>Place: Washington State University, Phase I Auditorium<br>Address: 668 North River Point, Spokane<br>Informal Open House: 5:30 PM<br>Formal Public Hearing: 7:00 PM |
| | Date: Wednesday, August 13, 2003<br>Place: Chelan County Public Utility District No 1<br>Address: 327 N Wenatchee Ave., Wenatchee<br>Informal Open House: 5:30 PM<br>Formal Public Hearing: 7:00 PM |
| Expected FEIS Date of Issue: | December 11, 2003. |
| Expected Final Rule Adoption: | December 19, 2003. |
| Subsequent Environmental Review: | Local governments will conduct additional environmental review prior to adopting Shoreline Master Program amendments. |
| Prior EIS documents: | The original Draft EIS was issued on April 12, 1999, titled *Shoreline Management Act Guidelines for the Development of Master Programs (WAC 173-16): Draft Environmental Impact Statement*. That 1999 version of the draft rule was withdrawn, substantially modified, and re-filed with the Code Revisers Office. Accordingly, a Modified Draft EIS was re-written in its entirety and issued on June 28, 2000 (*Proposed Shoreline Master Program Guidelines Rule Amendment (WAC 173-26, Part III and Part IV): Modified Draft Environmental Impact Statement*), and the Final EIS on November 6, 2000. This Supplemental Draft EIS is wholly self-contained and reference to the prior documents is not necessary.[1] |
| Location of EIS Information: | Shorelands & Environ. Assistance Program<br>Washington Department of Ecology |

[1] Persons wishing to review the November 2000 FEIS may view or download a copy at http://www.ecy.wa.gov/programs/sea/SMA/guidelines/archives/nov292000version/feis2000a.pdf.

300 Desmond Drive
Lacey, Washington

Persons desiring to view the EIS information files should make an appointment at least one week in advance by telephoning 1-888-211-3641 (toll free) or sending an e-mail to shorelineguidelines@ecy.wa.gov.

Incorporations by reference: Incorporations by reference are identified in Chapter 8, References Cited and Consulted.

Cost of SDEIS: There is no cost for single copies of the Supplemental Draft EIS

To comment on this SDEIS Comments on this Supplemental Draft EIS may be submitted in writing by postal mail, facsimile (fax), or e-mail. Oral comments cannot be accepted. Separate comments should be submitted on the rule itself, and the EIS. The Department of Ecology cannot be responsible for interpreting combined comments which do not clearly address one or the other. All comments (written, faxed, or e-mailed) must include a complete postal mailing address to enable us to respond. All comments must be post marked or date stamped no later than September 15, 2003.

***Postal mail comments should be mailed to:***
Shoreline Guidelines SDEIS Comments
Shorelands Program
Wash. Department of Ecology
PO Box 47600
Olympia, WA 98504-7600

***Faxed comments should be addressed to:***
"Shoreline Guidelines SDEIS Comments" and should be faxed to 360-407-6902. Commentators should be aware of the uncertainties inherent in fax transmissions and are encouraged to use postal mail. The Department of Ecology cannot be responsible for failed fax transmissions.

***E-mail comments should be e-mailed to:***
shorelineguidelines@ecy.wa.gov with the Subject line "Shoreline Guidelines Rule SDEIS Comments." If you choose to compose your comments in a word processor and attach that file to your e-mail, please identify the file format (e.g. WordPer

fect 8.0, StarOffice Write 6.0, MS Word 97, etc.). We recommend that you also copy and paste your comments into the body of your e-mail as insurance against the attachment becoming damaged and unreadable during transmission, or being deleted due to the presence of a virus. The Department of Ecology cannot be responsible for failed e-mail transmissions.

Termination of special access

The special toll free telephone number (1-888-211-3641) and special e-mail address (shorelineguidelines@ecy.wa.gov) for this project will terminate on December 31, 2003.

# Table of Contents

*Fact Sheet* ..... *iii*

*Table of Contents* ..... *vii*

*1 • Summary* ..... *1*

**Organization of EIS** ..... **1**

**Objectives, Purpose, and Need** ..... **2**

**Alternatives** ..... **2**
Alternative A: No Action Continued Implementation of Former WAC 173-16 ..... 3
Alternative B: Prescriptive Standards ..... 3
Alternative C: Policy Guidance ..... 3
Alternative D: Dual Path Performance Standards ..... 4
Alternative E: Negotiated Settlement Performance Standards ..... 4

**Existing Status and Trends, and Anticipated Impacts** ..... **5**
WAC 173-16 ..... 5
WAC 173-26, Sections 170 to 250 ..... 6

**Significant Areas of Controversy and Uncertainty, and Issues to be Resolved** ..... **7**

*2 • Approach and Affected Environment* ..... *9*

**Introduction and Organization** ..... **9**

**Approach to Analysis** ..... **9**

**Affected Environment** ..... **10**

*3 • Authority and Need* ..... *13*

**Authority** ..... **13**

**Need** ..... **14**

*4 • Alternatives* ..... *17*

**Process of Developing Alternatives** ..... **17**
Phase 1: 1992 - 1994 ..... 17
Phase 2: 1995 - 1998 ..... 18
Phase 3: 1998 – 2000 ..... 20
Phase 4: 2000 ..... 21
Phase 5: 2000 - 2003 ..... 23

**Alternative A: No Action Continued Implementation of Existing WAC 173-16** ..... **24**
Environmental Protection ..... 24
State and Local Responsibility ..... 25
SMA-GMA Consistency ..... 25
Statutory Directive ..... 28

**Alternative B: Prescriptive Standards** ..... **28**
Environmental Protection ..... 29
State and Local Responsibility ..... 29
SMA-GMA Consistency ..... 29
Salmon Habitat ..... 29

**Alternative C: Policy Guidance** ..... **29**
Environmental Protection ..... 30
State and Local Responsibility ..... 30
SMA-GMA Consistency ..... 30
Salmon Habitat ..... 30

**Alternative D: Dual Path Performance Standards** ..... **30**
Environmental Protection ..... 31
State and Local Responsibility ..... 31
SMA-GMA Consistency ..... 32
Salmon Habitat ..... 32

**Alternative E: Negotiated Settlement Performance Standards** ..... **33**
Environmental Protection ..... 34
State and Local Responsibility ..... 34
SMA-GMA Consistency ..... 34
Shoreline Habitats ..... 34

***5 • Habitat-scale Existing Conditions and Impacts under WAC 173-16*** ..... ***37***

**Introduction and Overview** ..... **37**

**Marine Shorelines** ..... **37**
Inland Marine Shorelines ..... 38
Ocean Coast Shorelines ..... 40
Ocean Estuary Shorelines ..... 41

**Stream and River Shorelines** ..... **42**

**Lakes** ..... **46**

**Wetlands** ..... **47**
Washington's Wetland Resources ..... 48
Types and Distribution ..... 48
Trends ..... 49

***6 • Comparative Impact Analyses*** ..... ***51***

**Introduction and Overview** ..... **51**

**Comprehensive Process to Prepare or Amend Shoreline Master Programs (WAC 173-26-200)** ..... **53**
Protection of Ecological Functions of the Shorelines (WAC 173-26-200 (2) (c)) ..... 53
Environmental Impact Mitigation (WAC 173-26-200 (2) (e)) ..... 54
Shoreline Restoration Planning (WAC 173-26-200 (2) (f)) ..... 55
Addressing Cumulative Impacts in Developing Master Programs (WAC 173-26-200 (3) (d) (iii)) .. 56

**Environment Designations (WAC 173-26-210)** ..... **57**

**General Provisions (WAC 173-26-220)** ..... **59**
Archaeological and Historic Resources (220 (1)) ..... 59
Wetlands (220 (2) (c) (i)) ..... 60
Geologically Hazardous Areas (220 (2)(c) (ii)) ..... 61
Critical Salt Water Habitats (220 (2) (c) (iii)) ..... 62
Critical freshwater habitats (220 (2) (c) (iv)) ..... 64
Flood Hazard Reduction (220 (3)) ..... 66
Public Access (220 (4)) ..... 68
Shoreline Vegetation Conservation (220 (5)) ..... 70
Water Quality, Storm Water, and Nonpoint Pollution (220 (6)) ..... 72

**Shoreline Modifications (WAC 173-26-230 ..... 74**
Shoreline Stabilization (230 (3) (a)) ..... 74
Piers and Docks (230 (3) (b)) ..... 78
Fill (230 (3) (c)) ..... 80
Breakwaters, Jetties, Groins, and weirs (230 (3) (d)) ..... 81
Beach and Dune Management (230 (3) (e)) ..... 82
Dredging and Dredged Material Disposal (230 (3) (f)) ..... 84

**Shoreline Uses (WAC 173-26-240) ..... 86**
Agriculture (240 (3) (a)) ..... 86
Aquaculture (240 (3) (b)) ..... 89
Boating Facilities (240 (3) (c)) ..... 91
Commercial Development (240 (3) (d)) ..... 92
Forest Practices (240 (3) (e)) ..... 94
Industry (240 (3) (f)) ..... 96
In-stream Structural Uses (240 (3) (g)) ..... 97
Mining (240 (3) (h)) ..... 99
Recreational Development (240 (3) (i)) ..... 100
Residential Development (240 (3) (j)) ..... 101
Transportation and Parking (240 (3) (k)) ..... 103
Utilities (240 (3) (l)) ..... 103

***7 Integrated Analysis ..... 105***

**WAC 173-16 ..... 105**

**WAC 173-26 ..... 105**

***8 • References Cited and Consulted ..... 109***

***Appendix A: EIS Authors and Contributors ..... 129***

***Appendix B: Supplemental Draft EIS Distribution Lists ..... 131***
Local Governments ..... 131
Regional Agencies ..... 131
Washington State Agencies ..... 131
Native American Governments ..... 131
Federal Government Agencies ..... 132
Non-governmental Organizations which Commented on the 2000 Modified Draft EIS ..... 133

***Appendix C: WAC 173-26-080 Master programs required of local governments ..... 135***

***Appendix D: Glossary of Terms and Acronyms ..... 141***

# 1 • Summary

Reading this summary merely provides an overview and cannot be regarded as a substitute for reading the entire document.

## Organization of EIS

Chapter 2, Approach and Affected Environment, provides a discussion of how we approached environmental analysis for this environmental impact statement, and a definition of the "affected environment." Readers should expect the generalized discussions which are appropriate to and typical of a non-project or programmatic environmental impact statement.

Chapter 3, Authority and Need, first states the authorities for the proposed rule amendment found in the Shoreline Management Act. It then summarizes the need for the proposed rule amendment.

Chapter 4, Alternatives, first summarizes the process Ecology pursued in arriving at the alternative approaches to updating the Shoreline Master Program Guidelines rules, and then summarizes the alternatives considered by Ecology and its advisory committees.

Chapter 5, Habitat-scale Existing Conditions, addresses the landscapes which come under the Shoreline Management Act — an act which was adopted in 1971, and for which substantive implementation had begun by the mid 1970s when most local governments had adopted shoreline master programs under the former WAC 173-16. Therefore, this chapter is also a description of the environmental impacts and trends resulting from the application of WAC 173-16. This chapter is organized around the fundamental landscape features which come under the Shoreline Management Act: marine systems and habitats, stream and river systems and habitats, lakes, and wetlands.

Chapter 6, Comparative Impact Analyses, compares the No Action Alternative with the Preferred Alternative by analyzing the pertinent sections of the proposed WAC 173-26, Sections 170 - 250.

Chapter 7, Integrated Analysis, provides a brief review of the cumulative effect of the key portions of the proposed WAC 173-26, Sections 170 - 250.

Chapter 8, References Cited and Consulted, provides a bibliography of reference materials consulted in the preparation of this environmental impact statement. Full bibliographic references for the authorities cited in text by the "Author, Date" notation may be found here.

Appendix A identifies the EIS authors and contributors.

Appendix B lists the agencies provided with a copy of this EIS on the initial distribution.

Appendix C lists the local governments required to adopt a shoreline master program under the Shoreline Management Act.

Appendix D provides a glossary of terms and abbreviations.

## Objectives, Purpose, and Need

The Shoreline Management Act charges Ecology with periodically reviewing and amending guidelines for implementing the SMA as directed by the 1995 legislature in ESHB 1724 which amended the SMA at RCW 90.58.060 — please refer to Chapter 3, Authority.

The *Report of the Shoreline Guidelines Commission to the Department of Ecology* dated February 16, 1999 states that the guidelines need updating for three principal reasons:

> 1. The Legislature has required that the guidelines be updated. The 1995 regulatory reform legislation, Engrossed Substitute House Bill 1724, stated in Section 1, that the Growth Management Act "...should serve as the integrating framework for all other land-use related laws." ESHB 1724 also established a schedule for local governments to review and update their plans and development regulations, with the next such cycle due September 1, 2002. If master programs are to be integrated in accordance with ESHB 1724 in this cycle, the guidelines need to address integration issues well in advance of that date.
>
> 2. Population growth and changes in the law, planning practice, and use of science since 1971 are significant and require clearer guidance in the rule in order to achieve balanced and effective resource management.
>
> In chapter 90.58.020 RCW the Legislature found "...that the shorelines of the state are among the most valuable and fragile of its natural resources and that there is great concern throughout the state relating to their utilization, protection, restoration and preservation…" and called for "...coordinated planning ... in order to protect the public interest associated with the shorelines of the state while, at the same time, recognizing and protecting private property."
>
> The guidelines need to provide better direction to local governments for effective protection, restoration and preservation of natural resources and utilization of the shorelines, particularly with regard to conflict among uses preferred in the Act.
>
> 3. A premise of the Governor's Salmon Recovery Strategy is to use existing laws to comply with the Endangered Species Act. Since salmon depend on many areas and resources within the jurisdiction of the Shoreline Management Act for their survival, the guidelines need to show how local master programs can help implement the strategy to recover salmon and their habitat.

Ecology's objective and purpose in adopting the proposed rule amendment is to:

- comply with the legislative mandate at RCW 90.58.060; and
- update the existing guidelines rule to bring it into conformance with current practices, science, and technology.

## Alternatives

Five alternatives have been considered since this process began in 1992. The "No Action" alternative required to be evaluated by SEPA (State Environmental Policy Act) is continued application of the former guidelines rule, WAC 173-16. Four other alternatives have been considered: Alternative B – Prescriptive Standards; Alternative C – Policy Guidance; Alternative D – Dual Path Performance Standards; and Alternative E —Negotiated Settlement Performance Standards. During the winnowing process (see below) alternatives A, B, and C were considered and rejected relatively early in the process. Alternative D then emerged as the preferred alternative. As Alternative D was further developed, elements of the other alternative approaches were incorporated where deemed ap

propriate. Alternative D was adopted in November 2000. However, a coalition of business groups and local governments challenged the guidelines, and in August 2001 the Shoreline Hearings Board (SHB) invalidated them. In an effort to avoid years of legal appeals, the State of Washington entered into mediation talks aimed at reaching a legal settlement. In December 2002 the parties agreed to a stipulated settlement including a new draft shoreline guidelines rule. In January 2003 Ecology issued a formal announcement of intent to file the draft rule for adoption.[2]

### *Alternative A: No Action*
### *Continued Implementation of Former WAC 173-16*

Continuing to use the former Shoreline Mater Program Guidelines rule (WAC 173-16) is the 'no action alternative' for analytical purposes[3]. That is, if no action were taken, WAC 173-16, adopted in 1972, would remain the *de facto* guidance governing the content of local Shoreline Master Programs. WAC 173-16 is characterized in Chapter 6, Comparative Impact Analyses, for analytical comparison with the preferred alternative.

### *Alternative B: Prescriptive Standards*

The Guidelines Commission (1998 – 1999) considered developing new guidelines with specific prescriptive standards. This alternative approach would result in a rule with specific numerical standards, effective state-wide, that set minimum requirements for local governments to achieve through their local SMPs for the full range of shoreline uses. This alternative approach was considered early in the Commission's process, and discussed repeatedly throughout the Commission's term. No consensus was ever reached by the Commission members that Prescriptive Standards were a desirable or viable approach despite the passionate support for this pathway by some Commission members.

In consultation with local government representatives, Department of Ecology staff learned that while some local planners supported prescriptive standards, others viewed them as too restrictive and counter-productive.

In the end, Ecology determined that Prescriptive Standards were not a viable alternative for lack of broad support, and chose not to pursue this alternative.

### *Alternative C: Policy Guidance*

The Shorelines Guidelines Commission also considered using a general policy approach that would provide guidance to local governments and flexibility to implement individual

---

[2] Copies of the stipulated settlement, the Draft SMP Guidelines, as negotiated (Attachment A to the settlement), and settlement agreement details (Attachment B) may be found on the Ecology web site at http://www.ecy.wa.gov/programs/sea/SMA/guidelines/archives/negotiation.html.

[3] WAC 173-16 was voided by the adoption of WAC 173-26, Parts III and IV in November 2000. When the SHB invalidated WAC 173-26, Parts III and IV, WAC 173-16 remained voided, leaving no shoreline master program guidelines rule in effect. By law Ecology *must* adopt a guidelines rule for implementation of the Shoreline Management Act. Therefore, for analytical purposes the required 'no action' alternatives presumes a "fictional" continued implementation of WAC 173-16.

SMPs at the local level. However, as with Alternative B, Prescriptive Standards, no consensus could be reached that Policy Guidance was a viable approach, and was therefore eliminated from detailed study early in the Commission's process.

## *Alternative D: Dual Path Performance Standards*

The 2000 preferred alternative, Dual Path Performance Standards, was an amendment of WAC 173-26, incorporating two new sections, Part III and Part IV, each containing new guidelines for shoreline master programs, and voiding the existing shoreline master program guidelines in WAC 173-16.

As described in Chapter 4 (Process of Developing Alternatives, Phase 4), Parts III and IV were dual paths to achieving the same results under the Shoreline Management Act. Part III set forth "mandatory minimum procedures and performance based standards, but would have allowed local governments the flexibility to decide how to achieve the performance standards." Part IV, on the other hand, provided great specificity to aid local governments in developing a master program that achieved the performance standards.

All local governments required by the SMA to adopt a shoreline master program (SMP) would have been required to amend their existing SMP in accordance with Part III, or alternatively, at their choice, under Part IV.

The Guidelines Commission determined that in all areas of the guidelines it is beneficial to give policy direction, while in other areas additional specific standards may be optimal. The Performance Standards Alternative was a compilation of policies and standards. If written effectively, a rule using performance standards provides local government with adequate flexibility to adapt a master program to local conditions as well as demanding a high level of certainty for environmental protection. Alternative D set goals, but allowed local governments to set their own course to reach these goals. This approach would have allowed flexibility to enable local governments to develop customized master programs and it demands a high level of certainty for effective environmental protection.

Subsequent to the Guidelines Commission, Alternative D was edited by Ecology in response to comments received from local governments, the general public, and other interested parties. As described in Chapter 4 (Process of Developing Alternatives, Phase 4), Part IV was developed in response to needs for a more definitive expression, or statement, of the performance standards proposed by Ecology in the December 1999 draft.

## *Alternative E: Negotiated Settlement Performance Standards*

The current preferred alternative is a derivative of Alternative D, although thoroughly rethought and, where necessary, re-written by the negotiation team. The following characterization is quoted from a comparison of Alternative E with Alternative D, Part III (Shorelands and Environmental Assistance Program, 2003)

> The Negotiated Settlement draft guidelines begin with a significantly expanded statement of general policy goals for shorelines of the state followed by a new set of eleven governing principals. These sections contain statements about what the guidelines are intended to accomplish based on the provisions of the SMA as well as statements describing the limitations on regulatory authority. These were used as benchmarks in redrafting the guidelines and are intended to establish a foundation for consistent interpretation of the guidelines in the future.

Based on the governing principles the following general changes were made to the body of the document:

- More explicit acknowledgment throughout the document that there are legal limitations on the regulatory authority of state and local government with respect to private property.
- Protection of the shoreline environment is recognized as an essential statewide policy goal of the SMA and "No Net Loss of Shoreline Ecological Functions" is established as the standard of environmental protection for SMP regulations of future development on the shoreline. In general, greater reliance is placed on general standard of no net loss, less on prescriptive standards by environment designation, use or activity.
- Restoration of ecological functions where the shoreline environment is degraded as a result of past actions is established as a planning requirement for local government to address through non-regulatory means. The planning approach is intended to coordinate and prioritize public and private restoration efforts and promote use of available resources for restoration purposes. It is also intended to assure coordination between development and restoration activities related to the shorelines.
- While protection and restoration of the ecological functions necessary to support shoreline dependent wildlife is clearly recognized as part of the essential statewide policy goal and special attention is given to issues related to salmon and other priority species, the guidelines do not attempt to specifically address compliance with the Endangered Species Act and thereby there is nothing comparable to "Path B".
- Provide clearer SMA/GMA relationship such as acknowledging it is local governments' obligation to assure consistency, and that Ecology's review is limited to the master programs' consistency with SMA (not GMA).

Additional information on Alternative E and the Negotiated Settlement is available on Ecology's web site at http://www.ecy.wa.gov/programs/sea/SMA/guidelines/archives/negotiation.html.

## Existing Status and Trends, and Anticipated Impacts

### *WAC 173-16*

Chapters 5 and 6 characterize the status and trends for Washington's shorelines as they have developed under WAC 173-16, as experiencing varying degrees of degradation.

Riparian habitats have been altered or degraded by forestry and agricultural practices, and clearing for various urban and suburban lands uses. Stream channel hydrology and ecology has been altered for the worse and degraded. Wetlands loss continues, apparently at undiminished rates. Estuarine water quality is variable, and in places is substandard. Overall more commercial shellfish beds are being downgraded than are being upgraded due to on-going pollution problems. As more and more people build larger and larger houses on and near unstable slopes the problems associated with landsliding become greater. Nearly two miles of Puget Sound shorelines are armored each year, adversely affecting beach and nearshore habitats, and the creatures which depend on those habitats for all or a portion of their life cycle.

What goes undocumented, however, is what Washington's shorelines would have become without the Shoreline Management Act (and other resource management and environmental protection legislation). Two examples of activities moderated or halted by the

passage of the Shoreline Management Act and adoption of WAC 173-16 are over-water structures (as exemplified by multi-family residential construction in Seattle) and beach fills (as exemplified by residential beach filling on the Mason County shores of Hood Canal).

## *WAC 173-26, Sections 170 to 250*

It is important to realize that adoption and implementation WAC 173-26, Sections 170 to 250 will not be a panacea from any perspective. Development will continue to occur on Washington's shorelines, and therefore habitat alteration will continue to occur. The rate of development is driven largely by the state of the economy — a robust economy tends to result in more development, and more expansive development projects. The conditions in the Puget Sound region of Washington during the 1990s, and late 1990s in particular, bear out this statement of the obvious.

The rate and nature of habitat loss and degradation is moderated by land use, environmental, and pollution control laws and regulations. The Shoreline Management Act functions in conjunction with a number of other state laws, the most important of which to this environmental impact statement are identified in Chapter 6.

From reading the individual impact analyses of Chapter 6 one could gain the impression that WAC 173-26, Sections 170 to 250 will be only marginally effective in reducing the rate of habitat loss and degradation, and other undesirable environmental consequences of shoreline development and activities. The integrated effect of WAC 173-26, Sections 170 to 250 as a whole, however, is anticipated to have a synergistic effect, producing overall environmental benefits substantially greater than the sum of the parts.

To the extent that WAC 173-26, Sections 170 to 250 is more effective than was WAC 173-16 at moderating environmental impacts — and everything else being equal — future adverse effects on the shoreline environment will be substantially less. To the extent that WAC 173-26, Sections 170 to 250 is better integrated and coordinated with other land use, environmental, and pollution control laws and regulations than was WAC 173-16 (as it is), future adverse effects on the environment will be substantially less.

However, WAC 173-26, Sections 170 to 250 contains a number of concepts wholly or explicitly lacking in WAC 173-16:

- planning for ecological restoration of degraded shorelines;
- vegetation conservation for the protection of shoreline habitats;
- explicit management of geologically hazardous areas, and to do so in concert with requirements of the Growth Management Act;
- explicit management of critical salt water habitats, and to do so in conjunction with shoreline management of adjacent areas;
- explicit management of riverine corridors, and to do so in especially in conjunction with protection of hydrologic and ecologic values;
- explicit management for flood hazard reduction; and

- the mandate to allow no net loss of ecological functions as a result of development activity or operations.

Three provisions of WAC 173-26 especially stand out in this respect; all are discussed in greater detail in chapters 6 and 7:

The requirements for vegetation conservation which apply more-or-less across-the-board to most shoreline developments will result in substantially lower rates of habitat loss and degradation from new development.

The requirement for local governments to include identification of degraded shorelines in their comprehensive shoreline inventories, and to include in their amended Shoreline Master Program measures for restoration for those ecologically degraded shorelines, will provide long-term guidance for not just the local jurisdiction, but any organization seeking to affect habitat restoration. This, in concert with the requirement to coordinate critical area planning under the Growth Management Act with shoreline planning and shoreline environmental designation under the Shoreline Management Act will further result in not only lower rates of habitat, but habitat restoration.

Finally, more so than any other feature of the proposed rule, the requirement that new development shall result in no net loss of ecological functions will result in substantially lower rates of habitat alteration from new development. This feature is more powerful than it might appear on the surface. When fully implemented it will influence all shoreline development at the programmatic level, not just the case-by-case project level.

## Significant Areas of Controversy and Uncertainty, and Issues to be Resolved

There are no areas of controversy or uncertainty which can be resolved by environmental impact analysis.

This is not to say that there is no controversy or uncertainty associated with the proposed rule amendment.

Many, if not all, local governments are concerned over [1] the uncertainty of adequate funding with which to implement the proposed rule amendment, and [2] inadequate time to develop and adopt an updated shoreline master program.

Regarding funding, Ecology shares these concerns, and in the past has cooperated with local governments in seeking needed legislative appropriations. All parties to the mediation have stipulated to jointly seek state funding, beginning with $2 million over the next two years, to help local governments update their local shoreline master programs. The money is contained in the governor's budget proposal to the 2003 legislature. This is a fiscal issue, not one of environmental impact analysis.

Regarding timing, all parties to the mediation have stipulated to jointly propose legislation in 2003 to change implementation deadlines contained in the underlying Shoreline Management Act, such that local governments would have a staged time period within which to implement the proposed new rule ranging from 2005 to 2014. This is a statutory matter, not one of environmental impact analysis.

Some local governments, as well as other parties, have in the past contended that Ecology is not *required* to adopt updated guidelines. Ecology respectfully disagrees with this position (Fitzsimmons. 200a, 200b), citing RCW 90.58.020, RCW 90.58.060, and RCW 90.58.900. This is a matter of statutory interpretation, not one of environmental analysis.

Finally, there is an on-going measure of controversy and uncertainty over vegetation conservation and buffer widths. (See for example, news media attention to the issue, especially in Kitsap (Dunagan, 2000a, 2000b) and Skagit counties (Parr, 1999a, 1999b).) This state-wide, programmatic environmental impact statement cannot and does not address the fine details of buffer effectiveness for different specific purposes in different specific circumstances. The state-of-the-knowledge regarding buffer width prescription is such that this remains, at least in part, a matter of political decision-making, not one of environmental analysis. Also, the specifics of this issue will be resolved in the coming years as the science emerges and local governments develop, adopt, and implement amendments to their shoreline master programs.

These issues must be resolved in a forum other than environmental impact analysis.

# 2 • Approach and Affected Environment

## Introduction and Organization

This environmental impact statement (EIS) compares and analyzes the Washington state regulation for development of a local government shoreline master program (SMP) under WAC 173-16 adopted in 1972, with a proposed amendatory rule, WAC 173-26, Sections 170 to 250. This would be the first substantial amendment of the rules for development of an SMP. As discussed in Chapter 4, continued application of WAC 173-16 is Alternative A, the No Action Alternative required to be analyzed in an EIS. The proposed amendatory rule, WAC 173-26, Sections 170 to 250, is Alternative E, the preferred alternative.

For the purposes of this EIS the statutory elements of the environment (as defined by the State Environmental Policy Act (SEPA) rules (WAC 197-11-444)) have been organized into subjects more useful in discussing the Shoreline Management Act and the proposed rule amendment.

Habitat Scale Existing Conditions and Impacts Under WAC 173-16 (Chapter 5) are organized around the fundamental landscape features which come under the jurisdiction of the Shoreline Management Act: marine shorelines, stream and river shorelines, lake shorelines, and wetlands.

The Comparative Impact Analyses (Chapter 6) are organized around the features of the rule amenable to environmental impact analysis. That is, it is organized in accordance with the major sections of the draft rule. Chapter 6 compares the No Action Alternative with the Preferred Alternative.

Integrated Analysis (Chapter 7) provides a discussion of how certain prominent aspects of the proposed rule are especially different in kind or quality from the features of the existing WAC 173-16.

The impact analyses are generalized: simple adoption of the proposed rule will have no direct effect on the environment—it will simply require that local governments amend their local Shoreline Master Program in a manner consistent with the amended rule and the Shoreline Management Act, while also consistent with local circumstances. Direct environmental effects will be seen only when proposed projects are approved, constructed, and operated under those newly amended local master programs, years in the future.

## Approach to Analysis

As noted above, adoption of the proposed rule will have only an indirect effect on the environment—it will simply require that local governments amend their local Shoreline Master Program (SMP). Each of the 39 counties and 216 cities which come under the SMA (see Appendix C) will, over a period of years, adopt an amended SMP, each somewhat different from all others, but all consistent with the new rule and the Shoreline Management Act. The actual effect of the proposed rule amendment and the resulting

local SMPs on the shorelines of the state will emerge immediately on parcels of land which are developed or redeveloped under an amended SMP. On a state-wide landscape scale, however, substantial effects will likely not be seen for decades. This environmental impact statement addresses landscape scale effects, not site-specific effects. During this time other obvious factors will be affecting Washington's shorelines: population growth; the economy, and the related pace of development; the manner in which recovery of ESA-listed salmonid species is regulated by federal agencies under the Endangered Species Act; how future legislatures address further integration of the Shoreline Management Act and the Growth Management Act; and other, unforeseeable factors.

The level-of-detail of this environmental impact state is therefore generalized and variable. The environmental impact analyses are stated in terms of an event horizon two to three decades in the future.

This environmental impact statement does not address fiscal or economic issues, nor is it required to. As required by the Administrative Procedures Act at RCW 34.05.328(1)(c), a separate *Evaluation of Probable Benefits and Costs* (Washington Department of Ecology, 2003a) has been prepared. While not required to do so, Ecology has for this proposed rule amendment, prepared a separate *Small Business Economic Impact Statement* (Washington Department of Ecology, 2003b).

Finally, readers should note one other document feature: in many instances we quote at length from other documents and publications. These 'long quotes' are indicated by indenting that text and printing it in a smaller typeface, just as is done in the following section which quotes the Shoreline Management Act. We do this where ever practical so you can read what the law says, not a paraphrase; so that you can read what another analyst wrote, not how we summarized it.

## Affected Environment

The Shoreline Management Act extends shoreline management to "shorelines of the state" which are defined as:

> RCW 90.58.030 (2) (c) "Shorelines of the state" are the total of all "shorelines" and "shorelines of state-wide significance" within the state;
>
> (d) "Shorelines" means all of the water areas of the state, including reservoirs, and their associated shorelands, together with the lands underlying them; except (i) shorelines of state-wide significance; (ii) shorelines on segments of streams upstream of a point where the mean annual flow is twenty cubic feet per second or less and the wetlands associated with such upstream segments; and (iii) shorelines on lakes less than twenty acres in size and wetlands associated with such small lakes;
>
> (e) "Shorelines of state-wide significance" means the following shorelines of the state:
>
> (i) The area between the ordinary high water mark and the western boundary of the state from Cape Disappointment on the south to Cape Flattery on the north, including harbors, bays, estuaries, and inlets;
>
> (ii) Those areas of Puget Sound and adjacent salt waters and the Strait of Juan de Fuca between the ordinary high water mark and the line of extreme low tide as follows:
>
> (A) Nisqually Delta—from DeWolf Bight to Tatsolo Point,
>
> (B) Birch Bay—from Point Whitehorn to Birch Point,

(C) Hood Canal—from Tala Point to Foulweather Bluff,

(D) Skagit Bay and adjacent area—from Brown Point to Yokeko Point, and

(E) Padilla Bay—from March Point to William Point;

(iii) Those areas of Puget Sound and the Strait of Juan de Fuca and adjacent salt waters north to the Canadian line and lying seaward from the line of extreme low tide;

(iv) Those lakes, whether natural, artificial, or a combination thereof, with a surface acreage of one thousand acres or more measured at the ordinary high water mark;

(v) Those natural rivers or segments thereof as follows:

(A) Any west of the crest of the Cascade range downstream of a point where the mean annual flow is measured at one thousand cubic feet per second or more,

(B) Any east of the crest of the Cascade range downstream of a point where the annual flow is measured at two hundred cubic feet per second or more, or those portions of rivers east of the crest of the Cascade range downstream from the first three hundred square miles of drainage area, whichever is longer;

(vi) Those shorelands associated with (i), (ii), (iv), and (v) of this subsection (2)(e);

(f) "Shorelands" or "shoreland areas" means those lands extending landward for two hundred feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward two hundred 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 this chapter; the same to be designated as to location by the department of ecology. Any county or city may determine that portion of a one-hundred-year-flood plain to be included in its master program as long as such portion includes, as a minimum, the floodway and the adjacent land extending landward two hundred feet therefrom;

All the Washington's approximately 2,763 miles of marine shorelines come under the SMA, with their shorelines encompassing approximately 105 square miles.

The shorelines of the 758 lakes managed under the SMA (WAC 173-20) encompass approximately 81 square miles.

The shorelines associated with streams managed under the SMA (WAC 173-18) encompass approximately 750 square miles.[4]

The shorelines managed under the SMA constitute approximately 1.4 percent of the state's 66,582 square miles of land area.

A shoreline master program is required of all 39 counties of the state, and 216 cities (WAC 173-26-080); see Appendix C.

[4] It is more difficult to accurately measure the length of streams than the length of marine or lake shores, therefore the accuracy of the land area of shorelands associated with streams is very approximate; the value most likely lies within the range of 600 to 900 square miles.

# 3 • Authority and Need

This chapter first states the authorities for the proposed rule amendment found in the Shoreline Management Act. It then summarizes the need for the proposed rule amendment.

## Authority

In adopting the Shoreline Management Act the legislature declared the following findings and basic state policy:

> RCW 90.58.020—Legislative findings—State policy enunciated—Use preference.
>
> The legislature finds that the shorelines of the state are among the most valuable and fragile of its natural resources and that there is great concern throughout the state relating to their utilization, protection, restoration, and preservation. In addition it finds that ever increasing pressures of additional uses are being placed on the shorelines necessitating increased coordination in the management and development of the shorelines of the state. The legislature further finds that much of the shorelines of the state and the uplands adjacent thereto are in private ownership; that unrestricted construction on the privately owned or publicly owned shorelines of the state is not in the best public interest; and therefore, coordinated planning is necessary in order to protect the public interest associated with the shorelines of the state while, at the same time, recognizing and protecting private property rights consistent with the public interest. There is, therefor, a clear and urgent demand for a planned, rational, and concerted effort, jointly performed by federal, state, and local governments, to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines.
>
> It is the policy of the state to provide for the management of the shorelines of the state by planning for and fostering all reasonable and appropriate uses. This policy is designed to insure the development of these shorelines in a manner which, while allowing for limited reduction of rights of the public in the navigable waters, will promote and enhance the public interest. This policy contemplates protecting against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the state and their aquatic life, while protecting generally public rights of navigation and corollary rights incidental thereto.

The Shoreline Management Act charges Ecology with periodically reviewing and amending guidelines for implementing the SMA as directed by the 1995 legislature in ESHB 1724 which amended the SMA at RCW 90.58.060:

> RCW 90.58.060—Review and adoption of guidelines—Public hearings, notice of—Amendments.
> (1) The department shall periodically review and adopt guidelines consistent with RCW 90.58.020, containing the elements specified in RCW 90.58.100 for:
>
> (a) Development of master programs for regulation of the uses of shorelines; and
>
> (b) Development of master programs for regulation of the uses of shorelines of statewide significance.
>
> (2) Before adopting or amending guidelines under this section, the department shall provide an opportunity for public review and comment as follows:
>
> (a) The department shall mail copies of the proposal to all cities, counties, and federally recognized Indian tribes, and to any other person who has requested a copy, and shall publish the proposed guidelines in the Washington state register. Comments shall be submitted in writing to the department within sixty days from the date the proposal has been published in the register.

(b) The department shall hold at least four public hearings on the proposal in different locations throughout the state to provide a reasonable opportunity for residents in all parts of the state to present statements and views on the proposed guidelines. Notice of the hearings shall be published at least once in each of the three weeks immediately preceding the hearing in one or more newspapers of general circulation in each county of the state. If an amendment to the guidelines addresses an issue limited to one geographic area, the number and location of hearings may be adjusted consistent with the intent of this subsection to assure all parties a reasonable opportunity to comment on the proposed amendment. The department shall accept written comments on the proposal during the sixty-day public comment period and for seven days after the final public hearing.

(c) At the conclusion of the public comment period, the department shall review the comments received and modify the proposal consistent with the provisions of this chapter. The proposal shall then be published for adoption pursuant to the provisions of chapter 34.05 RCW.

(3) The department may propose amendments to the guidelines not more than once each year. At least once every five years the department shall conduct a review of the guidelines pursuant to the procedures outlined in subsection (2) of this section. [1995 c 347 § 304; 1971 ex.s. c 286 § 6.]

The 1992 Legislature adopted ESB 6128 amending the Shoreline Management Act regarding provisions for shoreline erosion protection for single family residences, especially regarding "timely protection against loss or damage" and giving "preference for permit issuance for measures to protect single family residences occupied prior to January 1, 1992, where the proposed measure is designed to minimize harm to the shoreline natural environment":

RCW 90.58.100 (6) Each master program shall contain standards governing the protection of single family residences and appurtenant structures against damage or loss due to shoreline erosion. The standards shall govern the issuance of substantial development permits for shoreline protection, including structural methods such as construction of bulkheads, and nonstructural methods of protection. The standards shall provide for methods which achieve effective and timely protection against loss or damage to single family residences and appurtenant structures due to shoreline erosion. The standards shall provide a preference for permit issuance for measures to protect single family residences occupied prior to January 1, 1992, where the proposed measure is designed to minimize harm to the shoreline natural environment. [1995 c 347 § 307; 1992 c 105 § 2; 1991 c 322 § 32; 1971 ex.s. c 286 § 10.]

Amendment of WAC 173-16 to incorporate the provisions of ESB 6128 was originally delayed pending the completion of research into appropriate erosion control measures, environmental impacts, and policy options (Canning & Shipman, 1994), and then further delayed to integrate ESB 6128-mandated amendments with those mandated by ESHB 1724.

## Need

The *Report of the Shoreline Guidelines Commission to the Department of Ecology* dated February 16, 1999 states that the guidelines need updating for three principal reasons:

1. The Legislature has required that the guidelines be updated. The 1995 regulatory reform legislation, Engrossed Substitute House Bill 1724, stated in Section 1, that the Growth Management Act "...should serve as the integrating framework for all other land-use related laws." ESHB 1724 also established a schedule for local governments to review and update their plans and development regulations, with the next such cycle due September 1, 2002. If master programs are to be

integrated in accordance with ESHB 1724 in this cycle, the guidelines need to address integration issues well in advance of that date.

2. Population growth and changes in the law, planning practice, and use of science since 1971 are significant and require clearer guidance in the rule in order to achieve balanced and effective resource management.

In chapter 90.58.020 RCW the Legislature found "...that the shorelines of the state are among the most valuable and fragile of its natural resources and that there is great concern throughout the state relating to their utilization, protection, restoration and preservation…" and called for "...coordinated planning ... in order to protect the public interest associated with the shorelines of the state while, at the same time, recognizing and protecting private property."

The guidelines need to provide better direction to local governments for effective protection, restoration and preservation of natural resources and utilization of the shorelines, particularly with regard to conflict among uses preferred in the Act.

3. A premise of the Governor's Salmon Recovery Strategy is to use existing laws to comply with the Endangered Species Act. Since salmon depend on many areas and resources within the jurisdiction of the Shoreline Management Act for their survival, the guidelines need to show how local master programs can help implement the strategy to recover salmon and their habitat.

The Tri-County Urban Issues ESA Study (R2 Resource Consultants, et al., 2000), commissioned by the Tri-County ESA Response Effort, evaluated a number of regulatory programs pertinent to salmon recovery and concluded the following with respect to the Shoreline Management Act:

Local Shoreline Master Programs draw special attention to development within 200 feet of the shoreline and allow for broad conditioning authority to protect the shoreline ecosystem and salmon habitat. However, permit exemptions for single family residences, and for piers, docks, and bulkheads accessory to single-family residences that are valued at less than $10,000 (for freshwater locations) or less than $2,500 (for saltwater locations) contribute to cumulative adverse effects on shoreline ecosystems. Permit review is needed to ensure consistency with watershed plans that address the cumulative adverse effects that can result from dense, single family development along shorelines containing critical salmon habitat. Additionally, there has been considerable latitude in interpretation of some of the definitions in the current shoreline master program guidelines. Best available science has not always been applied, and performance criteria that are desirable for salmon recovery have not always been clearly specified.

