Washington State
Coastal Zone Management Program
Section 309 Assessment and Strategy, 2001
Final Report

Shorelands and Environmental Assistance Program

Washington Department of Ecology

April, 2001

Publication 01-06-003

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

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Dear Reader:

I am pleased to present the Washington State Final 309 Assessment and Strategy report. This report addresses nine separate areas of coastal zone management in Washington State. This assessment was used by the Department of Ecology to establish priorities for federal Coastal Zone Management Act section 309 funding uses for the next 3 – 5 years. Of the nine areas, four were selected as high priorities: 1) cumulative and secondary effects of growth; 2) wetlands; 3) coastal hazards; and 4) aquaculture.

Please remember that these priorities specifically apply only to Washington state's use of the Coastal Zone Management Act section 309 funds. They do not indicate broad priorities for the Shorelands and Environmental Assistance Program as a whole; coastal zone management is only a part of our program's responsibilities.

To those of you who provided comments on the draft assessment, "thank you." Your comments assisted us in understanding the issues and making our choices.

Sincerely,

Gordon White

Gordon White, Manager
Shorelands and Environmental Assistance Program

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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.

The project manager and editor for this report was Douglas J. Canning. Individual assessments were prepared by Douglas Canning (public access; special area management planning; facility siting; sea level rise; and aquaculture), Andrew McMillian and Tom Hruby (wetlands), Hugh Shipman (Puget Sound coastal hazards), Brian Voigt (Pacific Ocean coastal hazards), Terry Swanson (ocean resources and marine debris), and Tom Mark (cumulative and secondary effects of growth). Dennis Lefevre, Grays Harbor Council of Governments, assisted with the special area management planning assessment. Bill Dewey and Diane Cooper, Taylor Shellfish Company, assisted with aquaculture assessment.

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Recommended bibliographic citation:

Shorelands and Environmental Assistance Program. 2000. *Washington State Coastal Zone Management Program Section 309 Assessment and Strategy, 2001Final Report*. (Publication 01-06-003) Shorelands and Environmental Assistance Program, Washington Department of Ecology, Olympia.

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1 • Introduction

The Coastal Zone Management section 309 improvement grants program was initiated by Congress in its 1990 reauthorization of the Coastal Zone Management Act (CZMA), and expanded in its 1995 reauthorization of the CZMA. Congress has set aside special funding to encourage the states to make improvements to their federally approved coastal zone management programs in one or more of nine specific improvement areas:

1. Attaining increased opportunities for **public access**, taking into account current and future public access needs, to coastal areas of recreational, historical, aesthetic, ecological, or cultural value.

2. Preventing or significantly reducing threats to life and destruction of property be eliminating development and redevelopment in **coastal high hazard areas**, managing development in other hazard areas, and anticipating and managing the effects of potential sea level rise.

3. Planning for the use of **ocean resources**.

4. Protection, restoration, or enhancement of the existing **coastal wetlands** base, or creation of new coastal wetlands.

5. Development and adoption of procedures to assess, consider, and control **cumulative and secondary impacts of coastal growth and development**, including the collective effect on various individual uses or activities on coastal resources, such as coastal wetlands and fishery resources.

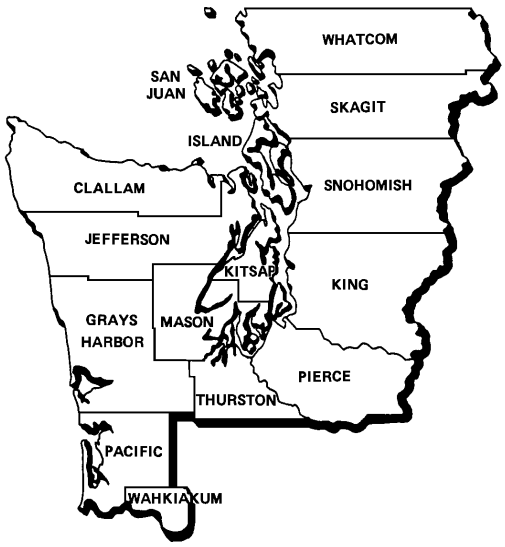
6. Reducing **marine debris** entering the Nation's coastal and ocean environment by managing uses and activities that contribute to the entry of such debris.

7. Preparing and implementing **special area management plans** for important coastal areas.

8. Adoption of procedures and enforceable policies to help facilitate the **siting of energy and government facilities** which may be of greater than local significance.

9. Enhance existing procedures and planning processes for siting **marine aquaculture facilities** while maintaining current levels of coastal resource protection. (Added, 1995.)

Washington's coastal zone management program applies to the fifteen coastal counties as shown in the adjacent map.



Federal rules and policies for implementation of the 309 improvements program require identification of one or two or three improvement areas in which a state will be eligible to receive grants.

Washington's 309 program has worked in the three areas of [1] cumulative and secondary impacts of growth, [2] coastal hazards, and [3]

special area management planning during the second phase of 309 funding (1997-2001) as described in the following chapter. This assessment reviews progress in those three areas plus the status of the other six areas. Based on this new assessment, proposals will be made for priority areas for improvements to Washington's coastal zone management program during the third 309 funding phase (2001-2005).

Program improvements are defined by the Office of Ocean and Coastal Resource Management (OCRM, 2000) to be:

1. A change to coastal zone boundaries;
2. New or revised authorities, including statutes, regulations, enforceable policies, administrative decisions, executive orders, and memoranda of agreement/understanding;
3. New or revised local coastal programs and implementing ordinances;
4. New or revised coastal land acquisition, management, and restoration programs;
5. New or revised Special Area Management Plans or plans for Areas of Particular Concern (APC) including enforceable policies and other necessary implementation mechanisms or criteria and procedures for designating and managing APCs; and,
6. New or revised guidelines, procedures and policy documents which are formally adopted by a state or territory and provide specific interpretations of enforceable CZM program policies to applicants, local government and other agencies that will result in meaningful improvements in coastal resource management.

Program implementation activities are also eligible for section 309 funding which meet the following general criteria:

1. must relate to one or more 309 program changes;
2. must be a component of the activity that measures, within two years, how it will improve effectiveness of the program; and,
3. must be cost effective.

Within these general requirements, eligible program implementation activities include:

1. administrative actions to carry out and enforce program change policies, authorities and other management techniques;
2. equipment purchases related to the program change; and
3. allowable costs as determined in accordance with the provisions of OMB Circular A-87: Cost Principles for State and Local Governments.

Section 309 priorities do not directly affect over-all goals of Washington's coastal zone management program.

2 • Summary of Past 309 Efforts

Throughout the first 309 improvement program phase (1992-96), Washington State worked in two 309 improvement areas. One, under the cumulative and secondary impacts of growth improvement area, addressed the need to better integrate state and local government implementation of the Shoreline Management Act (SMA) of 1971 with the newly adopted Growth Management Act (GMA) of 1990 (and 1991 amendments). Washington's second focus addressed Puget Sound coastal erosion management and the impacts of shoreline armoring under the coastal hazards improvement area.

During the second 309 improvement program phase (1997-2001), Washington State worked in three 309 improvement areas: Cumulative and Secondary Impacts; Coastal Hazards; and Special Area Management Planning.

This chapter summarizes Washington's 309 efforts between 1997 and 2001.

Cumulative and Secondary Impacts

The Growth Management Project has steadily evolved to meet changing legislative mandates and local government needs. Initially the Growth Management Project was designed to respond to provisions of the Growth Management Act of 1990 and the GMA Amendments of 1991 where there were overlapping interests with the Shoreline Management Act. In recent years, project emphasis shifted to a response to mandates under regulatory reform legislation and Endangered Species Act listings. Project goals, however, have remained consistent: to foster consistency at the local government level between GMA-mandated comprehensive plans, development regulations, and critical areas ordinances, and SMA-mandated local shoreline master programs (SMPs)—all of which address the cumulative and secondary impacts resulting from land use practices in sensitive coastal areas.

In 1995, the Washington State legislature adopted legislation amending the SMA as a part of a broad regulatory reform effort aimed at achieving better integration of GMA, SMA, and SEPA (State Environmental Policy Act). While not changing the broad goals of the SMA, this legislation did require amendment of all the rules for implementation of the SMA. Accordingly, the emphasis of the 309 Growth Management Project shifted beginning with the 1995-96 fiscal year. Throughout the 1995-97 period, the 309 Growth Management Project placed emphasis on amendment of the SMA implementing regulations. Accordingly, the SMP Approval and Amendment Procedures rule (WAC 173-26) and the Shoreline Management Permit and Enforcement rule (WAC 173-27) were adopted in September 1996 and the wetlands delineation manual rule was adopted in February 1997.

The Shoreline Master Program Guidelines rule produced significant controversy and, as a result, these regulations were not adopted in 1997 as anticipated. Questions were raised about the proper relationship between the SMA and GMA, the content of the guidelines and extent of change from the existing guidelines. These matters were first debated by a subcommittee of the State Land Use Study Commission and subsequently by a broad based Shorelines Guidelines Commission. While this was going on, the issue of prospective listing of certain fish species native to the state under the federal Endangered Species Act emerged. While providing some impetus for action on guidelines, this issue further complicated the task of completing the

guidelines. The Guidelines Commission recommended adoption of a set of guidelines though it was not a consensus decision of the Commission. The proposed guidelines were then submitted for formal public review and comment. Substantial comments were received in writing and in the public hearings. Based on these comments, a redrafting process was undertaken. The new draft provided two alternative approaches: (1) a more flexible, policy driven approach, and (2) a more prescriptive approach that has been endorsed by the National Marine Fisheries Service (NMFS) and US Fish and Wildlife Service (USFWS) as providing the certainty of protecting listed species of fish that they require. This set of guidelines was submitted for formal public review during 2000 and subsequently adopted by the Department, with revisions to address comments received, on November 29, 2000.

Coastal Hazards

In our 1997 CZM309 Assessment, we identified the need for information and guidance on alternatives to shoreline armoring as a high priority. In the accompanying Strategy we outlined a plan to specifically address the issue of beach nourishment on Puget Sound. This project will be completed shortly and is expected to lead directly to improvements in the Shoreline Guidebook as well as additional technical guidance and training.

Over thirty beach nourishment projects in Puget sound have been documented. They illustrate a wide variety of techniques, from cobble beach feeding projects to sandy pocket beaches, and an equally wide range of applications, from recreational enhancement to mitigation from habitat loss due to a large armoring project. The project reviews understanding of gravel beach nourishment and the use of nourishment on estuarine beaches, neither of which has been well documented previously in the national or region literature.

The project provides the consulting community, local governments, and resource managers with information on the design and management of nourishment projects, and in so doing will promote creative applications of nourishment, increase regulatory requirements to consider soft alternatives to traditional armoring, and encourage monitoring and adaptive management of shoreline projects.

Demand for this information on nourishment remains high. The Department of Ecology is providing technical assistance in this area, assisting with the review, permitting, and monitoring of nourishment projects, and participating in efforts to develop regulatory guidance on soft shoreline stabilization. The agency recently published a report on alternative bank stabilization techniques, including nourishment.