Local Shoreline Master Programs could be improved in a number of ways. Shoreline modification could be limited only to areas where modification is necessary to support a permitted use. Permitted activities should be geared toward reducing adverse affects and modifications to salmon habitat, and modifications should be allowed only where appropriate for a specific type of shoreline. Preferences should be given to modifications that result in lesser impacts on salmon and that will enhance ecological functions and values. Cumulative impacts on the riparian zone of exempt private structures could be addressed by requiring contributions to a restoration and/or enhancement bank. Where joint-use private docks are encouraged, laws regarding neighbor liability need to be changed to provide incentives. As the Shoreline Master Program Guidelines are modified, they should take into account current laws and technology that did not exist in the past.

# 4 • Alternatives

This chapter first summarizes the process Ecology pursued in arriving at the alternative approaches to updating the Shoreline Master Program Guidelines rules, and then summarizes the alternatives considered by Ecology and its advisory committees. The "No Action" alternative required to be evaluated by SEPA is continued application of the original rule, WAC 173-16. Four other alternatives have been considered: Alternative B — Prescriptive Standards; Alternative C — Policy Guidance; Alternative D — Dual Path Performance Standards; and Alternative E — Negotiated Settlement Performance Standards.

During the winnowing process (see below) alternatives A, B, and C were considered and rejected relatively early in the process. Alternative D then emerged as the preferred alternative. As Alternative D was further developed, elements of the other alternative approaches were incorporated where deemed appropriate. Alternative D was adopted in November 2000. However, a coalition of business groups and local governments challenged the guidelines, and the Shoreline Hearings Board (SHB) in August 2001 invalidated them. In an effort to avoid years of legal appeals, the State of Washington entered into mediation talks aimed at reaching a legal settlement. In December 2002 the parties agreed to a stipulated settlement including a new draft shoreline guidelines rule. In January 2003 Ecology a formal announcement of intent to file the draft rule for adoption. Copies of the stipulated settlement, the Draft SMP Guidelines as negotiated (Attachment A), and settlement agreement details (Attachment B) may be found on the Ecology web site at http://www.ecy.wa.gov/programs/sea/SMA/guidelines/archives/negotiations.html

In simple, colloquial terms, prescriptive standards might be thought of as: "You shall do this, and you'll do it this way." Policy guidance might be thought of as: "You shall do something like this, and figure out for yourself how to accomplish it." Performance standards might be though of as: "You shall do something like this, and we've provided some guidance on performance deemed to indicate that you've met the goals."

This chapter discusses and analyzes the alternatives at varying levels of detail, consistent with the detail to which the alternatives were developed. More detailed analyses are found in Chapter 6 for Alternatives A and E.

## Process of Developing Alternatives

The process of developing an amendment of the shoreline master program guidelines rule occurred in five phases over a period of eleven years as follows.

### *Phase 1: 1992 - 1994*

Ecology first began considering the desirability of amending the shoreline master program guidelines rule in the context of regulatory reform in 1992. That autumn, an informal Regulatory Reform Committee was convened by Ecology, including representatives from Clark, Cowlitz, Douglas, Kittitas, and Thurston counties, and the cities of Anacortes, Bremerton, Issaquah, and Seattle. The committee's report, dated March 1993, formed

the basis of Ecology's recommendations to then-Governor Lowry's Task Force on Regulatory Reform.

Also beginning in 1992, Ecology embarked on what became a 2-year process to work with, and assist local governments in integrating provisions of the Shoreline Management Act with the newly enacted Growth Management Act, including the GMA requirements for local adoption of Critical Area Ordinances. This effort culminated in the release of the 2nd edition of the *Shoreline Management Guidebook* (Shorelands and Coastal Zone Management Program, 1994), which included guidance on integrating growth management with shorelines management.

## *Phase 2: 1995 - 1998*

The 1995 Legislature adopted ESHB 1724 ("…an act relating to implementing the recommendations of to governor's task force on regulatory reform on integrating growth management planning and environmental review…"), including a provision amending the SMA (RCW 90.58.060) which directs Ecology to "periodically review and adopt guidelines" for local shoreline master programs consistent with SMA policy, and "at least once every five years…conduct a review of the guidelines."

In response, Ecology initiated a process to develop shorelands and growth management integration rules and technical assistance materials. Early steps included meeting with local government planners and discussing needs and alternative approaches; contracting with the Social and Economic Sciences Research Center at Washington State University for a public opinion survey on shoreline use and management; and preparing a conceptual draft of a new Guidelines rule.

The 1996 public opinion survey (Social and Economic Sciences Research Center, 1996) was modeled on a 1983 public opinion survey (League of Women Voters, 1983) to enable comparisons across the decades; both surveys addressed fundamental questions on how the public perceives the state's shorelines and shoreline management. The 1996 survey was designed to enable statistically valid comparisons of western Washington and eastern Washington opinions, a feature lacking in the 1983 survey.

When asked about their preferred shoreline uses, people tended to have high-to-medium priorities for wildlife habitat (94%), public parks (93%), and fish farming (71%). Conversely, they registered low or no priority for marinas (58%), industry (76%), shops or restaurants (62%), office buildings (90%), and apartments and condominiums (83%). Priorities for agriculture was pretty evenly split: 51% for a high-to-medium priority, and 49% for a low or no priority rating. Eastside and westside opinions were similar. (Canning, 1997b.)

When asked "Is there too much development on shorelines?" 54% said "Yes" with no significant difference between eastside and westside opinions. This represents a shift in opinion since 1983 when the predominate opinion on the intensity of shoreline development was "about right." (Table 4.1; Canning, 1997b.)

| Table 4.1 Amount of Development on Shorelines | | |
|---|---|---|
| Opinion | 1983 | 1996 |
| Too Little | 6% | 7% |
| About Right | 46% | 39% |
| Too Much | 36% | 54% |
| No Opinion or Don't Know | 12% | 0% |

People tended to have high-to-medium priorities for flood hazard reduction (84%), habitat maintenance (98%), provision of public access (87%), recreation (82%), and protection of wetlands (87%). Conversely, they registered low or no priority for providing for residential development (73%) or providing for commercial development (77%). Opinions on providing for port and industrial development was closely split at 51% for a high-to-medium priority and 49% for a low or no priority. There were no meaningful eastside–westside differences. (Social and Economic Sciences Research Center, 1996; Canning, 1997b.)

Between December 1995 and April 1996 Ecology conducted outreach on the mandated rule amendment and regulatory reform measures:

- a December 1995 questionnaire sent to 230 local governments resulted in a 12% return;
- facilitated focus groups held in Everett, Longview, Moses Lake, and Tacoma in February and March 1996 were attended by 120 persons representing local government, port districts, Indian tribes, environmental organizations, and business and industry; and
- Ecology co-sponsored the April 1996 Planning Association of Washington conference in Spokane where 23% of the planners present attended a special session to discuss the proposed shoreline master program guidelines rule update.

Based upon comments received throughout the outreach process, Ecology formed a Shorelines Policy Advisory Group (SPAG) in May 1996 composed of entities representing a broad range of interests including county and municipal government, environmental organizations, business and industry, and agriculture. The SPAG was charged with assisting Ecology in drafting an amended shoreline master program guidelines rule based upon a discussion draft released on July 1996. The SPAG meet throughout the summer, and a draft amended rule was released for informal comment in October 1996. Some 750 copies of the discussion draft were distributed state-wide. The initial comment deadline of January 31, 1997 was extended to March 3, 1997. The October 1996 draft rule amendment consisted of proposed SMA – GMA integration and regulatory reform measures (largely procedural in nature), and substantive amendments of a "policy guidance" nature (see Alternative C: Policy Guidance).

During early 1997 Ecology also briefed the Land Use Study Commission (LUSC; created by ESHB 1724) on the October 1996 discussion draft rule amendment. The LUSC ap

pointed a subcommittee to review the October 1996 draft and consult with Ecology. The subcommittee met for approximately one year and held seven public meetings to address SMA - GMA integration issues. The subcommittee reached no consensus on substantive changes to the October 1996 draft, but issued a report with directions for more "efficient and effective" shoreline regulations and related legislation, and documenting the need for updated guidelines.

### *Phase 3: 1998 – 2000*

With endorsement of the Governor and the Joint Natural Resources Cabinet, Ecology established a broad-based Guidelines Commission which held nineteen public meetings, reviewed two drafts of a proposed guidelines rule. The following description of the Commission's work is taken from the final Report of the Shoreline Guidelines Commission to the Department of Ecology by the Commission's Chairperson and Facilitator (Somers & Arthur, 1999).

> In June 1998, Governor Gary Locke invited representatives of various interest groups to serve on the Guidelines Commission that the Department of Ecology was forming. Commission members included representatives from counties, cities, ports, business, environmental groups, tribes, and state agencies. Although invited, the Association of Washington Business and the agricultural community declined to participate.
>
> The Guidelines Commission met over 20 times between July 7, 1998 through January 11, 1999. The Commission sought to build on previous efforts to revise the guidelines and integrate the Growth Management Act and the Shoreline Management Act. As a starting point, the Commission focused on a list of issues identified by the Land Use Study Commission (LUSC). After reviewing this preliminary list, the Commission added a number of other related issues.
>
> The Governor's Joint Natural Resources Cabinet (JNRC) asked that the Commission give a progress report to JNRC by September 1. On October 13th, 1998, the Commission Chair Dave Somers met with JNRC and provided an update of the progress of the Commission. At that time the Commission expressed a desire to continue working on guideline recommendations. JNRC supported this extension of time and indicated that the Commission should prioritize revisions related to salmon recovery.
>
> The Commission was an advisory body. Members sought consensus, but understood that where they could not achieve it, Ecology would develop language to put forth as part of a proposed rule. Individual Commission members were responsible for consulting between meetings with representatives of their "constituencies."
>
> At the last meeting, held January 11, members reviewed Ecology's last working draft, dated December 30, 1998. The Chair, assisted by the facilitator, noted those portions of the draft that had consensus support of the Commission and also noted any unresolved issues. This report summarizes the work of the Commission and has the support of all members except where noted. In those exceptions the report attempts to describe the nature of each unresolved issue so that Ecology understands clearly what issues do not have consensus support of the Commission members.

The Guidelines Commission's report noted that the existing Guidelines (WAC 173-16) "need updating for three principal reasons" — [1] the legislative mandate in ESB 1724; [2] population growth and advances in the underlying science, and [3] the Governor's Salmon Recovery Plan. Please refer to Chapter 3, Authority and Need, where the Commission's statement is quoted in its entirety.

The Commission's work resulted in the draft shoreline master program guidelines issued by Ecology for formal public comment in April 1999. Due to an unusually high level of

public interest, the original June 21, 1999 deadline for comments was extended to August 4, 1999, and five more public hearings were scheduled.[5]

In response to the more than 2,500 comments[6] received on the April, 1999 draft guidelines, Ecology withdrew the April 1999 draft rule and developed and released a "working draft" of a alternative guidelines rule incorporating many of the comments received on the April, 1999 release. The working draft was released for informal public comment in December, 1999, and a notice of availability was mailed to everyone who commented on the April, 1999 version. This December, 1999 release was used as a basis for discussions with concerned legislators, local government elected and appointed officials, and other interested parties. Informal comments on the December, 1999 release were accepted through March 1, 2000.

## *Phase 4: 2000*

Some of the local government comments on the December 1999 draft rule version indicated a growing awareness of and concern over the impending "Section 4(d) rules"[7] to be adopted by the National Marine Fisheries Service (NMFS) and the US Fish and Wildlife Service (USFWS), collectively known as "the Federal Services" or simply "the Services") pursuant to the listing of various salmonid species and ESUs[8] under the Endangered Species Act. Some comments expressed concern that Ecology's draft rule was getting out in front of the Services, and thereby was prematurely second-guessing the Federal Services' potential standards for shoreline development. Conversely, other comments expressed concern that Ecology was not getting out in front on the issue, thereby likely proposing a rule which would be incompatible with the impending 4(d) rule. Yet other comments pointed out that not all shorelines regulated by local governments were under an ESA listing.

As Ecology explored the contradictory comments, a dual path approach evolved. The December 1999 draft rule would be edited to respond to the direct comments on general as well as specific features, maintaining the "performance based standards" approach. This came to be known as "Path A" in colloquial terms (not to be confused with Alternative A in the terminology of this EIS). On a parallel track, in discussions with the Federal

---

[5] A total of nine public hearings were held in Ellensburg, Spokane, Olympia, Seattle, Okanogan, Pasco, Bellingham, Montesano, and Vancouver. The Shoreline Management Act requires that four public hearing be held.

[6] Many of the comments were duplicative. For example, approximately 1,000 copies of a form letter were received regarding regulation of residential shoreline armoring.

[7] The 4(d) rule is issued by the federal government and lists "do's" and "don'ts" for protecting threatened salmon. The rule is named after a section of the Endangered Species Act and prohibits the "taking," or harming, of protected salmon or their habitat. Violating the rules spelled out in the 4(d) rule could leave the violator open to federal fines and other penalties. The proposed rule may also list certain activities that can continue without violating the law. (Definition taken from the Tri-county Endangered Species Act web page at http://www.salmoninfo.org/tricounty/QandA.htm)

[8] ESU: "evolutionarily significant unit" — a terminology used to indicate a "distinct" population of Pacific salmon, and therefore a species as defined under the Endangered Species Act.

Services (and other parties), a "Path B" approach began to evolve which would be more definitive than path A.

Ecology's rule development team issued the following statement regarding the dual path approach:

**Shoreline Master Program Guidelines & the ESA**

- The Shoreline Management Act confers broad procedural and substantive authority on the Department of Ecology with regard to the development and approval of locally prepared shoreline master programs and amendments thereto.
- The possible approaches to updating the Guidelines under the SMA can be viewed as a continuum, ranging from an extremely flexible approach with almost no guidance to aid local governments in drafting a consistent SMP, to an extremely prescriptive approach with no room for local governments to adjust for regional characteristics and needs. Most viable approaches to the Guidelines fall somewhere between these two extremes.
- The SMA sets a floor on the level of flexibility the Guidelines can include: at a minimum, the Guidelines must address the elements listed in RCW 90.58.100.
- So long as the guidelines are within the authority of the SMA and consistent with the policy of the act (RCW 90.58.020), the statute does not set a maximum ceiling on the level of prescriptiveness contained in the Guidelines.
- There are a variety of methods available to satisfy the requirements of the federal Endangered Species Act (ESA) with regard to shoreline uses and activities. These include specific reference to the guidelines in the section 4(d) rule ultimately adopted by the federal services (NMFS and USFWS), which can grant an exception from the definition of "take." Any shoreline use or activity that creates a take will be illegal unless allowed by a 4(d) rule exception or alternatively, through an incidental take authorization issued after completion of a section 7 consultation with the federal services. The services and Ecology are committed to pursuing these approaches (see letters to Tom Fitzsimmons of Ecology from both services dated May 22nd, 2000) to ensure that shoreline uses and activities conducted in accordance with the new guidelines and the updated SMPs will be insulated from liability under the ESA.
- The SMA provides sufficient authority to incorporate the requirements of the ESA related to shoreline uses and activities regulated by the act, within the SMP Guidelines. This result can be achieved by following a more specific model.
- Past experience in shorelines management tells us that flexibility is needed to carry out SMA objectives given the range of shoreline conditions and environments that exist in Washington State, and the fact that the SMA applies to areas with listed species as well as to areas with no listed species. NMFS and USFWS suggest that more certainty is needed however, to ensure ESA compliance. Hence, a two path approach is proposed.

**Two Path Rule: Structure & Effect**

- One rule amending WAC 173-26, consisting of two distinct parts: Path A and Path B (shown in the draft rule as Parts III and IV respectively). The two paths may yield different local SMP structure and content, but both would fully comply with requirements of the Shoreline Management Act.
- Path A would set forth mandatory minimum procedures and performance based standards, but would allow local governments the flexibility to decide how to achieve the performance standards.
- All local governments currently covered by the SMA would have to update their SMPs either according to Path A or Path B. They must choose one or the other.

- Nothing in Path A would preclude local governments from negotiating with the Services' their own approach to satisfying ESA requirements. Again, the SMA sets the floor, not the ceiling regarding the level of compliance required for shoreline development.
- Path B is the result of collaboration with NMFS and USFWS, providing specific means for satisfying ESA requirements. Path B has the added benefit of providing local governments the up-front certainty that, if they follow its requirements, their SMPs and local shoreline development approvals will be insulated from liability under the ESA. Path A would not provide such certainty.
- Use of Path B by local governments will be voluntary.
- Regardless of whether a local government proceeded under the requirements of Path A or opted to revise its master program according to Path B, Ecology would review the amendments pursuant to RCW 90.58.090.
- Ecology's decision to approve or deny a revised master program could be appealed to the Growth Management Hearings Board.

Path A and Path B were considered to be synonymous: Path B simply offered a more "definitive" expression of the "performance based standards" expressed in Path A. The Federal Services issued statements indicating that a Section 4(d) exception and/or Section 7 incidental take statement could likely be granted for Path B in the future.

In the proposed amendment of WAC 173-26, Path A was contained in Part III, and Path B was contained in Part IV.

Following the formal public review process, Ecology adopted the proposed rule on November 29, 2000.

## *Phase 5: 2000 - 2003*

Throughout 2000, adoption of a new rule had remained controversial, especially regarding the dual path approach. In December 2000, the Washington Association of Business (AWB) — representing a coalition of business organizations, cities, and counties) — and the Washington Aggregates and Concrete Association appealed the new guidelines rule to the Shoreline Hearings Board (SHB). The Washington Environmental Council (WEC) lead an environmental coalition which intervened in support of the guidelines rule.

The Shorelines Hearings Board, in a split decision on August 27, 2001, ruled that Ecology had failed to properly conduct the rule review process and that certain provisions of Path B exceeded statutory authority. The ruling invalidated the new guidelines, but did not invalidate Ecology's repeal of the previous rule (WAC 173-16), thus leaving the state with no shoreline master program guidelines rule. Existing local master programs remained in effect.

Quickly, parties to the original SHB appeal moved to appeal the SHB decision to Thurston County Superior Court. However, based on Ecology director Tom Fitzsimmon's belief that mediation would be more beneficial than protracted litigation, the Governor and the Attorney General convened mediation talks aimed at reaching a negotiated settlement. Mediators were selected, the parties to the lawsuit appointed representatives, and mediated negotiations extended from early 2001 through late 2002.

By autumn 2002 a negotiated version of a new draft shoreline master program guidelines rule had been achieved, and shortly thereafter all the other necessary agreements (e.g. funding and local adoption schedules) were in place. The parties entered into a formal settlement agreement on December 20, 2002.

In January 2003, in conformance with the settlement agreement, Ecology initiated the public process for formal adoption of the negotiated settlement draft guidelines rule.

## Alternative A: No Action
## Continued Implementation of Existing WAC 173-16

For purposes of environmental impact analysis, continuing to use the existing Shoreline Mater Program Guidelines rule (WAC 173-16) is considered to be the 'no action alternative.' As discussed in Chapter 1, the State Environmental Policy Act (SEPA) requires that a 'no action alternative' be analyzed. Previous environmental impact statements on earlier iterations of the proposed action analyzed continued utilization of WAC 173-16. With the inadvertent voiding of WAC 173-16 there is now no existing guidelines rule to remain in place if the preferred alternative is not adopted. However, SEPA requires 'no action' analysis, and the Shoreline Management Act requires Ecology to adopt guidelines. Therefore, for purposes of environmental impact analysis, we choose to hold with our previous analyses of continued implementation of WAC 173-16 as the 'no action alternative.' The following analyses are therefore worded as if WAC 173-16 was still in effect.

WAC 173-16 is characterized in Chapter 6, Significant Impacts, for analytical comparison with the preferred alternative.

### *Environmental Protection*

The original shoreline master program guidelines rule no longer provides an adequate level of environmental protection to meet the intent of the SMA. Existing conditions and trends in shoreline jurisdiction are not acceptable for sensitive species recovery or for protection of the natural ecological functions of the shorelines of the state. Sections of the guidelines addressing natural systems and use activities have not proven to be adequate in protecting shoreline ecological functions. With continued implementation of the No Action alternative, it is fair to expect current trends in shoreline management to continue. These trends would include a net increase in shoreline armoring, an increase in development within shoreline jurisdiction, continued degradation of water quality, and a continued net loss of shoreline habitat[9].

Much has been learned about the physical and biological character of Washington's shorelines since 1972. Since adoption and initial implementation of the Shoreline Man

---

[9] Obviously, the "trends" are variable when viewed locally. One the one hand, an increase in the intensity and density of shoreline development will lead to a continuation or even worsening of adverse effects in some locales. On the other hand, some local governments have adopted updated master programs which in some respects provide improved shoreline management leading to a stabilization or even improvement of effects trends.

agement Act, studies have been conducted for example, on the ecological importance of near shore areas, shoreline morphology, and the needs of wild salmonids. These studies have indicated that the cumulative impacts of shoreline modifications are adversely impacting the productive capacity of the state's waters (see Chapter 5, Habitat-scale Existing Conditions & Impacts Under WAC 173-16.

The 1972 Guidelines were based on science dating from the 1960s that identified the adverse impacts of dumping, dredging, filling, channelizing, etc. These were the result of large-scale projects with far-reaching and visible impacts. To varying degrees, the SMA has been a success in controlling or moderating most of these impacts while allowing important economic development to continue.

The issue now is that we continue to lose shoreline resources as a result of the cumulative impact of many small scale and dispersed projects on the shoreline. As more and more shoreline is developed, the native vegetation is removed and the physical character of the shoreline is changed. The fish and wildlife dependent on those physical and biological characteristics are eliminated. The policy of the SMA is to "protect against adverse effects to… the land and its vegetation and wildlife," and on shorelines of statewide significance (SSWS) to "preserve the natural character" and "protect the resources and ecology" of the shoreline. These policies are not adequately addressed by the current guidelines and thereby are not adequately addressed by most of the SMPs in effect today.

## *State and Local Responsibility*

Without an update of the guidelines, the roles of the state and local governments would remain as they are today. The state government would continue to administer the SMP guidelines to meet the directives of the SMA. The state would also continue with its role of providing technical assistance, when available, to local governments. Local jurisdictions would follow the existing guidelines to write and amend their master programs and the Department of Ecology would be required to review and approve the SMPs consistent with the current guidelines. The state could increase enforcement efforts to make local governments better comply with the existing guidelines.

## *SMA-GMA Consistency*

This section assesses consistency with various aspects of the Growth Management Act, the Shorelines Management Act, and other laws.

### *Consistency with GMA*

At the broad policy level, the SMA and the Growth Management Act (GMA; RCW 36.70A)) are compatible and consistent.

However, as a result of the 1995 amendments to the GMA, the local master program policies are an element of the local comprehensive plan and the master program regulations are part of the local development regulations. RCW 36.70A.070 further requires:

> The comprehensive plan of a county or city that is required or chooses to plan under RCW 36.70A.040 shall consist of a map or maps, and descriptive text covering objectives, principles, and standards used to develop the comprehensive plan. The plan shall be an internally consistent

> document and all elements shall be consistent with the future land use map. A comprehensive plan shall be adopted and amended with public participation as provided in RCW 36.70A.140.

Therefore, within the SMP Guidelines, there are issues related to GMA policy, process and terminology that need to be addressed to facilitate local SMA planning in the context of the GMA.

The most basic issue is that WAC 173-16 does not acknowledge the policies and requirements of the GMA. The guidelines were written from the perspective that no comparable state level planning requirements applied. In circumstances where a balancing of planning interests is required, the Guidelines provide no guidance to local government and a very limited basis for Ecology to properly consider such interests. This increases the opportunity for conflict between the local government, Ecology and other interested parties.

The Department of Community, Trade, and Economic Development (DCTED) has adopted minimum criteria for compliance with GMA (WAC 365-190 and 195). To varying degrees, these criteria address topics of interest in SMA implementation. While there is some consistency in purpose between the GMA procedural criteria and the SMP guidelines, there are significant overlaps and inconsistencies between the two regulations. An example of this is the public participation requirements. Both regulations include extensive specific requirements. The requirements are not the same and are not completely compatible.

The use of terms presents opportunities for misunderstanding. Some terms such as "urban" and "rural" have specific meanings in each that are not directly compatible and lead to misunderstandings. Others, such as "element" are used similarly, but still create confusion. The policies of the local master program are an element of the comprehensive plan as designated by the GMA. The SMA requires that a local master program contain several specific elements addressing certain subject areas.

### *Consistency with SMA*

Since 1972 the SMA, and the way it is implemented, has changed. Statutory changes have been made to definitions and to other provisions. Implementation has evolved substantially in response to changes in other law (such as the GMA), Shorelines Hearings Board (SHB) decisions and court cases, and through day to day experience. At the time the guidelines were written, no one had ever written a shoreline master program. Most of the original master programs bear strong resemblance to the guidelines. Some communities have taken new approaches to SMP organization in their SMP updates which appear to provide more effective management.

Aside from the requirements of ESHB 1724, two amendments to the SMA require amendments to the guidelines. In 1991, as a part of flood related legislation, a provision was added requiring a flood prevention element in all master programs (RCW 90.58.100(2)(h)). In 1992, a provision was added requiring master programs to incorporate shoreline erosion protection requirements (RCW 90.58.100(6)). Work was underway to do both of these amendments in 1995. However, the 1995 changes to the SMA suggested a more comprehensive approach and so those single purpose amendments were incorporated into the overall effort to update the guidelines.

### Shorelines of Statewide Significance

The SMA establishes certain shorelines as being of greater importance than others, from a statewide perspective. Shorelines of statewide significance (SSWS) are established in the SMA with a variety of criteria and applicability. They generally include the marine waters, some of the tidelands and uplands adjacent to the marine waters, and the larger lakes and streams and the lands adjacent to them. Special policies are established for SSWS in RCW 90.58.020. The SMA identifies a requirement for development of guidelines for SSWS, separate from other shorelines. The SMA also requires that Ecology assure that the SMP provide for "optimum implementation of the policy of this chapter to satisfy the statewide interest" when making a decision on a local master program as it applies to SSWS. The SMA also establishes different criteria for review of master programs by the Growth Management Hearings Boards and SHB when SSWS are involved. (RCW 90.58.190).

### Shoreline Uses

The 1972 Guidelines were oriented toward management of typical shoreline uses of the time. Resource based industries dominated the industrial waterfront and international trade was limited and tied to the resource industries. Vacation homes were scattered along the shoreline.

The way we use shorelines has changed dramatically. International trade, recreation, and multiple use developments now dominate the urban waterfront. Residential uses have proliferated and changed in character. Most shoreline residences are now full time residences. Redevelopment of residential sites is common with large homes replacing cabins. Instead of houses scattered along the shoreline, there is continuous residential development along many if not most of our lakes and marine waters with only scattered undeveloped land. The cumulative impact of continuous residential development on the shoreline was not adequately addressed by the guidelines.[10]

Issues such as brownfields redevelopment, sediment contamination clean-up, habitat restoration, mitigation banking and dredged material management have emerged and require a flexible approach. While the intent behind such activities is clearly consistent with the overall intent of the SMA, the guidelines, and the existing master programs, have often been an impediment to such projects because the guidelines do not address them.

### Impacts on Permit Processing

RCW 90.58.140 requires that a shoreline permit may only be issued when it is consistent with the approved local master program and the SMA. The guidelines were intended to form the basis for approval of master programs and are only directly applicable to permits in very limited circumstances.

---

[10] Ecology recognized this trend in the mid 1980s and developed guidance materials to deal with it, but these materials are not incorporated into the SMP Guidelines rule.

The effect of maintaining the existing guidelines is then a secondary effect. Approximately 50 % of the master programs statewide have never been amended; over 80% have not had significant amendments or been rewritten. As a general matter, these programs reflect the deficiencies identified above as applicable to the guidelines. Thereby, a project proponent cannot rely on the provisions of the SMP as assuring compliance with the policy of the SMA, encounters confusion between GMA and SMA requirements and may receive contradictory guidance from various local and state agencies. This leads to uncertainty and delays in permit processing. Further, where a project proponent seeks approval to do clean-up, restoration, or otherwise to employ innovative approaches to environmentally sound development, the master program is likely to be an impediment.

#### *Consistency with Other Statutes*

The land and water areas within the jurisdiction of the SMA are also the subject of other regulatory programs at the local, state and federal level, including, but not limited to:

- Local: Zoning, Subdivision, Critical Areas, Flood Plain, Clearing and Grading;
- State: Hydraulics Code, Forest Practices Act, Surface Mining, Water Pollution Control Act, Water Code; and
- Federal: Clean Water Act, Rivers and Harbors Act, Endangered Species Act.

While all of these have common interests with the SMA, none of them are intended to address the specific policy interests of the SMA in a comprehensive manner.

Critical area regulations and local SMPs address common geography and subject matter. All of the types of critical areas occur at least partly within SMA jurisdiction and two (shellfish beds and kelp and eelgrass areas) occur only within SMA jurisdiction.

### *Statutory Directive*

Maintenance of the current guidelines as found in WAC 173-16 is presented here as the No Action Alternative required by the State Environmental Policy Act (SEPA). The legislature, however, has precluded a 'no action' outcome: as noted above, ESHB 1724 requires Ecology to update the guidelines at least once every five years.

## Alternative B: Prescriptive Standards

The Guidelines Commission (1998 – 1999) considered developing new guidelines with specific prescriptive standards. This alternative approach would result in a rule with specific numerical standards, effective state-wide, that set minimum requirements for local governments to achieve through their local SMPs for the full range of shoreline uses. This alternative approach was considered early in the Commission's process, and discussed repeatedly throughout the Commission's term. No consensus was ever reached by the Commission members that Prescriptive Standards were a desirable or viable approach despite the passionate support for this pathway by some Commission members.

In consultation with local government representatives, Department of Ecology staff learned that while some local planners supported prescriptive standards, others viewed them as too restrictive and therefore counter-productive.

In the end, Ecology determined that Prescriptive Standards were not a viable alternative for lack of broad support, and chose not to pursue this alternative.

### *Environmental Protection*

Prescriptive standards would provide highly specific direction to local governments with a strict test for compliance. These criteria could allow for less flexibility and creativity in the planning process, but could ensure consistent management of shoreline resources across jurisdictions. However, Washington's shoreline environments are extremely diverse. Setting strict prescriptive standards across the board could be very complex and difficult to administer.

### *State and Local Responsibility*

Prescriptive standards would result in a considerable reduction in local government's autonomy and authority to prepare individualized master programs. Each local jurisdiction would be required to write master programs to meet the state-prescribed standards. The state may need to assume a greater responsibility for monitoring and enforcing compliance on the local level. Non-complying jurisdictions would require state assistance and technical support. The relationship between local governments and the state could become contentious over staffing and funding issues for inventories and monitoring and applicable standards. Cooperation between local and state government may be difficult to maintain.

### *SMA-GMA Consistency*

The Prescriptive Standards Alternative was rejected by the Guidelines Commission for further study before it could be developed to a level-of-detail sufficient to assess consistency between SMA and GMA.

### *Salmon Habitat*

Historically, either prescriptive standards or an effective performance based approach is essential in species recovery programs. Prescriptive standards could be a definitive approach to meet the objectives of the state's salmon recovery program if sufficient regional versatility were incorporated into the rule. The Guidelines Commission judged that the needed regional versatility could be better achieved through a Performance Standards Alternative.

## Alternative C: Policy Guidance

The Shorelines Guidelines Commission also considered using a general policy approach that would provide guidance to local governments and flexibility to implement individual SMPs at the local level. However, as with Alternative B, Prescriptive Standards, no consensus could be reached that Policy Guidance was a viable approach, and therefore was eliminated from detailed study early in the Commission's process.

### *Environmental Protection*

A general policy approach would provide the greatest flexibility to local governments to develop a localized SMP that would address issues of local concern. Policy level guidelines would direct local jurisdictions to protect environmental functions in shoreline areas. However, because a policy-oriented set of guidelines would not include standards, a lesser level of certainty for environmental protection would result. Policy oriented guidelines would not include tests for compliance. Also, there would be no certainty for consistent management between neighboring jurisdictions, which could result in ineffective management of shoreline resources on a system-wide, or watershed scale.

### *State and Local Responsibility*

With policy level guidelines, the state's role as program reviewer and technical assistant would need to be expanded. The state would continue to address local plans on a case by case basis. State support for guidance, technical assistance, and, in many cases, planning expertise would be a necessity. For those local jurisdictions with minimal funding or planning staff, the state would need to provide adequate support, both technical and monetary, to enable them to produce effective individualized SMPs. The local governments' roles would also be expanded. With a higher level of flexibility, the local jurisdiction would be positioned to develop a customized SMP. This effort would require planning and policy development.

### *SMA-GMA Consistency*

Alternative C would allow for consistent integration of SMA and GMA. Much like in Alternative D, policy guidance would provide local governments with the ability and the direction to integrate their planning efforts, reduce unnecessary duplication in the planning process, and develop consistent language for the local plans.

### *Salmon Habitat*

It is likely that a policy level approach would not help the state's efforts to comply with salmon recovery efforts. The increased level of flexibility given to local governments coupled with the lack of certainty in environmental outcomes would not be an effective mechanism in the statewide approach to salmon recovery. Without specific standards for recovery efforts, a system-wide or landscape approach would be virtually impossible.

## Alternative D: Dual Path Performance Standards

The former (2000) preferred alternative, Performance Standards, was an amendment of WAC 173-26, incorporating two new sections, Part III and Part IV, each containing new guidelines for shoreline master programs, and voiding the existing shoreline master program guidelines in WAC 173-16.

As described in Chapter 4 (Process of Developing Alternatives, Phase 4), Parts III and IV were dual paths to achieving the same results under the Shoreline Management Act. Part III set forth "mandatory minimum procedures and performance based standards, but would allow local governments the flexibility to decide how to achieve the performance

standards." Part IV, on the other hand, provided greater specificity to aid local governments in developing a master program that achieves the performance standards.

All local governments required by the SMA to adopt a shoreline master program (SMP) would have been required to amend their existing SMP in accordance with Part III, or alternatively, at their choice, under Part IV.

The Guidelines Commission determined that in all areas of the guidelines it is beneficial to give policy direction, while in other areas additional specific standards may be optimal. The Performance Standards Alternative was a compilation of policies and standards. If written effectively, a rule using performance standards provides local government with adequate flexibility to adapt a master program to local conditions as well as demanding a high level of certainty for environmental protection. Alternative D set goals, but allowed local governments to set their own course to reach these goals. This approach allowed flexibility to enable local governments to develop customized master programs and it demanded a high level of certainty for effective environmental protection.

Subsequent to the Guidelines Commission, Alternative D was edited by Ecology in response to comments received from local governments, the general public, and other interested parties. As described in Chapter 4 (Process of Developing Alternatives, Phase 4), Part IV was developed in response to needs for a more definitive expression, or statement, of the performance standards proposed by Ecology in the December 1999 draft.

### *Environmental Protection*

Performance standards measure results. Alternative D would have set high levels of environmental protection, but would not specifically direct a local government how to achieve this result. This allowed local flexibility, but did not relieve the need to meet the prescribed performance standards. Certain risks are inherent in making performance standards the method of determining environmental protection. One risk is the reactive nature of performance standards; compliance is not determined until after results have been attained. This could cause some concern. However, proper safeguards were deemed available. The Department of Ecology would continue to review and approve master programs. If an SMP is inadequate, the department would not grant approval.

Part IV expressed performance standards for environmental protection in more definitive language than did Part III. While Part III and Part IV were both performance-based standards, the level of definition in Part IV was greater than in Part III. However, Part IV was still less prescriptive than Alternative B would have been.

### *State and Local Responsibility*

Alternative D was designed to allow maximum flexibility to local governments while concurrently requiring some specific standards from the state. This approach was designed to protect the essential ecological functions of the shoreline resources with predetermined standards. This level of specificity for critical resource protection gave local jurisdictions direct guidance and created a simple test for compliance. Policy-level guidelines would be developed by the Department of Ecology to address resources and functions not governed with set standards. Policy guidance in the rule would consistently

direct local governments toward a desired SMP goal without directing the means to the end. In Part IV, in certain instances, this policy direction was supplemented with more specific guidance on how to achieve the performance standards. This level of guidance would allow for innovative, flexible, and varied approaches that will be developed on a case-by-case level and created individually to meet the needs of the local jurisdiction. In the case of those jurisdictions which chose to plan under Part IV, there was an added level of specificity and certainty.

As is currently the case, Ecology would review all SMPs and approve those with acceptable environmental protection.

As with Alternative C, Policy Guidance, the state's role as program reviewer and technical assistant would need to be expanded. State support for guidance, technical assistance, and, in many cases, planning expertise would be a necessity. For those local jurisdictions with minimal funding or planning staff, the state would need to provide adequate support, both technical and monetary, to enable them to produce effective individualized SMPs. The local governments' roles would also be expanded. With a higher level of flexibility, the local jurisdiction would be positioned to develop a customized SMP. This effort would require planning and policy development.

### *SMA-GMA Consistency*

Alternative D would work to integrate the requirements of the SMA with those of the GMA for jurisdictions planning under the Growth Management Act. Alternative D provided measures to reduce administrative duplication, thereby allowing integration of elements of local plans and opportunities for enhancement of shoreline management through integrated planning efforts.

### *Salmon Habitat*

Alternative D had the potential to effectively address the needs of Washington State's salmon recovery effort in shoreline areas. Performance standards would be set to protect and restore needed salmon habitat. These standards were measurable and could be held to a strict test for compliance. In this way, Alternative D was similar to a prescriptive standards approach. However, Alternative D had added flexibility for salmon recovery that could make implementation of local plans easier and more effective. For example, a local government, knowing it must reach a predetermined level of compliance with water quality or as an element of the state's salmon recovery effort, would have had the added flexibility of determining how to implement a resource protection program to accomplish the required level of protection. For Part III, the Department of Ecology would not mandate a specified approach, but only the requisite result. Part IV added additional specificity and guidance for meeting the broad goals of the guidelines. This way a local jurisdiction could, to the extent they desired, creatively and individually craft a program to meet the state's goals. This could be a local program to protect critical habitat areas by requiring conservation easements in developing areas, or by instituting programs to assist in large woody debris recruitment in salmon bearing streams. Allowing opportunity for creative planning on the local level could be an effective method to meet state goals for salmon recovery.

## Alternative E: Negotiated Settlement Performance Standards

While the preferred alternative, Alternative E, is a derivative of Alternative D, it is one which was subjected to thorough debate by the negotiation team which re-thought the concept and purpose of the required shoreline master program guidelines rule. That thinking was then expressed in a body of "governing principles" which formed the fundamental basis for the re-written rule. In summary, those governing principles[11] are:

1. "The guidelines are subordinate to the Act. Any inconsistency between the guidelines and the Act must be resolved in accordance with the Act."
2. "The guidelines are intended to reflect the policy goals of the Act, as described in WAC 173-26-175 and WAC 173-26-180."
3. "All relevant policy goals must be addressed in the planning policies of master programs."
4. "The planning policies of master programs (as distinguished from the development regulations of master programs) may be achieved by a number of means, only one of which is the regulation of development…"
5. "The Policy goals of the Act, implemented by the planning policies of master programs, may not be achievable by development regulation alone…"
6. "The territorial jurisdictions of the master program's planning function and regulatory function are legally distinct. The planning function may, and in some circumstances must, look beyond the territorial limits of shorelines of the state… The regulatory function is limited to the territorial limits of shorelines of the state…"
7. The planning policies and regulatory provisions of master programs and the [GMA] comprehensive plans and development regulations…shall be integrated and coordinated…"
8. "…It is recognized that shoreline ecological functions may be impaired not only by shoreline development subject to the substantial development permit requirement of the Act but also by past actions, unregulated activities, and development that is exempt from the Act's permit requirements. The principle regarding protecting shoreline ecological systems is accomplished by these guidelines in several ways, and in the context of related principles. These include…"
9. "To the extent consistent with the policy and use preference of 90.58.020, this chapter (WAC 173-26), and these principles, local governments have reasonable discretion to balance the various policy goals of this chapter, in light of other relevant local, state, and federal regulatory and non-regulatory programs, and to modify master programs to reflect changing circumstances."
10. "Local governments, in adopting and amending master programs and the department in its review capacity shall, to the extent feasible, as required by RCW 90.58.100(1)"…[use all available information, technical resources, and techniques].
11. "In reviewing and approving local government actions under 90.58.090, the department shall insure that the state's interest in shorelines is protected, including compliance with the policy and provisions of 90.58.020."

In some respects Alternative E might be seen by some as a shift towards the "policy guidance" side of the "performance standards" balancing of policy and prescription as compared with Alternative D. However, the governing principles unique to Alternative E provide explicit direction, linked to statute, for policy guidance.

---

[11] For a full statement of the governing principles, refer to WAC 173-26-185

### *Environmental Protection*

Alternative E sets high levels of environmental protection, but would not specifically direct a local government how to achieve this result. This allows local flexibility, but does not relieve the need to meet the prescribed performance standards. Certain risks are inherent in making performance standards the method of determining environmental protection. One risk is the reactive nature of performance standards; compliance is not determined until after results have been attained. This could cause some concern. However, proper safeguards were deemed available. The Department of Ecology will continue to review and approve master programs. If an SMP is inadequate, the department would not grant approval.

### *State and Local Responsibility*

Alternative E was designed to allow maximum flexibility to local governments while concurrently requiring some specific standards from the state. This approach was designed to protect the essential ecological functions of the shoreline resources with predetermined standards. This level of specificity for critical resource protection gave local jurisdictions direct guidance and created a simple test for compliance. Policy-level guidelines will be developed by the Department of Ecology to address resources and functions not governed with set standards. Policy guidance in the rule will consistently direct local governments toward a desired SMP goal without directing the means to the end.