Special Area Management Planning

As mandated in the original Grays Harbor Estuary Management Plan (GHEMP), the Grays Harbor Council of Governments (COG, formerly Grays Harbor Regional Planning) reconvened the GHEMP Task Force for a five-year plan review and update. A variety of issues and conflicts were raised at the “kick-off” meeting in January 1997. As with the original Task Force, representation included all local jurisdictions within the estuary and state and federal agencies with regulatory resource authority.

Fundamental questions emerged regarding plan value and effectiveness. Should the update be a policy document with the regulatory implications removed? How would state and federal

agencies include the update in their development review process? What specific issues need to be updated/addressed?

Through the course of monthly Task Force meetings, these issues were discussed with consensus achieved in plan structure and specific estuary-wide issues to be addressed. Sub-committees were formed to establish a problem statement and recommendations for estuary-wide issues including: exotic infestations; wetland regulations and mitigation; dredging; habitat restoration; recreation; shoreline erosion management; and, public and agency education.

As various sections of the plan were reviewed, streamlined, and updated, major policy and regulatory shifts were surfacing from state and federal agencies which presented potentially substantive effects upon the update effort. The anticipated Endangered Species Act (ESA) listing of one or more anadromous fish species within Grays Harbor and the resulting "4d" rulings, plus the proposed amendment of the state Shoreline Management Act (SMA) guidelines for local Shoreline Master Programs (SMPs) created a problematic situation for the update. With the status, degree of impact, and timing unclear for the aforementioned efforts, continuing the GHEMP update became increasingly futile. With the risk of losing Task Force continuity and interest, it was decided by the Task Force to place the GHEMP update effort on hold pending clarification of impacts resulting from the ESA listings and SMA guideline amendment.

3 • Enhancement Area Assessments

The enhancement area assessments are organized according to the following standard format.

Enhancement Area Assessment Outline

Section 309 Programmatic Objectives

Each section begins with a quotation of the Section 309 programmatic objectives in italic typeface. These are the goals which any state must work to, at least in part, if that improvement area becomes a priority. These objectives were developed by Congress with a national perspective, and have varying applicability to specific states.

Resource Characterization

A characterization of the resource is provided according to a required format. Where the resource characterization is unchanged from the first assessment in 1991-92 only summary information is provided in this assessment. Copies of the 1991-92 assessment and strategy are available on request.

Management Characterization

A characterization of the management program(s) for the resource are provided according to a required format. Emphasis is on changes since the prior assessment.

Conclusion

The conclusions reached express a number of considerations:

- is Washington's coastal zone management program the best and proper means of achieving success is resolving the issue?
- can the issue be resolved in the context of 309 funding requirements for legislative, regulatory, or enforceable policy approaches which also result in an "improvement" to Washington's coastal zone management program.
- are all the parties necessary to success ready and able to participate?
- is the over-all likelihood of success reasonably high?

Public Access

Section 309 Programmatic Objectives

1. *Improve public access through regulatory, statutory, and legal systems.*
2. *Acquire, improve, and maintain public access sites to meet current and future demand through the use of innovative funding and acquisition techniques.*
3. *Develop or enhance a Coastal Public Access Management Plan which takes into account the provision of public access to all users of coastal areas of recreational, historical, aesthetic, ecological, and cultural value.*
4. *Minimize potential adverse impacts of public access on coastal resources and private property rights through appropriate protection measures.*

Public Access Characterization

Extent of Public Access

The extent of public access to marine shorelines as of 1985 is summarized in the table on the following page. More recent information has not yet been compiled. Similar, comprehensive information for lake shores and streams and rivers in the coastal zone is not known to be available.

Extensive private ownership of tidelands and shorelands in Washington State began immediately after statehood (1889) with the sale of state-owned tidelands to [1] raise money for the State Treasury, [2] enable "wharfing out" to deep water so as to encourage marine commerce, and [3] encourage and enable commercial oyster production, especially in Willapa Bay. In 1907 the Legislature directed the sale of aquatic lands in Lake Washington and Lake Union (large coastal lakes) specifically to finance the Alaska-Yukon-Pacific Exposition. Publicly owned tidelands and shorelands were sold into private ownership on demand until the early 1970s. By 1979, only 39 percent of Washington's tidelands and 70 percent of the shorelands remained in public ownership. Current policy is to sell no publicly owned tidelands or shorelands into private ownership, although a lease program continues.

Based on the 1985 inventory, of Washington's 2,200 miles of inland marine shoreline, the approximately 700 sites represent about 425 miles of shoreline, or about 19 percent of that shore. 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.

Use and Demand for Public Access

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%).

Access Type	Number of Marine Sites in 1985
State/County/Local parks	Of the total of 748 listed marine public access sites, 32 are operated by federal agencies, and 716 by state, county, regional, or local agencies.
Public Beaches	575 listed public access sites have a beach.
Boat Ramps	135 listed public access sites have a total of 226 boat launch ramps.
Scenic Vistas	192 listed public access sites have a scenic view.
State or Local Designated Rights-of-Way	27 listed public access sites are identified as a right-of-way road end, however many hundreds are known to exist.
Fishing Piers	68 listed public access sites have a fishing pier.
Coastal Trails	81 listed sites have a hiking trail.
Disabled Access	94 listed public access sites have disabled access facilities
Boardwalks or Walkways	No compiled information.
Wildlife Refuges	There are 7 listed national wildlife refuge units which provide for public access.
Camping Sites	82 listed public access sites have a total of 4,576 camp sites.

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.

In a 1995-96 study of boating access and access needs covering the lower 190 miles of the Columbia River (from the mouth to Dalles Dam), the researchers found that motor boaters desire additional boat launch facilities and improvements to the facilities some existing launches. Launch facilities every 10-to-12 miles along the river were considered adequate. Presently there are a total of 33 launches in the 190 miles, but their spacing and placement often exceeds the 10-to-12 mile criteria. Other desires include more transient moorage.

Additionally, the research discovered that paddle-craft boaters desire resolution of use conflicts between human-powered craft and motorboats, additional launch sites and camping facilities, and information resources such as guidebooks to paddling on the lower Columbia River.

Impediments to Provision of Public Access

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

Management Characterization

Within each of the management categories below, overall changes (both positive and negative) since the last assessment are identified. However, characterizations are difficult to make because so many federal, state, regional, and local agencies are involved in provision of public access.

Management Category	Changes Since Last Assessment
Statutory, Regulatory, and Legal Systems	No change.
Acquisition Programs	Moderate negative: Funding levels flat or diminished, resulting in less site acquisition. Not a 309 change.
Comprehensive Access Planning	No change. Comprehensive access planning is carried out at the local government level in conjunction with general outdoor recreation planning. There is no comprehensive access plan within the Washington coastal zone management program.
Operation & Maintenance Programs	Moderate negative: Funding levels flat or diminished, resulting in less site maintenance. Not a 309 change.
Innovative Funding Techniques	No change.
Public Education and Outreach	Moderate negative: Funding levels flat or diminished, resulting in less public outreach. Not a 309 change.
Road end rights-of-way	Moderate negative: Frequency of the abandonment to adjacent private property owners by local government appears to have increased, resulting in a loss of public access. The procedures have reportedly often been improper, but the information is largely anecdotal. Some local governments are granting a 'private use license' to private property owners adjacent to undeveloped street ends. No state agency has delegated oversight authority over state law regulating right-of-way abandonment. Not a 309 change.

Conclusion

The relative amount and quality of public access in Washington state is not keeping pace with population growth or the desires of some user groups.

1. The major problems in addressing the programmatic objectives for public access are:

- Financial: funding programs for acquisition, maintenance, and staffing are flat or diminishing.

- Opportunity: there are few large, undeveloped shoreline properties available for public acquisition.

2. The prior and proposed priority for Public Access is:

1997 Assessment	**This Assessment**
High	High
Medium	**Medium**
Low	Low

3. A medium priority is proposed. There is no foreseeable remedy to the primary problem — inadequate funding for acquisition and management. Given the existing competition for funding for other state priorities — salmon recovery, transportation, and education — the likelihood of acquiring substantial new funding for public access is not judged to be high. Washington State proposes no new policy or regulatory directions for Public Access at this time. State level assistance to local government needs will be met with CZMA section 306A and 306 funding, plus other state funding sources, principally from the Interagency Committee for Outdoor Recreation (IAC) and the Aquatic Lands Enhancement Account (ALEA) funds administered by the Department of Natural Resources.

Coastal Hazards

Section 309 Programmatic Objectives

1. *Direct future public and private development and redevelopment away from hazardous areas, including the high hazard areas delineated as FEMA V-zones and areas vulnerable to inundation from sea and Great Lakes level rise.*
2. *Preserve and restore the protective functions of natural shorelines features such as beaches, dunes, and wetlands.*
3. *Prevent or minimize threats to existing populations and property from both episodic and chronic coastal hazards.*

Coastal Hazards Characterization

Washington State has approximately 2800 miles of marine shoreline, of which 2200 is located within Puget Sound and adjacent inland waters. The character of coastal hazards varies significantly between the ocean coast and the Puget Lowland, as does the nature of development and the associated risks. Washington's coastal hazards were described in the 1992 assessment and are therefore presented in less detail here. The general level of risk in Washington state from coastal hazards is characterized in the table below. This assessment discusses coastal hazards in four contexts: coastal flooding in general; other coastal hazards on the Pacific Ocean coast; other coastal hazards on the Puget Sound coast; and sea level rise.

General Level of Risk

The general level of risk in Washington State is summarized in the following table and discussed the text below.

Tsunami and Seismic Risk

Tsunami and seismic risk is equally great on Washington's ocean coast and in Puget Sound. The nature, source, and frequency of the risk varies as discussed below. Washington's ocean coast shoreline is subject to tsunamis generated by both local and distant seismic events or by large coastal or submarine landslides. Recent studies indicate that the Puget Sound region is vulnerable to severe earthquakes and that these earthquakes have left a record of severe coastal impacts, including tsunami, sudden land level changes, ground shaking and liquefaction, and major landsliding. The effect of a modern earthquake on coastal areas of Puget Sound, particularly in the major urban centers and port areas, would be comparable to the 1995 Magnitude 6.9 earthquake that struck Kobe, Japan. Even relatively minor earthquakes may trigger landslides on coastal bluffs or liquefaction events in developed river deltas that would have serious consequences.