As is currently the case, Ecology will review all SMPs and approve those with acceptable environmental protection.

As with Alternatives C and D, the state's role as program reviewer and technical assistant would need to be expanded. State support for guidance, technical assistance, and, in many cases, planning expertise would be a necessity. For those local jurisdictions with minimal funding or planning staff, the state would need to provide adequate support, both technical and monetary, to enable them to produce effective individualized SMPs. The local governments' roles would also be expanded. With a higher level of flexibility, the local jurisdiction would be positioned to develop a customized SMP. This effort would require planning and policy development.

### *SMA-GMA Consistency*

Alternative E works to integrate the requirements of the SMA with those of the GMA for jurisdictions planning under the Growth Management Act. Alternative E provides measures to reduce administrative duplication, thereby allowing integration of elements of local plans and opportunities for enhancement of shoreline management through integrated planning efforts.

### *Shoreline Habitats*

Alternative E is significantly different from alternatives B, C, and D in that it broadly addresses shoreline habitats and their ecological functions, rather than focusing on salmon and salmon habitat protection restoration. Alternative E also clearly acknowledges that

habitat recovery (including salmon recovery) cannot be achieved simply through regulation of new development, but requires an integrated approach which also addresses comprehensive habitat restoration planning and nonregulatory approaches.

# 5 • Habitat-scale Existing Conditions and Impacts under WAC 173-16

## Introduction and Overview

This chapter on habitat-scale existing conditions addresses the primary landscapes which come under the Shoreline Management Act — an act which was adopted in 1971, and for which substantive implementation had begun by the mid 1970s when most local governments had adopted shoreline master programs under WAC 173-16. Therefore, this chapter is also a description of the environmental impacts and trends resulting from the application of WAC 173-16.

This chapter is organized around the fundamental landscape features which come under the Shoreline Management Act: marine systems and habitats, stream and river systems and habitats, lakes and lakeshores, and wetlands.

The existing conditions descriptions provided in this chapter address basic, landscape scale characteristics from a state-wide perspective; where necessary, additional, more specific characterizations are provided in the comparative impact analyses in Chapter 6. Some existing conditions descriptions also address recent trends in adverse effects of land uses and practices.

Readers are cautioned to remember that the broad characterizations and trends presented here will, of course, show some variation in different landscapes and land uses across the state. Environmental degradation trends will proceed at different rates depending on the predominate land use, the intensity of land use, and the pace of development. Some addition information on the characteristics of particular land uses can be found in Chapter 6 in the section on Shoreline uses. In some discrete areas environmental improvements might be found. In general, however, the broad themes presented here are accurate on a state-wide basis.

As compared with the 2000 EISs, this 2003 EIS is updated to include reference to research completed between 2000 and early 2003.

## Marine Shorelines

Washington State has three distinct "coasts" — the shores of the inland marine waters of Puget Sound and the Strait of Juan de Fuca (2,246 mi); the Pacific Ocean coast itself (171 mi); and the shores of the estuaries fronting the Pacific Ocean (313 mi)[12]. Several aspects of the state's coasts are considered here; other very specific information is provided in Chapter 6.

---

[12] Readers familiar with descriptions of Washington's coast may be aware of other marine shoreline length documentations; here we use the lengths defined by Hagen (1958).

## *Inland Marine Shorelines*

The coast of Puget Sound includes the most intensively developed marine shorelines in the region, in particular the rapidly growing Tacoma – Seattle – Everett metropolitan complex, where high density urban and port facility development is centered on major river deltas and their bays. Outlying suburban shorelines have long been popular for second homes and residences; a growing phenomenon is a trend to redevelop old sub-thousand square foot houses into multi-thousand square foot houses resulting in a substantially greater footprint on the land. In places, a "strip city" forms along the shore with high density residential development backed by remnant rural land uses in the interior. Remnants of agricultural lands and timber-growing tracts can still be found in rural areas. For the most part, the shores of the Strait of Juan de Fuca are relatively undeveloped though they have been subject to timber harvest.

Puget Sound shorelines are predominately narrow beaches, fully or mostly inundated at high tides, and backed by steep banks or bluffs. Most coastal bluffs are unstable or marginally stable; landsliding is common during wet winters when heavy rainfall saturates the soil and upper geologic layers (Gerstel, et al., 1997; Baum et al., 1998). Sand spits are few and mostly small. Rocky shores are common only in the San Juan Islands or north Puget Sound. Substantial portions of the central and south Puget Sound shoreline have been armored in urban areas, at shoreline railroad fills, and for shoreline residential development.

Storm and wave energy regimes are tempered by Puget Sound's inland location, with most storms coming out of the south. When, rarely, a northerly storm occurs at high tide the damage to structures built close to the shore can be substantial.

No comprehensive study of the state of Puget Sound shorelines has been completed, but King County has completed a reconnaissance study of King County marine shorelines, including Vashon and Maury islands (Brennan, 2001). The following paragraphs are excerpted from Chapter 12 (Conclusions and Recommendations) of the report, the whole of which is incorporated by reference.

> The nearshore ecosystem plays a critical role in support of a wide variety of biological resources, many of which are important to the people of the region for commercial, recreational, cultural, aesthetic, and other social values. These resources include the physical characteristics as well as numerous species of shellfish, finfishes, birds and other wildlife. Resources such as bivalves are common on beaches and flats. A large number of fish species use nearshore habitats for feeding, refuge, migration, and reproduction. Juvenile salmon preferentially feed on prey produced in the nearshore habitats including subestuaries, flats, beaches, riparian zones, kelp, and eelgrass meadows. These habitats are far removed from salmon spawning areas, which have been the focus of salmon life history and strategies for protection of critical salmonid habitat. However, nearshore habitat clearly plays an important role in the support of these highly migratory species through both direct and indirect mechanisms. For example, the riparian zone bordering the nearshore provides a direct source of prey for salmon and shade that enhances beach conditions for spawning forage fish and other species that use upper intertidal zones.
>
> The interactive effect of human-caused changes and natural variability on processes and resources has not been studied. Consideration and documentation of natural versus human-induced stressors on the nearshore ecosystem are sorely needed. The underlying causes of poorly understood phenomena, such as widespread declines in herring stocks and reductions in salmon body size, may become clearer through such studies. The fact that both human and climate-related factors may

play a role is only speculative at this time. In many circumstances, we lack the mechanistic understanding to judge what is natural versus what is not natural in forcing variations we see in the nearshore ecosystem.

The viability of the nearshore system processes that support these resources has been damaged and continues to be threatened by a wide variety of human-induced changes. The essential habitat-forming and many fundamental ecological processes have been severely damaged throughout much of the study area. Factors that have contributed include overwater structures, dredging, filling, shoreline armoring, shoreline vegetation removal, chemical and bacteria contamination, organic matter and nutrient loading, resource extraction (i.e., sport and commercial harvest, logging activities, mining), land-use practices (i.e., commercial and residential development, roads, bridges, transportation facilities), commercial activities (i.e., shipping, wastewater disposal), and recreational activities and support (i.e., boating, marinas). Major losses because of dredging and filling have occurred in Elliott Bay and Shilshole Bay, but losses have occurred in other areas as well as a result of development and land use practices. In many cases, multiple stressors are affecting shoreline areas. For example, Lincoln Park suffers from beach erosion caused by a seawall, but is also subjected to heavy clam harvesting and fecal contamination.

Shoreline modifications have occurred over an exceedingly high percentage of WRIAs 8 and 9 nearshore habitats, and represent one of the larger impacts on the nearshore ecology of the region. Numerous studies and reports have identified anthropogenic causes of habitat loss and degradation, species declines, and the needs for improving resource management and ecosystem health. While improvements have been made in some areas, the general condition of the nearshore environment continues on a downward trend due to a lack of attention, inadequate resources, and inadequate response to warnings and recommendations for improvement.

The cumulative effects of multiple stressors, or individual stressors over various temporal and spatial scales, on the nearshore system are unstudied in a systematic way. Despite a good foundation for conceptual approaches and an understanding of the links between shoreline structural alteration, physical processes, and biological functions, there is a surprising gap in our documentation of ecological changes (Thayer et al. 1975). Furthermore, neither historical baseline nor current monitoring data provide the basis for understanding the magnitude of this change or threshold for cumulative impacts (Canning and Shipman 1995). In order to restore nearshore systems, it is essential to better understand the interaction of multiple stressors on the ecosystem.

The nearshore must be addressed from an ecosystem perspective. The nearshore environment is influenced by a plethora of factors, both natural and anthropogenic, due to its placement in the larger landscape. Factors that effect oceanic, freshwater and terrestrial systems individually, all come together in a “great mixing bowl” to create a unique environment in the Puget Sound nearshore. Understanding all of the unique characteristics and complexities is a tremendous task that will take many years of dedicated, well coordinated research and analysis. However, this will require a shift from our approach of single-species, or single-habitat management to an integrated ecosystem approach. For example, we need to understand that land-use practices along our shorelines have direct and indirect influences on the nearshore ecosystem (i.e., loss of vegetation, changes in sedimentation, water quality, and hydrology). These influences result in changes such as habitat structure, food supply and other elements that can reduce the viability of multiple species within the system. Other factors, such as dams and water withdrawals, geographically far removed from the nearshore, can dramatically influence sediment supply and salinity in subestuaries, which in turn changes vegetation communities, habitat structure and species composition. The nearshore is therefore not only part of an individual watershed, but is also the thread that binds together multiple watersheds. Thus, it is imperative that we not only understand the nearshore ecosystem as a unique “marine” system, but that we also look across the landscape to determine how the nearshore interacts with influences from other distinct ecosystems.

## *Ocean Coast Shorelines*

The Pacific Ocean coast, by contrast, has markedly lower intensity development. There is no major urban center. Significant portions of the coast are public parks or other reservations, or within the bounds of Indian reservations. Development (mostly low density residential) occurs only in limited areas along this coast.

The ocean coast is open to the full force of storm-driven waves. During El Niño winters the sea level can temporarily be a foot or more above normal, accompanied by an increased frequency of storm waves, potentially causing temporary but unusually severe erosion (Kaminsky, Ruggiero & Gelfenbaum, 1998).

### *North Pacific Coast Shorelines*

Washington's north Pacific coast is characterized by steep, rocky bluffs and headlands, punctuated by a few small pocket beaches, with land ownership predominately within Olympic National Park and five Indian reservations.

There are no known comprehensive studies characterizing the state of the North Pacific coast shoreline habitats. However, a review of shoreline aerial oblique photographs published the Department of Ecology's Digital Coastal Atlas at http://www.ecy.wa.gov/ programs/sea/ SMA/atlas_home.html shows that over the entire 113-mile north Pacific coast from Cape Flattery south to Moclips, there are only four developed areas, each a square mile or less in extent: the former Makah Air Force Station on the Makah Indian Reservation; La Push on the Quileute Indian Reservation; Kalaloch in Olympia National Park; and Taholah on the Quinault Indian Reservation. Other than those developed areas the remaining 100 miles of this part of the coast is forested.

Because of no or low development pressures, this shoreline remains relatively intact ecologically. The Department of Ecology has no jurisdiction under the Shoreline Management Act over national park lands or Indian reservation lands, and therefore little jurisdiction over shorelines in this region.

### *South Pacific Coast Shorelines*

Washington's south Pacific coast is characterized by a broad coastal plain and sandy beaches and sandspits acting, in effect, as "barrier islands" at the mouths of Willapa Bay and Grays Harbor. For most of the 20$^{th}$ century the southwest coast beaches have been accretional (Phipps & Smith, 1978) but beginning in the 1980s the rate of accretion began to slow (Phipps, 1990). The most damaging and dramatic effects of El Niño season coastal erosion tends to occur at or near bay mouth entrances.

Land ownership is mostly in small residential parcels and lots. Notable exceptions include Ocean Shores and Westport.

There are no known comprehensive studies characterizing the state of the South Pacific coast shoreline habitats. However, a review of shoreline aerial oblique photographs published the Department of Ecology's Digital Coastal Atlas at http://www.ecy.wa.gov/ programs/sea/ SMA/atlas_home.html shows that little of the coast from Moclips south to Cape Disappointment is undeveloped or undisturbed. The coast between developed

population centers at Moclips, Pacific Beach, Oyhut, Ocean Shores, Westport, Grayland, and greater Long Beach is mostly developed to low density residential land uses. The few exceptions are Willapa National Wildlife Refuge, Leadbetter Point State Park, and Fort Canby State Park. Much of the land back from the shore remains forested, much of it in industrial timberlands. Bell and Huppert (2000) measured land use within 5 miles of the coast and determined that approximately 80% of that 5-mile corridor is forested (Table 5.1).

**Table 5.1: Land Use By Coastal Sections of Grays Harbor and Pacific Counties (within 5 miles of coast)**

**Area (acres)**

| | AG | BARREN | COMM | FOREST | RANGE | RES | WATER | WETLAND | OTHER |
|---|---|---|---|---|---|---|---|---|---|
| Grays Harbor Co. | 2072 | 4566 | 3840 | 212068 | 2735 | 9896 | 6236 | 10427 | 4676.31 |
| Pacific Co. | 8418 | 3446 | 1263 | 183101 | 4898 | 7414 | 14870 | 8515 | 7341.48 |

**Percentage of Total Area**

| | AG | BARREN | COMM | FOREST | RANGE | RES | WATER | WETLAND | OTHER |
|---|---|---|---|---|---|---|---|---|---|
| Grays Harbor Co. | 0.0081 | 0.0178 | 0.0150 | 0.8267 | 0.0107 | 0.0386 | 0.0243 | 0.0407 | 0.0182 |
| Pacific Co. | 0.0352 | 0.0144 | 0.0053 | 0.7653 | 0.0205 | 0.0310 | 0.0622 | 0.0356 | 0.0307 |

**Measured From:** USGS Land Use/Land Cover Data 1:250,000 mapping.
**Notes:** AG = agricultural; BARREN = barren lands; COMM = commercial lands; FOREST = forest lands; RANGE =range lands; RES = residential lands; WATER = lands covered by water; WETLANDS =wetlands; and OTHER = undefined land use types.
**Source:** Bell & Huppert, 2000.

Although the intensity of development on this part of the coast is low compared with Puget Sound marine shorelines, still, little of this shoreline remains ecologically intact.

## *Ocean Estuary Shorelines*

The shallow coastal estuaries (Grays Harbor, Willapa Bay, and the Columbia River estuary) and their shorelines are characterized by relatively small cities and towns, mostly at the river mouths, still-extensive farm-lands and dairy-lands, and shellfish aquaculture. Most shorelines are in private ownership with the exception of Willapa Bay where portions lie within the Willapa National Wildlife Refuge, and the Columbia River estuary . where portions lie within the Julia Butler Hanson National Wildlife Refuge.

For the most part these bays lie within a broad coastal plain, therefore the shorelines are backed by tidal wetlands, freshwater wetlands, and other low-lying lands. Bluff-backed shorelines are rare. Coastal flooding is an occasional problem for some of the cities and towns, especially those situated on the mouth of a major river.

Storm and wave energy regimes are tempered by the relatively short fetches across the bays. Shoreline accretion and erosion patterns are poorly studied; shoreline erosion is know to occur on portions of the North Bay of Grays Harbor, and near the mouth of Willapa Bay.

There are no known, contemporary, comprehensive studies which characterize the state of Grays Harbor, Willapa Bay, or Columbia River estuary shoreline habitats.

However, a review of shoreline aerial oblique photographs published the Department of Ecology's Digital Coastal Atlas at http://www.ecy.wa.gov/ programs/sea/ SMA/atlas_home.html shows that much of the shoreline is developed to established

communities, low density residential areas, and coastal highways. On Grays Harbor, developed shorelines occur at Ocean Shores (small lot residential with armored shores), Hoquiam (urban industrial), Aberdeen (urban industrial), and Westport. Approximately 1/4 of the north shore is edged by SR 109 and associated development; approximately 1/3 the south shore is edged by SR 105 and associated development. On Willapa Bay, developed shorelines occur at Tokeland, Raymond, South Bend, Bay Center, and much of the east shore of Long Beach Peninsula, especially near Nahcotta. Approximately 1/4 of the east shore is edged by US Highway 101 and associated development. On the Columbia River estuary, developed shorelines occur at Ilwaco, Chinook, and Cathlamet. Approximately 1/4 of the north shore is edged by US Highway 101 or SR 4 and associated development. Bell and Huppert (2000) measured land use within 5 miles of the coast and determined that approximately 80% of the land is forested (Table 5.1).

To varying degrees, the ocean estuary shorelines are a patchwork of developed (both to a built environment and agricultural/forestry) and ecologically intact areas.

## Stream and River Shorelines

Stream and river shorelines and their riparian areas, cover an intricate network of corridors throughout the state. While there are profound differences in native riparian vegetation species, diversity, and density, as well as the degree of modification throughout the state, with particular differences caused by the climate difference between eastern and western Washington, all riparian habitats share fundamental characteristics.

The following statewide characterization of riparian habitats and streams is quoted from portions of Knutson & Naef (1997), the whole of which is incorporated by reference into this environmental impact statement:

> Riparian ecosystems are considered the most sensitive to environmental change (Naiman et al. 1993) and have the highest vulnerability to alteration (Thomas et al. 1979). These ecosystems are formed and maintained by natural disturbances (e.g., landslides, debris torrents, flooding) which serve to contribute resources (e.g., woody debris, spawning gravel, nutrients) to riparian and instream habitat. The same natural disturbance that erodes features in one area may create or revitalize habitat conditions elsewhere. Stable channels and optimal stream habitat conditions occur when some balance exists between the supply of resources and the ability of the channel to store or transport them.
>
> Natural systems evolve and become adapted to a particular rate of natural disturbances over long periods. Land uses alter stream channel processes and disturbance regimes that affect aquatic and riparian habitat (Montgomery and Buffington 1993). Human-induced disturbances are often of greater magnitude and/or frequency compared to natural disturbances. These higher rates may reduce the ability of riparian and stream systems and the fish and wildlife populations to sustain themselves at the same productive level as in areas with natural rates of disturbance.
>
> Other characteristics also make riparian habitats vulnerable to degradation by human-induced disturbances. Their small size, topographic location, and linear shape make them prone to disturbances when adjacent uplands are altered. The unique microclimate of riparian and associated aquatic areas supports some vegetation, fish, and wildlife that have relatively narrow environmental tolerances. This microclimate is easily affected by vegetation removal within or adjacent to the riparian area, thereby changing the habitat suitability for sensitive species (Thomas et al. 1979, O'Connell et al. 1993).

Because riparian habitat more strongly influences the structure and function of small streams compared to large streams, small streams are more prone to pronounced impacts from the removal of riparian habitat than are large streams and rivers. Land uses that affect water quantity and quality (e.g., dams, agriculture, urban areas), are more likely to affect large streams and rivers because their habitat quality is largely controlled by the input of water from upstream and upland areas (Sullivan et al. 1987, Bilby 1988). When water quantity is reduced in large streams, riparian habitat is likely to be negatively impacted.

Because of its high primary productivity, riparian habitat often responds well to restoration efforts (Kinch 1989). In many cases, ceasing or modifying human activities that negatively impact riparian habitat, coupled with restoration efforts, can bring about relatively rapid and dramatic recovery of lost ecosystem function (Hair et al. 1978, Kinch 1989, Clary and Medin 1990). However, the invasion of exotic plant species may delay or even preclude re-establishment of the original plant community.

Major land uses that impact riparian areas are grouped into seven categories for discussion: forest practices, roads, agriculture, grazing, urbanization, dams, and recreation.

**Forest Practices**

Forest practices, including timber harvest and its associated activities (e.g., road building, pre-commercial thinning, controlled burning, herbicide and insecticide spraying), temporarily or permanently alter the character of forested landscapes, including riparian habitat. Because riparian areas topographically occur below uplands, they receive water, soil, and organic debris from upland areas. Forest practices in uplands and in riparian areas are often responsible for delivery of these resources to streams at rates significantly different than natural rates, resulting in changes to structural and functional elements of riparian areas.

Moring et al. (1994) summarized four studies that examined the effects of logging on fish habitat. They reported that bank stability was reduced and solar radiation to the stream increased in areas without intact buffer strips of riparian vegetation. Water temperatures rose above 30°C, dissolved oxygen reached critically low levels, sediment loads increased significantly, and particulate organic matter increased tenfold. They also reported population declines of reticulate sculpins, cutthroat trout, and other salmonids.

Vegetation removal, road construction, and soil disturbance are the chief mechanisms by which forest practices influence riparian areas. These disturbances result in:

- hydrologic (relating to water flow) effects;
- soil destabilization, erosion, and sedimentation;
- stream temperature increases and a more severe microclimate;
- loss of large woody debris;
- fish and wildlife effects;
- cumulative effects.

**Roads**

Whether constructed as a part of forest practices, agriculture, recreation, or urbanization, roads may have significant and long-lasting impacts on riparian and instream habitat and their fish and wildlife populations (Larse 1970, Thomas et al. 1979, Oakley et al. 1985, Furniss et al. 1991, Hicks et al. 1991b, Noss and Cooperrider 1994). Roads of all types and locations (not including foot trails) affect riparian or stream systems by changing the drainage of a watershed, removing riparian habitat, or by causing mass soil movement, erosion, and subsequent sedimentation into streams. The degree of these effects is related to the road location, construction and maintenance techniques, and to the manner in which roads cross streams. Roads more directly affect fish and wildlife populations by removing riparian habitat, altering instream habitat, introducing human

disturbance to riparian and stream areas, acting as a barrier to movement, and causing vehicle-related mortality of wildlife. To prevent or reduce impacts, road planning and route selection by an interdisciplinary team is perhaps the most important single element of road development (Larse 1970).

Although we know that the total length and density of roads have increased in expanding urban areas of Washington, no specific information on the rate of increase and on the overall road mileage, density, or distribution is available (L. Fenstermaker, pers. comm.). On National Forest land in Oregon and Washington, road mileage has risen from 33,850-36,900 km (22,000-24,000 mi) in 1962 to over 138,460 km (90,000 mi) in 1990 (Reeves and Sedell 1992). It has been estimated that about 3,000 miles of new roads are constructed annually on forest lands in the western forested area of the United States (Larse 1970). Many of these newly created forest roads are built without adequate consideration of riparian and fish habitat (Reeves and Sedell 1992). As the density of roads increases, road impacts on riparian and stream systems will inevitably worsen. Roads may have unavoidable effects on streams, no matter how well they are located, designed, or maintained (U.S. For. Serv. et al. 1993).

**Agriculture**

Beyond the obvious loss of riparian habitat as a result of direct conversion to agricultural land, the effects of agricultural operations on riparian areas generally consist of an excessive supply of non-point source pollution. Because riparian and aquatic systems are the eventual recipients of sediments, fertilizers, pesticides, and wastes, agricultural activities influence the function of stream and riparian ecosystems.

**Grazing**

Overgrazing is one of the most destructive forces in riparian ecosystems (Davis 1982) and is usually the result of inappropriate livestock management (Behnke and Raleigh 1978, Oregon-Washington Interagency Wildlife Council 1979, Platts 1979). Grazing can affect all characteristics of riparian and associated aquatic systems, including vegetative cover, soil stability, bank and channel structure, instream structure, and water quantity and quality. Overgrazing is considered one of the principal factors contributing to the decline of native salmonids in the Pacific Northwest (Behnke and Zarn 1976, Armour et al. 1991).

While the general condition of rangelands in the United States has improved over the last century (Box 1979, Busby 1979), grazed riparian areas are in worse condition. The U.S. Bureau of Land Management estimated that of 217,254 ha (536,835 ac) of riparian habitat, 181,086 ha (447,464 ac) (83%) were in unsatisfactory condition (Almand and Krohn 1979). Riparian areas that have been and continue to be subject to overgrazing are primarily those in the semi-arid and arid regions (Behnke and Raleigh 1978).

**Urbanization**

People have traditionally settled in riverine floodplains and along the banks of major streams and lakes (Goldstein et al. 1983, Nabhan 1985). Modern urban settlement near water and throughout watersheds usually entails large-scale removal of native vegetation and its replacement with buildings, pavement, roads, and manicured plantings, all consisting primarily of impervious surfaces. Unlike the effects of forestry, the loss of natural vegetation and consequences to riparian and stream habitats in urbanized areas are usually permanent (Booth 1991). The effects of urban and industrial developments generally result in:

- changes in basin hydrology;
- loss of riparian habitat;
- loss of woody debris and other instream structures;
- degradation of stream channels;
- reduction in water quality;

- habitat fragmentation;
- introduction of pets and exotic pests.

The loss of natural vegetation in riparian and upland areas and its replacement with compacted or largely impervious surfaces changes the hydrology of urbanized watersheds. These changes usually result in a loss of fish and wildlife habitat. Overall, hydrologic changes upset the balance of aggradation and degradation processes that are essential in maintaining healthy stream and riparian ecosystems. The most dramatic and well-studied effect is the increase in the maximum discharge associated with floods and storm events; peak flows in urbanized watersheds have been known to increase as much as five-fold over natural conditions (Booth 1991).

In an attempt to be close to the water and to "clean up" areas by replacing them with manicured landscapes, riparian vegetation is often cleared when land is developed. Because riparian habitat supports the greatest number of species compared to other habitats, its protection can provide a significant benefit to fish and wildlife in developed landscapes (Noss 1993).

The loss of riparian vegetation due to urbanization: 1) degrades stream conditions through increased erosion of banks that are no longer armored with roots and debris from natural vegetation, 2) removes a source of logs and organic debris that stabilize streams and provide a source of food and nutrients, 3) increases stream temperatures through shade removal, and 4) reduces the capacity of the riparian area to filter incoming sediments and pollutants (Klein 1979).

Woody debris, especially large logs, are lost in urbanized areas through the removal of their source — riparian vegetation. Logs are flushed through the systems during high peak flows, and they are lost through deliberate removal. Historically, logs were removed in large rivers to improve navigation associated with urban development (Sedell and Luchessa 1982). After the removal of riparian vegetation, remnant logs eventually degrade or are swept downstream during the frequently occurring flooding events in urban areas (Booth 1991). Large woody debris that is removed is rarely replaced in urban areas.

Fish-bearing rivers and streams that flow through heavily-developed areas rarely resemble their natural form. Stream beds are replaced with drainpipes and culverts, riparian vegetation is removed, and municipal wastes contribute pollutants, sediments, and excessive nutrients to the water. To accommodate the real estate needs and safety of expanding urban populations, streams and rivers are frequently channelized, diked, or piped underground. For example, 73% of Ravenna Creek in King County now runs through a pipe (Wash. Dept. Ecol. 1981). Loss of riparian vegetation, increased flooding, and stream channel manipulation eliminate large woody debris, pools and riffles, sinuosity, slow flowing side channels, and other essential structural components of fish habitat in urbanized areas. Destruction or severe degradation of fish and wildlife habitat by urbanization is often complete and irreparable (Canning and Stevens 1989).

Streams and rivers flowing through urban landscapes suffer reductions in water quality that impair their ability to support microorganisms, fish, and wildlife. Water quality is reduced through increased sedimentation, chemical pollution, and increases in water temperature. Higher than normal surface flows carry pollution, nutrients, and sediment to streams in large quantities. Surface flows also deliver warmer water to streams than do subsurface flows. Urban stormwater run-off is commonly borne in storm sewers or surface channels and deposited directly into the waterway, with little opportunity to be absorbed, cooled, and cleansed by passing through natural vegetation and soils (King County Planning Division 1980).

One of the greatest impacts of urbanization on wildlife comes from habitat fragmentation (Stenberg et al. 1997). Remaining natural habitat in urban areas typically consists of small, infrequently encountered remnant patches that are isolated from each other (Carleton and Taylor 1983, Goldstein et al. 1983). Wildlife in such settings is limited to highly-adaptive and mobile species with small area or generalized habitat requirements; examples include the American robin, European starling, house sparrow, raccoon, and coyote (Aldrich and Coffin 1980, Quinn 1992). Animals that require large areas of intact natural vegetation, such as some forest interior songbirds and elk,

are lost during habitat fragmentation associated with urbanization (Aldrich and Coffin 1980, Bryant and Maser 1982).

May, et al. (1997) characterize the lowland stream corridors of the Puget Sound basin as follows based on a study of a group of 22 streams in Snohomish King, Pierce, and Kitsap counties as follows:

> The Puget Sound lowland (PSL) ecoregion contains an abundance of complex and historically productive salmonid habitat in the form of small streams as well as their riparian forests and wetlands. These watersheds are under intense pressure due primarily to the cumulative effects of urban development. Instream habitat characteristics, riparian conditions, physio-chemical water-quality, and biological attributes of 22 PSL streams (120 survey reaches). were studied over a gradient of development levels to determine relationships between urbanization and stream quality and suggest target conditions for management/protection. Urbanization of PSL watersheds has resulted in an increase in the fraction of total impervious area (% TIA) and a decrease in forested area, including a significant loss of natural riparian forests and wetlands. The cumulative effects of a modified hydrologic (disturbance) regime, the loss of instream structural complexity, and the alteration of channel morphological characteristics accompanying urbanization have resulted in substantial degradation of instream habitat during the initial phases of the development process. As the level of basin development increased above 5% total impervious area (% TIA), results indicated a precipitous initial decline in biological integrity as well as the physical habitat conditions (quantity and quality) necessary to support natural biological diversity and complexity. The frequency, volume, and quality of large woody debris (LWD) decreased significantly as basin development and riparian encroachment increased. Loss of LWD due to washout and removal, as well as a reduction in LWD recruitment due to loss of mature riparian forest areas, were significant factors. As a result of the reduction in the quantity and quality of LWD, along with the effects of a modified hydrologic regime, Coho rearing habitat was significantly reduced. Salmonid spawning habitat was also degraded by the cumulative effects of urbanization. Fine sediment in spawning gravels generally increased as urbanization increased, while intragravel dissolved oxygen (IGDO) also decreased during the period of salmonid embryo development. Chemical constituents (primarily metals) of water quality during baseflow conditions, as well as storm events, were insufficient to have produced adverse effects in streams with low to moderate % TIA, but increased markedly in highly urbanized basins (TIA>45%).
>
> Results suggest that resource management should place a high priority on preservation and protection of high quality stream ecosystems (TIA <5%) that currently support natural salmonid populations (Coho and cutthroat). Mature, riparian forests dominated by coniferous trees should be the long-term management goal. A wide (>30 m) and near-continuous (<2 breaks/km) riparian zone appears to be a necessary, although not a wholly sufficient condition for a natural level of stream quality and biotic integrity. Restoring the natural hydrologic regime should be a primary goal for rehabilitation and enhancement efforts. A set of stream quality indices and instream habitat target conditions are proposed for monitoring and managing PSL streams.

## Lakes

There are somewhat more than 7,800 lakes in Washington State (Wolcott, 1973a, 1973b).[13] Less than ten percent of these lakes come under the Shoreline Management Act. When first adopted by the legislature in 1971, the SMA mandated shoreline management of all lakes twenty acres and greater in surface area. In developing the rule defining and listing the lakes of Washington which come under the SMA (Chapter 173-20 WAC), the Department of Ecology made a decision to exclude from regulatory listing all

[13] A lake, as defined by Wolcott for his inventory, has a minimum surface area of one acre.

lakes on federal reservations (military reservations, Indian reservations, national parks, and national forests). Also, lakes 20 acres and greater in area, and lying on a 100-year flood plain, were not listed (e.g. the Columbia River floodplain in Clark County) because they are encompassed by the SMA by virtue of their being a part of the 100-year flood plain. WAC 173-20 lists 758 lakes.

Bortleson, Dion & McConnell (1974) provide the best landscape-scale, state-wide characterization of the physical character of lakes of Washington:

> Lakes in Washington occur under a great variety of geologic conditions. In the Puget Sound Lowlands of western Washington most lakes occupy depressions in the surface of glacial drift — the sand, gravel, slit, clay, and till laid down by the Puget lobe of continental glaciers during the ice age. These depressions are either elongate troughs cut by the passing of ice sheet or are more circular-shaped kettle lakes formed by the melting of stagnant ice blocks.
>
> In the adjacent foothills of the Cascade Range and Olympic Mountains, most lakes occupy depressions eroded in the bedrock by the passing continental glacier, while lakes in the higher mountains are in basins cut by local alpine glaciers.
>
> In eastern Washington, lakes in the mountainous northern part — Okanogan Highlands — and on the eastern slope of the Cascade Range generally occur in glacier-cut depressions in bedrock. In the semiarid Columbia Plateau, underlain by basalt bedrock, most lakes occupy the more deeply cut parts of some coulees of the channeled scablands.
>
> Many lakes have been formed, or increased in size, by man's activities. Numerous reservoirs are located in valleys of the Cascade Range and Olympic Mountains, dammed for a variety of purposes that include municipal water supply, irrigation, electrical power generation, flood control, and recreation. In the Columbia Basin Irrigation Project area of eastern Washington a number of small lakes have been formed in low areas by seepage and waste water from the irrigation project.

Lakeshore land use in urban areas, for the most part, has come to be dominated by high density single family residential development accompanied by shoreline modification (landscaping, shoreline bulkheads, and private docks) which has substantially altered the character of the shoreline. Lakes an hour or two commute-distance from urban areas are also increasingly dominated by lower density residential and recreational single family development also accompanied by shoreline modification. On such lakes: little or none of the shoreline is ecologically intact; varying levels of cultural eutrophication[14] might be a problem (especially in areas not served by sanitary sewers); and intensive aquatic recreation degrades wildlife habitat.

There is no contemporary, state-wide, characterization of the environmental status of lake shore riparian habitats of Washington.

## Wetlands

This section is quoted from *Washington Wetland Resources* (Lane & Taylor, 1996), the whole of which is incorporated by reference into this environmental impact statement. The original version may also be viewed on-line, including illustrations and maps, at http://wa.water.usgs.gov/reports/wetlands/.

---

[14] A eutrophic lake is one with relatively high levels of nutrients; eutrophicatition is the process of nutrient enrichment; and cultural eutrophication is due to human-caused factors such as on-site sewage leachates and storm water runoff. Cultural eutrophication unnaturally accelerates the aging of lakes.

## Washington's Wetland Resources

Washington's wetlands are remarkably diverse, each having a unique combination of ecological characteristics such as altitude, seasonality, chemistry, and species composition. Although wetlands cover only about 2 percent of the State, they are a valuable and important resource.

Wetlands perform many important hydrologic functions, such as maintaining stream flows, slowing and storing floodwaters, stabilizing streambank, and reducing the erosion of shorelines. Although usually thought of as areas of ground-water discharge, some wetlands serve as areas of ground-water recharge (Washington State Department of Ecology, 1992a). Wetlands also improve water quality by filtering out sediments, excessive nutrients, and toxic chemicals. By serving these and other functions, wetlands can sometimes reduce or eliminate the need for the costly engineering and construction of control, treatment, and retention facilities (Puget Sound Water Quality Authority, 1990).

For a vast and diverse array of wildlife, including invertebrates, fish, amphibians, reptiles, birds, and mammals, wetlands are essential habitats for feeding, nesting, cover, or breeding. More than 315 species of wildlife use the State's wetlands as primary feeding or breeding habitat. Wetlands are vital nursery and feeding areas for anadromous fish such as salmon and steelhead trout (Washington State Department of Wildlife, undated). Wetlands are critical habitats for at least one-third of the State's threatened or endangered species of wildlife (Puget Sound Water Quality Authority, 1990).

Wetlands furnish many opportunities for education and scientific research. The numbers and diversity of plants and animals found in wetlands make these habitats excellent locations for teaching and research in biology, botany, ornithology, environmental science, and ecology.

Washington's wetlands provide many quality-of-life benefits. As scenic areas, wetlands present a visually pleasing contrast to upland areas, open water, and forests. In addition, the State's wetlands support a wide range of recreational activities, including bird watching, nature appreciation, camping, boating, fishing, and hunting.

## Types and Distribution

Wetlands are lands transitional between terrestrial and deep-water habitats where the water table usually is at or near the land surface or the land is covered by shallow water (Cowardin and others, 1979).

According to a 1988 FWS inventory, wetlands cover about 939,000 acres in Washington (D.D. Peters, U.S. Fish and Wildlife Service, unpub. data, 1990). That inventory, part of the FWS

Palustrine: Nontidal and tidal-freshwater wetlands in which vegetation is predominantly trees (forested wetlands); shrubs (scrub-shrub wetlands); persistent or nonpersistent emergent, erect, rooted herbaceous plants (persistent- and nonpersistent-emergent wetlands); or submersed and (or) floating plants (aquatic beds). Also, intermittently to permanently flooded open-water bodies of less than 20 acres in which water is less than 6.6 feet deep.

Lacustrine: Nontidal and tidal-freshwater wetlands within an intermittently to permanently flooded lake or reservoir larger than 20 acres and (or) deeper than 6.6 feet. Vegetation, when present, is predominantly nonpersistent emergent plants (nonpersistent-emergent wetlands), or submersed and (or) floating plants (aquatic beds), or both.

Riverine: Nontidal and tidal-freshwater wetlands within a channel. Vegetation, when present, is same as in the Lacustrine System.

Estuarine: Tidal wetlands in low-wave-energy environments where the salinity of the water is greater than 0.5 part per thousand (ppt) and is variable owing to evaporation and the mixing of sea-water and freshwater.

Marine: Tidal wetlands that are exposed to waves and currents of the open ocean and to water having a salinity greater than 30 ppt.

National Wetlands Inventory, used color-infrared aerial photographs taken from 1980 to 1984 combined with field inventories of selected wetlands. Owing to the limitations of this process, a small percentage of wetlands might not have been included in the acreages.

Palustrine wetlands cover about 709,000 acres, about 75 percent of the total wetland acreage in Washington (D.D. Peters, U.S. Fish and Wildlife Service, unpub. data, 1990). These wetlands exist throughout the State in coastal sand dunes; in lowlands adjacent to estuaries, rivers, and lakes; in the backwaters of reservoirs and irrigation wasteways; adjacent to springs or seeps; and in isolated depressions. Extensive tracts of palustrine wetlands cover the sand spits of Grays Harbor and Willapa Bay and the banks of the Columbia, Chehalis, Yakima, and Pend Oreille Rivers (Canning and Stevens, 1989; Washington State Department of Ecology, 1992b).

Palustrine forested wetlands commonly are referred to as swamps or coastal swamps. Their predominant vegetation includes red alder, thin-leafed alder, black cottonwood, western red cedar, Sitka spruce, and hemlock. Palustrine scrub-shrub wetlands commonly are referred to as swamps or bogs. Their predominant vegetation includes willows, red Osier dogwood, Douglas Spiraea, Snowberry, hawthorn, wild rose, and gooseberry. Palustrine emergent wetlands are also known as freshwater marshes, wet meadows, fens, bogs, prairies, potholes, vernal pools, and playas. Predominant emergent vegetation includes cattail, bulrush, and reed canary grass. Predominant aquatic-bed vegetation includes duckweed, water lilies, and water buttercup (Canning and Stevens, 1989).

Lacustrine wetland acreage in Washington is not addressed in this summary because the acreage has not yet been separated from the acreage for lacustrine deepwater habitat (D.D. Peters, U.S. Fish and Wildlife Service, unpub. data, 1990). Lacustrine emergent wetlands and aquatic beds exist in the shallows of lakes throughout Washington. Predominant emergent vegetation includes duckweed, water lilies, water buttercup, arrowhead, water plantain, smartweed, yellow water lily, common mare's tail, and pondweed. Predominant lacustrine aquatic-bed vegetation is the same as noted for palustrine aquatic beds (Canning and Stevens, 1989).

Riverine wetlands cover about 700 acres in Washington (D.D. Peters, U.S. Fish and Wildlife Service, unpub. data, 1990) and consist of the areas of river channels that are occasionally to permanently flooded. These areas can be nonvegetated or vegetated by submersed and nonpersistent emergent aquatic plants. Areas of the river channel that typically are exposed commonly are referred to as river bars, gravel bars, or unconsolidated shorelines. They commonly become vegetated by pioneering terrestrial species such as dandelion and fireweed during periods of low flow. Plant species commonly found in the flooded areas of the channel include true watercress, yellowcress, yellow water lily, arrowhead, water plantain, and smartweed (Canning and Stevens, 1989).

Estuarine wetlands cover about 202,000 acres, about 22 percent of the total wetland acreage in Washington (D.D. Peters, U.S. Fish and Wildlife Service, unpub. data, 1990). These wetlands are present on the deltas and in the lower reaches of most of the rivers in western Washington (the part of the State west of the crest of the Cascade Range). Broad expanses of estuarine wetlands exist around Grays Harbor and Willapa Bay on the coast, at the mouth of the Columbia River, and around Skagit and Padilla Bays on Puget Sound (Canning and Stevens, 1989; Washington State Department of Ecology, 1992b).

Marine wetlands cover about 27,000 acres, about 3 percent of the total wetland acreage in Washington (D.D. Peters, U.S. Fish and Wildlife Service, unpub. data, 1990) and consist of beaches and rocky shores. The high-energy tidal environment of these wetlands keeps them unvegetated except for algae. Marine wetlands exist along the Pacific coast and the Strait of Juan de Fuca, on some offshore rocky islands, and in the San Juan Islands (Canning and Stevens, 1989).