Hazard Class	Risk Ranking	Notes
Hurricanes or Typhoons	Medium	Washington's location on the northeast Pacific Ocean precludes tropical storms, but results in exposure to intense and prolonged winter storm conditions capable of causing severe damage.
Flooding	Medium	Coastal flooding is most often a result of river flood flows reaching the coast on a high tide.
Storm Surge	Medium	See note for 'Hurricanes or Typhoons'
Episodic Erosion	High	Episodic erosion is largely associated with the Pacific Ocean coast during El Niño winters when higher-than-normal sea levels aggravate the normal winter beach erosion cycle. Episodic erosion also occurs in Puget Sound on the rare occasion of a northerly storm.
Chronic Erosion	High	Chronic erosion is largely associated with Puget Sound where a combination of long-term sea level rise, tectonic ground subsidence, and the adverse effects of shoreline armoring lead to beach lowering and shoreline retreat.
Sea/Lake Level Rise	Medium	Long-term hazard.
Subsidence	Low	Washington has no near-term risk from subsidence due to groundwater or petroleum withdrawals; low rates of tectonic subsidence increase the rate of sea level rise in central and south Puget Sound.
Earthquakes	High	Low frequency, but high hazard.
Tsunamis	High	Low frequency, but high hazard.
Coastal Landsliding	High	Coastal landsliding is a common occurrence during wet winters, especially on developed slopes in the Puget Sound region.

As one of the commentators on the draft assessment put it:

> "At a recent Tsunamis and Landslides Workshop held in Seattle (January 2001) much new information was presented on the 950 AD Seattle fault event and the tsunami it caused. Numerical computer modeling of this and the 1700 AD. Cascadia subduction zone event have increased our awareness of the seriousness of their potential impacts to Washington's shoreline communities and natural resources. The recurrence interval for mega-thrust earthquakes (MM 8.5 - 9.0) along the Cascadia Subduction Zone has been estimated in the range of 350 - 600 years. It has been 300 years since the last event.

The impacts of the next event will surely dwarf even the worst storms nature can produce in this region: severe ground-shaking, liquefaction, inundation, channel scouring, spit breaching, erosion, and land subsidence.

"Now is the time to recognize and begin to consider mitigating this hazard along our Pacific Coast and inside the Strait of Juan de Fuca. And while the risk of a major tsunami inside Puget Sound is considerably less well understood, it has happened in the past and will undoubtedly happen again.

"We should, I believe, take a leaf from Oregon's book in addressing coastal hazards, in particular their state's requirement for siting critical facilities out of tsunami inundation zones. As these zones become more precisely delineated through computer modeling, we'll have no excuses for allowing such facilities to be placed in harm's way."

Coastal Flooding

Flood-prone areas on the ocean coast include portions of the large barrier spits of the southwest coast, low-lying communities located within the estuaries, and isolated small communities located at stream mouths along the Olympic Coast. Areas most at risk within Puget Sound include sand spits and other barrier beaches and low-lying areas near river mouths. Coastal flooding occurs when winter storms coincide with high tides and is often accompanied by severe wind and wave damage. Sea level rise will increase both the magnitude and the frequency of flooding and may lead to permanent inundation of some areas over the long-term.

Pacific Ocean Coastal Hazards

During the past century, most of the southwest Washington coast has featured an accretional trend, and erosion events were treated as localized problems. In the recent past, however, a series of events (chronic erosion at Cape Shoalwater, a jetty breach at Westport, El Niño-associated erosion at Point Brown leading to placement of an armored beach fill, and erosion at Fort Canby State Park) have increased general awareness of coastal erosion along the state's southwest coast. While a management response to these types of events is largely undefined, communities are in a much better position to make informed decisions as a result of the research of the Southwest Washington Coastal Erosion Study.

The seasonal exchange of sediment within the Columbia River Littoral Cell (CRLC) is large. The CRLC beaches lower approximately 0.5 m during the winter season and retreat horizontally between 20 and 30 m. This seasonal change is primarily due to the large winter wave climate and seasonal variability of wave direction and water levels in the Pacific Northwest. During the high wave conditions of the winter season, sediment is transported northward and offshore while during the low wave conditions of the summer season, sediment is transported back onshore and southward. As a result, the net change over the full annual cycle is small relative to the seasonal variability (Ruggiero & Voigt, 2000).

The largest wave event on record in the Pacific Northwest occurred during a La Niña winter, (3 March 1999), with deep-water significant wave heights measuring over 10 m and an associated storm surge measuring approximately 1.4 m. This major storm caused widespread

erosion and flooding throughout the CRLC and destroyed a restroom facility in the City of Ocean Shores, WA (Ruggiero & Voigt, 2000).

Rapid erosion continues to occur along SR 105 in Willapa Bay and at Cape Shoalwater on the north side of the Willapa Bay entrance. In response to erosion near SR 105, a large groin was constructed inside the bay in 1999. While it is still too early to comment on the results of this project, it appears to have afforded some level of protection for SR 105. Since the late 1800s, more than 3 km of erosion has occurred at Cape Shoalwater. No protective measures have been undertaken to protect the remaining properties at Cape Shoalwater.

Erosion hazards at Point Brown (Ocean Shores) resulted in placement of an armored beach fill in 1996 as a temporary measure to afford time for the development of a long-term solution. Since then, little progress has been made on the development of a long-term planning strategy to avoid or mitigate coastal erosion hazards, and the armored beach fill has been extended to the north with sand-filled geotextile tubes.

Rapid erosion at Fort Canby State Park has forced the Washington Parks and Recreation Commission to consider relocating at least a portion of the park's campground. Research indicates that the future shoreline position will be east of the existing campground by 2009 (Kaminsky et al., 1999). Erosion during the past few years has eliminated the primary dune and affected existing infrastructure, including the destruction of public restrooms and created ongoing maintenance problems for the remaining beach access parking lot.

In general, changes along the southwest Washington coast can be attributed to a shoreline response to decreasing sediment supply. As the system approaches equilibrium based on a new sediment supply, it is expected that shoreline reorientation will occur throughout the region. The Southwest Washington Coastal Erosion Study is integrating research results and developing information for coastal planning, including results from a shoreline change and wave run-up models to identify problematic areas for future management consideration.