## *Trends*

Estimates of presettlement wetland acreage in Washington range from 1.17 to 1.53 million acres, depending on the historical information and research assumptions used (Canning and Stevens, 1989; Dahl, 1990; Washington State Department of Ecology, 1992b). Based on a 1988 estimate

by the FWS, about 20 to 39 percent of Washington's wetlands, have been lost during the past two centuries. Other estimates place the total loss as great as 50 percent, and some urbanized areas of the Puget Sound area have experienced losses of from 70 to 100 percent. Estimates of continuing wetland loss range from 700 to 2,000 acres per year. In addition, most of the State's remaining wetlands have been significantly degraded (Washington State Department of Ecology, 1992b, d).

The principal historical causes of wetland loss and degradation are the expansion of agriculture and the siting of ports and industrial facilities. The major causes of continuing loss and degradation of wetlands are urban expansion, forestry and agricultural practices, and the invasion of exotic plants and animals (Canning and Stevens, 1989; Washington State Department of Ecology, 1992b, d).

# 6 • Comparative Impact Analyses

## Introduction and Overview

This chapter on comparative impact analyses is organized in accordance with the major sections of the draft rule. These impact analyses compare Alternative A, a continued application of the original guidelines rule, WAC 173-16, with the proposed Alternative E (WAC 173-26, Sections 170 - 250). Statements here as to the content or meaning of WAC 173-16 or the proposed WAC 173-26 are summarized for the purposes of environmental impact analysis and have no other meaning; the full intent and text of those rules can be obtained only by reading the full text of the rule. The summarizations of portions of WAC 173-26 emphasize the broad policies which form the basis for the proposed rule and the impact analyses herein.

*Any difference between the current draft WAC 173-26 rule element and the invalidated WAC 173-26 rule element adopted in 2000, is noted in this typeface before each summary characterization of the current rule element. The difference characterization is quoted from Ecology's "Summary Characterization of Invalidated and Proposed Replacement Guidelines WAC 173-26" (Shoreland and Environmental Assistance Program, 2003) The notation, "Substantially the same" means "Substantially the same as the invalidated 2000 rule."*

The impact analyses are necessarily generalized, as adoption of the proposed rule will only indirectly effect the environment—it will simply require that local governments amend their local Shoreline Master Program in a manner consistent with the amended rule, while also consistent with local circumstances. The exact manner in which the draft rule will affect the environment will be determined largely by the specifics of each of the 39 county and 216 city shoreline master programs.

How quickly those local SMPs cause actual effects on-the-ground or in-the-water will be determined by the pace of development and re-development. On a state-wide, landscape scale, substantive effects cannot be expected for decades. Locally, landscape scale effects may be evident sooner.

In a geographical sense, the effects of the proposed rule amendment can be expected to be most prominent and most quickly realized in western Washington — if past trends continue into the future. A review of the shoreline permit activity state-wide since 1990 indicates that two-thirds (66.7%) of the permitted shoreline development projects occur in 28 of the 255 local jurisdictions which implement the SMA (see Table 6.1). Another way of looking at this is to summarize the permitted projects not by individual jurisdiction but by geographic areas (counties) (Table 6.2): approximately 75% of the permitted shoreline development projects occur in one-third of the counties (italicized in Table 6.2).

**Table 6.1: Permitted Shoreline Projects by Individual Jurisdiction, 1990 – 2002.**

| Jurisdiction | Projects | Percent |
|---|---|---|
| Seattle | 737 | 6.3 |
| Pierce County | 569 | 4.9 |
| San Juan County | 506 | 4.3 |
| Mason County | 478 | 4.1 |
| King County | 457 | 3.9 |
| Whatcom County | 415 | 3.6 |
| Skagit County | 383 | 3.3 |
| Snohomish County | 318 | 2.7 |
| Grays Harbor County | 306 | 2.6 |
| Pacific County | 305 | 2.6 |
| Island County | 290 | 2.5 |
| Tacoma | 281 | 2.4 |
| Chelan County | 262 | 2.2 |
| Cowlitz County | 251 | 2.2 |
| Lewis County | 234 | 2.0 |
| Mercer Island | 214 | 1.8 |
| Clark County | 203 | 1.7 |
| Kitsap County | 200 | 1.7 |
| Clallam County | 192 | 1.6 |
| Everett | 157 | 1.3 |
| Bellingham | 149 | 1.3 |
| Thurston County | 143 | 1.2 |
| Jefferson County | 143 | 1.2 |
| Renton | 141 | 1.2 |
| Wahkiakum County | 124 | 1.1 |
| Vancouver | 119 | 1.0 |
| Port Angeles | 117 | 1.0 |
| Pend Oreille County | 111 | 1.0 |
| Subtotal | 7805 | 66.7 |
| All Others | 3849 | 33.3 |
| Total | 11654 | 100.0 |

Table Notes:

1. Data derived from queries on the Shorelands Programs' Permit Tracking Database for the period 1 January 1990 through 31 December 2002.

2. No assurance is implied that this information is complete. The database from which it was derived is maintained for the purpose of tracking permit applications, not for assessing development trends.

**Table 6.2: Permitted Shoreline Projects by County area, 1990 – 2002.**

| County | Projects | Percent |
|---|---|---|
| *King* | *2410* | *20.7* |
| *Pierce* | *997* | *8.6* |
| *Whatcom* | *639* | *5.5* |
| *Snohomish* | *632* | *5.4* |
| *Skagit* | *563* | *4.8* |
| *San Juan* | *553* | *4.7* |
| *Grays Harbor* | *493* | *4.2* |
| *Mason* | *492* | *4.2* |
| *Pacific* | *439* | *3.8* |
| *Chelan* | *396* | *3.4* |
| *Kitsap* | *391* | *3.4* |
| *Clark* | *390* | *3.3* |
| *Island* | *340* | *2.9* |
| Cowlitz | 318 | 2.7 |
| Clallam | 315 | 2.7 |
| Lewis | 269 | 2.3 |
| Thurston | 244 | 2.1 |
| Spokane | 191 | 1.6 |
| Jefferson | 178 | 1.5 |
| Grant | 174 | 1.5 |
| Yakima | 84 | 1.3 |
| Okanogan | 152 | 1.3 |
| Wahkiakum | 143 | 1.1 |
| Pend Oreille | 116 | 1.0 |
| Kittitas | 96 | 0.8 |
| Stevens | 93 | 0.8 |
| Whitman | 84 | 0.7 |
| Benton | 80 | 0.7 |
| Skamania | 64 | 0.5 |
| Walla Walla | 63 | 0.5 |
| Douglas | 58 | 0.5 |
| Klickitat | 48 | 0.4 |
| Asotin | 43 | 0.4 |
| Ferry | 34 | 0.3 |
| Columbia | 12 | 0.1 |
| Franklin | 8 | 0.1 |
| Adams | 1 | 0.0 |
| Lincoln | 1 | 0.0 |
| Garfield | 0 | 0.0 |
| Total | 11654 | 100.0 |

It is important to remember that much shoreline development is exempted from a requirement to acquire a shoreline permit, most notably single-family residential development. These data do not, therefore, include residential development. It is also important to remember that the data in the tables do not distinguish between the magnitude of the permitted projects. Still, the broad patterns identified above are likely to be representative of on-the-ground conditions.

This EIS can only anticipate what might be the secondary and cumulative effects of statewide implementation by local governments.

An integrated analysis of these segmented analyses is provided in Chapter 7.

Finally, the writing style in this chapter is 'telegraphic' — that is, to avoid the constant repetition of phrases like "…the proposed rule…" such phrases have been eliminated to a large degree where ever the context is unambiguous.

Where provisions of WAC 173-26 are quoted, they characterize the broad intents of a particular section. Readers with a concern for the detail should read the entire rule itself.

## Comprehensive Process to Prepare or Amend Shoreline Master Programs (WAC 173-26-200)

Three aspects of the rule provisions for the content of Shoreline Master Programs are both substantially different from WAC 173-16, and potentially have a substantial effect on environmental characteristics. These provisions address [1] protection of ecological functions of the shorelines, [2] environmental impact mitigation, and [3] shoreline restoration planning.

### *Protection of Ecological Functions of the Shorelines (WAC 173-26-200 (2) (c))*

#### *Existing WAC 173-16*

While WAC 173-16, taken as a whole, implicitly addresses protection of ecological functions, it contains no section which explicitly addresses protection of the ecological functions of shorelines. To the extent that shoreline management planning and permitting addressed protection of ecological functions, that would have explicitly occurred under the influence of the State Environmental Policy Act through the preparation of an environmental impact state or the Mitigated Determination of Nonsignificance process.

#### *Proposed WAC 173-26*

This section provides, in part, that:

> As established in WAC 173-26-185(8) these guidelines are designed to assure, at minimum, no net loss of ecological functions necessary to sustain shoreline natural resources and to plan for restoration of ecological functions where they have been impaired. Managing shorelines for protection of the natural resources depends on sustaining the functions provided by:

- Ecosystem-wide processes such as those associated with the flow and movement of water, sediment and organic materials; the presence and movement of fish and wildlife and the maintenance of water quality.
- Individual components and localized processes such as those associated with shoreline vegetation, soils, water movement through the soil and across the land surface and the composition and configuration of the beds and banks of water bodies.

Master programs shall contain policies and regulations that assure at minimum, no net loss of ecological functions necessary to sustain shoreline natural resources. To achieve no net loss of ecological functions as a result of shoreline uses and development, master programs should establish environment designations and associated use provisions consistent with the provisions of these guidelines. Done consistent with these guidelines this should ensure that development not impair currently functioning habitat or reduce the function of already impaired habitat. Where uses or development that impact ecological functions are necessary to achieve other objectives of RCW 90.58.020, master program provisions shall, to the greatest extent feasible, protect existing ecological functions and avoid new impacts to habitat and ecological functions before implementing other measures designed to achieve no net loss of ecological functions.

Master Programs shall also include policies that promote restoration of ecological functions where they have been impaired, based on analysis described in WAC 173-26-200 (3)(d)(i), as provided in WAC 173-26-200(2)(f). It is intended that local government, through the master program, along with other regulatory and non-regulatory programs contribute to restoration by planning for and fostering restoration and that such restoration occur through a combination of public and private programs and actions. Local government should identify restoration opportunities through the shoreline inventory process and authorize, coordinate and facilitate appropriate publicly and privately initiated restoration projects within their Master Programs. The goal of this effort is master programs which include planning elements that, when implemented, serve to improve the overall condition of habitat and resources within the shoreline area of each city and county.

### *Existing Conditions and Impacts Under WAC 173-16*

Please refer to Chapter 5 for a comprehensive review of the environmental condition of Washington's shorelands.

### *Potential Environmental Impacts Under WAC 173-26*

Please refer to the following section on environmental impact mitigation.

## *Environmental Impact Mitigation (WAC 173-26-200 (2) (e))*

### *Existing WAC 173-16*

While WAC 173-16, taken as a whole, implicitly addresses mitigation for adverse environmental effects, it does not explicitly addresses environmental impact mitigation. To the extent that shoreline management planning and permitting addressed environmental impact mitigation, that would have occurred under the influence of the State Environmental Policy Act through the preparation of an environmental impact statement or the Mitigated Determination of Nonsignificance process.

### *Proposed WAC 173-26*

This section provides, in part, that:

> To assure no net loss of shoreline ecological functions, master programs shall include provisions that require proposed individual uses and developments to analyze environmental impacts of the proposal and include measures to mitigate environmental impacts not otherwise avoided or mitigated by compliance with the master program and other applicable regulations. To the extent Washington's State Environmental Policy Act of 1971 (SEPA), chapter 43.21C RCW, is applicable, the analysis of such environmental impacts shall be conducted consistent with the rules implementing SEPA, which also address environmental impact mitigation in WAC 197-11-660 and define mitigation in WAC 197-11-768.

### *Existing Conditions and Impacts Under WAC 173-16*

Please refer to Chapter 5 for a comprehensive review of the environmental condition of Washington's shorelands.

### *Potential Environmental Impacts Under WAC 173-26*

No net loss of ecological functions through project design and mitigation may seem like an ambitious goal. It is tempting to simply say, 'if it was easy, the mandate for mitigation of adverse environmental effects in the State Environmental Policy Act would have accomplished this goal during the past thirty years.' That, however, would be simplistic.

Under SEPA, an environmental impact statement (EIS) is required of few projects, with the majority of projects not being scrutinized by the full analysis of an EIS and the requisite mitigation of adverse environmental effects. The cumulative effects of all those small, unscrutinized projects[15] has produced much of the environmental degradation described in Chapter 5 above, and below in this chapter.

Together, the requirements to protect ecological functions of shorelines, along with environmental impact mitigation, is expected to substantially reduce the adverse environmental effects of all degrees of development, large and small.

## *Shoreline Restoration Planning (WAC 173-26-200 (2) (f))*

### *Existing WAC 173-16*

WAC 173-16 contains no section which explicitly addresses planning for shoreline restoration.

### *Proposed WAC 173-26*

This section provides, in part, that:

> Consistent with [the] principle [at] WAC 173-26-185(8)(c)[16], master programs shall include goals and policies for restoration of impaired shoreline ecological functions. These master program pro

---

[15] Some projects are scrutinized under the Mitigated Determination of Nonsignificance process rather than the full EIS process.

[16] WAC 173-26-185(8)(c ) states: "For counties and cities containing any shorelines with impaired ecological functions, master programs shall include goals and policies that provide for restoration of such impaired ecological functions. These master program provisions shall identify existing policies and programs that contribute to planned restoration goals and identify any additional policies and programs that local government will implement to achieve its goals. These master program elements regarding restoration should

> visions should be designed to achieve overall improvements in shoreline ecological functions over time, when compared to the status upon adoption of the master program. The approach to restoration planning may vary significantly among local jurisdictions.

### *Existing Conditions and Impacts Under WAC 173-16*

Please refer to Chapter 5 for a comprehensive review of the environmental condition of Washington's shorelands.

### *Potential Environmental Impacts Under WAC 173-26*

While this element of the rule can require local governments to plan for "restoration of impaired shoreline ecological functions," it might seem that in the absence of certain, dedicated, state funding to local government for implementation of such a plan, there can be no assurance of the degree to which such plans will result in restoration projects being carried out. However, there is already much shoreline habitat restoration occurring, but in an uncoordinated manner. Planning for restoration, funded or not, provides for prioritization of restoration sites for the local government, for nongovernmental organizations, for entities required to perform off-site mitigation (e.g. private, commercial developers; Washington Department of Transportation projects; and other public entities such as parks), and for funding agencies such as the Salmon Recovery Funding Board or the Northwest Power Planning Council.

## *Addressing Cumulative Impacts in Developing Master Programs (WAC 173-26-200 (3) (d) (iii))*

One of the required steps in preparing and amending a master program (WAC 173-26-200 (3)) is to "analyze issues of shoreline concern," including addressing cumulative impacts.

### *Existing WAC 173-16*

WAC 173-16 contains no section which explicitly requires cumulative impacts analysis of what shoreline master programs do or do not accomplish.

### *Proposed WAC 173-26*

This section provides, in part, that:

> The principles that regulation of development shall achieve no net loss of ecological function requires that master program policies and regulations address the cumulative impacts on shoreline ecological functions that would result from future shoreline development and uses that are reasonably foreseeable from proposed master programs. To comply with the general obligation to assure no net loss of shoreline ecological function, the process of developing the policies and regulations of a shoreline master program requires assessment of how proposed policies and regulations cause and avoid such cumulative impacts.

---

make real and meaningful use of established or funded non-regulatory policies and programs that contribute to restoration of ecological functions, and should appropriately consider the direct or indirect effects of other regulatory or non-regulatory programs under other local, state, and federal laws, as well as any restoration effects that may flow indirectly from shoreline development regulations and mitigation standards."

> … Accordingly, particular attention should be paid to policies and regulations that address platting or subdividing of property, laying of utilities, and mapping of streets that establish a pattern for future development that is to be regulated by the master program.
>
> … For such commonly occurring and planned development, policies and regulations should be designed without reliance on an individualized cumulative impacts analysis. Local government shall fairly allocate the burden of addressing cumulative impacts across among development opportunities.

The general intent is that through cumulative impacts analysis of the shoreline master program itself during its development, that the approved shoreline master program will have addressed and resolved cumulative environmental impacts of all shoreline development.

### *Existing Conditions and Impacts Under WAC 173-16*

Please refer to Chapter 5 for a comprehensive review of the environmental condition of Washington's shorelands.

### *Potential Environmental Impacts Under WAC 173-26*

Please refer to Chapter 7 for a comprehensive discussion of the cumulative, integrated effects of the proposed action.

## Environment Designations (WAC 173-26-210)

The shoreline environment designations established under the Shoreline Management Act are one of the principal tools available for applying and tailoring the general guidelines of the Act to local shorelines. Not only does classifying shorelines into specific designations as recommended in WAC 173-16-040(4) provide the means of adapting broad policies to shoreline segments with distinctively different conditions and resources, it is also a way to integrate comprehensive shoreline planning into master program regulations.

### *Existing WAC 173-16*

The existing rule identifies four primary shoreline environments:

> (i) Natural environment. The natural environment is intended to preserve and restore those natural resource systems existing relatively free of human influence. Local policies to achieve this objective should aim to regulate all potential developments degrading or changing the natural characteristics which make these areas unique and valuable.
>
> (ii) Conservancy environment. The objective in designating a conservancy environment is to protect, conserve and manage existing natural resources and valuable historic and cultural areas in order to ensure a continuous flow of recreational benefits to the public and to achieve sustained resource utilization.
>
> (iii) Rural environment. The rural environment is intended to protect agricultural land from urban expansion, restrict intensive development along undeveloped shorelines, function as a buffer between urban areas, and maintain open spaces and opportunities for recreational uses compatible with agricultural activities.

> (iv) Urban environment. The objective of the urban environment is to ensure optimum utilization of shorelines within urbanized areas by providing for intensive public use and by managing development so that it enhances and maintains shorelines for a multiplicity of urban uses.

In addition, a local government may elect to establish additional environment designations as warranted, and many have done so. Typical alternative designations include an "urban-maritime" designation for shorelines where only water-dependent uses are regularly permitted; a "suburban" designation applying to shorelines that are not strictly urban, but are more intensively developed than a rural setting; and an "aquatic" designation to include all water areas and submerged lands.

### *Proposed WAC 173-26*

*The overall section on environment designation is substantially the same. However it has been edited and reorganized to provide clarity and consistency with the principles.*

General provisions state (in part):

> The recommended classification system consists of six basic environments: "High-intensity," "shoreline residential," "urban conservancy," "rural conservancy," "natural," and "aquatic" as described in this section and WAC 173-26-210(5). Local governments should assign all shoreline areas an environment designation consistent with the corresponding designation criteria provided for each environment. In delineating environment designations local government should assure that existing shoreline ecological functions are protected with the proposed pattern and intensity of development. Such designations should also be consistent with policies for restoration of degraded shorelines.

The basic environments are defined as follows:

> The purpose of the "natural" environment is to protect those shoreline areas that are relatively free of human influence or that include intact or minimally degraded shoreline functions intolerant of human use. These systems require that only very low intensity uses be allowed in order to maintain the ecological functions and ecosystem-wide processes. Consistent with the policies of the designation local [governments] should include planning for restoration of degraded shorelines within this environment.
>
> The purpose of the "rural conservancy" environment is to protect ecological functions, conserve existing natural resources and valuable historic and cultural areas in order to provide for sustained resource use, achieve natural flood plain processes, and provide recreational opportunities. Examples of uses that are appropriate in a "rural conservancy" environment include low-impact outdoor recreation uses, timber harvesting on a sustained-yield basis, agricultural uses, aquaculture, low-intensity residential development and other natural resource based low-intensity uses.
>
> The purpose of the "aquatic" environment is to protect, restore, and manage the unique characteristics and resources of the areas waterward of the ordinary high-water mark.
>
> The purpose of the "high-intensity" environment is to provide for high-intensity water-oriented commercial , transportation, and industrial uses while protecting existing ecological functions and restoring ecological functions in areas that have been previously degraded.
>
> The purpose of the "urban conservancy" environment is to protect and restore ecological functions of open space, floodplain and other sensitive lands where they exist in urban and developed settings, while allowing a variety of compatible uses.
>
> The purpose of the "shoreline residential" environment is to accommodate residential development and appurtenant structures that are consistent with this chapter. An additional purpose is to provide appropriate public access and recreational uses.

In addition,

> Local governments may establish a different designation system or may retain their current environment designations, provided it is consistent with the purposes and policies of this section and WAC 173-26-210(5).

Also,

> Local governments may use "parallel environments" where appropriate. Parallel environments divide shorelands into different sections generally running parallel to the shoreline or along a physical feature such as a bluff or railroad right of way. Such environments may be useful, for example, to accommodate resource protection near the shoreline and existing development further from the shoreline. Where parallel environments are used, developments and uses allowed in one environment should not be inconsistent with the achieving the purposes of the other.

#### *Existing Conditions & Impacts Under WAC 173-16*

The existing environment designation provisions of WAC 173-16 provide local governments with a measure of flexibility nearly as great as that provided by the proposed WAC 173-26, but this flexibility is not as explicitly presented in the existing rule. Examples of how this flexibility might be implemented were not presented in an organized way until 1990 when the first edition of the *Shoreline Management Guidebook* was published. As a result, for the most part, shoreline designations throughout the state tend to be limited to four basic environments: natural, conservancy, rural, and urban.

#### *Potential Environmental Impacts Under WAC 173-26*

The proposed environment designation provisions of WAC 173-26 provide local government with more guidance in establishing alternative shoreline environment designations, and in establishing consistency between their local shoreline master program and their comprehensive plans. Nothing in the existing rule prevents local governments from the use of alternative or parallel environment designations, and many have. Some key differences between WAC 173-16 and the proposed rule are that under the proposed rule local master programs (1) must state the criteria for classifying or reclassifying shorelines with an environment designation, (2) that local governments "should assign all shoreline areas an environment designation consistent with the corresponding designation criteria provided for each environment", (3) the management policies associated with the environment designations are more specific than under WAC 173-16, and (4) emphasis is placed on planning for restoration of degraded shorelines. The anticipated net result is that, to a greater degree than at present, shorelines designations will more closely resemble existing landscape and land use characteristics, and will address habitat restoration.

## General Provisions (WAC 173-26-220)

### *Archaeological and Historic Resources (220 (1))*

#### *Existing WAC 173-16*

Provides at section 060 (2) that in preparing SMPs local governments should identify areas of potential archaeological or cultural value and establish procedures for salvaging the data, and that shoreline permits should contain provisions requiring notification of archaeological or cultural discoveries.

### *Proposed WAC 173-26*

*No significant change.*

Requires that in preparing SMPs local governments shall provide for the protection of archaeological, historical, and cultural features. Shoreline permits shall require site inspections or evaluations in areas of known cultural resources, and shall require notification and work-stoppage if cultural artifacts are found.

### *Existing Conditions & Impacts Under WAC 173-16*

Shorelines are generally acknowledged to harbor a disproportionate density of cultural resources due to the proximity of water and fisheries resources. No studies are known to have been published which assess the loss of cultural resources in shorelines due to development.

### *Potential Environmental Impacts Under WAC 173-26*

The proposed rule essentially reiterates the intents of RCW 27.44 (Indian Graves and Records) and RCW 27.53 (Archaeological Sites and Resources) and their implementing rules which are already applicable to development in shorelines. No measurably different degree of protection of cultural resources is likely to occur.

## *Wetlands (220 (2) (c) (i))*

### *Existing WAC 173-16*

WAC 173-16 contains no section which explicitly regulates wetlands, however, section 050 (6) describes "some of the features of…[marshes, bogs, and swamps]…which are susceptible to damage…and to provide a basis for the guidelines pertaining to human-use activities…"

### *Proposed WAC 173-26*

*No significant change.*

Requires that a SMP shall provide for no net loss of wetlands with respect to: certain forms of construction actions; vegetation removal; filling; or other actions which would result in a significant change of physical, chemical, or biological characteristics of wetlands. Master programs will be required to adhere to specific standards regarding: wetlands use regulations; wetland ratings or characterizations; alteration; buffers; mitigation; and compensatory mitigation.

### *Existing Conditions & Impacts Under WAC 173-16*

See Chapter 5 for a summary of the status and trends of wetlands state-wide. Currently wetlands are regulated under a variety of means and programs. However, none of these laws addresses wetlands in a comprehensive fashion. For example, the federal Clean Water Act (implemented primarily through the US Army Corps of Engineers' "Section 404" permit program) only regulates the placement of fill in wetlands. The state Growth Management Act requires that cities and counties "designate and protect" wetlands

through "Critical Areas Ordinances" but provides no specific standards of protection. Some local governments have adopted local wetlands ordinances. In 1990 Ecology issued a model wetlands ordinance[17], use of which is voluntary. Thus, the level of protection afforded to wetlands in Washington is highly variable across the state.

### *Potential Environmental Impacts Under WAC 173-26*

The proposed rule will bring greater consistency to the management of wetlands under the SMA. All local governments will have to address the same specific types of wetlands, and will have to address the same set of issues in developing their master program. The proposed rule provides state-wide policy guidance, while allowing local governments flexibility to develop regulations appropriate to the local landscape features. The rate of wetlands loss and degradation is expected to be reduced.

## *Geologically Hazardous Areas (220 (2)(c) (ii))*

### *Existing WAC 173-16*

WAC 173-16 contains no section which explicitly addresses geologically hazardous areas.

### *Proposed WAC 173-26*

*No significant change.*

Requires that local governments [1] restrict new development in geologically hazardous areas as defined by WAC 365-190-080(4) under the Growth Management Act[18], [2] to prohibit new development that would pose a hazard during its useful life, and [3] prohibit new development which would require shoreline stabilization (with certain exceptions).

### *Existing Conditions & Impacts Under WAC 173-16*

Unstable slopes are common along Puget Sound shorelines (WDOE, 1977, 1978a, 1978b, 1978c, 1978d, 1979a, 1979b, 1979c, 1979d, 1979e, 1980a, 1980b) and steep slopes in general. Landsliding can be a hazard state-wide, but is especially dangerous in western Washington where heavy winter rains saturate soil layers, fostering landsliding (Gerstel, et al., 1997).

The Growth Management Act requires that cities and counties "designate and protect" geologically hazardous areas through "Critical Areas Ordinances" but provides no specific standards of protection.

---

[17] The Model Wetlands Ordinance is still available for use, but portions are now considered in need of updating.

[18] WAC 365-190-080 (4) lists as hazardous areas those areas susceptible to one or more of the following: erosion hazard, landslide hazard, seismic hazard, and other such as mines or volcanic hazards. In shorelands these hazards are generally, but not exclusively, associated with unstable bluffs, river channel migration zones, and unconsolidated shores.

### *Potential Environmental Impacts Under WAC 173-26*

For geologically hazardous areas which also fall under the Shoreline Management Act, establishes explicit standards which are lacking in WAC 365-190-080(4) under the Growth Management Act. To the extent that new development on unstable slopes and other geologically hazardous areas is restricted or provided with mitigating design, this should result in lower rates of damage to structures and risk people than occurs at present, and lower rates of delivery of excessive sediment loads to streams.

Additionally, development on shoreline geologically hazardous areas often leads to attempts to stabilize the base of the slope at the shoreline through the use of hard structures. As discussed elsewhere in "Shoreline Modification Activities" such structural stabilization has an adverse environmental effect on shoreline processes and habitats. To the extent that new development on shoreline geologically hazardous areas is restricted, the impetus for shoreline stabilization will be reduced, thus effecting a net benefit to aquatic species.

## *Critical Salt Water Habitats (220 (2) (c) (iii))*

### *Existing WAC 173-16*

WAC 173-16 contains no section which explicitly regulates critical saltwater habitats, however, section 050 (5) describes "some of the features of…[estuaries]…which are susceptible to damage…and to provide a basis for the guidelines pertaining to human-use activities…"

### *Proposed WAC 173-26*

*Substantially the same however that regulation of private development will address protection (no net loss) while restoration is a planning objective to be implemented by means other than regulation is clarified.*

Critical saltwater habitat is defined as:

> Critical saltwater habitats include all kelp beds, eelgrass beds, spawning and holding areas for forage fish, such as herring, smelt and sandlance, commercial and recreational shellfish beds, mudflats, intertidal habitats with vascular plants, and areas with which priority species have a primary association. Critical saltwater habitats require a higher level of protection due to the important ecological functions they provide. Ecological functions of marine shorelands can affect the viability of critical saltwater habitats. Therefore, effective protection and restoration of critical saltwater habitats should integrate management of shorelands as well as submerged areas.

Requires that SMPs address the following, where applicable: protecting and restoring a system of fish and wildlife habitats with connections between larger habitat blocks and open spaces; protecting riparian and estuarine ecosystems; establishing buffer zones around these areas to separate incompatible uses from the habitat areas; restoring lost salmonid habitat; improving water quality; and protecting fresh water and sediment inflow regimens.

Also:

> All public and private tidelands or bedlands suitable for shellfish harvest shall be classified as critical areas. Local governments should consider both commercial and recreational shellfish ar

> eas. Local governments should review the Washington department of health classification of commercial and recreational shellfish growing areas to determine the existing condition of these areas. Further consideration should be given to the vulnerability of these areas to contamination or potential for recovery. Shellfish protection districts established pursuant to chapter 90.72 RCW shall be included in the classification of critical shellfish areas.

Also provides that docks, bulkheads, bridges, fill, floats, jetties, utility crossings, and other human-made structures shall not intrude into or over critical saltwater habitats except under certain conditions.

### *Existing Conditions & Impacts Under WAC 173-16*

Inventory and assessment of critical saltwater habitats is patchy and often dated; only commercial shellfish beds are regularly inventoried and assessed. The general health of Washington's shellfish beds continues to decline, as summarized by the Washington Department of Natural Resources (1998), the whole of which is incorporated by reference into this environmental impact statement:

> Shellfish beds serve as a good indicator of the health of the marine environment. Water pollution, poor land use and development of shoreline areas affect these beds. Crabs, shrimp, oysters, clams and other sea creatures rely on marine sediments for food, shelter and nurseries and are susceptible to pollutants that accumulate in these sediments. Shellfish living in polluted sediments tend to accumulate bacteria and toxins in their tissue, making them unfit for human consumption.
>
> Many people rely on healthy populations of shellfish for commercial and recreational uses. The more than 350 commercial shellfish operations in Washington harvest a variety of species, including oysters, clams, mussels and scallops. In 1996, the shellfish industry generated about $740 million and employed 4,300 people.
>
> The Washington State Department of Health classifies more than 200,000 acres of commercial shellfish growing areas in Puget Sound and Pacific coastal bays as approved, conditionally approved or prohibited. The department monitors surveys and samples the commercial shellfish growing beds to determine pollution levels and public health and safety. From 1981 to 1996, the department downgraded the classification of 46,000 acres, but upgraded only about 7,000 acres.
>
> Conditions in some of Washington's commercial shellfish beds are improving while others are getting worse. In general, for all of Puget Sound, more commercial shellfish beds are being downgraded than upgraded. This indicates that overall environmental quality is declining, and results in decreased harvests.
>
> Recreational shellfish-gathering is allowed at 142 public beaches. However, 52 of those beaches are classified as open and 41 beaches are classified as closed because of the presence of pollutants that pose health and safety dangers to shellfish consumers. The remaining beaches are not yet classified.

The protection presently afforded critical saltwater habitats is patchy and inconsistent, based as it is on the application of diverse local shoreline master programs (by local governments) the state's Hydraulics Code (by the Department of Fish and Wildlife), and local watershed management and shellfish water quality programs.

The effect on shellfish beds is problematic: shellfish are filter feeders less affected by shoreline development than by water quality degradation having its source throughout the watershed (e.g. storm water runoff, failing on-site sewage systems, or uncontrolled agricultural wastes) or from in-water sources (e.g. marinas or boating wastes).

While it is difficult to assess the protective effects (or lack thereof) of an individual regulation such as WAC 173-16 on critical saltwater habitats, the available data indicate the overall set of land use and water quality laws and regulations have not adequately protected the resource.

### *Potential Environmental Impacts Under WAC 173-26*

Future impingement on critical salt water habitats will be minimized, thereby affording a greater measure of protection to these habitats than at present. Intertidal habitats will benefit the most, as these habitats are most likely to be affected at present by small, over-water, non-water dependent structures.

## *Critical freshwater habitats (220 (2) (c) (iv))*

### *Existing WAC 173-16*

WAC 173-16 contains no section which explicitly regulates riverine corridors, however, section 050 (8) describes "some of the features of…[rivers streams and creeks]…which are susceptible to damage…and to provide a basis for the guidelines pertaining to human-use activities…"

### *Proposed WAC 173-26*

*Critical freshwater habitat provisions have been substantially simplified to address general habitat values, establish no net loss as the regulatory standard and require coordination with flood hazard and other requirements that directly effect freshwater habitats.*

Contains provisions which "applies to master program provisions affecting critical freshwater habitats, including those portions of streams, rivers, wetlands, and lakes, their associated channel migration zones, and flood plains designated as such."

Provides that "effective management of river and stream corridors depends on:"

> (I) Planning for protection, and restoration where appropriate, along the entire length of the corridor from river headwaters to the mouth; and
>
> (II) Regulating uses and development within the stream channel, associated channel migration zone, wetlands, and the flood plain, to the extent such areas are in the shoreline jurisdictional area, as necessary to assure no net loss of ecological functions associated with the river or stream corridors, including the associated hyporheic zone, results from new development.
>
> As part of a comprehensive approach to management of critical freshwater habitat and other river and stream values, local governments should integrate master program provisions, including those for shoreline stabilization, fill, vegetation conservation, water quality, flood hazard reduction, and specific uses, to protect human health and safety and to protect and restore the corridor's ecological functions and ecosystem-wide processes.
>
> Applicable master programs shall contain provisions to protect hydrologic connections between water bodies, water courses, and associated wetlands. Restoration planning should include incentives and other means to restore water connections that have been impeded by previous development.
>
> Master program provisions for river and stream corridors should, where appropriate, be based on the information from comprehensive watershed management planning, as indicated in WAC 173-26-200 (3).

### *Existing Conditions & Impacts Under WAC 173-16*

The greatest threat to riverine corridors comes from development within those areas. The following description of the status and trends of riparian habitats in urbanizing areas is quoted from Knutson & Naef (1997), the whole of which is incorporated by reference into this environmental impact statement:

> People have traditionally settled in riverine floodplains and along the banks of major streams and lakes (Goldstein et al. 1983, Nabhan 1985). Modern urban settlement near water and throughout watersheds usually entails large-scale removal of native vegetation and its replacement with buildings, pavement, roads, and manicured plantings, all consisting primarily of impervious surfaces. Unlike the effects of forestry, the loss of natural vegetation and consequences to riparian and stream habitats in urbanized areas are usually permanent (Booth 1991). The effects of urban and industrial developments generally result in:
>
> - changes in basin hydrology;
> - loss of riparian habitat;
> - loss of woody debris and other instream structures;
> - degradation of stream channels;
> - reduction in water quality;
> - habitat fragmentation;
> - introduction of pets and exotic pests.
>
> The loss of natural vegetation in riparian and upland areas and its replacement with compacted or largely impervious surfaces changes the hydrology of urbanized watersheds. These changes usually result in a loss of fish and wildlife habitat. Overall, hydrologic changes upset the balance of aggradation and degradation processes that are essential in maintaining healthy stream and riparian ecosystems. The most dramatic and well-studied effect is the increase in the maximum discharge associated with floods and storm events; peak flows in urbanized watersheds have been known to increase as much as five-fold over natural conditions (Booth 1991).
>
> In an attempt to be close to the water and to 'clean up' areas by replacing them with manicured landscapes, riparian vegetation is often cleared when land is developed. Because riparian habitat supports the greatest number of species compared to other habitats, its protection can provide a significant benefit to fish and wildlife in developed landscapes (Noss 1993).
>
> The loss of riparian vegetation due to urbanization: 1) degrades stream conditions through increased erosion of banks that are no longer armored with roots and debris from natural vegetation, 2) removes a source of logs and organic debris that stabilize streams and provide a source of food and nutrients, 3) increases stream temperatures through shade removal, and 4) reduces the capacity of the riparian area to filter incoming sediments and pollutants (Klein 1979).
>
> Fish-bearing rivers and streams that flow through heavily-developed areas rarely resemble their natural form. Stream beds are replaced with drainpipes and culverts, riparian vegetation is removed, and municipal wastes contribute pollutants, sediments, and excessive nutrients to the water. To accommodate the real estate needs and safety of expanding urban populations, streams and rivers are frequently channelized, diked, or piped underground. For example, 73% of Ravenna Creek in King County now runs through a pipe (Wash. Dept. Ecol. 1981). Loss of riparian vegetation, increased flooding, and stream channel manipulation eliminate large woody debris, pools and riffles, sinuosity, slow flowing side channels, and other essential structural components of fish habitat in urbanized areas. Destruction or severe degradation of fish and wildlife habitat by urbanization is often complete and irreparable (Canning and Stevens 1989).

> Streams and rivers flowing through urban landscapes suffer reductions in water quality that impair their ability to support microorganisms, fish, and wildlife. Water quality is reduced through increased sedimentation, chemical pollution, and increases in water temperature. Higher than normal surface flows carry pollution, nutrients, and sediment to streams in large quantities. Surface flows also deliver warmer water to streams than do subsurface flows. Urban stormwater run-off is commonly borne in storm sewers or surface channels and deposited directly into the waterway, with little opportunity to be absorbed, cooled, and cleansed by passing through natural vegetation and soils (King County Planning Division 1980).
>
> One of the greatest impacts of urbanization on wildlife comes from habitat fragmentation (Stenberg et al. 1997). Remaining natural habitat in urban areas typically consists of small, infrequently encountered remnant patches that are isolated from each other (Carleton and Taylor 1983, Goldstein et al. 1983). Wildlife in such settings is limited to highly-adaptive and mobile species with small area or generalized habitat requirements; examples include the American robin, European starling, house sparrow, raccoon, and coyote (Aldrich and Coffin 1980, Quinn 1992). Animals that require large areas of intact natural vegetation, such as some forest interior songbirds and elk, are lost during habitat fragmentation associated with urbanization (Aldrich and Coffin 1980, Bryant and Maser 1982).

### *Potential Environmental Impacts Under WAC 173-26*

Over time, the rate of habitat degradation as described above in riverine corridors should slow state-wide, and in discrete areas subject to redevelopment could see some improvement due to "no net loss" and mitigation requirements.

## *Flood Hazard Reduction (220 (3))*

### *Existing WAC 173-16*

WAC 173-16 contains no section which explicitly addresses flood hazard reduction, however, section 050 (9) describes "some of the features of…[flood plains]…which are susceptible to damage…and to provide a basis for the guidelines pertaining to human-use activities…"

### *Proposed WAC 173-26*

*Substantially the same.*

Requires that master programs shall implement integrated flood hazard reduction measures in accordance with the following principles. Principles state:

> Flooding of rivers, streams, and other shorelines is a natural process that is affected by factors and land uses occurring throughout the watershed. Past land use practices have disrupted hydrological processes and increased the rate and volume or runoff, thereby exacerbating flood hazards and reducing ecological functions. Flood hazard reduction measures are most effective when integrated into comprehensive strategies that recognize the natural hydrogeological and biological processes of water bodies. Over the long term, the most effective means of flood hazard reduction is to prevent or remove development in flood-prone areas, to manage storm water within the flood plain, and to maintain or restore the riverine system's natural hydrological and geomorphilogical processes.
>
> Structural flood hazard reduction measures, such as diking, even if effective in reducing inundation in a portion of the watershed, can intensify flooding elsewhere. Moreover, structural flood hazard reduction measures can damage ecological functions crucial to fish and wildlife species, bank stability, and water quality. Therefore, structural flood hazard reduction measures shall be

avoided wherever possible. When necessary, they shall be accomplished in a manner to minimize change to shoreline ecological functions and ecosystem-wide processes.

### *Existing Conditions & Impacts Under WAC 173-16*

Flood hazards are managed under the cooperative federal-state-local program based on the National Flood Insurance Program administered by the Federal Emergency Management Agency, and regulated under both the Critical Area Ordinance provisions of the Growth Management Act, and Washington's Flood Plain Management Act (Chapter 86.16 RCW).

Flood hazard and flood damage remains a problem in most basins of western Washington and in eastern Washington especially in the Yakima and Okanogan basins. During the decade of the 1990s flood damage in Washington state exceeded one billion dollars.

The Washington Department of Community, Trade, and Economic Development's manual, *Optional Comprehensive Plan Element for Natural Hazard Reduction* (Growth Management Program, 1999), the whole of which is incorporated by reference into this environmental impact statement, characterizes Washington flood plains and flooding as follows:

> In Washington there are two types of significant flooding:
>
> - Large riverine events
> - Ground water flooding events
>
> Riverine flooding occurs when an increase in the volume of water in a river or stream channel occurs, and the river or stream overflows its banks and spills onto the adjacent floodplain. Large riverine floods can have great impact due to their scale, associated with densely populated areas, and the possibility of secondary hazards (such as landsliding and structural fires). Factors influencing damage from these events include high flow volumes and velocity, aggradation, bank erosion, and in-stream debris. Not surprisingly, a comparison of the locations in Washington state rivers and counties experiencing repetitive flood disasters, indicates that those counties with the most extensive river systems, such as King, Snohomish, Lewis, Skagit, and Grays Harbor, are also the counties which experience the most frequent flood events.
>
> Despite the division of Washington by the Cascade Mountains into "wet" and "dry" halves, riverine flooding does occur throughout the state. The differing climates do, however, create different flood regimes east and west of the Cascades. Western Washington, which is characterized by "wet" winters with major rainfall in the lower elevations and heavy winter snowfall in the higher elevations, sees nearly 70 percent of its floods between November and February. \the rivers which flow out of the Olympic Mountain Range and off the western slopes of the Cascade Mountains flood frequently. Large riverine floods are the flood events most commonly associated with major storms, such as the floods that resulted from the 1995-1996 storms in Western Washington. Some of the most significant flooding occurs when rain falls on early snows, leading to an unseasonably early melting of snowpack. Conversely, the relatively "dry" winters of Eastern Washington make direct large storm-related flooding uncommon. Although the February 1996 floods occurred during "winter," the meteorological conditions were actually spring-like, with heavy, warm rains on snow. Eastern Washington is particularly subject to flash floods, such as occurred in 1998 in Ferry County and Ephrata. It is also vulnerable to spring snowmelt, such as occurred in the Methow and Okanogan Valleys.
>
> The nature and extent of a flood event is the result of the complex hydrologic response of the landscape to the storm or melt runoff. In general, the more quickly water from a drainage basin

concentrates in a stream or depression, the greater the level of flooding. Factors affecting this hydrologic response include:

- land use and land management practices
- hillslope gradient and aspect
- drainage patterns and density
- surficial deposits
- soil texture and permeability
- water storage capacity
- land cover and vegetation.

Most counties in the state experience one to two serious events per year. With the exception of five sparsely populated counties in Eastern Washington, every county has suffered multiple federally declared disasters; six counties suffered four federally declared disasters in three years. Recurring disasters cause undue hardship on thousands of Washington state residents; result in enormous business, agriculture and other commercial losses; and cost millions of local, state, and federal tax dollars to repair.

The financial impacts of these disasters seems to increase every year. The annual cost of all natural disasters in the United States has doubled in the past decade, from roughly $25 billion a year to $50 billion. The reasons for the increase in costs are not clear. Many experts contend that increased urbanization in vulnerable areas is responsible. Another possible explanation for these increased costs includes our increased dependence on man-made structures, such as utility lines, which are fragile in the face of disasters. Another cause could be the extensive development we have allowed in high risk areas as a result of our belief that the measures taken to tame or control natural phenomena, such as rivers or steep hillsides, will ensure our protection.

### *Potential Environmental Impacts Under WAC 173-26*

The provisions of Section 220 (3) will supplement the flood plain regulatory programs under the Flood Plain Management Act and the Growth Management Act, and promote integration of shoreline master program flood management provisions with other local programs adopted under the FPMA and the GMA. This integration will foster more comprehensive and cost-effective approaches to flood hazard management, thereby resulting in reduced damages to public and private property, better integration of habitat conservation concerns into management plans, and a lower rate of riparian habitat loss and degradation.

## *Public Access (220 (4))*

### *Existing WAC 173-16*

Addressed in a broad sense in the Recreation section (WAC 173-16-060 (21)) which states that:

> (a) Priority will be given to developments…which provide recreational uses and other improvements facilitating public access to shorelines.

Also addressed in other sections, the net effect of which is to create a ‘network’ of requirements and inducements for provision of public access.

### *Proposed WAC 173-26*

*Substantially the same. Includes reference to compliance with constitutional and other legal limitations and requirement that public access improvements not result in a net loss of shoreline ecological functions.*

Provides that local master programs shall:

(i) Promote and enhance the public interest with regard to rights to access waters held in public trust by the state while protecting private property rights and public safety.

(ii) Protect the rights of navigation and water-dependent uses.

(iii) To the greatest extent feasible consistent with the overall best interest of the state and the people generally, protect the public's opportunity to enjoy the physical and aesthetic qualities of shorelines of the state, including views of the water.

(iv) Regulate the design, construction, and operation of permitted uses in the shorelines of the state to minimize, insofar as practical, interference with the public's use of the water.

Also provides, in other sections, requirements and inducements for the provision of public access associated with specific kinds of shoreline development.

### *Existing Conditions & Impacts Under WAC 173-16*

The following description is quoted from *Washington State Coastal Zone Management Section 309 Assessment and Strategy, 1997* (Shorelands and Water Resources Program, 1997.)

> As of 1985 Washington's 2,200 miles of inland marine shoreline had approximately 700 public access sites occupying about 425 miles of shoreline, or about 19 percent of that shore (Scott, et al., 1986). Since only half that public shore has access from the uplands, the public has real access to only about 10 percent of the inland marine waters of Puget Sound. No more recent information is available for Washington marine shorelines, and no such comprehensive studies are known to have been completed for lake, stream, or river shorelines.
>
> Public use of shorelines and the demand for public access can be readily characterized from a 1996 state-wide public opinion survey (Social and Economic Sciences Research Center, 1996). Forty two percent of Washingtonians go to a shoreline at least once a month, and 80% go at least several times a year. Lakes, rivers and streams, and Puget Sound are about equally popular as "most frequently visited" while the ocean is the least frequent first choice (13%). When asked, "Is there adequate public access to shorelines in Washington?" 63% responded "enough" and 37% "not enough." When asked what they found 'bothersome' to their shoreline visits, 75% identified "crowds," but this choice was fifth behind litter, site abuse, building development, and poor water quality.
>
> Overall, the principal impediments to provision of adequate public access are considered to be:
>
> - inadequate funding for acquisition of new sites;
> - inadequate funding for maintenance of existing sites; and
> - private property owner resistance to siting adjacent public facilities.

### *Potential Environmental Impacts Under WAC 173-26*

WAC 173-26 essentially codifies much of the public access guidance which was issued by Ecology during the past twenty years, and which was 'field tested' by many local governments in both projects and local master programs. Incremental improvements to

public access will occur to the extent that new development approvals are conditioned to require public access to shorelines.

Poorly sited or designed public access to shorelines has the capacity to adversely affect shoreline habitats and resources. A provision that local shoreline master programs

> Do not allow public access improvements that would cause significant adverse impacts to shoreline ecological functions that cannot be mitigated. Require that public access improvements with the potential to degrade ecological functions be designed to minimize adverse impacts.

should largely eliminate future adverse environmental effects of new public access siting, development, and operation.

## *Shoreline Vegetation Conservation (220 (5))*

### *Existing WAC 173-16*

WAC 173-16 contains no section which explicitly addresses vegetation conservation. However, various sections of the rule clearly state requirements or inducements for maintenance of vegetative buffers or the like (e.g. section 050 (6) regarding marshes, bogs, and swamps, section 050 (9) regarding floodplains, section 060 (1) regarding agricultural practices, section 060 (3) regarding forest management practices, section 060 (8) regarding residential development, and section 060 (9) regarding utilities.

### *Proposed WAC 173-26*

*Clarification added that vegetation conservation areas are not necessarily closed to use as long as no net loss of shoreline ecological functions standard is met. Standards have been simplified to focus on no net loss.*

The vegetation conservation section has broad application across the various environmental designations, the general master program provisions, and shoreline uses:

> Vegetation conservation includes activities to protect and restore vegetation along or near marine and freshwater shorelines that contributes to the ecological functions of shoreline areas. Vegetation conservation provisions include the prevention or restriction of plant clearing and earthgrading, vegetation restoration, and the control of invasive weeds and nonnative species.
>
> Unless otherwise stated, vegetation conservation does not include those activities covered under the Washington State Forest Practices Act, except for conversion to other uses and those activities over which local governments have authority. As with all master program provisions, vegetation conservation provisions apply even to those shoreline uses and developments that are exempt from the requirement to obtain a permit. Like other master program provisions, vegetation conservation standards do not apply retroactively to existing uses and structures, such as existing agricultural practices.

Also provides that vegetation conservation is to be implemented through the following principles:

> The intent of vegetation conservation is to protect and restore the ecological functions and ecosystem-wide processes performed by vegetation along shorelines. Vegetation conservation should also be undertaken to protect human safety and property, to increase the stability of river banks and coastal bluffs, to reduce the need for structural shoreline stabilization measures, to improve the visual and aesthetic qualities of the shoreline, to protect plant and animal species and their habitats, and to enhance shoreline uses.

Master programs shall include; planning provisions that address vegetation conservation and restoration, and regulatory provisions that address conservation of vegetation; as necessary to assure no net loss of shoreline ecological functions and ecosystem-wide processes, to avoid adverse impacts to soil hydrology, and to reduce the hazard of slope failures or accelerated erosion.

Local governments should address ecological functions and ecosystem-wide processes provided by vegetation as described in WAC 173-26-200 (3)(d), (e), (f), and (g).

Local governments may implement these objectives through a variety of measures, where consistent with Shoreline Management Act policy, including clearing and grading regulations, setback and buffer standards, critical area regulations, conditional use requirements for specific uses or areas, mitigation requirements, incentives and non-regulatory programs.

In establishing vegetation conservation regulations, local governments must use available scientific and technical information, as described in WAC 173-26-200 (2)(a). At a minimum, local governments should consult shoreline management assistance materials provided by the department and Management Recommendations for Washington's Priority Habitats, prepared by the Washington state department of fish and wildlife where applicable.

### *Existing Conditions & Impacts Under WAC 173-16*

Development of riparian corridors, and occupancy of developed areas, progressively results in the degradation or elimination of native vegetation through degradation and/or replacement with managed landscapes, often dominated by exotic species. This habitat degradation has adverse secondary effects on fish and wildlife populations and the value of riparian areas as migration corridors. The degree of the adverse impact is, of course, highly variable depending on the intensity of development, the character of the existing native vegetation community, and the nature of the local shoreline master program. (See also "Riverine Corridors and other fresh water fish and wildlife conservation areas (220 (2) (c) (iv))" above.)

Some local governments already include vegetation management provisions in their shoreline master programs based on recommendations in the *Shoreline Management Guidebook* (Shorelands and Coastal Zone Management Program, 1994), but these recommendations are not as comprehensive or far-reaching as the proposed provisions of WAC 173-26.

### *Potential Environmental Impacts Under WAC 173-26*

The proposed rule will assure that all shoreline master programs include vegetation conservation provisions, that future damage to riparian areas is minimized, due to "no net loss" and mitigation requirements.

Possibly more than any other aspect of WAC 173-26, the Vegetation Conservation provisions at section 220 (5) constitute a new approach in shoreline management — "…to protect and restore the ecological functions and ecosystem-wide processes performed by vegetation along shorelines…" — for the purpose of implementing the provision of the Shoreline Management Act which states: "…protecting against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the state and their aquatic life…" (RCW 90.58.020). The Vegetation Conservation provisions will over-lay, and therefore affect, the way all shoreline modifications and shoreline uses are designed, built, and operated.

Over time, the rate of habitat degradation on shorelines should slow state-wide, and in redeveloped areas should see some improvement due to "no net loss" and mitigation requirements.

## *Water Quality, Storm Water, and Nonpoint Pollution (220 (6))*

### *Existing WAC 173-16*

WAC 173-16 contains no section which explicitly addresses water quality; however, various sections of the rule clearly address protection of water quality (e.g. section 060 (1) agricultural practices, section 060 (8) residential development, section 060 (14) land filling, and section 060 (16) dredging.

### *Proposed WAC 173-26*

*Essentially the same.*

States that:

> Shoreline master programs shall, as stated in RCW 90.58.020, protect against adverse impacts to the public health, to the land and its vegetation and wildlife, and to the waters of the state and their aquatic life, through implementation of the following principles:
>
> (i) Prevent impacts to water quality and storm water quantity that would result in a net loss of shoreline ecological functions, or a significant impact to aesthetic qualities, or recreational opportunities.
>
> (ii) Ensure mutual consistency between shoreline management provisions and other regulations that address water quality and storm water quantity, including public health, storm water, and water discharge standards. The regulations that are most protective of ecological functions shall apply.

### *Existing Conditions & Impacts Under WAC 173-16*

Water quality in Washington State is regulated and managed primarily through the Water Pollution Control Act (Chapter 90.48 RCW), Dairy Nutrient Management Act (Chapter 90.64 RCW), Puget Sound Water Quality Protection Act (Chapter 90.71 RCW), and Shellfish Protection Districts Act (Chapter 90.72 RCW). Water quality is addressed also by the Shoreline Management Act (Chapter 90.58 RCW) at section 90.58.020: "…This policy contemplates protecting against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the state and their aquatic life…" For a thorough review of Washington's water quality laws see Washington Department of Ecology (1999).

The 1998 Washington State Water Quality Assessment (Butkus, 1997) , the whole of which is incorporated by reference into this environmental impact statement, assessed estuary, stream, and lake water quality state-wide and concluded:

- Of the designated uses assessed, no impairment was found in 35% of all streams, 32% of estuaries, and 63% of lakes statewide.
- All assessed aquatic life uses were fully supported in 61% of all streams and 28% of estuaries statewide.

- Swimming was assessed as fully supported in 57% of all streams and 97% of estuaries statewide.
- Aesthetic enjoyment due to trophic state was fully supported in 63% of lakes statewide.
- The primary cause of use impairment in streams is fecal coliform.
- The primary cause of use impairment in estuaries is temperature created by natural conditions.
- The primary cause of human-caused impairment in estuaries is fecal coliform.
- The primary cause of use impairment in lakes is excessive nutrients.
- The primary human-caused source of pollution that is impairing all surface waters (streams, estuaries, and lakes) is agriculture.

A recent nation-wide assessment of estuarine eutrophication[19] (Bricker, et al., 1999) addressed ten estuaries in Washington state: Columbia River; Willapa Bay; Grays Harbor; Puget Sound; Hood Canal; Whidbey Basin & Skagit Bay; South Puget Sound; Port Orchard System; Bellingham, Padilla and Samish Bays; and Sequim and Discovery Bays. Eutrophic conditions and trends in most were rated Moderate ("symptoms generally are less periodic and/or occur over medium or smaller areas"). Hood Canal and South Puget Sound were rated High ("symptoms generally occur periodically and/or over extensive areas"). Columbia River was rated Low ("few local symptoms occur at more than minimal levels). Symptoms in all except the Columbia River are expected to worsen by 2020. Both Hood Canal and South Puget Sound are naturally susceptible to eutrophication because of poor flushing (water exchange) characteristics, and both are subject to a "high overall human influence." Other estuaries in Washington State have better flushing characteristics and are therefore better able to overcome human influence.

### *Potential Environmental Impacts Under WAC 173-26*

By requiring that local shoreline master programs "…prevent impacts to water quality that would result in a net loss of shoreline ecological functions…" and "…ensure mutual consistency between shoreline management provisions and other regulations that address water quality…" the proposed rule will exert a useful function of integrating the diversity of water quality management programs in the shoreline zone. This should, if not countered by factors outside of shoreline jurisdiction, lead to a net improvement in water quality.

[19] Eutrophication is the accelerated production of organic matter, particularly algae, in a water body. It is usually caused by an increase in the amount of nutrients being discharged into the waterbody. As a result of accelerated algal production, a variety of impacts may occur, including nuisance and toxic algal blooms, depleted dissolved oxygen, and loss of submerged aquatic vegetation.

# Shoreline Modifications (WAC 173-26-230

## *Shoreline Stabilization (230 (3) (a))*

### *Existing WAC 173-16*

Provides policy guidance as follows:

> (a) Bulkheads and seawalls should be located and constructed in such a manner which will not result in adverse effects on nearby beaches and will minimize alterations of the natural shoreline.
>
> (b) Bulkheads and seawalls should be constructed in such a way as to minimize damage to fish and shellfish habitats. Open-piling construction is preferable in lieu of the solid type.
>
> (c) Consider the effect of a proposed bulkhead on public access to publicly owned shorelines.
>
> (d) Bulkheads and seawalls should be designed to blend in with the surroundings and not to detract from the aesthetic qualities of the shoreline.
>
> (e) The construction of bulkheads should be permitted only where they provide protection to upland areas or facilities, not for the indirect purpose of creating land by filling behind the bulkhead. Landfill operations should satisfy the guidelines under WAC 173-16-060(14).

### *Proposed WAC 173-26*

*Section has been restructured for clarity and revised to focus on implementation of the no net loss of shoreline ecological functions standard.*

Takes a mixed approach blending both prescriptive measures and performance standards to regulating shoreline erosion control for the purpose of minimizing adverse environmental effects to shoreline processes and habitats. Certain practices, presently conditionally allowable, would be disallowed or further restricted. Much (but not all) new development would be required to be sited and constructed such that shoreline erosion control measures would be unnecessary. New shoreline stabilization structures would be allowable only when there is a clear demonstration of need. Mitigation for adverse environmental effects will be required. Reading the full text is advised.

### *Existing Conditions & Impacts Under WAC 173-16*

Shoreline erosion conditions and stabilization practices vary significantly on Puget Sound beaches, Pacific Ocean beaches, on lake shores, and river banks as discussed below.

#### Inland Marine Waters

The shores of Washington's inland coast—greater Puget Sound—undergo both shoreline erosion and landsliding. The overall rates of shoreline retreat are usually minor, maybe an inch or two a year, but in some areas may average as much as half a foot per year. This is usually due to a combination of bluff undercutting and failure of steep slopes, resulting in landslides. At any particular location, landslides occur infrequently, often decades apart. Simple shoreline wave erosion *by itself* is often not the problem on Puget Sound shorelines.

Shoreline erosion is a concern to both coastal property owners and the users and managers of coastal public resources. Property owners are naturally concerned with protecting their investments in land and buildings. Unfortunately, houses and other buildings are often built dangerously close to the shoreline. Most property owners react to incidents of erosion or landsliding by erecting erosion control structures such as concrete or rock bulkheads. If properly constructed, these shoreline armoring structures can slow most forms of wave induced shoreline erosion for a period of time, but will probably do little to prevent continuing landsliding. Many shoreline property owners consider shoreline armoring critical to the protection of their real estate investment.

Resource managers are, of course, concerned about any adverse effects on the habitats which support biological resources such as fish and shellfish, and are charged with protecting the public property right in those resources.

The Department of Ecology's Coastal Erosion Management Strategy project for Puget Sound (conducted between 1993 and 1995; Canning & Shipman, 1995; Terich, Schwartz & Johannessen, 1994; Macdonald, et al., 1994; Thom, et al., 1994) , the whole of each being incorporated by reference into this environmental impact statement, revealed that shoreline armoring typically results in the following adverse effects:

- sediment supply to nearby beaches is cut off, thus leading to "starvation" of the beaches for the sand and other fine grained materials that typically make up a beach;
- the hard face of shoreline armoring, particularly concrete bulkheads, reflects energy back onto the beach, thus exacerbating beach erosion;
- in time, a sandy beach is transformed into gravel or cobbles, and may even be scoured down to bedrock, or more commonly in the Puget Sound basin, a hard clay. The footings of bulkheads are exposed, leading to undermining and failure;
- vegetation which shades the upper beach is eliminated, thus degrading the value of the beach for spawning habitat; and
- any transformation of the character of the beach affects the kind of life the beach can support.

In addition, there are impacts of land clearing practices associated with shoreline armoring:

- Ironically, property owners often exacerbate their inherent slope stability problems in two ways. First, they attempt to maximize views by building their homes dangerously close to the bluff edge. Second, they further enhance their views of Puget Sound by removing much or all the vegetation from the bluff face and top. Both of these practices further destabilize banks and bluffs, triggering more frequent or more severe slope failures.
- A common sequence of events is: land is cleared and a house is built as close to the edge of the bluff as is allowed; trees and large shrubs are removed from the top and face of the bluff to enhance water views; within a few years there is a localized landslide at the site, usually during a wet winter; the property owner applies for a permit

to construct shoreline armoring as protection from further landsliding. In fact, most armoring will do little to prevent future landsliding.

- The rationale for constructing shore protection devices is often mixed up with many non-geologic motivations. Bulkheads are often viewed as landscape improvements or as convenient ways to improve beach access on otherwise difficult sites. On a bluff shoreline, the bulkhead and the terrace behind it provide an excellent place to store a small dinghy, to place a picnic table, or to serve as the foundation of a stairtower. In doing so, the native vegetation is replaced by a lawn with few or no shrubs, and the overhanging vegetation typical of Puget Sound beaches is eliminated.

Shoreline armoring is a common practice in Puget Sound, more so in the south and central Puget Sound counties of Thurston, Mason, Pierce, Kitsap, King, and Island.

The best information on the amount and annual rate of armoring is for Thurston County, based on a thorough inventory of marine shoreline armoring (Morrison, Kettman & Haug, 1993). In 1977, 14 percent of Thurston County's 103 miles of marine shoreline were armored. By 1993 that had increased to 29 percent, or 30 miles. The annual rate of armoring was about one percent, or one mile per year.

Throughout all of Puget Sound, the annual rate of armoring is estimated to be at least 1.7 miles per year during 1993 to 1995. An equal amount of existing armoring was repaired or replaced during this time. This information is considered to be an under-estimate. Seventy five percent of this new armoring was constructed in Mason, Kitsap, and Pierce counties.[20]

**Pacific Ocean Coast**

For the most part, the Pacific Ocean coast is accretional and has been for centuries. Beginning a few decades ago the rate of accretion slowed (Phipps & Smith, 1978; Phipps, 1990), and during the past decade incidents of erosion have occurred along the coast at discrete locations: Fort Canby State Park; the northerly four or so miles of the Long Beach Peninsula; Cape Shoalwater; the Grayland area; at Westhaven State Park; and at Point Brown. The Pacific Ocean coast is especially vulnerable to short-term erosion incidents during El Niño winters (Kaminsky, Ruggerio & Gelfenbaum, 1998).

Shoreline armoring is uncommon on the Pacific Ocean beaches, largely because of [1] the high construction cost relative to the value of structures at risk, and [2] the status of the ocean beaches as a shoreline of statewide significance[21]. The principal armoring proj

---

[20] This data was developed by monitoring the State Environmental Policy Act weekly Register between May 1993 and October 1995 for marine shoreline erosion control actions. The quality of information in the SEPA Register is variable. Not all local governments process permit applications and report information in the same manner. Some applications for shoreline armoring fall below a threshold for SEPA Register reporting altogether. As a result, the information developed from the SEPA Register should be regarded as indicative, not absolutely accurate, and conservative in that it does not capture all marine erosion control actions.

[21] The shorelines of state-wide significance provisions of the Shoreline Management Act (RCW 90.58.020) provide that "…the interests of all the people shall be paramount in the management of shorelines of state-wide significance…" The Act further requires that on shorelines of state-wide significance that local mas-

ects have been placed at Cape Shoalwater to protect SR 105 and at Point Brown to protect five condominium buildings. These structures have not been monitored for adverse environmental effects[22].

**Streams and Rivers**

Most development along streams and rivers occurs in the lower reaches where meandering is common. Meandering, by its very nature, is a constant dynamic of bank erosion and accretion. Along these reaches rip rap revetment armoring or bioengineered structures are generally the solution of choice. At present, there is little quantitative information which characterizes the extent and nature of stream and river bank armoring or stabilization.

### *Potential Environmental Impacts Under WAC 173-26*

In general, hard approaches to shoreline erosion control will be discouraged, and soft approaches encouraged. Still, there will remain many high energy sites where effective shoreline erosion control will require some form of armoring.

The most important cumulative effect of Puget Sound shoreline stabilization is to cut off the supply of sediments from eroding banks and bluffs which maintain the beaches. When a sufficient portion of a drift cell has been armored or otherwise protected, for a sufficient period of time (usually a few decades), the cumulative effect is a combination of beach lowering and coarsening. Two key secondary effects are [1] that the beach lowering exposes the footings of shoreline armoring, thus necessitating repair or replacement; and [2] the beach coarsening changes the beach habitat, affecting the creatures which can live there. (Canning & Shipman, 1994; Thom, Shreffler, and Keith Macdonald, 1994; Macdonald, Simpson, Paulsen, Cox, and Gendron. 1994.) It is important to remember that even soft shoreline erosion protection techniques, if they prevent sediments from reaching the beach, can also have adverse environmental effects.

Marine shorelines are not particularly amenable to vegetative shoreline erosion control because [1] there are few erosion-resistant plant materials which tolerate being rooted in salt water and [2] the wave energy on marine shorelines is generally such that vegetative erosion control alone is inadequate to resist erosive force where shoreline retreat is a threat to structures.

Fresh water shores (lakes, streams and rivers) are more amenable to stabilization using vegetation. Still, in high energy situations bioengineered solutions combining armoring with vegetation will be the preferred alternative where shoreline stabilization must be applied.

---

ter programs "shall give preference to uses in the following order of preference which: (1) recognize and protect the state-wide interest over local interest; (2) preserve the natural character of the shoreline; and other provisions.

[22] What monitoring has been carried out has been more for the purpose of monitoring the condition of the structure and any beach lowering which could adversely affect the structure.

Over all, the proposed rule will foster more use of softer approaches to shoreline stabilization, but will not eliminate all application of hard approaches. Future adverse physical, biological, and ecological effects to shorelines and beaches will be moderated in comparison with the past.

In conjunction with other sections of the proposed rule which provide for greater setbacks from the shoreline, avoidance of geologically hazardous areas, and vegetation conservation, the net effect will be to lessen the need for shoreline stabilization all together, and especially shoreline armoring.

## *Piers and Docks (230 (3) (b))*

This rule section addresses two vastly different scales of construction: [1] commercial, industrial, and public piers and docks, and [2] small facilities associated with a single family residence.

### *Existing WAC 173-16*

Provides general policy guidance regarding: floating docks, preference for open-pile piers, priority for community docks over single-use docks, cumulative effects of single-use docks, and water quality.

### *Proposed WAC 173-26*

*Clarification that a dock associated with a single family residence is a water dependent use is added.*

Provides distinct policy guidance regarding commercial and public piers and docks, and small facilities associated with a single family residence, including performance standards:

> New piers and docks shall be allowed only for water-dependent uses or public access. As used here, a dock associated with a single family residence is a water dependent use provided that it is designed and intended as a facility for access to watercraft and otherwise complies with the provisions of this section. Pier and dock construction shall be restricted to the minimum size necessary to meet the needs of the proposed water-dependent use. Water-related and water-enjoyment uses may be allowed as part of mixed-use development on over-water structures where they are clearly auxiliary to and in support of water-dependent uses, provided the minimum size requirement needed to meet the water-dependent use is not violated.
>
> New pier or dock construction, excluding docks accessory to single-family residences, should be permitted only when the applicant has demonstrated that a specific need exists to support the intended water-dependent uses. If a port district or other public or commercial entity involving water-dependent uses has performed a needs analysis or comprehensive master plan projecting the future needs for pier or dock space, and if the plan or analysis is approved by the local government and consistent with these guidelines, it may serve as the necessary justification for pier design, size, and construction. The intent of this provision is to allow ports and other entities the flexibility necessary to provide for existing and future water-dependent uses.
>
> Where new piers or docks are allowed, master programs should contain provisions to require new residential development of two or more dwellings to provide joint use or community dock facilities, when feasible, rather than allow individual docks for each residence.
>
> Piers and docks, including those accessory to single-family residences, shall be designed and constructed to avoid or, if that is not possible, to minimize and mitigate the impacts to ecological

functions, critical areas resources such as eelgrass beds and fish habitats and processes such as currents and littoral drift. See WAC 173-26-220 (2)(c)(iii) and (iv). Master programs should require that structures be made of materials that have been approved by applicable state agencies.

### *Existing Conditions & Impacts Under WAC 173-16*

Larger commercial and public piers and docks are commonly associated with urban harbors of Puget Sound and the coastal estuaries, and to a lesser degree the Columbia – Snake river inland waterway system. The private, single family ("single use") pier or dock is commonly associated with lake shores state-wide and protected embayments of Puget Sound. During the past twenty years the number and density of single use piers and docks in some Puget Sound embayments and some lakes has notably increased.

Nightingale and Simenstad (2001a) reviewed the literature on the environmental effects of marine over water structures of all scales, and concluded that adverse environmental effects could be caused by the shading effect of the over-water structures, and any boats moored to them, on the growth of aquatic organisms, including behavioral effects on fish, and that "overwater structures can pose significant impacts to ambient wave energy patterns and substrate types." Regarding cumulative effects, they concluded that:

> Given the apparent increasing demand for overwater structures, structural design to allow maximum light transmission and to mitigate energy and substrate changes are required to protect the ecosystems marine fishes rely upon. Given what is known concerning overwater structure impacts to marine and estuarine ecosystems, we conclude that multiple placements of overwater structures in marine waters can pose substantive risks of significant changes to the immediate and surrounding marine and estuarine ecosystems. These risks require the assessment of existing cumulative light limitation effects and wave energy and substrate effects to the shoreline environment. These risks require assessment at the drift cell level before considering the addition of new structures

Kahler, Grassley, and Beauchamp (2000) reviewed the literature on the environmental effects of overwater structures on lake shores primarily in the context of effects upon salmonids, and especially for Lake Washington. Their general conclusions

> 1) Piers, piles, boatlifts, and moored boats may provide cover, shade, and focal points for exotic predators of juvenile chinook (Oncorhynchus tshawytscha) and coho (O. kisutch) salmon such as smallmouth bass (Micropterus dolomieui) and largemouth bass (M. salmoides). Note: native predators such as cutthroat trout (O. clarki) and piscivorous birds may also benefit from shorezone structures, but they have yet to be considered in BAs for proposed shorezone development in the Lake Washington system.
>
> 2) Shading from piers, boat canopies, boathouses, and moored boats may reduce the abundance of prey organisms available to juvenile chinook and coho salmon, and to forage fish of bull trout (Salvelinus confluentus) by reducing aquatic vegetation and phytoplankton abundance. Any reduction in aquatic vegetation may also reduce complex refuge habitat. To date, the Services have made no distinction between native and non-native aquatic vegetation.
>
> 3) The temporary turbidity associated with construction may reduce water quality to the detriment of chinook and coho salmon, bull trout, and forage fish of bull trout.
>
> 4) Pile driving may disrupt the distribution and behavior of, or injure, chinook and coho salmon, bull trout, and forage fish of bull trout.
>
> 5) Piers and/or bulkheads may disrupt the migratory and rearing behavior of juvenile chinook and coho salmon.

6) The boating activity that accompanies piers could disturb rearing or migrating chinook and coho salmon.

7) Chemicals used to preserve or clean wood structures, and hydrocarbons from boats and personal watercraft could be acutely or chronically toxic to chinook and coho salmon, bull trout, or prey items of those species.

8) Pier lighting may facilitate nocturnal predation on juvenile chinook and coho salmon by visual predators like smallmouth bass, cutthroat trout, and piscivorous birds.

9) The removal of vegetation during bulkhead construction or replacement could eliminate a potential source of cover and food (allocthonous input of terrestrial insects and detritus for foraging aquatic insects) for juvenile chinook and coho salmon, and forage fish of bull trout. Vegetation removed is typically not replaced with native woody species that could provide a future source of woody debris to the lake (see impact 13, below). Instead, shoreline property owners generally favor lawn or ornamental shrubby species that preserve lake views.

10) Bulkheads prevent the recruitment of native sediment to the lake, resulting in a loss of heterogeneous substrate, and resulting in shoreline erosion at the toe or along the shore downwind of the bulkhead. This could affect the availability of spawning and rearing habitat, and the forage base for a variety of fish species.

11) Bulkheads eliminate shallow-water habitat, which is critical as refuge and foraging habitat for juvenile salmonids and other small fish.

12) Bulkheads reflect wave energy at the shoreline, resulting in the scour of sediment at the bulkhead toe, and creating an inhospitable high-energy environment for juvenile fish.

13) The permanent removal of woody debris during bulkhead and/or pier construction reduces the availability of complex refuge habitat for small fish, and attachment surfaces for periphyton.

### *Potential Environmental Impacts Under WAC 173-26*

Application of the proposed rule should substantially reduce or mitigate the adverse effects of pier and dock construction and operation.

## *Fill (230 (3) (c))*

### *Existing WAC 173-16*

Provides policy guidance on landfilling, and performance standards with respect to protection of ecological values, minimization of hazards, erosion prevention, and water quality.

### *Proposed WAC 173-26*

*Essentially the same.*

Provides policy guidance on landfilling, and performance standards linked to section 200 (2)(c) regarding protection of ecological values. Fills waterward of ordinary high water are restricted:

> Fills shall be located, designed, and constructed to protect shoreline ecological functions and ecosystem-wide processes, including channel migration. Fills waterward of the ordinary high-water mark shall be allowed only when necessary to support a water-dependent use, public access, cleanup and disposal of contaminated sediments as part of an interagency environmental clean-up plan, mitigation action, environmental restoration, beach nourishment or enhancement project.

Fills waterward of the ordinary high-water mark for any use except ecological restoration should require a conditional use permit.

### *Existing Conditions & Impacts Under WAC 173-16*

The cascading, cumulative adverse environmental effects associated with land filling can include:

- On marine shores, intertidal habitat loss through direct burial, leading to:
  - Stress on fish and wildlife populations dependent on shallow water habitats, such as increased predation on juveniles dependent on shallow water to escape capture
- On lake shores, shallow water habitat loss through direct burial, leading to:
  - Stress on fish and wildlife populations dependent on shallow water habitats
- On marine shores, disruption of long-shore drift patterns, leading to:
  - A down-drift 'groin effect' leading to:
    - Beach 'starvation' and lowering and coarsening of the beach, leading to
      - Changes in the composition of intertidal fauna
      - And increased shoreline erosion of downdrift properties
- interference with the public's right to access and use navigable waters

  Indeed, it was a landfill in Lake Chelan which was determined by the Washington Supreme Court to be illegal (Wilbour v. Gallagher, 77 Wash. 2nd 306, 462 P.2nd 232 (1969)), which in turn precipitated adoption of the Shoreline Management Act so as to prevent such actions in the future.

Adoption of the Shoreline Management Act and implementation under WAC 173-16 halted the most egregious beach filling as exemplified by pre-SMA practices on the shores of Hood Canal.

### *Potential Environmental Impacts Under WAC 173-26*

Application of the proposed rule should result in further reductions in landfill, thus slowing the rate of shallow subtidal and intertidal habitat elimination and degradation.

## *Breakwaters, Jetties, Groins, and weirs (230 (3) (d))*

### *Existing WAC 173-16*

Provides policy guidance on breakwaters, and performance standards with respect to preferences for floating breakwaters, and minimization of adverse effects to littoral drift and navigation. Provides policy guidance on jetties and groins, and performance standards with respect to minimization of adverse effects to littoral drift, wildlife, and aesthetics.

### *Proposed WAC 173-26*

*Essentially the same.*

Provides that:

> Breakwaters, jetties, groins, and weirs located waterward of the ordinary high-water mark shall be allowed only where necessary to support water-dependent uses, public access, shoreline stabilization, or other specific public purpose. Breakwaters, jetties, groins, weirs, and similar structures should require a conditional use permit, except for those structures installed to protect or restore ecological functions, such as woody debris installed in streams. Breakwaters, jetties, groins, and weirs shall be designed to protect critical areas and shall provide for mitigation according to the sequence defined in WAC 173-26-200(2)(f).Part IV, in addition to language referencing T&E species, also contains specific provisions mandating conditional use permits for these types of structures.

### *Existing Conditions & Impacts Under WAC 173-16*

Breakwaters, jetties and groins are a diverse grouping of shoreline structures with fundamentally differing purposes. Breakwaters are off-shore structures generally constructed parallel to the shore for the purpose of protecting harbor or marina entrances from the full effect of waves. Jetties are subtidal structures generally placed in pairs at the entrance to embayments for the purpose of 'jetting' currents through the entrance for the purpose of maintaining channel depth. Groins are intertidal structures constructed perpendicular to the shore for the purpose of trapping drift material thus 'building up' the beach updrift of the groin. As such, their environmental effects are fundamentally different.

Severe adverse environmental effects appear to be associated only with groins which effect a

- Disruption of long-shore drift patterns, leading to:
  - A down-drift 'groin shadow effect' leading to:
    - Beach 'starvation' and lowering and coarsening of the beach, leading to
      - Changes in the composition of intertidal fauna
      - And increased shoreline erosion of downdrift properties

Adoption of the Shoreline Management Act and implementation under WAC 173-16 placed restrictions on the construction of groins; few groins are constructed in comparison with the pre-SMA era.

### *Potential Environmental Impacts Under WAC 173-26*

Application of the proposed rule should result in further refinement of mitigative requirements for breakwaters, jetties, groins, etc., in general, and especially groins, leading to a lower rate of habitat degradation. The requirement for a conditional use permit (CUP) will lead to greater state oversight.

## *Beach and Dune Management (230 (3) (e))*

This section applies to "Washington's dunes and their associated beaches [which] lie along the Pacific Ocean coast between Point Grenville and Cape Disappointment." These

beaches are also subject to the Seashore Conservation Act of 1970 which is implemented by the Washington Parks and Recreation Commission.

### *Existing WAC 173-16*

WAC 173-16 contains no section which explicitly addresses beach and dune management. However, the Shoreline Management Act identifies the ocean coast dunelands as a shoreline of statewide significance (RCW 90.58.020) which establish a higher standard of management which states "…the interests of all the people shall be paramount in the management of shorelines of state-wide significance…"

### *Proposed WAC 173-26*

*Specific reference to requirement for a conditional use permit is removed. Compliance with no net loss of shoreline ecological functions standard is added.*

Provides that:

> "Dune modification" is the removal or addition of material to a dune, the reforming or reconfiguration of a dune, or the removal or addition of vegetation that will alter the dune's shape or sediment migration. Dune modification may be proposed for a number of purposes, including protection of property, flood and storm hazard reduction, erosion prevention, and ecological restoration.
>
> Coastal dune modification shall be allowed only consistent with state and federal flood protection standards and when it will not result in a net loss of shoreline ecological functions or significant adverse impacts to other shoreline resources and values.
>
> Dune modification to protect views of the water shall be allowed only on properties subdivided and developed prior to the adoption of the master program and where the view is completely obstructed for residences or water-enjoyment uses and where it can be demonstrated that the dunes did not obstruct views at the time of original occupancy, and then only in conformance with the above provisions.

### *Existing Conditions & Impacts Under WAC 173-16*

Dune modification is practiced in the Pacific Ocean beach dunelands of southwest Washington. Dune modification involves earthmoving, that is, cutting the tops of dunes and filling dune troughs. The purpose of dune modification is to gain or regain views of the ocean from the first row of residences built behind the primary dune[23].

Local governments in southwest Washington have various approaches to regulating dune modification in their local shoreline master programs or other ordinances, ranging from implicit or explicit prohibition, to conditional allowance.

The ocean beach dunes are vegetated predominately by one of two introduced beach grasses, either *Ammophila breviligulata* (American Beachgrass) which is native to the

---

[23] Washington's southwest coast is composed of dune fields which have accreted, or built up, over many decades. The "primary dune" is the first dune behind the beach, or conversely, the most waterward of the dunes. The secondary dunes are all those behind, or landward, of the primary dune. Between the dunes are dune troughs or deflation plains. If the elevation of the deflation plains is sufficiently low to expose the water table, then a wetland will develop. In some instances a dune trough is sufficiently deep that a pond or small lake will form. The term "foredune" is occasionally applied to the primary dune in error; strictly speaking, the foredune is the waterward face of the primary dune.

Atlantic coast and Great Lakes region of North America, or *Ammophila arenaria* (European Beachgrass or Marram Grass) which is native to Europe. Both species have become naturalized along the Pacific Northwest coast as a result of dune stabilization plantings. Of the two, *Ammophila breviligulata* is the most successful and widespread. (Seabloom, 1991; Seabloom & Wiedemann, 1994). If dune cutting is not too deep, either species will regenerate, revegetating the cut dune, and eventually re-establishing a tall, view-blocking dune. In the interim, the cut-out dune represents an aesthetic scar to many of the public walking on the beach.

The adverse environmental effects associated with dune modification appear to be less important than the potential risk to public safety. To the extent that the primary dune is lowered, there is an increased risk of storm waves surging through the gap, temporarily flooding properties behind the primary dune. There already exists a similar risk of flood surges penetrating the primary dune at the 'gap roads' which provide public vehicular access to the beaches. No substantial adverse effects are known to have occurred.

### *Potential Environmental Impacts Under WAC 173-26*

The proposed provisions will standardize local government approaches to regulation of dune modification, where local governments choose to allow dune modification at all, and ensure that dune modification does not adversely affect the ecological functions of those dune lands, especially as a result of the "no net loss" of ecosystem functions and mitigation requirements.

## *Dredging and Dredged Material Disposal (230 (3) (f))*

### *Existing WAC 173-16*

Provides that shoreline master programs shall minimize damage to ecological values; provide a long-range plan for disposal; allow deposition in-water only for habitat improvement purposes or where land deposition is more detrimental; and discourage dredging for the purpose of obtaining fill material.

### *Proposed WAC 173-26*

*Compliance with no net loss of shoreline ecological functions standard is added.*

Provides that shoreline master programs shall avoid or minimize damage to ecological values; provide that new development should minimize need for new dredging; that all dredging should be done so as to avoid or minimize adverse effects; discourage dredging for the purpose of obtaining fill material, and require a conditional use permit where allowed; disposal into river channel migration zones should be discouraged, and require a conditional use permit where allowed.

### *Existing Conditions & Impacts Under WAC 173-16*

#### Regulatory Programs

Review and approval of dredging activities or projects in Washington State is managed under policies and guidelines established by a coordinated state - federal consortium

designated as the Dredged Material Management Program or DMMP. The DMMP consists of representatives from two state agencies (Ecology and Department of Natural Resources) and two federal agencies (US Army Corps of Engineers and US Environmental Protection Agency).