Puget Sound Coastal Hazards

Puget Sound coastal hazards are discussed in terms of erosion, erosion control, environmental impacts of armoring, landslides, and earthquakes.

Shoreline erosion affects most of Puget Sound's 2,246 miles of shoreline and includes bluff retreat and landsliding, erosion of spits and barrier beaches, and erosion of inadequately protected artificial landfill. Overall rates of erosion are relatively slow, but intensive development in eroding areas increases risks and potential losses. Erosion adversely impacts residential development, industrial sites, public recreational facilities, hazardous waste sites, and urban shorelines.

Erosion on Puget Sound has been traditionally addressed with the construction of bulkheads and seawalls and riprap revetments. Shoreline armoring extends over 30% of the Sound's shoreline (more than 95% along the eastern shoreline of central Puget Sound between Everett and Tacoma), and consists primarily of residential shore protection. Rates of armoring remain high in many jurisdictions, although stricter scrutiny of armoring by permit agencies has reduced the rate of new armoring in some jurisdictions, discouraging armoring where structures are at low risk from erosion and forcing greater consideration of alternative technologies.

Shoreline armoring results in a wide range of environmental impacts, including degradation of shoreline habitat, beach loss, fragmentation of riparian vegetation, and modified erosion patterns. Concern about nearshore habitat losses, particularly as they impact threatened and endangered salmon stocks, has greatly elevated public attention on armoring during the last two years and made it the focus of many regulatory and restoration based planning efforts. Emphasis has been placed on avoiding development that will require erosion control structures, restricting armoring directly, and encouraging environmentally friendly alternatives such as vegetative bank stabilization and beach nourishment.

Over 30% of Puget Sound's shoreline is subject to landsliding. Landslides contributed to federal disaster declarations in early 1997, after Seattle reported damages of greater than $30 million, a family of four was killed in their shoreline home on Bainbridge Island, and a major landslide temporarily closed the mainline of the Burlington Northern Santa Fe Railroad along the shore in south Snohomish County. Record precipitation levels in the winter of 1998-99 led to reactivation of many very large, deep-seated landslides throughout the region, including one in Thurston County that resulted in over thirty homes being condemned. The extensive and costly damages that resulted from the 1997-1998 landslides, particularly in heavily developed areas such as Seattle, indicate that the landslide hazard is increasing with increased development, despite improvements in our understanding of landslides and strengthened development regulations in steep slope areas.

Landsliding of Puget Sound bluffs, and other steep slope areas, is largely associated with heavy winter rainfall. Landsliding is often most severe on improperly developed slopes, or where development was placed to close to unstable slopes.

Sea Level Rise

Washington State initiated a sea level rise response project in 1988. Through the early 1990s studies were completed on vertical land movements as they affect sea level rise (Shipman, 1989), potential threats and policy issues (Canning, 1991), historical effects on coastal wetlands (Beale, 1991), potential future effects on coastal wetlands (carried out in conjunction with a US Environmental Protection Agency Pacific Northwest regional study (Park, Lee & Canning, 1991), policy response alternatives (Klarin, Branch, Hershman & Grant, 1990), and potential effects on the City of Olympia (carried out through a grant to the City of Olympia; Craig, 1993).

Sea level rise would be moderated on Washington’s Pacific Ocean coast by upward vertical land movements of up to 2 mm/year, while sea level rise in south and central Puget Sound would be exacerbated by downward vertical land movements of up to 2 mm/year.

The principal threat was considered to be coastal erosion, especially in the urbanizing Puget Sound basin, and a follow-up Coastal Erosion Management Strategy (CEMS) project for Puget Sound addressed erosion management techniques and technologies, adverse environmental effects of shoreline armoring, and policy alternatives (Canning & Shipman, 1995).

Risks From Inappropriate Development

Extensive residential development of shoreline bluffs and barrier beaches throughout Puget Sound places increasingly large numbers of homes at risk to coastal hazards such as erosion

and flooding. This in turn leads to greater public investment in infrastructure in the same hazardous areas, more need for local governments to plan for natural disasters, and higher costs at all levels of government when disasters do occur. This occurs on Puget Sound when floods and storms damage low-lying beach communities, when landslides destroy homes or require substantial public expenditures for mitigation, and when erosion threatens public facilities.

Erosion affects many recreational beaches and shoreline parks, impacting public resources and reducing the quality of public access. Traditional armoring does little to restore the beach or enhance the public experience. Beach nourishment may address these issues well, but guidance to engineers, local planners, and regulators remains scarce for the small gravel beach projects typical of Puget Sound.

The wide-spread use of seawalls and bulkheads to address shoreline erosion on Puget Sound leads to significant impacts on beaches and nearshore ecology. Armoring can eliminate sources of sediment, lowering and narrowing downdrift beaches and further aggravating erosion elsewhere. Armoring can also lead to changes in beach substrate, beach hydrology, and riparian vegetation, thereby harming nearshore and adjacent upland habitat. Such shoreline structures often allow development to occur closer to the shore than otherwise would be acceptable, increasing adverse impacts on water quality, native shoreline vegetation, and aesthetics.

On Washington's southwest coast, the recent shift on some shoreline segments from an accretional to an erosional state has placed some private development at risk. For the most part, current laws and regulations prohibit or discourage erosion control structures on the Pacific Ocean beaches. If this recent shift from accretion to erosion continues and spreads geographically a fundamental policy review will be necessary.