The policies and guidelines under which the DMMP manages dredging activities are contained in guidance manuals specific to discrete water bodies, e.g. Puget Sound, Grays Harbor & Willapa Bay, and the lower Columbia River. (These manuals are available for viewing on web sites maintained by the Seattle and Portland Corps District offices.) A user manual titled the "Dredged Material Evaluation and Disposal Procedures" manual is also posted on the Seattle District web site and is currently undergoing a revision. Certain issues or problems encountered by DMMP relating to policies or guidelines are often presented at annual review meetings convened for the benefit of interested public and stakeholders. The out come or decision by DMMP pertaining to such issues or problems are contained in the summary document prepared following the annual review meeting, and thereby become incorporated as new or revised policy and guidance. Both formal and informal coordination of dredging activities is carried out as an integral element of the DMMP.

**Puget Sound**

Navigation waterways of Puget Sound have played an important role in the region's development and growth. There are 34 public port districts serving the region. Approximately 50 miles of navigation channels, approximately 50 miles of port terminal ship berths, and more than 200 small boat harbors must be periodically dredged to maintain the commercial and recreational services provided by these facilities. Over the period 1975-1985, an estimated 24.8 million cubic yards of sediments were removed from Puget Sound harbors and waterways. (Adapted from US Army Corps of Engineers, 1989.)

**Columbia River**

The US Army Corps of Engineers (COE) maintains the authorized Federal Navigation Channel in the Columbia River from the mouth of the Columbia River (river mile[24] (RM) –3), upriver to McNary Dam (RM 292). The operation and maintenance dredging is carried out through a combination of dredging (hopper, pipeline, agitation, and clamshell dredges), hydraulic control works (pile dikes), and navigational range markers. The pile dikes control channel alignment, provide bank protection, reduce erosion, and provide for dredge material disposal areas. The COE currently utilizes and maintains 236 pile dikes along the navigation channel. (Adapted from National Marine Fisheries Service, 1999c.)

**Environmental Effects**

Nightingale and Simenstad (2001) reviewed the environmental effects of dredging on marine habitats for the Aquatic Habitat Guidelines project and concluded the following.

---

[24] River miles are measured from the mouth of a stream or river, which is mile zero, along the thread of the stream upstream to the headwaters. Negative river miles indicates a projection of the thread of the stream into the receiving waters (in this instance the Pacific Ocean).

**Direct Biological Effects**

The direct biologic effects of both maintenance and new project dredging activities include entrainment mortalities, behavioral effects, contaminant release, and noise effects that can induce behavioral change or cause injury and fitness risks. However, with the exception of contaminant exposure, these effects tend to be temporary and localized. The literature reflects that fish gill injury from exposure to high suspended sediment loads is likely the principle mechanism of injury, but to what extent is uncertain and deserves further analysis. Thresholds for gill injury specific to marine and estuarine environments have not been identified. The most relevant issue is likely the ability of fish to avoid plumes and dredge activity areas. This requires an understanding of the nature of fish present and the options available to them in order to avoid the dredge areas. We conclude that a clearer understanding of the effects of dredging on a variety of marine fishes would come from a further synthesis of what is known about the life-history strategies, water column use, and timing of a wide variety of marine fishes in specific areas. This would enable the further development of site- and species-specific environmental windows to avoid entrainment and limit risks. We conclude that refinement in the identification of injury thresholds, behavioral effects, and the distribution of species across all life-history stages are required to avoid animal injury and morality risks.

**Long-Term Effects**

Given the dynamic nature of estuarine and marine ecosystems, the history of freshwater and marine dredging, and the lack of long-term pre and post project monitoring and documentation of effects specific to how individual dredging projects effect the larger ecosystem make it difficult to conclusively identify effects. The lack of documentation specific to the nature and timing of recolonization preclude the ability to make conclusive statements on long-term effects. We conclude that dredging projects and the beneficial uses of dredged materials present the highest potential as an effective restoration tool when projects are planned on an ecosystem landscape-scale basis specific to the life-history needs of the biota utilizing the larger landscape.

### *Potential Environmental Impacts Under WAC 173-26*

The principal regulatory programs affecting dredging and dredged material disposal are other than the Shoreline Management Act and the local shoreline master programs. Still, the proposed new provisions under WAC 173-26 would tend to bring local master programs more in alignment with other state and federal regulatory programs.

## Shoreline Uses (WAC 173-26-240)

### *Agriculture (240 (3) (a))*

#### *Existing WAC 173-16*

Provides that

> (a) Local governments should encourage the maintenance of a buffer of permanent vegetation between tilled areas and associated water bodies which will retard surface runoff and reduce siltation.
>
> (b) Master programs should establish criteria for the location of confined animal feeding operations, retention and storage ponds for feed lot wastes, and stock piles of manure solids in shorelines of the state so that water areas will not be polluted.
>
> (c) Local governments should encourage the use of erosion control measures, such as crop rotation, mulching, strip cropping and contour cultivation in conformance with guidelines and standards established by the Soil Conservation Service, U.S. Department of Agriculture.

### *Proposed WAC 173-26*

*Section is completely revised to reflect 2002 legislation on applicability [of the Shoreline Management Act] to agriculture. Where agriculture exists today, master programs may not significantly limit changes in agricultural use. New agricultural uses subject to requirement to assure no net loss of shoreline ecological functions and other applicable provisions of the SMP.*

Provides that:

> (i) For the purposes of this section, the terms agricultural activities, agricultural products, agricultural equipment and facilities and agricultural land shall have the specific meanings as provided in WAC 173-26-020.
>
> (ii) Master programs shall not require modification of or limit agricultural activities occurring on agricultural lands. In jurisdictions where agricultural activities occur, master programs shall include provisions addressing new agricultural activities on land not meeting the definition of agricultural land, conversion of agricultural lands to other uses, and other development on agricultural land that does not meet the definition of agricultural activities.
>
> (iii) Nothing in this section limits or changes the terms of the current exception to the definition of substantial development. A substantial development permit is required for any agricultural development not specifically exempted by the provisions of RCW 90.58.030(3)(e)(iv).
>
> (iv) Master programs shall use definitions consistent with the definitions found in WAC 173-26-020 (3).
>
> (v) New agricultural activities are activities that meet the definition of agricultural activities but are proposed on land not currently in agricultural use. Master programs shall include provisions for new agricultural activities to assure that:
>
> > (A) Specific uses and developments in support of agricultural use are consistent the environment designation in which the land is located.
> >
> > (B) Agricultural uses and development in support of agricultural uses, are located and designed to assure no net loss of ecological functions and to not have a significant adverse impact on other shoreline resources and values.
>
> Measures appropriate to meet this requirements include provisions addressing water quality protection, and vegetation conservation, as described in WAC 173-26-220(5) and (6). Requirements for buffers for agricultural development shall be based on scientific and technical information and management practices adopted by the applicable state agencies necessary to preserve the ecological functions and qualities of the shoreline environment.
>
> (vi) Master programs shall include provisions to assure that development on agricultural land that does not meet the definition of agricultural activities, and the conversion of agricultural land to non-agricultural uses, shall be consistent the environment designation, and the general and specific use regulations applicable to the proposed use and do not result in a net loss of ecological functions associated with the shoreline.

### *Existing Conditions & Impacts Under WAC 173-16*

The following description of the status and trends of shoreline riparian habitats affected by agricultural practices is quoted from Knutson & Naef (1997), the whole of which is incorporated by reference into this environmental impact statement:

> Beyond the obvious loss of riparian habitat as a result of direct conversion to agricultural land, the effects of agricultural operations on riparian areas generally consist of an excessive supply of non-point source pollution. Because riparian and aquatic systems are the eventual recipients of sediments, fertilizers, pesticides, and wastes, agricultural activities influence the function of stream and riparian ecosystems.

Soil Erosion and Sedimentation

Sediment is considered a source of non-point pollution and is the most common and easily recognizable impact of agriculture on riparian systems. Erosion from croplands accounts for 40- 50% of the sediment in waterways in this country (Terrell and Perfetti 1989). As with other land use practices, careful management of croplands can greatly reduce the amount of erosion and stream sedimentation.

The following description of the status and trends of shoreline riparian habitats affected by grazing practices is quoted from Knutson & Naef (1997), the whole of which is incorporated by reference into this environmental impact statement:

Overgrazing is one of the most destructive forces in riparian ecosystems (Davis 1982) and is usually the result of inappropriate livestock management (Behnke and Raleigh 1978, Oregon-Washington Interagency Wildlife Council 1979, Platts 1979). Grazing can affect all characteristics of riparian and associated aquatic systems, including vegetative cover, soil stability, bank and channel structure, instream structure, and water quantity and quality. Overgrazing is considered one of the principal factors contributing to the decline of native salmonids in the Pacific Northwest (Behnke and Zarn 1976, Armour et al. 1991).

While the general condition of rangelands in the United States has improved over the last century (Box 1979, Busby 1979), grazed riparian areas are in worse condition. The U.S. Bureau of Land Management estimated that of 217,254 ha (536,835 ac) of riparian habitat, 181,086 ha (447,464 ac) (83%) were in unsatisfactory condition (Almand and Krohn 1979). Riparian areas that have been and continue to be subject to overgrazing are primarily those in the semi-arid and arid regions (Behnke and Raleigh 1978).

The major reason for the continued decline of the quality of riparian habitat is that riparian areas are typically managed in the same way as upland areas, despite the fact that livestock use riparian areas more than uplands (Platts 1990). Because livestock concentrate in riparian areas, and because riparian areas are more sensitive to overuse, upland management schemes have usually caused significant degradation of riparian habitat even if uplands remain in good condition (Behnke and Raleigh 1978, Debano and Schmidt 1989, Elmore 1989, Platts 1989, Platts 1990).

### *Potential Environmental Impacts Under WAC 173-26*

The adverse environmental effects of new agricultural development will be moderated as will be the operational effects of that newly developed agricultural land.

The adverse impacts associated with existing agricultural activities will continue to occur so long as those existing agricultural activities continue.

Ecology has concluded that the best way to comprehensively address agricultural issues is to defer to the on-going Agriculture, Fish and Water negotiations (also known as Ag/Fish/Water and AFW). The AFW process is self-described (Washington State Conservation Commission, 2000) as:

Negotiations have begun between the Agriculture community and the state departments of Agriculture, Fish and Wildlife, and Ecology, as well as the Washington State Conservation Commission and staff from the Governor's Office, representatives from federal agencies, local government, interested legislators, environmental groups, and Tribes. This collaborative process called Agriculture, Fish and Water (AFW) is aimed at voluntary compliance.

The AFW process involves negotiating changes to the existing Field Office Technical Guide (FOTG) and the development of guidelines for Irrigation Districts to be used to enhance, restore, and protect habitat for endangered fish and wildlife species, and address state water quality needs.

This two-pronged approach has developed into two processes, one involving agricultural interests and the second one concerns Irrigation Districts across the state.

The negotiated agreement must assure the long-term economic viability of agriculture in Washington State.

## *Aquaculture (240 (3) (b))*

### *Existing WAC 173-16*

Provides that while "aquaculture is a preferred, water-dependent use," permitting of aquaculture projects should "not significantly interfere with navigation," "impair the aesthetic quality of Washington shorelines," or degrade water quality. Also provides that because "shellfish resources and conditions suitable for aquaculture only occur in limited areas," "proposed developments and activities should be evaluated for impact on productive aquaculture areas," and that "Identified impacts should be mitigated through permit conditions and performance standards."

### *Proposed WAC 173-26*

*Compliance with no net loss of shoreline ecological functions standard is added.*

Provides that while aquaculture is a water-dependent use, permitting of aquaculture projects should "not significantly interfere with navigation," "impair the aesthetic quality of Washington shorelines," degrade water quality, or significantly impair ecological functions.

### *Existing Conditions & Impacts Under WAC 173-16*

The following description is quoted from *Washington State Coastal Zone Management Section 309 Assessment and Strategy, 1997* (Shorelands and Water Resources Program, 1997.)

> Washington's aquaculture industry is dominated by salmon net pen facilities in Puget Sound; oyster growing in Puget Sound, Grays Harbor, and Willapa Bay; and mussel growing in Puget Sound. Ship-based deep-water harvest of Geoduck clams in Puget Sound is treated here even though it is the harvest of a wild crop; many of the management issues are similar to those for aquaculture. The most recent comprehensive review of the Washington State aquaculture industry was published in 1987, and is now out of date. No contemporary, comprehensive information is available.
>
> Washington's legislative policy regarding the fostering and regulation of aquaculture is principally embodied in five acts: the Aquaculture Marketing Act of 1994 (Chapter 15.85 RCW); the Multiple Use Concept in Management and Administration of State-Owned Lands Act of 1971 (Chapter 79.68 RCW); the Aquatic Lands Act of 1984 (Chapter 79.90 RCW); the Shoreline Management Act of 1971 (Chapter 90.58 RCW); and the Water Pollution Control Act (Chapter 90.48 RCW)..
>
> The Aquaculture Marketing Act declares that it be "...the policy of this state to encourage the development and expansion of aquaculture..." and that "...the legislature encourages promotion of aquacultural activities, programs, and development with the same status as other agricultural activities, programs, and development..."
>
> The Multiple Use Concept Act declares that "[t]he department of natural resources shall foster the commercial and recreational use of the aquatic environment for production of food, fiber, income

and public enjoyment from state-owned aquatic lands under its jurisdiction and from associated waters, and to this end the department may develop and improve production and harvesting of macro-algae and sealife attached to or growing on aquatic land or contained in aquaculture containers..."

The Aquatic Lands Act is a broad piece of legislation setting policy for the use and management of the state's aquatic lands for, among other uses, aquaculture. The ALA is implemented by the Department of Natural Resources, Aquatic Resources Division.

The Shoreline Management Act is implemented by local government (under state Department of Ecology oversight) through local shoreline master programs. Current Department of Ecology guidance for local master programs is that "areas with high aquacultural use potential should be identified and encouraged for aquacultural use and protected from degradation by other types of land and water uses." The guidance further indicates that consideration should be given to both the positive and adverse impacts of aquacultural development "...on the physical environment, on other existing and approved land and water uses, including navigation, tribal 'usual and accustomed fishing grounds,' public access, and on the aesthetic qualities of the project area." Also, "[p]reference should be given to those forms of aquaculture that involve lesser environmental and visual impacts."

The Water Pollution Control Act regulates aquaculture such as salmon net pen operations through the National Pollutant Discharge Elimination System (NPDES) Waster Discharge Permit system and the Sediment Management Standards.

The principal environmental concerns are [1] water quality, [2] habitat alteration by introduced species, and [3] land use patterns and conflicts.

Water quality remains a problem for commercial shellfish aquaculture throughout the state. Principal causes are diverse, and in different regions might include sewage treatment plant discharges, failing on-site sewage treatment systems, marina and boater wastes, animal or other agricultural wastes, or urban runoff and similar nonpoint discharges. Conversely, there is also concern about pollution caused by aquaculture facilities.

New waste discharge standards (WAC 173-221A-110) were adopted by the Department of Ecology in October 1995. New sediment management standards (Chapter 173-204 WAC) were adopted by the Department of Ecology in January 1996. Both of these standards should result in improvements for shellfish growing habitat.

More intractable is the problem of nonpoint contamination from on-site sewage systems, urban runoff, and boater wastes. In recent years much effort has been devoted to watershed management at the local government level, aided by grants and technical assistance from state agencies. The gains have been few, incremental, and hard won. Still, in some regions of the state a long term trend toward degradation of commercial shellfish beds has been slowed or halted.

Habitat alteration affects primarily oyster culture in Willapa Bay which is increasingly threatened by an infestation of exotic species of Spartina. Spartina infestation has recently spread to Grays Harbor and some embayments of Puget Sound. Please refer to the Wetlands assessment for a comprehensive discussion of Spartina.

Land use conflicts are diverse, complex, and widespread. Land use patterns and density also contribute to the problems of water quality and habitat degradation.

Land use conflicts are easily dismissed as merely aesthetic, but that has not been a useful framework for dealing with the issue. Residential shoreline property owners are typically op-posed to the siting of aquaculture facilities such as mussel rafts or salmon net pens, or the permitting of Geoduck harvest operations, within their viewshed. Noise is also cited as an issue. Aquaculturists are adversely affected by residential stormwater runoff, on-site sewage effluents, and boater wastes. In many ways this is a land use conflict similar to any situation where residential land uses abut resource extraction or agricultural land uses.

Local governments, in evaluating shoreline substantial development permit applications under the Shoreline Management Act tend to lend deference to the wishes of the residential property owners. Local governments must enforce the SMA, but they have no clear mandate under any of the legislation aimed at fostering aquaculture. This remains an unresolved issue for private aquaculturists, and also for the Department of Natural Resources which licenses Geoduck clam harvest.

### *Potential Environmental Impacts Under WAC 173-26*

New aquaculture facilities will, overall, have less of an impact on other species than in the past. Other provisions of the proposed rule, especially those relating directly and indirectly to water quality, will tend to alleviate the adverse effects of shoreline development and activities upon aquaculture. The land use conflicts between residential land uses and aquaculture will remain unaffected.

## *Boating Facilities (240 (3) (c))*

### *Existing WAC 173-16*

"Boating facilities" are termed "marinas" in WAC 173-16, which provides that marina siting and permitting should seek to "reduce damage to fish and shellfish resources and be aesthetically compatible with adjacent areas," that "[s]hallow-water embayments with poor flushing action should not be considered for overnight and long-term moorage facilities," that "special attention" should be given to operational procedures which minimize accidental fuel spillage, and that state and local health standards should be consulted. Marinas are also regulated under state and local health regulations.

### *Proposed WAC 173-26*

*Compliance with no net loss of shoreline ecological functions standard is added.*

Provides that boating facilities[25] should be located "only at sites with suitable environmental conditions, shoreline configuration, access, and neighboring uses;" should meet "health, safety, and welfare requirements;" should "mitigate visual and ecological impacts," as well as "impacts of associated parking;" should "limit the impacts from boaters living in their vessels (live-aboards);" and "protect the rights of navigation."

### *Existing Conditions & Impacts Under WAC 173-16*

The adverse environmental effects associated with boating facilities and marinas vary depending on the location, size, density, occupancy, flushing characteristics, and other factors. The adverse primary effects at and near the marina site can include accidental fuel and oil spills; boat maintenance wastes and debris; sloughing of anti-fouling bottom paints; bacterial contamination from human wastes; and marine debris and litter. The following material is quoted from a report on a survey of boat yard and marina operation by Stasch & Lynch (1999):

**Bilgewater/Fueling**

---

[25] Boating facilities are defined to exclude docks serving four or fewer single-family residences; such smaller facilities would come under the shoreline modification provisions for piers and docks.

Bilgewater and fueling were identified early on as significant sources of pollution to our surface waters, particularly oils. During fueling, fuel vents can "burp" fuel overboard. Many boaters use the burp as their clue that the fuel tanks have been filled. If the fuel tanks vent onboard, as is the case with some diesel powered boats, then the boat owner is much more careful since having slippery diesel spilled on deck is clearly undesirable. But when the tanks vent overboard, the urgency is diminished.

**Hazardous Waste**

Hazardous waste management was viewed by the advisory workgroup as an area needing improvement and orphaned wastes identified as a persistent problem facing 25 percent of marinas. Hazardous waste tends to collect in dock boxes and boathouses over time. Without proper facilities for the management of hazardous wastes, the risk of improper disposal increases. …only 13 percent of marinas had facilities for managing hazardous waste…

**Used Oil**

Used oil is a common problem waste of any industrial sector utilizing internal combustion engines. Marinas, particularly large ones, generate a substantial amount of used oil as a result of routine maintenance of their tenant's vessels. Because used oil is very messy, providing recycling opportunities is a good customer service; still only 40 percent of marinas collect used oil.

What we do know from the on-site visits is that marinas collect an average of 1,000 gallons of used oil per year. Since 60 percent of the 200 marinas visited do not collect used oil, as much as 120,000 gallons of used oil is not being collected by the marinas. It is not possible to determine with certainty how this oil is being managed, but clearly, if this oil was being managed closer to the point of generation, there would be less risk to the environment.

**Sewage**

Sewage was probably the most difficult issue during the campaign, because many boaters have strongly held beliefs regarding the true environmental impacts of the discharge of sewage. Many boaters and marina owner/operators feel that the problem of fecal coliform contamination lies with other forms of non-point source pollution, such as failing septic tanks and hobby farms. This may account for the fact that only 40 percent of marinas had a procedure to assure that live-aboards used the sewage pumpouts on a routine basis. (It is interesting to note that 68 percent of marinas actively managed wastes generated by pets.) In fact, only 58 percent of marina owner/operators at the time of the on-site visits could identify one of two major causes of shellfish bed closures: fecal coliform bacteria and red tide contamination.

### *Potential Environmental Impacts Under WAC 173-26*

Future boating facilities will be held to a somewhat higher standard and will therefore result in lower levels of environmental impacts than in the past.

## *Commercial Development (240 (3) (d))*

### *Existing WAC 173-16*

Provides that while "…priority should be given to those commercial developments which are particularly dependent on their location and/or use of the shorelines of the state and other development that will provide an opportunity for substantial numbers of the people to enjoy the shorelines of the state," "new commercial developments on shorelines should be encouraged to locate in those areas where current commercial uses exist."

### *Proposed WAC 173-26*

*Provisions revised for clarity and consistency with overall principles. Compliance with no net loss of shoreline ecological functions standard is added and requirement for restoration is removed.*

Provides that

> Master programs shall first give preference to water-dependent commercial uses over nonwater-dependent commercial uses; and second, give preference to water-related and water-enjoyment commercial uses over nonwater-oriented commercial uses.
>
> Master programs should prohibit nonwater-oriented commercial uses on the shoreline unless they meet [certain criteria].

### *Existing Conditions & Impacts Under WAC 173-16*

Following is a description of the status and trends of shoreline riparian habitats affected by urbanization in general which is quoted from Knutson & Naef (1997), the whole of which is incorporated by reference into this environmental impact statement. For purposes of environmental impact analysis, this description includes factors associated with four shoreline uses under WAC 173-16-240: Commercial Development, Industry, Residential, and Transportation and Parking. Subsequent sections of this environmental impact statement which address Industry, Residential, and Transportation and Parking will refer back to this section.

> People have traditionally settled in riverine floodplains and along the banks of major streams and lakes (Goldstein et al. 1983, Nabhan 1985). Modern urban settlement near water and throughout watersheds usually entails large-scale removal of native vegetation and its replacement with buildings, pavement, roads, and manicured plantings, all consisting primarily of impervious surfaces. Unlike the effects of forestry, the loss of natural vegetation and consequences to riparian and stream habitats in urbanized areas are usually permanent (Booth 1991). The effects of urban and industrial developments generally result in:
>
> - changes in basin hydrology;
> - loss of riparian habitat;
> - loss of woody debris and other instream structures;
> - degradation of stream channels;
> - reduction in water quality;
> - habitat fragmentation;
> - introduction of pets and exotic pests.
>
> The loss of natural vegetation in riparian and upland areas and its replacement with compacted or largely impervious surfaces changes the hydrology of urbanized watersheds. These changes usually result in a loss of fish and wildlife habitat. Overall, hydrologic changes upset the balance of aggradation and degradation processes that are essential in maintaining healthy stream and riparian ecosystems. The most dramatic and well-studied effect is the increase in the maximum discharge associated with floods and storm events; peak flows in urbanized watersheds have been known to increase as much as five-fold over natural conditions (Booth 1991).
>
> In an attempt to be close to the water and to "clean up" areas by replacing them with manicured landscapes, riparian vegetation is often cleared when land is developed. Because riparian habitat supports the greatest number of species compared to other habitats, its protection can provide a significant benefit to fish and wildlife in developed landscapes (Noss 1993).

The loss of riparian vegetation due to urbanization: 1) degrades stream conditions through increased erosion of banks that are no longer armored with roots and debris from natural vegetation, 2) removes a source of logs and organic debris that stabilize streams and provide a source of food and nutrients, 3) increases stream temperatures through shade removal, and 4) reduces the capacity of the riparian area to filter incoming sediments and pollutants (Klein 1979).

Woody debris, especially large logs, are lost in urbanized areas through the removal of their source — riparian vegetation. Logs are flushed through the systems during high peak flows, and they are lost through deliberate removal. Historically, logs were removed in large rivers to improve navigation associated with urban development (Sedell and Luchessa 1982). After the removal of riparian vegetation, remnant logs eventually degrade or are swept downstream during the frequently occurring flooding events in urban areas (Booth 1991). Large woody debris that is removed is rarely replaced in urban areas.

Fish-bearing rivers and streams that flow through heavily-developed areas rarely resemble their natural form. Stream beds are replaced with drainpipes and culverts, riparian vegetation is removed, and municipal wastes contribute pollutants, sediments, and excessive nutrients to the water. To accommodate the real estate needs and safety of expanding urban populations, streams and rivers are frequently channelized, diked, or piped underground. For example, 73% of Ravenna Creek in King County now runs through a pipe (Wash. Dept. Ecol. 1981). Loss of riparian vegetation, increased flooding, and stream channel manipulation eliminate large woody debris, pools and riffles, sinuosity, slow flowing side channels, and other essential structural components of fish habitat in urbanized areas. Destruction or severe degradation of fish and wildlife habitat by urbanization is often complete and irreparable (Canning and Stevens 1989).

### *Potential Environmental Impacts Under WAC 173-26*

New commercial development will be held to a higher standard than in the past regarding adverse effects on shoreline habitat, and will therefore result in lower levels of environmental impacts than in the past.

## *Forest Practices (240 (3) (e))*

### *Existing WAC 173-16*

Provides for replanting, prevention of debris accumulation, maintenance of scenic qualities, proper design and construction of roads and bridges, protection of public water supply quality, minimization of sedimentation, and maintenance of buffer strips.

### *Proposed WAC 173-26*

*Compliance with no net loss of shoreline ecological functions standard is added and requirement for restoration is removed.*

Provides that:

> Local master programs should rely on the Forest Practices Act and rules implementing the act and the Forest and Fish Report as adequate management of commercial forest uses within shoreline jurisdiction. However, local governments shall, where applicable, apply this chapter to Class IV-General forest practices where shorelines are being converted or are expected to be converted to non-forest uses.
>
> Forest practice conversions and other Class IV-General forest practices where there is a likelihood of conversion to non-forest uses, shall assure no net loss of shoreline ecological functions and shall maintain the ecological quality of the watershed's hydrologic system. Master programs shall establish provisions to ensure that all such practices are conducted in a manner consistent with the

master program environment designation provisions and the provisions of this chapter. Applicable shoreline master programs should contain provisions to ensure that when forest lands are converted to another use, there will be no net loss of shoreline ecological functions or significant adverse impacts to other shoreline uses, resources and values provided for in 90.58.020RCW such as navigation, recreation and public access .

Master programs shall implement the provisions of RCW 90.58.150 regarding selective removal of timber harvest on shorelines of statewide significance. Exceptions to this standard shall be by conditional use permit only.

Lands designated as "forest lands" pursuant to RCW 36.70A.170 shall be designated consistent with either the "natural," "rural conservancy," environment designation.

Where forest practices fall within the applicability of the Forest Practices Act, local governments should consult with the department of natural resources, other applicable agencies, and local timber owners and operators.

### *Existing Conditions & Impacts Under WAC 173-16*

The following description of the status and trends of shoreline riparian habitats affected by forest practices is quoted from Knutson & Naef (1997), the whole of which is incorporated by reference into this environmental impact statement:

> Forest practices, including timber harvest and its associated activities (e.g., road building, precommercial thinning, controlled burning, herbicide and insecticide spraying), temporarily or permanently alter the character of forested landscapes, including riparian habitat. Because riparian areas topographically occur below uplands, they receive water, soil, and organic debris from upland areas. Forest practices in uplands and in riparian areas are often responsible for delivery of these resources to streams at rates significantly different than natural rates, resulting in changes to structural and functional elements of riparian areas.
>
> Moring et al. (1994) summarized four studies that examined the effects of logging on fish habitat. They reported that bank stability was reduced and solar radiation to the stream increased in areas without intact buffer strips of riparian vegetation. Water temperatures rose above 30°C, dissolved oxygen reached critically low levels, sediment loads increased significantly, and particulate organic matter increased tenfold. They also reported population declines of reticulate sculpins, cutthroat trout, and other salmonids.
>
> Vegetation removal, road construction, and soil disturbance are the chief mechanisms by which forest practices influence riparian areas. These disturbances result in:
>
> - hydrologic (relating to water flow) effects;
> - soil destabilization, erosion, and sedimentation;
> - stream temperature increases and a more severe microclimate;
> - loss of large woody debris;
> - fish and wildlife effects;
> - cumulative effects.

### *Potential Environmental Impacts Under WAC 173-26*

The reliance on the Forest Practices Act in conjunction with the *Forest and Fish Report,* and restrictions on vegetation removal associated with conversion to non-forestry uses, should result in incrementally lesser adverse environmental effects in riparian areas as a result of forest practices.

## *Industry (240 (3) (f))*

### *Existing WAC 173-16*

"Industry" is termed "ports and water-related industry" in WAC 173-16, which states:

> Ports are centers for water-borne traffic and as such have become gravitational points for industrial/manufacturing firms. Heavy industry may not specifically require a waterfront location, but is attracted to port areas because of the variety of transportation available.

Guidelines provide a priority for: water-dependent industry; safe and appropriate public access and public facilities; encouragement for cooperative use of docking, parking, cargo handling, and storage facilities; consideration of regional and state-wide needs for port facilities; and environmental compatibility.

### *Proposed WAC 173-26*

*Provisions revised for clarity and consistency with overall principles. Compliance with no net loss of shoreline ecological functions standard is added and requirement for restoration is removed.*

Provides that:

> Master programs shall first give preference to water-dependent industrial uses over non-water-dependent industrial uses; and second, give preference to water-related industrial uses over non-water-oriented industrial uses.
>
> Regional and statewide needs for water-dependent and water-related industrial facilities should be carefully considered in establishing master program environment designations, use provisions, and space allocations for industrial uses and supporting facilities. Lands designated for industrial development should not include shoreline areas with severe environmental limitations, such as critical areas.
>
> Where industrial development is allowed, master programs shall include provisions that assure that industrial development will be located, designed, or constructed in a manner that assures no net loss of shoreline ecological functions and such that it does not have significant adverse impacts to other shoreline resources and values.
>
> Master Programs should require that industrial development consider incorporating public access as mitigation for impacts to shoreline resources and values unless public access cannot be provided in a manner that does not result in significant interference with operations or hazards to life or property, as provided in WAC 173-26-220(4). Where industrial use is propose for location on land in public ownership, public access should be required. Industrial development and redevelopment should be encouraged to locate where environmental cleanup and restoration of the shoreline area can be incorporated.
>
> New non-water-oriented industrial development should be prohibited on shorelines except [under certain conditions].

### *Existing Conditions & Impacts Under WAC 173-16*

Please refer to "Commercial Development" section above.

### *Potential Environmental Impacts Under WAC 173-26*

New industrial development will be held to a higher standard than in the past regarding adverse effects on shoreline habitat. The rate of habitat elimination and degradation typical of the past will be diminished.

## *In-stream Structural Uses (240 (3) (g))*

### *Existing WAC 173-16*

WAC 173-16 contains no section which explicitly addresses in-stream structures or dams.

### *Proposed WAC 173-26*

*Provisions revised for clarity and consistency with overall principles. Compliance with no net loss of shoreline ecological functions standard is added and requirement for restoration is removed.*

Provides that:

> In-stream structures shall provide for the protection and preservation, of ecosystem-wide processes, ecological functions, and cultural resources, including, but not limited to, fish and fish passage, wildlife and water resources, shoreline critical areas, hydrogeological processes, and natural scenic vistas. The location and planning of in-stream structures shall give due consideration to the full range of public interests, watershed functions and processes, and environmental concerns, with special emphasis on protecting and restoring priority habitats and species.

### *Existing Conditions & Impacts Under WAC 173-16*

The following description of the status and trends of shoreline riparian habitats affected by dams is quoted from Knutson & Naef (1997), the whole of which is incorporated by reference into this environmental impact statement:

> An effect of dams is inundation of riparian habitat. The amount of habitat affected depends on the level of water rise and the geomorphic shape of the riparian channel. Steep-sided, forested canyons that are dominated by upland vegetation will lose less functional riparian habitat than broad river floodplains featuring extensive deciduous stands, gravel bars, and side channels. Water impoundment by dams has a way of "smoothing out" riparian features and irregularities that are important to the diversity of fish and wildlife (Sauve 1977).
>
> The following are ways in which dams can affect riparian and aquatic habitats (Johnson et al. 1977, Sauve 1977, Hildebrand and Goss 1981, Turbak et al. 1981, Strahan 1984, Brown and Johnson 1985, Carson and Peek 1987, Junk et al. 1989, Columbia Basin Fish and Wildlife Authority 1991, Hunter 1992, McComas et al. 1994).
>
> **Riparian Habitat**
>
> - continual rise and fall in water levels creates a zone of unnatural disturbance at the aquatic/riparian interface that usually cannot support the original vegetation;
> - changes in the plant species occupying the relocated riparian zone, with reductions in maturity and structural diversity of plant communities;
> - loss of level streamside habitat as banks become steeper;
> - loss of snow-free wintering habitat for deer, elk, and other species due to a net increase in riparian zone elevation.
>
> **Instream Structure**
>
> - sharply reduced recruitment of LWD and gravel downstream from the dam;
> - decreased stability of bank and bed;
> - altered sedimentation patterns.

**Water Quality**

- changes in nutrient transport and cycling;
- gas supersaturation;
- loss of water quality from dredging;
- wide fluctuations in stream and reservoir water temperatures;
- colder stream temperatures downstream from the dam;
- increased water surface area above the dam, resulting in less shading by bank-side vegetation and increased absorption of heat-producing solar radiation, thereby increasing the water temperature;
- reduced levels of dissolved oxygen concentrations downstream from reservoirs;
- elimination of flood pulses that bring nutrients from the floodplain into the river system.

**Water Quantity**

- wide fluctuations in water levels above and below the dam causing the stranding of fish and alternating desiccation and inundation of fish and wildlife breeding habitat;
- changes in the timing of high flows and water velocity from natural conditions, negatively affecting salmon migration and survivability.

**Fish Habitat**

- changes in fish numbers, species composition, and distribution;
- inundation of feeder streams, with loss of spawning habitat;
- loss of spawning and rearing habitat;
- blocked or impeded upstream and downstream fish passage;
- stranded juvenile fish and dewatered redds during flow fluctuations;
- turbine mortality.

An indirect effect of dams is the encouragement of agricultural, commercial, residential, and recreational development in previously undeveloped areas, particularly adjacent to water bodies. Roads are often built into relatively remote areas to construct and service the dams, and also to accommodate human developments that are created adjacent to the reservoirs created by the dams. In the Columbia Basin, extensive conversion of shrub-steppe riparian habitat into agricultural lands has occurred as a result of new irrigation capability afforded by water impoundment behind dams. These shrub-steppe riparian habitats formerly supported a great variety of wildlife species and provided critical mule-deer fawning grounds (Tabor 1976, Carson and Peek 1987).

Dams are major projects that are obligated to undergo full environmental and public review, as provided through the State Environmental Protection Act/National Environmental Protection Act, Federal Energy Regulatory Commission, and Fish and Wildlife Coordination Act. Mitigation and management prescriptions are thoroughly covered during these processes; therefore, management recommendations concerning dams would be redundant in this document and are not given. However, an understanding of the impacts of dams is important in assessing the quality and availability of fish and wildlife habitat on a regional basis. Also see Hunter (1992) for further information regarding dams and salmonids.

### *Potential Environmental Impacts Under WAC 173-26*

In addition to requiring that new in-stream structure projects protect ecological processes and functions, the proposed measures will provide the coordination between local shore

line master programs and established regulatory programs which is now lacking. This, in turn, should effect a lower rate of habitat loss and degradation and other forms of environmental degradation discussed above.

## *Mining (240 (3) (h))*

### *Existing WAC 173-16*

Provides that when mining is conducted, "adequate protection against sediment and silt production should be provided;" it "should be done in conformance with the Washington State Surface Mining Act;" and "the removal of sand and gravel from marine beaches" should be "strictly control[ed] or prohibit[ed]."

### *Proposed WAC 173-26*

*Section is substantially revised. The provision states "A shoreline master program should accomplish two purposes in addressing mining. First, identify where mining may be an appropriate use of the shoreline, which is addressed in this section and in the environment designation sections above. Second, ensure that when mining or associated activities in the shoreline are authorized, those activities will be properly sited, designed, conducted, and completed so that it will cause no net loss of ecological functions of the shoreline." Performance standards are established for mining to address the above requirements.*

Provides that:

> A shoreline master program should accomplish two purposes in addressing mining. First, identify where mining may be an appropriate use of the shoreline, which is addressed in this section and in the environment designation sections above. Second, ensure that when mining or associated activities in the shoreline are authorized, those activities will be properly sited, designed, conducted, and completed so that it will cause no net loss of ecological functions of the shoreline.

### *Existing Conditions*

The following description of the status and trends of shoreline riparian habitats affected by gravel extraction is quoted from National Marine Fisheries Service (1996b), the whole of which is incorporated by reference into this environmental impact statement:

> Extraction of alluvial material from within or near a stream bed has a direct impact on the stream's physical habitat parameters such as channel geometry, bed elevation, substrate composition and stability, instream roughness elements (large woody debris, boulders, etc.) depth, velocity, turbidity, sediment transport, stream discharge and temperature (Rundquist 1980; Pauley et al. 1989; Kondolf 1994a, b; OWRRI 1995). OWRRI, (1995) states that:
>
> Channel hydraulics, sediment transport, and morphology are directly affected by human activities such as gravel mining and bank erosion control. The immediate and direct effects are to reshape the boundary, either by removing or adding materials. The subsequent effects are to alter the flow hydraulics when water levels rise and inundate the altered features. This can lead to shifts in flow patterns and patterns of sediment transport. Local effects also lead to upstream and downstream effects.
>
> Altering these habitat parameters has deleterious impacts on instream biota and the associated riparian habitat (Sandecki, 1989). For example, impacts to anadromous fish populations due to gravel extraction include: reduced fish populations in the disturbed area, replacement of one species by another, replacement of one age group by another, or a shift in the species and age distributions (Moulton, 1980). In general terms, Rivier and Seguier (1985) suggest that the detrimental effects to biota resulting from bed material mining are caused by two main processes: (1) altera

tion of the flow patterns resulting from modification of the river bed, and (2) an excess of suspended sediment. OWRRI (1995) adds:

> Disturbance activities can disrupt the ecological continuum in many ways. Local channel changes can propagate upstream or downstream and can trigger lateral changes as well. Alterations of the riparian zone can allow changes in-channel [sic] conditions that can impact aquatic ecosystems as much as some in-channel [sic] activities.
>
> One consequence of the interconnectedness of channels and riparian systems is that potential disruptions of the riparian zone must be evaluated when channel activities are being evaluated. For example, aggregate mining involves the channel and boundary but requires land access and material storage that could adversely affect riparian zones; bank protection works are likely to influence riparian systems beyond the immediate work area.

### *Potential Environmental Impacts Under WAC 173-26*

The provisions of this mining section regarding no net loss of ecological functions, in conjunction with provisions regarding vegetation conservation, will effect a lower rate of habitat loss and degradation and other forms of environmental degradation discussed above.

## *Recreational Development (240 (3) (i))*

### *Existing WAC 173-16*

"Recreational development" is termed "recreation" in WAC 173-16, which encourages a broad variety of recreational features and facilities, linked by transportation corridors (hiking, biking, and vehicular); health and environmental effects should be addressed in siting and design.

### *Proposed WAC 173-26*

*Provisions revised for clarity and consistency with overall principles. Compliance with no net loss of shoreline ecological functions standard is added.*

> Recreational development includes commercial and public facilities designed and used to provide recreational opportunities to the public. Master programs should assure that shoreline recreational development is given priority and is primarily related to access to, enjoyment and use of the water and shorelines of the State. Commercial recreational development should be consistent with the provisions for commercial development in (d) above. Provisions related to public recreational development shall assure that the facilities are located, designed and operated in a manner consistent with the purpose of the environment designation in which they are located and such that no net loss of shoreline ecological functions or ecosystem-wide processes results.
>
> In accordance with RCW 90.58.100(4), master program provisions shall reflect that state-owned shorelines are particularly adapted to providing wilderness beaches, ecological study areas, and other recreational uses for the public and give appropriate special consideration to the same.
>
> For all jurisdictions planning under the Growth Management Act, master program recreation policies shall be consistent with growth projections and level-of-service standards established by the applicable comprehensive plan.

### *Existing Conditions & Impacts Under WAC 173-16*

The following description of the status and trends of shoreline riparian habitats affected by recreational development and activities is quoted from Knutson & Naef (1997), the whole of which is incorporated by reference into this environmental impact statement:

> Recreation is an important cultural activity that may take place within riparian areas. Recreational use of the riparian zone is many times that of other habitats, particularly in suburban and urban areas (North Central Forest Experiment Station 1977, Sachet 1988). In Oregon, up to 80% of the Willamette National Forest's dispersed recreation occurs in riparian areas (Gregory and Ashkenas 1990).
>
> Vegetation alteration at recreation sites occurs as a result of trampling, firewood gathering, off-road-vehicle (ORV) use, dispersed camp sites, landscaping, and the construction of roads, launches, and other structures. Herbaceous and shrub layers are usually most affected (Settergren 1977, Reese and Blakesley 1987). These layers are particularly important to nesting songbirds, amphibians, small mammals, and other species that require thick and multi-layered vegetation for protective cover, food gathering, and microclimate control (Weaver et al. 1979, Bull and Skovlin 1982, Doyle 1990). Shrub-oriented species such as Macgillivray's warbler and lazuli bunting may be fewer in number or absent at recreational sites. But species that nest and feed within tree canopies, such as Douglas squirrel and warbling vireo, may be unaffected by recreational development because mature trees are often spared at recreation sites (Reese and Blakesley 1987).
>
> Although information found in a literature review provided by Sachet (1988) was not specific to riparian areas, it does provide some insight to potential impacts in riparian areas as a consequence of ORV, pedestrian, and equestrian recreation in back country areas. General conclusions of wildlife habitat impacts by those forms of recreation have been summarized by Sachet (1988).
>
> ***Indirect Effects***
>
> - increased bare ground, trail width, trail depth, soil compaction, and soil bulk density;
> - increased potential for soil erosion;
> - reduced trailside vegetation, vegetative cover, and organic matter in the soil;
> - tree damage.
>
> ***Direct Effects***
>
> - disruption of normal activity patterns and habitat selection of big game because of ORV activity;
> - human disturbance of all wildlife.

### *Potential Environmental Impacts Under WAC 173-26*

The general provisions of this section, especially "no net loss of ecological functions" will work to reduce the adverse effects of new recreational development.

## *Residential Development (240 (3) (j))*

### *Existing WAC 173-16*

Provides that subdivision development should: be designed for the physical and environmental capabilities of the site; provide pedestrian shoreline access; preserve shoreline vegetation and control erosion; and use public water supplies in preference to on-site groundwater. Over-water residential construction should not be allowed.

### *Proposed WAC 173-26*

*Section is substantially revised as follows.*

*Single-family residences are the most common form of shoreline development and are identified as a priority use when developed in a manner consistent with control of pollution and prevention of damage to the natural environment. Without proper management, single family residential use can cause significant damage to the shoreline area through cumulative impacts from shoreline armoring, storm water runoff, septic systems, introduction of pollutants, and vegetation modification and removal. Residential development also includes multifamily development and the creation of new residential lots through land division.*

*Master programs shall include policies and regulations that assure no net loss of shoreline ecological functions will result from residential development. Such provisions should include specific regulations for setbacks and buffer areas, density, shoreline armoring, vegetation conservation requirements, and, where applicable, on-site sewage system standards for all residential development and uses and applicable to divisions of land in shoreline jurisdiction.*

*Residential development, including appurtenant structures and uses, should be sufficiently set back from steep slopes and shorelines vulnerable to erosion so that structural improvements, including bluff walls and other stabilization structures, are not required to protect such structures and uses. (See RCW 90.58.100(6).)*

*New over-water residences, including floating homes, are not a preferred use and should be prohibited. It is recognized that certain existing communities of floating and/or over water homes exist and should be reasonably accommodated to allow improvements associated with life safety matters and property rights to be addressed provided that any expansion of existing communities is the minimum necessary to assure consistency with constitutional and other legal limitations that protect private property.*

*New multiunit residential development, including the subdivision of land for more than four parcels, should provide community and/or public access in conformance to the local government's public access planning and this chapter.*

*Master programs shall include standards for the creation of new residential lots through land division that accomplish the following:*

*(i) Plats and subdivisions must be designed, configured and developed in a manner that assures that no net loss of ecological functions results from the plat or subdivision at full build-out of all lots.*

*(ii) Prevent the need for new shoreline stabilization or flood hazard reduction measures that would cause significant impacts to other properties or public improvements or a net loss of shoreline ecological functions.*

*(iii) Implement the provisions of WAC 173-26-210 and 173-26-220.*

### *Existing Conditions & Impacts Under WAC 173-16*

Please refer to “Commercial Development” section above.

### *Potential Environmental Impacts Under WAC 173-26*

New residential development, including land subdivision, will be held to a higher standard than in the past regarding adverse effects on shoreline habitat. Newly created lots or parcels should be required to be of sufficient size and configuration to cause no significant adverse impacts to ecological functions. The rate of habitat elimination and degradation typical of the past will be diminished.

## *Transportation and Parking (240 (3) (k))*

### *Existing WAC 173-16*

"Transportation and Parking" provisions are found in the "road and railroad design and construction" section of WAC 173-16, which provides that transportation corridors should be "located away from shorelands" except as necessary for port facilities; roadways should be sited, designed and constructed so as to minimize adverse environmental effects; that "loops or spurs of old highways with high aesthetic quality should be kept in service as pleasure bypass routes;" and land use and transportation plans should be coordinated.

### *Proposed WAC 173-26*

*Provisions revised for clarity and consistency with overall principles. Compliance with no net loss of shoreline ecological functions standard is added and requirement for restoration is removed.*

Provides that:

> … master program shall include policies and regulations to provide safe, reasonable, and adequate circulation systems to shorelines … consistent with the master program public access policies, public access plan, and environmental protection provisions…[and]… shall include systems for pedestrian, bicycle, and public transportation where appropriate…[ that]… parking facilities… will not result in a net loss of shoreline ecological functions or adversely impact existing or planned water-dependent uses…
>
> Parking facilities in shorelines are not a preferred use and shall be allowed only as necessary to support an authorized use. Shoreline master programs shall include policies and regulations to minimize the environmental and visual impacts of parking facilities.

### *Existing Conditions & Impacts Under WAC 173-16*

Please refer to "Commercial Development" section above.

### *Potential Environmental Impacts Under WAC 173-26*

New transportation and parking facilities will be held to a higher standard than in the past regarding adverse effects on shoreline habitat. The rate of habitat elimination and degradation typical of the past will be diminished.

## *Utilities (240 (3) (l))*

### *Existing WAC 173-16*

Provides for restoration of utility corridors upon completion of construction; underground placement where ever feasible; and integration with public access corridors.

### *Proposed WAC 173-26*

*Provisions revised for clarity and consistency with overall principles. Compliance with no net loss of shoreline ecological functions standard is added*

Provides that:

> Master programs shall include provisions to assure that:

All utility facilities are designed and located to assure no net loss shoreline ecological functions, preserve the natural landscape, and minimize conflicts with present and planned land and shoreline uses while meeting the needs of future populations in areas planned to accommodate growth.

Utility production and processing facilities, such as power plants and sewage treatment plants, or parts of those facilities, that are non-water-oriented shall not be allowed in shoreline areas unless it can be demonstrated that no other feasible option is available.

Transmission facilities for the conveyance of services, such as power lines, cables, and pipelines, shall be located outside of the shoreline area where feasible and when necessarily located within the shoreline area shall assure no net loss of shoreline ecological functions.

Utilities should be located in existing rights of way and corridors whenever possible.

Development of pipelines and cables on tidelands, particularly those running roughly parallel to the shoreline, and development of facilities that may require periodic maintenance which disrupt shoreline ecological functions should be discouraged except where no other feasible alternative exists. When permitted, provisions shall assure that the facilities do not result in a net loss of shoreline ecological functions or significant impacts to other shoreline resources and values.

### *Existing Conditions & Impacts Under WAC 173-16*

The placement of utilities typically results in the clearing of the utility corridor and a moderate amount of grading (cutting and filling). Underground utilities require trenching and backfilling. Many utility corridors are easements which run across rangelands, farmlands, or timberlands, and the long term effects are those associated with the fundamental land use.

### *Potential Environmental Impacts Under WAC 173-26*

The proposed rule establishes higher standards for siting utility corridors, which should result in lesser adverse effects from newly established corridors.

# 7 Integrated Analysis

Chapter 6 addresses the status and trends under WAC 173-16 and the likely future effects of WAC 173-26 regarding specific aspects of the environment, analyzed piecemeal according to the subdivisions of WAC 173-26. This chapter provides a succinct, integrated analysis of anticipated cumulative environmental effects.

## WAC 173-16

Chapters 5 and 6 have characterized the status and trends for Washington's shorelines as they have developed under WAC 173-16, as experiencing varying degrees of degradation.

Riparian habitats have been altered or degraded by forestry and agricultural practices, and clearing for various urban and suburban lands uses. Stream channel hydrology and ecology has been altered for the worse and degraded. Wetlands loss continues, possibly at undiminished rates[26]. Estuarine water quality is variable, and in places is substandard. Overall more commercial shellfish beds are being downgraded than are being upgraded due to on-going pollution problems. As more and more people built larger and larger houses on and near unstable slopes the problems associated with landsliding become greater. Nearly two miles of Puget Sound shorelines have been armored each year, adversely affecting beach and nearshore habitats, and the creatures which depend on those habitats for all or a portion of their life cycle.

What goes undocumented, however, is what Washington's shorelines would have become without the Shoreline Management Act (and other resource management and environmental protection legislation). Two examples of activities ended or moderated by the passage of the Shoreline Management Act and adoption of WAC 173-16 are over-water structures (as exemplified by multi-family residential construction in Seattle) and beach fills (as exemplified by residential beach filling on the shores of Hood Canal in Mason County).

## WAC 173-26

It is important to realize that from any perspective WAC 173-26 is not a panacea. Development will continue to occur on Washington's shorelines, and therefore habitat loss and degradation will continue to occur. The rate of development is driven largely by population growth and the state of the economy. Population growth provides the demand, and a robust economy provides the means to meet the demand. A robust economy tends to result not only in more development, but more expansive development projects. The conditions in the Puget Sound region of Washington during the 1990s bear out this statement of the obvious.

---

[26] Some wetlands scientists are of the opinion that in certain respects wetlands loss rates have slowed, but that wetlands degradation continues unabated. Sufficient monitoring data is not available to make an unequivocal statement, and especially not a quantitative statement.

The rate and severity of habitat loss and degradation is moderated by land use, environmental, and pollution control laws and regulations. The Shoreline Management Act functions in conjunction with a number of other state laws, the most important of which includes the Seashore Conservation Act, the Hydraulics Code, the State Environmental Policy Act, and the Growth Management Act.

From reading the individual impact analyses of Chapter 6 one could gain the impression that WAC 173-26 will be only marginally effective in reducing the rate of habitat loss and degradation, and other undesirable environmental consequences of shoreline development and activities. The integrated effect of WAC 173-26 as a whole, however, is anticipated to have a synergistic effect, producing overall environmental benefits substantially greater than the sum of the parts.

To the extent that WAC 173-26 is more effective than is WAC 173-16 at moderating environmental impacts — and everything else being equal — future adverse effects on the shoreline environment at specific project sites will be less than under WAC 173-16. To the extent that WAC 173-26 is better integrated and coordinated with other land use, environmental, and pollution control laws and regulations than is WAC 173-16 (as it is), future adverse effects on the environment at specific project sites will be less.

WAC 173-26 contains a number of concepts wholly or explicitly lacking in WAC 173-16:

- vegetation conservation for the protection of shoreline habitats;
- explicit management of geologically hazardous areas, and to do so in concert with requirements of the Growth Management Act;
- explicit management of critical salt water habitats, and to do so in conjunction with shoreline management of adjacent areas;
- explicit management of riverine corridors, and to do so in especially in conjunction with protection of hydrologic and ecologic values;
- explicit management for flood hazard reduction; and.
- the mandate to allow no net loss of ecological functions as a result of development activity or operations.

Three provisions of WAC 173-26 stand out in this respect.

The requirement for local governments to include identification of degraded shorelines in their comprehensive shoreline inventories, and to include in their amended Shoreline Master Program measures for restoration for those ecologically degraded shorelines, will provide long-term guidance for not just the local jurisdiction, but any organization seeking to affect habitat restoration.

The requirements for vegetation conservation which apply more-or-less across-the-board to most shoreline developments will likely result in lower rates of habitat loss and degradation from new development than any other element of the proposed rule.

The requirement that new development shall result in no net loss of ecological functions will, more than any other new element of the proposed rule, result in lower rates of habitat loss and degradation from new development.

Taken as a whole, the cumulative effects of these new provisions, plus the refined measures for implementing traditional components of the guidelines for development and implementation of local shoreline master programs, will result in substantially reduced adverse environmental effects of shoreline development and redevelopment, and positive environmental changes on those shorelines on which restoration is carried out.

On the other hand, many of the measures new to the proposed Shoreline Management Guidelines (SMG) rule are not new practices. In some respects the proposed changes to the SMG rule simply bring that rule into consistency with practices already required by other laws, regulations, or agreements. In these instances, the apparent environmental benefits and effect of the proposed rule will be less than it might seem by simply comparing the proposed WAC 173-26 with the old WAC 173-16. Notably, these areas of overlap (and source of the over lap) include flood hazard reduction (Growth Management Act; Flood Plain Management Act); water quality protection (Water Pollution Control Act; Dairy Nutrient Management Act; Puget Sound Water Quality Protection Act; Shellfish Protection Districts Act); dredging and dredged material management (Dredged Material Management Program under the federal Clean Water Act); agricultural practices (Agriculture Fish Water negotiations); forest practices (Forest Practices Act); geological hazards (Growth Management Act); and requirements for shoreline buffers (Growth Management Act, Agriculture Fish Water negotiations).

In April 2003 the Legislature adopted and the Governor signed a bill (SSB 6012) amending the Shoreline Management Act setting a schedule for local governments to amend their Shoreline Master Programs in accordance with the provisions of the proposed new Shoreline Management Guidelines Rule. The update adoption schedule is spread out over a period of nine years beginning in 2005. The results of the adoption schedule as compared with the amount of Shoreline Substantial Development (SSD) permit activity[27] in the counties is graphically depicted in Table 7.1. In general, the schedule of SMP update adoption is consistent with SSD activity; that is, counties in which a high level of permitting activity occurs are among the jurisdictions required to first update and adopt new master programs.

The beneficial environmental results of the proposed new rule at a project scale will begin to be seen over the next decade. Substantial beneficial effects at a landscape scale will likely not be apparent for many decades.

---

[27] A Shoreline Substantial Development permit is not required for a single family residence, therefore the data in Table 7.1 does not include the many single family residences constructed on shorelines regulated by the Shoreline Management Act. This skews the data but still provides a representative geographic view of where greater and lesser amounts of shoreline development activity occurs in the state.

**Table 7.1: Adoption schedule for updated Shoreline Master Programs compared with Substantial Development Permit activity by county area, 1990 – 2002.**

| Counties in rank order of SSD permits, 1990 - 2002 | Year SMP Adoption Required | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | 2009 | 2011 | 2012 | 2013 | 2014 |
| King | | | | | | |
| Pierce | | | | | | |
| Whatcom | | | | | | |
| Snohomish | | | | | | |
| Skagit | | | | | | |
| San Juan | | | | | | |
| Grays Harbor | | | | | | |
| Mason | | | | | | |
| Pacific | | | | | | |
| Chelan | | | | | | |
| Kitsap | | | | | | |
| Clark | | | | | | |
| Island | | | | | | |
| Cowlitz | | | | | | |
| Clallam | | | | | | |
| Lewis | | | | | | |
| Thurston | | | | | | |
| Spokane | | | | | | |
| Jefferson | | | | | | |
| Grant | | | | | | |
| Yakima | | | | | | |
| Okanogan | | | | | | |
| Wahkiakum | | | | | | |
| Pend Oreille | | | | | | |
| Kittitas | | | | | | |
| Stevens | | | | | | |
| Whitman | | | | | | |
| Benton | | | | | | |
| Skamania | | | | | | |
| Walla Walla | | | | | | |
| Douglas | | | | | | |
| Klickitat | | | | | | |
| Asotin | | | | | | |
| Ferry | | | | | | |
| Columbia | | | | | | |
| Franklin | | | | | | |
| Adams | | | | | | |
| Lincoln | | | | | | |
| Garfield | | | | | | |

Table 7.1 Notes

1. The rank order of the counties is taken from Table 6.2 and is based upon the number of SSD permits issued from 1990 to 2002.

2. The adoption schedule is taken from SSB 6012 as noted in the text.

3. For the most part, in the year by which a county is required to adopt an SMP update, so too are all the cities in that county required to adopt. Exceptions are noted and displayed in a lighter shade of gray.

3. King County and all cities over 10,000 population must adopt by 2009; all smaller cities by 2011.

4. Whatcom County and Bellingham must adopt by 2005; all other cities in the county by 2011.

5. Everett must adopt by 2005; Snohomish County and all other cities in the county by 2011.

6. Port Townsend must adopt by 2005; Jefferson County and all other cities in the county by 2011.

# 8 • References Cited and Consulted

This bibliography contains three types of materials: [1] some were consulted for general background information in preparing this environmental impact statement, but were not cited in the text; [2] some were explicitly used in preparing this environmental impact statement, and are cited in the text; and [3], some items listed here were not reviewed directly, but are cited in lengthy quotations from materials of type 2.

This bibliography also indicates those materials incorporated by reference as a part of this environmental impacts statement by displaying them in **bold face** type. Incorporations by reference are available for review at the Department of Ecology.


Albright, Rick, Ron Hirschi, Ron Vanbianchi & Claire Vita. 1980a. *Coastal Zone Atlas of Washington: Land cover and land use narratives. Volume 1: Urban, agriculture, nonforested uplands, forest, and water.* Washington Department of Ecology, Olympia.

Albright, Rick, Ron Hirschi, Ron Vanbianchi & Claire Vita. 1980b. *Coastal Zone Atlas of Washington: Land cover and land use narratives. Volume 2: Wetlands, exposed and other lands, appendices, glossary, and index.* Washington Department of Ecology, Olympia.

Aldrich, J. W., and R. W. Coffin. 1980. Breeding bird populations from forest to suburbia after thirty-seven years: Resident generalists thrive as migratory forest-interior species disappear. *Am. Birds* 34(1):3-7.

Almand, J. D., and W. B. Krohn. 1979. The position of the Bureau of Land Management on the protection and management of riparian ecosystems. Pages 359-361 in R. R. Johnson and J. J. McCormick, eds. *Strategies for the protection and management of floodplain wetlands and other riparian ecosystems*. U.S. For. Serv. Gen. Tech. Rep. WO-12.

Asherin, Duane A. and James J. Claar. 1976. *Inventory of riparian habitats and associated wildlife along the Columbia and Snake rivers. (Volume 3: Snake River-McNary Reservoir).* US Army Corps of Engineers North Pacific Division, Walla.

Artim, Ernest R. 1976a. *Relative ground settlement hazards of Thurston County, Washington.* Geologic Map GM-16. Washington Department of Natural Resources, Olympia.

Artim, Ernest R. 1976b. *Slope stability map of Thurston County, Washington*. Geologic Map GM-15. Washington Department of Natural Resources, Olympia.

Asherin, Duane A. and James J. Claar. 1976. *Inventory of riparian habitats and associated wildlife along the Columbia and Snake rivers. Volume 3: Snake River-McNary Reservoir.* US Army Corps of Engineers North Pacific Division, Walla Walla.

Bafus, Bill. 2000. *Evaluation of Probable Benefits and Costs: Chapter 173-26 Amended, State Master Program Approval — Amendment Procedures*. Washington Department of Ecology, Olympia.

Bailey, Allison, Helen Berry, Betty Bookheim, and Don Stevens. 1998. Probability-based estimation of nearshore habitat. *Puget Sound Research '98*: 580-588.

Baum, R.L., A.F. Cheborad, and R.L. Schuster. 1998. *Landslides triggered by the Winter 1996-97 Storms in the Puget Sound Lowland, Washington.* US Geological Survey Open File Report 98-239. Online edition: http:geohazards.cr.usgs.gov/pubs/ofr/oft98-239/ofr98-239.html

Behnke, R. J., and R. F. Raleigh. 1978. Grazing and the riparian zone: impact and management perspectives. Pages 263-267 in R. R. Johnson and J. F. McCormick, eds. *Strategies for protection and management of floodplain wetlands and other riparian ecosystems*. U.S. For. Serv. Gen. Tech. Rep. WO-12.

Behnke, R. J., and M. Zarn. 1976. *Biology and management of threatened and endangered western trouts*. U.S. For. Serv. Gen. Tech. Rep. RM-28.

Bell, Brenda. 1999. The liquid earth. *The Atlantic Monthly* 283(1):58-74. http://www.theatlantic.com/issues/99jan/mudslide.htm

Bell, Kathleen and Daniel Huppert. 2000. Integrated Ecological-Economic Modeling: Spatial Modeling of Land Use and Management Activities. pp 48-53 in Breslow, S. and J. K. Parrish, 2000. *PNCERS 1999 Annual Report*. Submitted to Coastal Ocean Programs, NOAA, April 2000. Also available at http://pdata.fish.washington.edu/pdfs/annualreport_1999.pdf

Bilby, R. E. 1988. Interactions between aquatic and terrestrial systems. Pages 13-29 in K. J. Raedeke, ed. *Streamside management: riparian wildlife and forestry interactions*. Coll. For. Resour. Contrib. No. 59., Univ. Washington, Seattle.

Blackwood, Jeff (project manager). 1999. *Interior Columbia Basin Ecosystem Management Project. Eastside draft environmental impact state.* US Forest Service & US Bureau of Land Management. http://www.icbemp.gov/pdfs/deis/eastside/eeis.html

Bolton, Susan, and Jeff Shellberg. *Ecological Issues in Floodplain and Riparian Corridors.* Prepared for the Aquatic Habitat Guidelines Steering Committee and jointly published by the Washington State departments of Ecology, Fish and Wildlife, and Transportation, Olympia. Also available in Adobe Acrobat© format at http://www.wa.gov/wdfw/hab/ahg/floodrip.htm.

Booth, D. B. 1991. Urbanization and the natural drainage system - impacts, solutions, and prognoses. *Northwest Environ. J.* 7:93-118.

Bortleson, G.C., N.P. Dion, J.B. McConnell, and L.M. Nelson. 1976. *Reconnaissance data on lakes in Washington: Volume 1, Clallam, Island, Jefferson, San Juan, Skagit, and Whatcom counties*. (Water-Supply Bulletin 43, Volume 1). Washington Department of Ecology, Olympia.

Bortleson, G.C., N.P. Dion, J.B. McConnell, and L.M. Nelson. 1976. *Reconnaissance data on lakes in Washington: Volume 2, King and Snohomish counties*. (Water-Supply Bulletin 43, Volume 2). Washington Department of Ecology, Olympia.

Bortleson, G.C., N.P. Dion, J.B. McConnell, and L.M. Nelson. 1976. *Reconnaissance data on lakes in Washington: Volume 3, Kitsap, Mason, and Pierce counties*. (Water-Supply Bulletin 43, Volume 3). Washington Department of Ecology, Olympia.

Bortleson, G.C., N.P. Dion, J.B. McConnell, and L.M. Nelson. 1976. *Reconnaissance data on lakes in Washington: Volume 4, Clark, Cowlitz, Grays Harbor, Lewis, Pacific, Skamania, and Thurston counties*. (Water-Supply Bulletin 43, Volume 4). Washington Department of Ecology, Olympia.

Bortleson, G.C., N.P. Dion, J.B. McConnell, and L.M. Nelson. 1976. *Reconnaissance data on lakes in Washington: Volume 5, Chelan, Ferry, Kittitas, Klickitat, Okanogan, and Yakima counties*. (Water-Supply Bulletin 43, Volume 5). Washington Department of Ecology, Olympia.

Bortleson, G.C., N.P. Dion, J.B. McConnell, and L.M. Nelson, 1976. *Reconnaissance data on lakes in Washington: Volume 6, Adams, Benton, Douglas, Franklin, Grant, Lincoln, Walla Walla, and Whitman counties*. (Water-Supply Bulletin 43, Volume 6). Washington Department of Ecology, Olympia.

Bortleson, G.C., N.P. Dion, J.B. McConnell, and L.M. Nelson, 1976. *Reconnaissance data on lakes in Washington: Volume 7, Pend Oreille, Spokane, and Stevens counties*. (Water-Supply Bulletin 43, Volume 7). Washington Department of Ecology, Olympia.

Bortleson, G.C., N.P. Dion, and J.B. McConnell. 1974. *A method for the relative classification of lakes in the State of Washington from reconnaissance data.* (Water-Resources Investigations 37-74). US Geological Survey, Tacoma.

Box, T. W. 1979. The American rangelands: their condition and policy implications for management. Pages 16-22 in *Proc. of the symposium on rangeland policies for the future*. U.S. For. Serv. Gen Tech. Rep. WO-17.

**Brennan, Jim (editor). 2001. *Reconnaissance Assessment of the State of the Nearshore Report: Eastern Shore of Central Puget Sound Including Vashon and Maury Islands.* King County Department of Natural Resources, Seattle.** Also available as a set of Adobe Acrobat files at http://dnr.metrokc.gov/wlr/watersheds/ puget/nearshore/sonr.htm

Bricker, S., C. Clement, D. Pirhalla, S.P. Orlando, and D.R.G. Farrow, 1999. *National Estuarine Eutrophication Assessment: Effects of Nutrient Enrichment in the Nation's Estuaries.* NOAA, National Ocean Service, Special Projects Office and the National Centers for Coastal Ocean Science. Silver Spring, MD. http://cammp.nos.noaa.gov/spo/proddetails.taf?offeringcode=1_SEA_99-13

Broadhurst, Ginny and Rob Walkinshaw. 1998. *Puget Sound nearshore habitat regulatory perspective: A review of issues and obstacles.* Puget Sound/Georgia Basin Environmental Report Series: Number 7. Puget Sound Action Team, Olympia. http://www.wa.gov/puget_sound/shared/taskforce7.html

Brody, Jeff (editor). 1991. *Hood Canal: Splendor at risk.* The Sun Newspaper, Bremerton, Washington

Brown, E. Reade (ed.). 1985. *Management of wildlife and fish habitats in forests of western Oregon and Washington.* (USDA Forest Service Publication No. R6-F&WL-192-1985). US Forest Service Pacific Northwest Region, Portland.

Bryant, L. D., and C. Maser. 1982. Classification and distribution. Pages 1-59 in J. W. Thomas and D. E. Toweill, eds. *Elk of North America*. First ed. Stackpole Books, Harrisburg, Va.

Bulthuis, Douglas A. 1995. Environmental requirements for eelgrasses in Puget Sound. pp 499-507 in: *Proceedings, Puget Sound Research '95.* Puget Sound Water Quality Authority, Olympia.

Burdick, D.M. and F.T. Short. 1995. *The effects of boat docks on eelgrass beds in Massachusetts coastal waters*. (Prepared for Waquoit Bay National Estuarine Research Reserve and Massachusetts Coastal Zone Management.) University of New Hampshire, Durham. http://depts.washington.edu/newwsdot/burdick.html (abstract only)

Busby, F. E. 1979. Riparian and stream ecosystems, livestock grazing, and multiple use management. Pages 6-12 in O. B. Cope, ed. *Proc. of the forum-grazing and riparian/stream ecosystems*. Trout Unlimited, Inc., Vienna, Va.

**Butkus, Steve. 1997. *1998 Washington State water quality assessment: Section 305(b) report.* Washington Department of Ecology report no. 97-13.**

Canning, Douglas J. (ed.). 1997a. *Washington State Coastal Zone Management Section 309 assessment and Strategy, 1997*. (Publication 97-92). Washington Department of Ecology, Olympia.

Canning, Douglas J. 1997b. *Public opinion on shoreline management in Washington state*. Shorelands and Water Resources Program, Washington Department of Ecology, Olympia.

Canning, Douglas. 1997c. Habitat loss and change on Puget Sound shorelines. *Puget Sound Notes* 40 (March 1997):1-2

Canning, Douglas J. 1991a. *Sea level rise in Washington State: State-of-the-knowledge, impacts, and potential policy issues.* Shorelands & CZM Program, Washington Department of Ecology, Olympia.

Canning, Douglas J., 1990. *Wetlands of Washington: A resource characterization and risk assessment*. Shorelands & CZM Program, Washington Department of Ecology, Olympia.

Canning, Douglas J., Lisa Randlette, and William A. Hashim. 1988. *Skokomish River comprehensive flood control management plan.* (Ecology Publication 87-24). Shorelands & CZM Program, Washington Department of Ecology, Olympia.

Canning, Douglas J. 1987. *Nisqually River Management Plan: Final environmental impact statement.* Shorelands & CZM Program, Washington Department of Ecology, Olympia.

Canning, Douglas J. and James Scott (editors). 1993. *The public trust doctrine in Washington state: Proceedings of the symposium, November 18, 1992.* (Ecology Publication 93-53). Washington Department of Ecology, Olympia.

Canning, Douglas J. and Hugh Shipman. 1995. *The cumulative environmental effects of shoreline erosion control and associated land clearing practices, Puget Sound, Washington. Coastal Erosion Management Studies, Volume 10*. (Draft in preparation) Washington Department of Ecology, Olympia.

**Canning, Douglas J. and Hugh Shipman. 1994. *Coastal erosion management studies in Puget Sound, Washington: Executive summary, Coastal Erosion Management Studies, Volume 1.* Shorelands and Water Resources Program, Washington Department of Ecology.**

Canning, D.J. and Michelle Stevens. 1989. *Wetlands of Washington-: A resource characterization.* Washington State Department of Ecology, Olympia.

Carleton, T. J., and S. J. Taylor. 1983. The structure and composition of a wooded urban ravine system. *Can. J. Bot*. 61:1392-1401.

Carrasquero, Jose. 2001. *Overwater Structures: Freshwater Issues.* Prepared for the Aquatic Habitat Guidelines Steering Committee and jointly published by the Washington State departments of Ecology, Fish and Wildlife, and Transportation, Olympia. Also available in Adobe Acrobat© format at http://www.wa.gov/wdfw/hab/ahg/overwatr.htm.

Castelle, A., C. Conolly, M. Emers, E.D. Metz, S. Meyer, and M. Witter. 1992. *Wetland buffers: An annotated bibliography.* Publication 92-11. Washington Department of Ecology, Olympia.

Clary, W. P., and D. E. Medin. 1990. *Differences in vegetation biomass and structure due to cattle grazing in a northern Nevada riparian ecosystem*. U.S. For. Serv. Res. Pap. INT-427. 8pp.

Coastal Erosion Task Force. 1999. *The Coastal Erosion Task Force: A Report to the Governor.* Washington Department of Community, Trade, and Economic Development, Olympia.

Cole-Warner, Lauran, Stephanie Stirling, David Kendall, Ted Benson, and Stephanie Stirling. 2000. *Dredged Material Management Program Biennial Report: Dredging Years 1998/1999.* Seattle District, US Army Corps of Engineers, Seattle, Washington. http://www.nws.usace.army.mil/dmmo/BR_00.pdf

Cowardin, L.M., Virginia Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of wetlands and deepwater habitats of the United States.* U.S. Fish and Wildlife Service Report FWS/OBS-79/31.

Cox, Jack, Keith Macdonald and Tom Rigert. 1994. *Engineering and geotechnical techniques for shoreline erosion management in Puget Sound. Coastal Erosion Management Studies Volume 4.* Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia.

Dahl, T.E. 1990. *Wetlands losses in the United States, 1780s to 1980s.* U.S. Fish and Wildlife Service, Washington D.C.

Davis, J. W. 1982. Livestock vs. riparian habitat management--there are solutions. Pages 175-183 in *Proc. Of the wildlife livestock relationships symposium*. For. Wildl. Range Exp. Stn., Univ. Idaho, Moscow.

Desbonnet, Alan, Pamela Pogue, Virginia Lee, and Nicholas Wolff. 1994. *Vegetated buffers in the coastal zone: A summary review and bibliography.* Coastal Resources Center Technical Report 2064. Rhode Island Sea Grant, University of Rhode Island, Narragansett.

Douglass, Scott L. and Bradley H. Pickel. 1999. The tide doesn't go out anymore: The effect of bulkheads on urban bay shorelines. *Shore & Beach* 67:19-25.

Downing, John. 1983. *The coast of Puget Sound.* University of Washington Press, Seattle.

Dunagan, Christopher. 2000a. 100-foot Shoreline Buffer Proposed. *The Sun*, June 6, 2000. On-line edition http://www.thesunlink.com/news/2000/june/0607shoreline.html. Bremerton, Washington.

Dunagan, Christopher. 2000b. 100-foot Study needed to find balance between salmon, buffers. *The Sun*, June 13, 2000. On-line edition http://www.thesunlink.com/news/2000/june/0613salmonbuffer.html. Bremerton, Washington.

Dunne, Thomas and Luna B. Leopold. 1978. *Water in environmental planning.* W.H. Freeman and Co., San Francisco.

Fitzsimmons, Tom. 2000a Letter to Bill Vogler, Executive Director, Washington Association of Counties, June 1, 2000. Washington Department of Ecology, Olympia.

Fitzsimmons, Tom. 2000b Letter to Stan Finkelstein, Executive Director, Association of Washington Cities, Inc., June 1, 2000. Washington Department of Ecology, Olympia.

Franklin, Jerry F. and Tawny Blinn. 1988. *Natural vegetation of Oregon and Washington: Commentary and bibliographic supplement.* Oregon State University Press, Corvallis.

Franklin, Jerry F. and C.T. Dyrness. 1973. *Natural vegetation of Oregon and Washington.* USDA Forest Service General Technical Report PNW-8). Pacific Northwest Forest and Range Experiment Station, Portland.

Fresh, K.L., B. Williams, and D. Pentilla. 1995. Overwater Structures and Impacts on Eelgrass in Puget Sound, Washington. pp 537-543 in: *Proceedings, Puget Sound Research '95.* Puget Sound Water Quality Authority, Olympia. http://depts.washington.edu/newwsdot/fresh.html

Gerstel, Wendy J., Matthew J. Brunengo, William S. Lingey, Robert Logan, Hugh Shipman, and Timothy J. Walsh. 1997. Puget Sound bluffs: The where, why, and when of landslides following the holiday 1996-97 storms. *Washington Geology* 25(1):17-31.

Good, James W. and Sandra S. Ridlington. 1992. *Coastal natural hazards: Science, engineering, and public policy.* (ORESU-B-92-001). Oregon Sea Grant, Oregon State University, Corvallis.

Green, J. 1968. *The biology of estuarine animals.* University of Washington Press, Seattle.

**Growth Management Program. 1999. *Optional comprehensive plan element for natural hazard reduction.* Washington Department of Community, Trade, and Economic Development, Olympia.**

Hagen, Carlos B. 1958. *Lengths of shoreline in Washington state.* Washington Department of Natural Resources, Olympia.

Hair, J. D., G. T. Hepp, L. M. Luckett, K. P. Reese, and D. K. Woodward. 1978. Beaver pond ecosystems and their relationships to multi-use natural resource management. Pages 80-92 in R. R. Johnson and F. J. McCormick, eds. *Strategies for the protection and management of floodplain wetlands and other riparian ecosystems.* U.S. For. Serv. Gen. Tech. Rep. WO-12.

Harrison, William A (ed.). 1989. *State of Washington Shorelines Hearings Board: Digest of decisions from June, 1971 through December, 1988.* (Third Edition). Shorelines Hearings Board, Olympia.

Hashim, William A. 1999. *Water quality summaries for the 62 Water Resource Inventory Areas of Washington State. Appendix A, Washington's water quality management plan to control nonpoint source pollution.* Washington Department of Ecology, Olympia.

Hicks, B., J. D. Hall, P. A. Bisson, and J. R. Sedell. 1991b. Responses of salmonids to habitat changes. Pages 483-518 in W. R. Meehan, ed. *Influences of forest and rangeland management on salmonid fishes and their habitats*. Am. Fish Soc. Spec. Publ. 19.

Hynes, H.B.N. 1970. *The ecology of running waters.* University of Toronto Press, Toronto.

Furniss, M. J., T. D. Roeloffs, and C. S. Yee. 1991. Road construction and maintenance. Pages 297-323 in W. R. Meehan, ed. *Influences of forest and rangeland management on salmonid fishes and their habitats*. Am. Fish. Soc. Spec. Publ. 19, Bethesda, Md.

Gerstel, Wendy J., Matthew J. Brunengo, William S. Lingley Jr., Robert Logan, Hugh Shipman, and Timothy J. Walsh. 1997. Puget Sound bluffs: The where, why, and when of landslides following the holiday 1996-97 storms. *Washington Geology* 25(1):17-31.

Goldstein, E. L., M. Gross, and R. M. Degraff. 1983. Wildlife and greenspace planning in medium-scale residential developments. *Urban Ecol*. 7:201-214.

Growth Management Program, 1998. *Optional comprehensive plan element for natural hazard reduction*. Washington Department of Community, Trade, and Economic Development, Olympia.

Jameson, David L. (ed.). 1976. *Ecosystem impacts of urbanization assessment methodology*. (EPA-600/3-76-072US Environmental Protection Agency, Washington.).

Johannessen, Jim. 1992. *Net shore-drift of San Juan, and parts of Jefferson, Island, and Snohomish counties, Washington*. Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia.

Johnson, Ralph W., Craighton Goeppele, David Jansen, and Rachel Paschal. 1992. The public trust doctrine and coastal zone management in Washington state. *Washington Law Review* 67(3): 521-597.

Johnson, Orlay W., Mary H. Ruckelshaus, W. Stewart Grant, F. William Waknitz, Ann M. Garrett, Gregory J. Bryant, Kathleen Neely, and Jeffe Hard. 1999. *Status review of Coastal Cutthroat Trout from Washington, Oregon, and California.* NOAA Technical Memorandum NMFS-NWFSC-37. National Marine Fisheries Service, Seattle, Washington. http://www.nwfsc.noaa.gov/pubs/tm/tm37/cutthroat.pdf

Kahler, Tom, Martin Grassley, and David Beauchamp. 2000. A Summary of the Effects of Bulkheads, Piers, and Other Artificial Structures and Shorezone Development on ESA-listed Salmonids in Lakes. City of Bellevue, Bellevue, Wash. (Also available as an Adobe Acrobat © document at http://www.ci.bellevue.wa.us/departments/Utilities/pdf/uti_shorezone_112001.pdf

Kaminsky, George M., Peter Ruggerio, and Guy Gelfenbaum. 1998. Monitoring coastal change in southwest Washington and northwest Oregon during the 1997-98 El Niño. *Shore & Beach*, July 1998: 42-51.

Kinch, G. 1989. *Riparian area management: grazing management in riparian areas*. U.S. Bur. Land Manage. Tech. Ref. 1737-4. Denver. 44pp.

King County Planning Division. 1980. *King County streams--a disappearing resource*. King Co. Resour. Planning Sec., Seattle. 24pp.

Klarin, Paul N., Kristi M. Branch, Marc J. Hershman, and Thomas F. Grant. 1990a. *Sea Level Rise Policy Alternatives Study: Volume 1. Alternative policy responses for accelerated sea level rise.* Shorelands & CZM Program, Washington Department of Ecology, Olympia.

Klarin, Paul N., Kristi M. Branch, Marc J. Hershman, and Thomas F. Grant. 1990b. *Sea Level Rise Policy Alternatives Study: Volume 2. An analytical review of state and federal coastal management systems and policy responses to sea level rise.* Shorelands & CZM Program, Washington Department of Ecology, Olympia.

Klein, R. D. 1979. Urbanization and stream quality impairment. *Water Resour. Bull*. 15:948-963.

**Knutson, K. Lea and Virginia L. Naef. 1997. *Management recommendations for Washington's priority habitats: Riparian*. Washington Department of Fish and Wildlife, Olympia. (also available at http://www.wa.gov/wdfw/ hab/ripfinal.pdf)**

Kondolf , G. Mathias, Matt Smeltzer, and Lisa Kimball. 2001. *Freshwater Gravel Mining and Dredging Issues.* Prepared for the Aquatic Habitat Guidelines Steering Committee and jointly published by the Washington State departments of Ecology, Fish and Wildlife, and Transportation, Olympia.

Koons, Robert R. and Rick D. Cardwell. 1981. *Significant areas for certain species of food fish and shellfish in Puget Sound*. (Technical Report 59). Washington Department of Fisheries, Olympia.

Kruckeberg, Arthur R. 1991. *The natural history of Puget Sound country.* University of Washington Press, Seattle.

**Lane, R.C. and William A Taylor. 1996. Washington wetland resources. Pp 393-398 in: US Geological Survey. 1996. *National water summary on wetland resources.* US Geological Survey Water Supply Paper 2425. (also available at http://wa.water.usgs.gov/reports/wetlands/)**

Larse, R. W. 1970. Prevention and control of erosion and stream sedimentation from forest roads. Pages 76-83 in *Proc. of symposium: forest land uses and stream environments.* Oregon State Univ., Corvallis.

League of Women Voters of Washington. 1983. *Public perception of the Washington Shoreline Management Act.* Report 96-116. Washington Department of Ecology, Olympia.

Leopold, Luna. 1968. *Hydrology for urban land planning: A guidebook on the hydrologic effects of urban land use.* (Geological Survey Circular 554). US Geological Survey, Washington.

Leopold, Luna B., A. Gordon Wolman, and John P. Miller. 1964. *Fluvial processes in geomorphology.* W.H. Freeman and Co., San Francisco.

**Macdonald, Keith, David Simpson, Bradley Paulsen, Jack Cox and Jane Gendron. 1994. *Shoreline armoring effects on physical coastal processes in Puget Sound, Washington. Coastal Erosion Management Studies Volume 5.* Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia.**

Macdonald, Keith B. and Fred Weinmann (eds). 1997. *Wetland and riparian restoration: Taking a broader view*. US Environmental Protection Agency, Region 10, Seattle.