Management Characterization

Changes to Washington State's hazard protection programs since the last assessment are summarized in the following table and discussed in the text below. All changes reflected in the table are the result of 309-funded projects carried out since 1992 (except as noted).

Coastal Flooding

There have been no changes in policies or management regimes since the last assessment.

Pacific Ocean Coastal Hazards

In an attempt to begin addressing some of the coastal hazard issues, especially coastal erosion, in 1998 Governor Gary Locke directed the Department of Community, Trade, and Economic Development to create a Coastal Erosion Task Force[1]. Governor Locke's directive arose, in part, when it became apparent that some of the parties were in disagreement regarding appropriate policy responses to the threats of coastal erosion. The Task Force's assignment was to develop short- and long-term policy recommendations on coastal erosion management. The Task Force, in March 1999, completed its work and delivered to the Governor a final

[1] The Task Force was composed of representatives of local, state, federal, and tribal government agencies; public port districts; non-governmental organizations; and citizens.

Mechanism	Changes since Last Assessment
Building restriction	Yes: the newly adopted amendments to the Shoreline Master Program Guidelines Rule (SMPGR) provide for new restrictions on the placement of structures in hazard areas.
Repair or rebuilding restrictions	Yes: the newly adopted amendments to the SMPGR provide for new restrictions on the repair or rebuilding of structures in hazard areas..
Restrict “hard” shoreline protection structures	Yes: the newly adopted amendments to the SMPGR provide for new restrictions on the placement of shoreline armoring.
Restrict renovation of shoreline protection structures	Yes: the newly adopted amendments to the SMPGR provide for new restrictions on the repair and renovation of shoreline armoring.
Beach or dune protection	Yes: the newly adopted amendments to the SMPGR provide for new standards for dune management.
Permit compliance program	No changes.
Inlet management plans	No changes.
Special Area Management Plans	No changes.
Local hazards mitigation planning	Moderate positive: local communities continue to complete or amend their Comprehensive Flood Hazard Management Plans. Not a 309 change.
Innovative procedures for dealing with takings	No changes.
Methodologies for determining setbacks	Yes: the newly adopted amendments to the SMPGR provide for new standards for the determination of buffers and setbacks.
Disclosure requirements	No changes.
Publicly funded infrastructure restrictions	No changes.

report with 22 specific policy recommendations. However, a clear consensus was not reached. A majority of the local governments submitted a "Minority Report and Dissent" to the

Governor which indicated that while they were in general concurrence with many of the recommendations they had substantive concerns with matters of definition, and had reservations about loss of local control. The Governor's Office has taken no follow-up action on either the Task Force's Final Report or the local governments' Minority Report and Dissent.

Puget Sound Coastal Hazards

Concerns about the environmental impacts of armoring have increased since the Coastal Erosion Management Studies were carried out early in the 1990s. Additional studies have expanded our knowledge of the extent of armoring on the Sound and have identified potential links between armoring and ecological health.

In addition, biologists are increasingly noting the critical relationship between geomorphological processes and the distribution and health of nearshore habitats. More is known about the dependence of eelgrass and fish spawning on sediment type and substrate dynamics. Similarly, studies are indicating that riparian vegetation and organic debris, both closely tied to erosion and geomorphic processes, play a key role in the shoreline ecosystem. Active research projects are underway to better identify the connections between geomorphology and ecological processes along Puget Sound.

Experience during the late 1990s has confirmed that landsliding remains a major coastal hazard on Puget Sound. In addition, the extent and concentration of damages suggests that landslide losses are likely to increase in the future. In addition, scientific work on historic and prehistoric landslides has greatly increased assessments of the risk to coastal Puget Sound from catastrophic earthquakes.

Development pressure is increasing along unstable and eroding shorelines. The level of development, and the corresponding risk, in many areas is much higher as a result of conversion of small vacation properties to large, year round residences. The high value of shoreline property increasingly allows sophisticated engineering measures to be constructed that in turn result in much greater environmental impacts than previously.

The problem is well illustrated by the City of Seattle, which despite relatively strict development regulations and considerable awareness of landslide risks, still suffered the highest landslide losses of any community in the 1996-97 disaster. Rapid development into unstable areas offsets gains in better regulations, emphasizing the need to examine carefully development policies in other, still fairly rural areas.

Sea Level Rise

Beginning in 1996, Ecology shifted its approach from one of carrying out (and funding) a "stand-alone" sea level rise response project, to one of coordination and cooperation with the University of Washington's climate variability (e.g. El Niño and the Pacific Decadal Oscillation) and climate change research program being implemented by the Climate Impacts Group (CIG) of JISAO (Joint Institute for the Study of the Atmosphere and Ocean). The CIG is supported by NOAA's Office of Global Programs, and addresses the following sectors:

hydrology and water resources; aquatic ecosystems, chiefly salmon; forests and forestry; coastal processes and activities; human health; and human dimensions. Through 1998, the CIG's coastal sector focused on sea level rise and associated coastal hazards; principal research results confirmed earlier studies by the Department of Ecology (Field and Hershman, 1997), and indicated that state agencies and local governments are, to varying degrees, ill-prepared to address either climate variability or climate change (Johnson, Arden, Hershman, & Canning, 1998). A study of the fiscal and economic implications of sea level rise was abandoned in 1999 when the CIG's funding proved inadequate. Beginning in 2000, the Coastal Sector began a shift away from its focus on sea level rise and coastal hazards, to a focus on [1] coastal watershed and estuary ecology, and [2] integration with the other sectors, especially hydrology and aquatic ecology. Since 1999 the project manager of Ecology's sea level rise response project has also served as Principal of the CIG Coastal Sector.