Macdonald, Keith and Bonnie Witek. 1994. *Management options for unstable bluffs in Puget Sound, Washington. Coastal Erosion Management Studies Volume 8.* Shorelands and Water Resources Program, Washington Department of Ecology, Olympia.

Martinson, R.K., 1976. *Salt-water fishery resources and shoreline development in the southern Hood Canal area, Washington*. (Misc. Geologic Investigations Map I-853 E). US Geological Survey, Washington.

May, C.W., E.B. Welch, R.R. Horner, J.R. Karr and B.W. Mar. 1997. *Quality indices for urbanization effects in Puget Sound lowland streams*. (Water Resources Series Technical Report No. 154). Department of Civil Engineering, University of Washington, Seattle.

McCabe, Gretchen H. and Katherine F. Wellman. 1994. *Policy alternatives for coastal erosion management. Coastal Erosion Management Studies Volume 6.* Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia

McCabe, Gretchen H. and Katherine F. Wellman. 1994. *Regional approaches to address coastal erosion management. Coastal Erosion Management Studies Volume 9.* Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia

Menashe, Elliot. 1993. *Vegetation management: A guide for Puget Sound bluff property owners.* (Publication 93-31). Washington Department of Ecology, Olympia.

Montgomery, D. R., and J. M. Buffington. 1993. *Channel classification, prediction of channel response, and assessment of channel condition*. Rep. TFW-SH10-93-002 prepared for the SHAMW Comm. of the Wash. State Timber/Fish/Wildl. Agreement. 84pp.

Moring, J. R., G. C, Garmon, and D. M. Mullen. 1994. Pages 194-207 in I. G. Cowx, ed. Rehabilitation of freshwater fisheries. Hull Int. Fish. Institute, Univ. of Hull, Fishing News Books, U.K.

Morrison, Steven W., Jacqueline and Dan Haug. 1993. *Inventory and characterization of shoreline armoring, Thurston County, Washington, 1977 – 1993.* Prepared by Thurston Regional Planning Council for Washington Department of Ecology, Olympia.

Mulvihill, E.L., C.A. Francisco, J.B. Glad, K.B. Kaster, R.E. Wilson, and O. Beeman. 1980. *Biological impacts of minor shoreline structures on the coastal environment: State of the art review* (2 vols). FWS/OBS-77-51. US Fish and Wildlife Service, Washington.

Myers, James M., Robert G. Kope, Gregory J. Bryant, David Teel, Lisa J. Lierheimer, Thomas C. Wainwright, W. Stewart Grant, F. William Waknitz, Kathleen Neely, Steven T. Lindley, and Robin S. Waples. 1998. *Status review of Chinook Salmon from Washington, Idaho, Oregon, and California.* NOAA Technical Memorandum NMFS-NWFSC-35. National Marine Fisheries Service, Seattle, Washington. http://www.nwfsc.noaa.gov/pubs/tm/tm35/index.htm

Myers, Rian. 1993. *Slope stabilization and erosion control using vegetation: A manual of practice for coastal property owners.* (Publication 93-30). Washington Department of Ecology, Olympia.

Myers, Rian D., Michele Lorilla, and Jane N. Myers. 1995. *Surface water and groundwater on coastal bluffs: A guide for Puget Sound property owners.* (Ecology Publication 95-107). Shorelands & CZM Program, Washington Department of Ecology, Olympia.

Nabhan, G. P. 1985. Riparian vegetation and indigenous southwestern agriculture: control of erosion, pests, and microclimate. Pages 233-236 in R. R. Johnson, C. D. Ziebell, D. R. Patton, P. F. Ffolliott, and R. H. Hamre, eds. *Riparian ecosystems and their management: reconciling conflicting uses*. U.S. For. Serv. Gen. Tech. Rep. RM-120.

National Marine Fisheries Service. 1998. *Factors contributing to the decline of Chinook Salmon: An addendum to the 1996 west coast Steelhead factors for decline report.* National Marine Fisheries Service, Portland, Oregon. http://www.nwr.noaa.gov/1salmon/salmesa/pubs/chinffd.pdf

National Marine Fisheries Service. 1996a. *Factors for decline. A supplement to the Notice of Determination for west coast Steelhead under the Endangered Species Act.* National Marine Fisheries Service, Portland, Oregon. http://www.nwr.noaa.gov/1salmon/salmesa/pubs/stlhffd.pdf

**National Marine Fisheries Service. 1996b. *NMFS National Gravel Extraction Policy.* National Marine Fisheries Service, Washington. http://swr.ucsd.edu/hcd/gravelsw.htm**

National Marine Fisheries Service. 1999c. *Endangered Species Act Section 7 Consultation, Biological Opinion, Columbia River Navigation Channel Operation and Maintenance Program*. National Marine Fisheries Service, Northwest Region, Portland.

National Oceanic and Atmospheric Administration. 1998. Endangered and threatened species: West Coast Chinook Salmon; listing status change; proposed rule. 50 CFR Parts 222, 226, and 227. *Federal Register* 63(45): 11482-11520.

Newton, J.A., S.L. Albertson, K. Nakata, and C. Clishe. 1998. *Washington State marine water quality in 1996 and 1997.* (Publication No. 98-338). Washington Department of Ecology, Olympia. http://www.wa.gov/ecology/pubs/98338.pdf

Nightingale, Barbara, and Charles Simenstad. 2001a. *Overwater Structures: Marine Issues.* Prepared for the Aquatic Habitat Guidelines Steering Committee and jointly published by the Washington State departments of Ecology, Fish and Wildlife, and Transportation, Olympia. Also available in Adobe Acrobat© format at http://www.wa.gov/wdfw/hab/ahg/overwatr.htm.

Nightingale, Barbara, and Charles Simenstad. 2001b. *Dredging Activities: Marine Issues.* Prepared for the Aquatic Habitat Guidelines Steering Committee and jointly published by the Washington State departments of Ecology, Fish and Wildlife, and

Transportation, Olympia. Also available in Adobe Acrobat© format at http://www.wa.gov/wdfw/hab/ahg/dredge.htm.

Nixon, Scott W., Candace A. Oviatt, and Sharon L. Northby. 1973. *Ecology of small boat marinas.* (Marine Technical Report Series No. 5). University of Rhode Island, Kingston.

Noss, R. F. 1993. Wildlife Corridors. Pages 43-68 in D. S. Smith and P. C. Hellmund, eds. *Ecology of greenways: design and function of linear conservation areas.* Univ. Minnesota Press, Minneapolis.

Noss, R. F., and A. Y. Cooperrider. 1994. *Saving nature's legacy: protecting and restoring biodiversity*. Island Press, Washington, D.C. 416pp.

Oakley, A. L., J. A. Collins, L. B. Everson, D. A. Heller, J. C. Howerton, and R. E. Vincent. 1985. Riparian zones and freshwater wetlands. Pages 58-76 in R. E. Brown, ed. *Management of wildlife and fish habitats in forests of western Oregon and Washington*. U.S. For. Serv. Portland, Oreg.

O'Connell, M. A., J. G. Hallett, and S. D. West. 1993. *Wildlife use of riparian habitats: a literature review*. TFW-WL1-93-001. Washington Department of Natural Resources, Olympia. 162pp.

Olson, Annette. 1997. Modeling the shade cast by overwater structures. *Puget Sound Notes* 40 (March 1997):6-9.

Omernik, James M. and Alisa L. Gallant. 1986. *Ecoregions of the Pacific Northwest.* EPA/600/3-86/033. US Environmental Protection Agency, Corvallis, OR.

Oregon-Washington Interagency Wildlife Committee. 1979. *Managing riparian ecosystems (zones) for fish and wildlife in eastern Oregon and eastern Washington.* Prepared by Riparian Habitat Subcomm. of the Oreg./Wash. Interagency Wildl. Comm. Portland, Oreg. 44pp.

Pacific County Department of Community Development, 1998. *Final Environmental Impact Statement for Pacific County's 1998 GMA Comprehensive Plan.* Pacific County Department of Community Development, South Bend, Washington. (Available at http://www.co.pacific.wa.us/pdf%20files/final%20EIS.pdf)

Pacific Shellfish Institute. 1999. *North American west coast shellfish industry 2010 goals: Research & initiatives priorities.* Pacific Shellfish Institute, Olympia, Wash. http://www.pcsga.org/Goals%202010.PDF

Parker, Jeff and Michael Ruef. 1977. *Geologic hazards in the coastal zone.* Washington Department of Ecology, Olympia

Parr, Marina. 1999a. County Grapples with Land-use Issues. *Skagit Valley Herald*, July 3, 1999. On-line edition, http://www.skagitvaleyherald.com/daily/99/july/03/a1landuse.html. Mount Vernon, Washington.

Parr, Marina. 1999b. Buffer Plan Seeks to Accommodate Farmers and Fish. *Skagit Valley Herald*, October 6, 1999. On-line edition, http://www.skagitvaleyherald.com/daily/99/october/06/a1bufferplan.html. Mount Vernon, Washington.

Payne, Neil F., Garet P. Munger, John W. Matthews, and Richard D. Taber (eds.). 1975. *Inventory of riparian habitats and associated wildlife along the Columbia and Snake rivers. (Volume 4: Mid-Columbia River).* US Army Corps of Engineers North Pacific Division, Walla Walla.

Penttila, Dan. 1978. *Studies of the Surf Smelt (*Hypomesus pretiosus*) in Puget S*ound. (Technical Report 42). Washington Department of Fisheries, Olympia.

Phipps, James B., 1990. *Coastal accretion and erosion in southwest Washington: 1977 - 1987*. (Publication 90-12). Washington Department of Ecology, Olympia.

Phipps, James B. and John M. Smith, 1978. *Coastal accretion and erosion in southwest Washington*. (Report 78-12). Washington Department of Ecology, Olympia.

Pickett, Paul. 2000. *Willapa River Total Daily Maximum Load Study: Data Summary Report.* Ecology Report 00-03-005. Washington Department of Ecology, Olympia. (Available at http://www.wa.gov/ecology/pubs/00030005.pdf)

Platts, W. S. 1979. Livestock grazing and riparian/stream ecosystems. Pages 39-45 in *Proc., forum-grazing and riparian/stream ecosystems*. Trout Unlimited, Inc.

Poston, Ted. 2001. *Treated Wood Issues Associated with Overwater Structures in Marine and Freshwater Environments.* Prepared for the Aquatic Habitat Guidelines Steering Committee and jointly published by the Washington State departments of Ecology, Fish and Wildlife, and Transportation, Olympia. Also available in Adobe Acrobat© format at http://www.wa.gov/wdfw/hab/ahg/overwatr.htm.

Proctor, C.M., et al. 1980. *An ecological characterization of the Pacific Northwest coastal region* (5 vols.). (FWS/OBS-79/11 through 15). US Fish and Wildlife Service, Washington.

Puget Sound Water Quality Action Team. 2002. *2002 Puget Sound update: Eighth report of the Puget Sound Ambient Monitoring Program.* Puget Sound Water Quality Action Team, Olympia, Washington.

Puget Sound Water Quality Action Team. 2000a. *Puget Sound's health 2000.* Puget Sound Water Quality Action Team, Olympia.

Puget Sound Water Quality Action Team. 2000b. *2000 Puget Sound update: Seventh report of the Puget Sound Ambient Monitoring Program.* Puget Sound Water Quality Action Team, Olympia, Washington. http://www.wa.gov/puget_sound/pslibrary/update_pdf/Intro_PG.html

Puget Sound Water Quality Authority. 1990. *1991 Puget Sound Water Quality Management Plan.* Puget Sound Water Quality Authority, Olympia, Wash.

Quinn, T. 1992. *The distribution, movements, and diet of coyotes in urban areas of western Washington.* Ph.D. Thesis, Univ. Washington, Seattle. 105pp.

R2 Resource Consultants, CH2M Hill, and Shapiro & Associates. 2000. *Tri-County urban issues ESA Study: Guidance document.* (Prepared on behalf of the Tri-County Urban Issues Advisory Committee). Available at http://www.salmoninfo.org/tricounty/tcUrbanIssuesToC.htm

Raedeke, Kenneth J. 1988. Streamside management: Riparian wildlife and forestry interactions. (Proceedings of the conference, February 11-13, 1987, University of Washington, Seattle). College of Forest Resources, University of Washington, Seattle.

Reeves, G. H., and J. R. Sedell. 1993. *Diversity of juvenile anadromous salmonid assemblages in coastal Oregon basins with different levels of timber harvest*. Trans. Am. Fish. Soc. 122:309-317.

Ryan, John C. 1994. *State of the Northwest*. Northwest Environment Watch, Seattle.

Salo, Ernest O. and Terrance W. Cundy (eds). 1987. *Streamside management: Forestry and fishery interactions.* (Proceedings of the conference, February 12-14, 1986, University of Washington, Seattle). College of Forest Resources, University of Washington, Seattle.

Schwartz, Maurice L., et al. 1991. *Net shore-drift in Washington state: Volume 1, Pacific Ocean and Strait of Juan de Fuca*. Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia.

Schwartz, Maurice L., et al. 1991. *Net shore-drift in Washington state: Volume 2, South Puget Sound Region*. Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia.

Schwartz, Maurice L., et al. 1991. *Net shore-drift in Washington state: Volume 3, Central Puget Sound Region*. Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia.

Schwartz, Maurice L., et al., 1991. *Net shore-drift in Washington state: Volume 4, Hood Canal Region.* Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia.

Schwartz, Maurice L., et al. 1991. *Net shore-drift in Washington state: Volume 5, Northern Bays and Straits*. Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia.

Schwartz, Maurice L and R. Scott Wallace. 1986. *Quantification of net shore-drift rates in Puget Sound and the Strait of Juan de Fuca*. Report 87-10. Washington Department of Ecology, Olympia.

Scott, James W. 1990. *Shoreline public access handbook*. Shorelands and Coastal Zone Management Program. Washington Department of Ecology publication 90-6.

Scott, James W., Melly A. Rueling & Don Bales. 1986. *Washington public shore guide: Marine waters.* University of Washington Press, Seattle.

Seabloom, Eric W., 1991. Ammophila *breviligulata Fern (American Beachgrass) on the foredunes of the Washington coast*. Shorelands & CZM Program, Washington Department of Ecology, Olympia.

Seabloom, E.W. and A.M. Wiedemann. 1994. Distribution and effects of *Ammophila breviligulata* Fern. (American Beachgrass) on the foredunes of the Washington coast. *Journal of Coastal Research* 10(1): 178-188.

Sedell, J. R., and K. J. Luchessa. 1982. Using the historical record as an aid to salmonid habitat enhancement. Pages 210-223 in *Acquisition and utilization of aquatic habitat inventory information*. West. Div., Am. Fish. Soc., Bethesda, Md.

Shipman, Hugh. 1997. Shoreline armoring on Puget Sound. *Puget Sound Notes* 40 (March 1997):2-5.

Shorelands and Coastal Zone Management Program. 1994. *Shoreline management guidebook*. 2nd edition. Washington Department of Ecology publication 93-104.

Shorelands and Environmental Assistance Program. 2003. *Shoreline Master Program Guidelines: Summary Comparison of Invalidated and Proposed Replacement Guidelines WAC 173-26.* Washington Department of Ecology, Olympia.

Shorelands and Water Resources Program. 1997. *Washington State Coastal Zone Management Section 309 Assessment and Strategy, 1997.* Washington Department of Ecology, Olympia.

Sidle, Roy C., Andrew J. Pearce, and Colin L. O'Loughlin. 1985. *Hillslope stability and land use.* Water Resources Monograph Series 11. American Geophysical Union, Washington, D.C.

Simenstad, Charles A., Barbara J. Nightingale, Ronald M. Thom & David K. Shreffler. 1999. *Impacts of ferry terminals on juvenile salmon migrating along Puget Sound shorelines. Phase I: Synthesis of state of knowledge.* Washington State Transportation Center, University of Washington, Seattle.

Simmons, Donna, 1995. *Shellfish and finfish: Resources at risk in the Hood Canal watershed. Executive summary with recommendations*. Hood Canal Coordinating Council, Hoodsport, Washington.

Simmons, Donna, 1995. *Shellfish and finfish: Resources at risk in the Hood Canal watershed.* Hood Canal Coordinating Council, Hoodsport, Washington.

Smith, Mackey and R.J. Carson, 1977. *Relative slope stability of the southern Hood Canal area, Washington.* (Misc. Geologic Investigations Map I-853 F). US Geological Survey, Washington.

Social and Economic Sciences Research Center. 1996. *Survey of Washington households on the Shoreline Management Act and related shoreline issues.* Washington Department of Ecology, Olympia.

Somers, Dave and Jim Arthur. 1999. *Report of the Shorelines Guidelines Commission to the Department of Ecology.* Unpublished report available from Shorelands and Environmental Assistance Program, Washington Department of Ecology, Olympia.

Spence, Brian C., Gregg A. Lomnicky, Robert M. Hughes and Richard P. Novitzki. 1996. *An ecosystem approach to Salmonid conservation.* TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, OR. (Available from National Marine Fisheries Service, Portland, Oregon.)

Stasch, Paul and Donna Lynch, 1999. Ship shape: Single industry campaign summary report. Publication 99-16. Washington Department of Ecology, Olympia. (also available at http://www.wa.gov/ecology/biblio/9916.html)

Stenberg, K. J., K. O. Richter, D. McNamara, and L. Vicknair. 1997. A wildlife habitat network for community planning using GIS technology. Pages 267-278 in D. Miller and G. De Roo, eds. *Urban environmental planning: policies, instruments, and methods in an international perspective*. Avebury Publ., London, U.K. In Press.

Sullivan, K., T. E. Lisle, C. A. Dolloff, G. E. Grant, and L. M. Reid. 1987. *Stream channels: the link between forests and fishes*. Pages 39-97 in E. O. Salo and T. W. Cundy, eds. Streamside management: forestry and fishery interactions. Coll. For. Resour. Contrib. No. 57, Univ. Washington, Seattle.

Tabor, James E. (ed.), 1976. *Inventory of riparian habitats and associated wildlife along the Columbia and Snake rivers. (Volume 2: Lower Columbia River).* US Army Corps of Engineers North Pacific Division, Walla Walla.

Terich, Thomas A. 1987. *Living with the shore of Puget Sound and the Georgia Strait.* Duke University Press, Durham.

**Terich, Thomas A., Maurice L. Schwartz and James Johannessen. 1994. *Annotated bibliographies on shoreline hardening effects, vegetative erosion control, and beach nourishment. Coastal Erosion Management Studies Volume 2.* Shorelands and Coastal Zone Management Program, Washington Department of Ecology.**

**Thom, Ronald M., David K. Shreffler and Keith Macdonald. 1994. *Shoreline armoring effects on coastal ecology and biological resources in Puget Sound, Washington. Coastal Erosion Management Studies Volume 7.* Shorelands and Water Resources Program, Washington Department of Ecology, Olympia.**

Thomas, B. Patrice. 1995. *Net shore-drift within Grays Harbor, Willapa Bay, and the mouth of the Columbia River, Washington.* Washington Department of Ecology, Olympia.

Thomas, J. W, C. Maser, and J. E. Rodiek. 1979. *Riparian zones*. Pages 40-47 in J. W. Thomas, ed. Wildl. habitats in managed forests: the Blue Mountains of Oregon and Washington. U.S. Forest Service, Washington, D.C.

US Army Corps of Engineers. 1989. *Draft environmental impact statement: Unconfined open-water disposal for dredged material, Phase II Puget Sound dredged disposal analysis.* Seattle District, US Army Corps of Engineers, Seattle.

U.S. Army Corps of Engineers, Seattle District, et al. 2000. *Dredged Material Evaluation and Disposal Procedures. A Users Manual for the Puget Sound Dredged Disposal Analysis (PSDDA) Program.* Seattle District, US Army Corps of Engineers, Seattle, Washington. http://www.nws.usace.army.mil/dmmo/UMPDF.pdf

United States Forest Service, United States Fish and Wildlife Service, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, National Park Service, United States Bureau of Land Management, and United States Environmental Protection Agency. 1993. *Forest ecosystem management: an ecological, economic, and social assessment*. Rep. of the For. Ecosys. Manage. Team. U.S. Gov. Printing Off., Washington, D.C. (Irr. Pag.).

Vestal, Barbara and Alison Rieser. 1995. *Methodologies and mechanisms for management of cumulative coastal environmental impacts. Part 1: Synthesis, with annotated bibliography.* National Oceanic and Atmospheric Administration, Silver Spring, Maryland.

Washington Department of Ecology. 2003a. *Evaluation Of Probable Benefits and Costs and Least Burdensome Analysis: Proposed Shoreline Management Guidelines Chapter 173-26 WAC.* Washington Department of Ecology, Olympia.

Washington Department of Ecology. 2003b. *Small Business Economic Impact Statement for Proposed Shoreline Management Guidelines Chapter 173-26 WAC*. Washington Department of Ecology, Olympia.

Washington Department of Ecology. 1999. *Washington's water quality management plan to control nonpoint source pollution* (Public review draft). Publication 99-26. Washington Department of Ecology, Olympia.

Washington Department of Ecology. 1992b. *1992 Statewide water quality assessment, 305(b) report.* Washington Department of Ecology publication 92-04.

Washington Department of Ecology. 1990. *Final Environmental Impacts Statement For the Washington State Sediment Management Standards. Chapter 173-204 WAC.* Washington Department of Ecology, Olympia. http://www.wa.gov/ecology/sea/smu/SMS1990EIS.doc

Washington Department of Ecology. 1977. *Coastal Zone Atlas of Washington: Volume 1, Whatcom County*. (Publication No. DOE 77-21-1). Washington Department of Ecology, Olympia.

Washington Department of Ecology. 1978a. *Coastal Zone Atlas of Washington: Volume 2, Skagit County*. (Publication No. DOE 77-21-2). Washington Department of Ecology, Olympia.

Washington Department of Ecology. 1978b. *Coastal Zone Atlas of Washington: Volume 3, San Juan County*. (Publication No. DOE 77-21-3). Washington Department of Ecology, Olympia.

Washington Department of Ecology. 1978c. *Coastal Zone Atlas of Washington: Volume 11, Jefferson County.* (Publication No. DOE 77-21-11). Washington Department of Ecology, Olympia.

Washington Department of Ecology. 1978d. *Coastal Zone Atlas of Washington: Volume 12, Clallam County.* (Publication No. DOE 77-21-12). Washington Department of Ecology, Olympia.

Washington Department of Ecology. 1979a. *Coastal Zone Atlas of Washington: Volume 4, Island County.* (Publication No. DOE 77-21-4). Washington Department of Ecology, Olympia.

Washington Department of Ecology. 1979b. *Coastal Zone Atlas of Washington: Volume 5, Snohomish County.* (Publication No. DOE 77-21-5). Washington Department of Ecology, Olympia.

Washington Department of Ecology. 1979c. *Coastal Zone Atlas of Washington: Volume 6, King County.* (Publication No. DOE 77-21-6). Washington Department of Ecology, Olympia.

Washington Department of Ecology. 1979d. *Coastal Zone Atlas of Washington: Volume 7, Pierce County.* (Publication No. DOE 77-21-7). Washington Department of Ecology, Olympia.

Washington Department of Ecology. 1979e. *Coastal Zone Atlas of Washington: Volume 10, Kitsap County.* (Publication No. DOE 77-21-10). Washington Department of Ecology, Olympia.

Washington Department of Ecology. 1980a. *Coastal Zone Atlas of Washington: Volume 8, Thurston County.* (Publication No. DOE 77-21-8). Washington Department of Ecology, Olympia.

Washington Department of Ecology. 1980b. *Coastal Zone Atlas of Washington: Volume 9, Mason County.* (Publication No. DOE 77-21-9). Washington Department of Ecology, Olympia.

Washington Department of Ecology. 1981. *Western Washington urban stream assessment*. Off. Water Prog., Water Quality Planning, Wash. Dept. Ecol., Olympia. 54pp.

Washington Department of Ecology. 1992b. *1992 Statewide water quality assessment, 305(b) report.* Washington Department of Ecology publication 92-04.

Washington Department of Ecology. 1992c. *Focus: Puget Sound wetland preservation.* Washington Department of Ecology publication F-S-92-112.

Washington Department of Ecology. 1992d. *Focus: Wetlands in Washington State.* Washington Department of Ecology publication F-S-92-108.

Washington Department of Ecology, 1999. *Washington's water quality management plan to control nonpoint source pollution (Public review draft).* Publication 99-26. Washington Department of Ecology, Olympia.

Washington Department of Ecology. 2000. *Legal fundamentals of the Shoreline Management Act.* Washington Department of Ecology, Olympia.

Washington Department of Natural Resources. 1998. *Our changing nature: Natural resource trends in Washington State.* Washington Department of Natural Resources, Olympia. (also available at http://www.wa.gov/dnr/ocn/index.html)

Washington Department of Wildlife. Undated. *Washington wetlands--Time is running out.* Washington State Department of Wildlife, Olympia.

WDOE: See Washington Department of Ecology.

Washington Department of Fish and Wildlife. 1997. *Final environmental impact statement for the Wild Salmonid Policy.* Washington Department of Fish and Wildlife, Olympia. http://www.wa.gov/wdfw/fish/wsp/wspeis.pdf

Washington Department of Fish and Wildlife. 2000. *Integrated streambank protection guidelines.* (Draft Abbreviated Version). Washington Department of Fish and Wildlife, Olympia.

**Washington Department of Natural Resources. 1998. *Our changing nature: Natural resource trends in Washington State.* Washington Department of Natural Resources, Olympia. http://www.wa.gov/dnr/ocn/index.html**

Washington State Conservation Commission. 2000. *AFW: Agriculture, Fish and Water.* Web site home page at http://www.conserver.org/afw/ (accessed 18 September 2000).

Wiedemann, Alfred M., 1984. *The ecology of Pacific Northwest coastal sand dunes: A community profile.* (FWS/OBS-84/04) U.S. Fish and Wildlife Service, Washington.

Williams, R. Walter, Richard M. Laramie, and James J. Ames. 1975a. *A catalog of Washington streams and salmon utilization: Volume 1, Puget Sound region.* Washington Department of Fisheries, Olympia.

Williams, R. Walter, Richard M. Laramie, and James J. Ames. 1975b. *A catalog of Washington streams and salmon utilization: Volume 2, Coast region.* Washington Department of Fisheries, Olympia.

Williams, Gregory D. and Ronald M. Thom. 2001. *Marine and Estuarine Shoreline Modification Issues.* Prepared for the Aquatic Habitat Guidelines Steering Committee and jointly published by the Washington State departments of Ecology, Fish and Wildlife, and Transportation, Olympia. Also available in Adobe Acrobat© format at http://www.wa.gov/wdfw/hab/ahg/marnrsrc.htm.

Wolcott, Ernest E. 1973a. *Lakes of Washington: Volume 1, Western Washington.* Washington Department of Ecology, Olympia.

Wolcott, Ernest E. 1973b. *Lakes of Washington: Volume 2, Eastern Washington*. Washington Department of Ecology, Olympia.

Yoshinaka, Marvin S. and Nancy J. Ellifrit, 1974. *Hood Canal: Priorities for tomorrow.* US Fish and Wildlife Service, Portland.

Zelo, Ian, and Hugh Shipman. 2000. *Alternative bank protection methods for Puget Sound shorelines.* Publication 00-06-012. Washington Department of Ecology, Olympia.

# Appendix A: EIS Authors and Contributors

Neil Aaland, Floods/Wetlands/Watersheds Section, Shorelands & Environmental Assistance Program, Washington Department of Ecology, Olympia: EIS design, scoping, and editorial review.

Douglas J. Canning, Coastal & Shorelands Section, Shorelands & Environmental Assistance Program, Washington Department of Ecology, Olympia: Editor, EIS design, principal analyst.

Paula Ehlers, Environmental Coordination Section, Shorelands & Environmental Assistance Program, Washington Department of Ecology, Olympia: EIS design, scoping.

Tim Gates, Coastal & Shorelands Section, Shorelands & Environmental Assistance Program, Washington Department of Ecology, Olympia: Process characterization; editorial review.

Brendan McFarland, Environmental Coordination Section, Shorelands & Environmental Assistance Program, Washington Department of Ecology, Olympia: EIS scoping.

John Owen, MAKERS architecture and urban design, Seattle: Process characterization.

James Schroeder, formerly with Coastal & Shorelands Section, Shorelands & Environmental Assistance Program, Washington Department of Ecology, Olympia: Alternatives analyses.

Peter Skowlund, Coastal & Shorelands Section, Shorelands & Environmental Assistance Program, Washington Department of Ecology, Olympia: Process characterization, needs statement.

Barbara Ritchie, Environmental Coordination Section, Shorelands & Environmental Assistance Program, Washington Department of Ecology, Olympia: EIS design, scoping.

This list of authors, contributors, and reviewers includes persons involved with the 1999, 2000, and 2003 versions of this EIS, because components of the 1999 and 2000 documents remain incorporated in this 2003 EIS.

# Appendix B: Supplemental Draft EIS Distribution Lists

## *Local Governments*

Please refer to Appendix C for a list of the local governments required to adopt a shoreline master program under the Shoreline Management Act, each of which as sent a copy of the Supplemental Draft EIS..

## *Regional Agencies*

Cowlitz-Wahkiakum Council of Governments, Kelso

Grays Harbor Council of Governments, Aberdeen

Hood Canal Coordinating Council, Quilcene

Puget Sound Regional Council, Seattle

Thurston Regional Planning Council, Olympia

## *Washington State Agencies*

Agriculture, Department of

Commerce, Trade and Economic Development, Department of
- Archaeology & Historic Preservation
- Growth Management Division

Ecology, Department of,
- Environmental Coordination Section
- Library

Fish and Wildlife, Department of

Health, Department of

Library, Washington State

Natural Resources, Department of

Parks and Recreation Commission

Puget Sound Water Quality Action Team

Transportation, Department of

## *Native American Governments*

Chehalis Confederated Tribes

Colville Confederated Tribes

Cowlitz Tribe

Elwha Klallam Tribe

Hoh Tribe

Jamestown S' Klallam Tribe

Kalispel Tribe

Lummi Tribe

Makah Tribe

Muckleshoot Tribe

Nisqually Tribe

Nooksack Tribe

Port Gamble S'Klallam Tribe

Puyallup Tribe

Quileute Tribe

Quinault Tribe

Samish Tribe

Sauk-Suiattle Tribe

Shoalwater Bay Tribe

Skokomish Tribe

Spokane Tribe

Squaxin Island Tribe

Stillaguamish Tribe

Suquamish Tribe

Swinomish Tribe

Tulalip Tribes

Upper Skagit Tribe

Yakama Indian Nation

## *Federal Government Agencies*

Army Corps of Engineers

- Portland District
- Seattle District
- Walla Walla District

Environmental Protection Agency, Region 10, Seattle

Federal Emergency Management Agency, Bothell

Fish and Wildlife Service, Region 1, Portland

National Oceanic and Atmospheric Administration:
National Marine Fisheries Service, Northwest Regional Office, Seattle
Office of Ocean and Coastal Resource Management, Silver Spring, MD

## *Non-governmental Organizations which Commented on the 2000 Modified Draft EIS*

Association of Washington Business

Building Industry Association of Washington

Columbia-Pacific Resource Conservation & Development

Northwest Indian Fisheries Commission

Port of Grays Harbor

Protect the Peninsula's Future

Puget Sound Energy

Sierra Club

Upper Columbia Resources Council

Washington Environmental Council

Washington State Farm Bureau

# Appendix C: WAC 173-26-080 Master programs required of local governments

The following local governments[28], listed alphabetically by county, are required to develop and administer a shoreline master program:

Adams County.

Asotin County.

- Asotin, city of.
- Clarkston, city of.

Benton County.

- Benton City, city of.
- Kennewick, city of.
- Prosser, city of.
- Richland, city of.
- West Richland, city of.

Chelan County.

- Cashmere, city of.
- Chelan, city of.
- Entiat, town of.
- Leavenworth, city of.
- Wenatchee, city of.

Clallam County.

- Forks, city of.
- Port Angeles, city of.
- Sequim, city of.

Clark County.

- Camas, city of.
- La Center, town of.
- Ridgefield, town of.
- Vancouver, city of.
- Washougal, city of.
- Woodland, city of.

Columbia County.

- Dayton, city of.
- Starbuck, town of.

Cowlitz County.

- Castle Rock, city of.
- Kalama, city of.
- Kelso, city of.
- Longview, city of.
- Woodland, city of.

Douglas County.

- Bridgeport, town of.
- Coulee Dam, city of.
- East Wenatchee, city of.

---

[28] All 39 counties come under the Shoreline Management Act, plus 216 cities which are located on shorelines which come under the act. Three cities (Bothell, Coulee Dam, and Woodland) lie within two counties.

Rock Island, town of.
Ferry County.
Republic, town of.
Franklin County.
Pasco, city of.
Garfield County.
Grant County.
Coulee City, city of.
Electric City, city of.
Grand Coulee, city of.
Krupp, town of.
Moses Lake, city of.
Soap Lake, city of.
Wilson Creek, town of.
Grays Harbor County.
Aberdeen, city of.
Cosmopolis, city of.
Elma, city of.
Hoquiam, city of.
Montesano, city of.
Oakville, city of.
Ocean Shores, city of.
Westport, city of.
Island County.
Coupeville, town of.
Langley, city of.
Oak Harbor, city of.
Jefferson County.
Port Townsend, city of.
King County.
Auburn, city of.
Beaux Arts Village, town of.
Bellevue, city of.
Black Diamond, city of.
Bothell, city of.
Burien, city of.
Carnation, town of.
Covington
Des Moines, city of.
Duvall, city of.
Federal Way, city of.
Hunts Point, town of.
Issaquah, city of.
Kenmore
Kent, city of.
Kirkland, city of.
Lake Forest Park, city of.
Maple Valley
Medina, city of.
Mercer Island, city of.
Milton, city of.
Newcastle, city of.
Normandy Park, city of.
North Bend, city of.
Pacific, city of.
Redmond, city of.
Renton, city of.
Sammamish
Sea-Tac, city of.
Seattle, city of.
Shoreline, city of.
Skykomish, town of.
Snoqualmie, city of.
Tukwila, city of.

Woodinville, city of.
Yarrow Point, town of.

Kitsap County.
Bremerton, city of.
Port Orchard, city of.
Poulsbo, city of.
Bainbridge Island, city of.

Kittitas County.
Cle Elum, city of.
Ellensburg, city of.
South Cle Elum, town of.

Klickitat County.
Bingen, town of.
Goldendale, city of.
White Salmon, town of.

Lewis County.
Centralia, city of.
Chehalis, city of.
Morton, city of.
Napavine
Pe Ell, town of.
Toledo, city of.
Vader, city of.
Winlock, city of.

Lincoln County.
Odessa, town of.
Sprague, city of.

Mason County.
Shelton, city of.

Okanogan County.
Brewster, town of.
Conconully, town of.
Coulee Dam, city of.
Okanogan, city of.
Omak, city of.
Oroville, town of.
Pateros, town of.
Riverside, town of.
Tonasket, town of.
Twisp, town of.
Winthrop, town of.

Pacific County.
Ilwaco, town of.
Long Beach, town of.
Raymond, city of.
South Bend, city of.

Pend Oreille County.
Cusick, town of.
Ione, town of.
Metaline, town of.
Metaline Falls, town of.
Newport, city of.

Pierce County.
Bonney Lake, city of.
Buckley, city of.
Dupont, city of.
Eatonville, town of.
Fife, city of.
Gig Harbor, city of.
Lakewood, city of.
Milton, city of.
Orting, city of.
Pacific, city of.
Puyallup, city of.

Roy, city of.
Ruston, town of.
South Prairie, town of.
Steilacoom, town of.
Sumner, city of.
Tacoma, city of.
University Place, city of.
Wilkeson, town of.

San Juan County.
Friday Harbor, town of.

Skagit County.
Anacortes, city of.
Burlington, city of.
Concrete, town of.
Hamilton, town of.
La Conner, town of.
Lyman, town of.
Mount Vernon, city of.
Sedro Woolley, city of.

Skamania County.
North Bonneville, city of.
Stevenson, town of.

Snohomish County.
Arlington, city of.
Bothell, city of.
Brier, city of.
Edmonds, city of.
Everett, city of.
Gold Bar, town of.
Granite Falls, town of.
Index, town of.
Lake Stevens, city of.
Lynnwood, city of
Marysville, city of.
Monroe, city of.
Mountlake Terrace, city of.
Mukilteo, city of.
Snohomish, city of.
Stanwood, city of.
Sultan, town of.
Woodway, town of.

Spokane County.
Latah, town of.
Liberty Lake
Medical Lake, town of.
Millwood, town of.
Rockford, town of.
Spokane, city of.
Spokane Valley
Waverly, town of.

Stevens County.
Chewelah, city of.
Northport, town of.

Thurston County.
Bucoda, town of.
Lacey, city of.
Olympia, city of.
Tenino, town of.
Tumwater, city of.
Yelm, town of.

Wahkiakum County.
Cathlamet, town of.

Walla Walla County.
Waitsburg, town of.

Walla Walla, city of.

Whatcom County.

Bellingham, city of.

Blaine, city of.

Everson, city of.

Ferndale, city of.

Lynden, city of.

Nooksack, city of.

Sumas, city of.

Whitman County.

Albion, town of.

Colfax, city of.

Malden, town of.

Palouse, city of.

Pullman, city of.

Rosalia, town of.

Tekoa, city of.

Yakima County.

Grandview, city of.

Granger, town of.

Naches, town of.

Selah, city of.

Union Gap, city of.

Yakima, city of.

Zillah, city of.

# Appendix D:
# Glossary of Terms and Acronyms

**channel migration zone:** means the lateral extent of likely movement along a stream reach with evidence of active stream channel movement over the past one hundred years. Evidence of active movement can be provided from aerial photos or specific channel and valley bottom characteristics. A time frame of one hundred years was chosen because aerial photos and field evidence can be used to evaluate movement in this time frame. Also, this time span typically represents the time it takes to grow mature trees that can provide functional large woody debris to most streams. In large meandering rivers a more detailed analysis can be conducted to relate bank erosion processes and the time required to grow trees that function as stable large woody debris. The CMZ shall include floodways and wetlands, as defined under chapter 90.58 RCW, whether associated with either shorelines of the state or shorelines of state-wide significance, as defined under chapter 90.58 RCW.

**CMZ:** channel migration zone.

**CSH:** critical saltwater habitat.

**DCTED:** the Washington Department of Community, Trade, and Economic Development.

**drift cell** (also known as drift sector or littoral cell): a discrete reach of marine shore in which littoral drift may occur without significant interruption, and which contains any and all sources of such drift, and also any accretion shoreforms accreted by the drift material.

**ESHB 1724:** an act of the 1995 Washington State Legislature "relating to implementing the recommendations of the governor's task force on regulatory reform on integrating growth management planning and environmental review" including integration of growth management and shoreline management.

**ESU:** "evolutionarily significant unit" — a terminology used to indicate a "distinct" population of Pacific salmon, and therefore a species as defined under the Endangered Species Act.

**GMA:** Growth Management Act

**littoral drift:** the sedimentary material moved along a beach under the influence of waves and currents.

**PFC:** properly functioning condition(s).

**properly functioning condition(s):** means conditions that create and sustain natural habitat-affecting processes (such as sediment routing, riverine

community succession, precipitation runoff patterns, a natural range of flow variability and channel migration) over the full range of environmental variation and that support productivity at a viable population level of T&E species. The term "properly functioning condition" indicates a level of performance for a subset of the more broadly defined "ecological functions," reflecting what is necessary for the recovery of T&E species.

**proposed, threatened, and endangered species:** means those native species that are proposed to be listed or are listed in rule by the Washington state department of fish and wildlife pursuant to RCW 77.12.020 as threatened (WAC 232-12-011) or endangered (WAC 232-12-014), or that are proposed to be listed as threatened or endangered or that are listed as threatened or endangered under the federal Endangered Species Act, 16 U.S.C. 1533.

**RCW:** Revised Code of Washington—laws enacted by the Washington State Legislature.

**Section 4(d) Rule:** The 4(d) rule is issued by the federal government and lists do's and don'ts for protecting threatened salmon. The rule is named after a section of the Endangered Species Act and prohibits the "taking," or harming, of protected salmon or their habitat. Violating the rules spelled out in the 4(d) rule could leave the violator open to federal fines and other penalties. The proposed rule may also list certain activities that can continue without violating the law. (Definition taken from the Tri-county Endangered Species Act web page at http://www.salmoninfo.org/tricounty/QandA.htm)

**SEPA:** State Environmental Policy Act (Chapter 43.21C RCW).

**SHB:** Shorelines Hearings Board.

**shoreline armoring:** structural methods of shoreline erosion management which "armor" or "harden" the shore, typically bulkheads and seawalls, revetments, and rock structures incorporating vegetation.

**site potential tree height:** means the average height, at age one hundred years, of the tallest mature native tree species that is capable of growing in the soils found at the site and for which height measurements are noted in the soil survey reports published by the natural resource conservation service and other sources. Each local natural resource conservation service field office maintains the surveys for its area.

**SMA:** Shoreline Management Act (Chapter 90.58 RCW).

**SMP:** Shoreline Master Program

**SPTH:** site potential tree height.

**SSWS:** Shorelines of statewide significance

**T&E or T&E species:** threatened or endangered species.

**WAC:** Washington Administrative Code—regulations adopted by Washington state agencies pursuant to laws adopted by the legislature.