Conclusions

1. Section 309 programmatic objectives include directing development away from hazardous areas and preserving or restoring the protective functions of natural shorelines.

Directing new development away from hazardous areas is difficult because: [1] the high value of shoreline property increases resistance to land use restrictions; [2] the public awareness of the nature and severity of coastal hazards is low; [3] compiled information on coastal hazards is incomplete, and [4] it is difficult for the public to access information on coastal hazards.[2]

2. The prior and proposed priority for Coastal Hazards is:

1997 Assessment	**This Assessment**
High	**High**
Medium	Medium
Low	Low

3. Coastal hazards, along with issues associated with the environmental consequences of hazard mitigation, remain the most pertinent issue affecting the long-term development of Washington's shoreline. This assessment area is inextricably linked to the issue of secondary and cumulative impacts of growth, because it relates to both the direct modification of the shoreline and to the proximity to the shore at which development occurs.

We ranked coastal hazards as a high priority in 1992 and 1997, and considerable progress was made during those years. The resulting technical and policy studies have been incorporated into the Shoreline Master Program Guidelines rule amendment (WAC 173-26 Parts III and IV)

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[2] Beginning in 1999 the Shorelands and Environmental Assistance Program began a long-term project to place difficult-to-obtain and out-of-print materials on the Department of Ecology web site. As of late 2000, much of the Southwest Washington Coastal Erosion Study results have been made available (http://www.ecy.wa.gov/programs/sea/swce/index.html), along with Shorelands' library of aerial oblique photographs of the state's marine shorelines (http://www.ecy.wa.gov/apps/shorephotos/). Newly available is Puget Sound marine shoreline slope stability mapping from the mid-1970s Coastal Zone Atlas of Washington (http://www.ecy.wa.gov/programs/sea/landslides/index.html).

adopted in November 2000. Still, work remains to be done, especially in the area of beach nourishment and beach erosion management in general.

Ocean Resources

Section 309 Programmatic Objectives

1. *Develop and enhance regulatory, planning, and intra-governmental coordination mechanisms to provide meaningful state participation in ocean resource management and decision-making processes.*

2. *Where necessary and appropriate, develop a comprehensive ocean resource management plan that provides for the balanced use and development of ocean resources, coordination of existing authorities, and minimization of use conflicts. These plans should consider, where appropriate, the effects of activities and uses on threatened and endangered species and their critical habitats.*

Resource Characterization

Introduction

A crucial distinction between Washington State and most other coastal states is that Washington has a vast "inland sea," Puget Sound, in addition to its ocean coast. The majority of the State's population resides in the Puget Sound area, thus attention and resources are focused on the Puget Sound Region.

Still, the Pacific Ocean region is an important area in the state's coastal zone. The Olympic National Park; the Flattery Rocks, Quileute Needles, and Copalis national wildlife refuges; and the Olympic Coast National Marine Sanctuary all speak to the coast's national significance. Six Indian tribes live on the coast: the Makah, Ozette, Hoh, Quileute, Quinault, and Shoalwater. The nationally-designated areas, coupled with tribal reservation land, occupy almost two-thirds of Washington's Pacific Coastline. These areas are relatively undisturbed and undeveloped.

The southerly third of the Pacific coastal region includes Grays Harbor, Willapa Bay, and the Columbia River estuary. These areas are the focus of attention at the federal, state, and local levels through efforts such as the Grays Harbor Estuary Management Plan (GHEMP), the local Willapa Water Quality Council, and the Columbia River estuary program sponsored by the US Environmental Protection Agency. The GHEMP is the only formal special area management plan (SAMP) adopted as a part of Washington's coastal zone management program.

In light of the focus on the Puget Sound and the relatively undeveloped and protected status of much of the Pacific Coast, Washington State has not targeted resources at development of a ocean resources management plan. Various state agencies operate pursuant to specific legislative and administrative mandates which address ocean issues. The Department of Ecology administers the Shoreline Management Act, which gives the local coastal governments' Shoreline Master Programs jurisdiction out to three miles. The 1995 Washington State legislature adopted a variety of bills that amended the SMA (see section on Cumulative and Secondary Impacts).

Resource Characterization

1. Ocean resources and uses of state concern are characterized in the table below:

Resource or Use	Threat or Conflict	Degree of Threat (H/M/L)	Anticipated Threat or Conflict
Shipping and Transportation	Oil & hazardous waste spills. Increased vessel traffic off the coast increases the potential for spills.	Medium	Oil spills can be devastating to coastal resources. Oil spills pollute the water, foul birds and marine mammals, wash up on shorelines.
Fisheries	Pollution, over-fishing, and unknown causes have resulted in a dramatic reduction of certain Pacific species.	Medium	Depletion of fisheries stocks can have devastating effects on other marine species and on coastal economies.
Petroleum and Natural Gas	Oil and gas development can have potentially devastating effects on the coastal environment.	Low	The US Department of Interior's Proposed Final Outer Continental Shelf Oil and Gas Leasing Program for 1997-2002 does not include Washington's coast. No lease sales are scheduled for any time in the future.
Water Quality	Bacterial contamination of coastal embayments and beaches by failing on-site sewage systems or point discharges from sewage treatment plants (STPs).	Low overall; medium locally.	While the Pacific Coastal waters are relatively pristine, some nearshore areas have been subject to shellfish harvest closures for the recreational Razor Clam harvest.

2. The State law that prohibits off shore oil and gas development, the 1989 Ocean Resources Management Act (ORMA), was amended in 1997 to extend the moratorium in perpetuity.

Management Characterization

1. State ocean management programs and initiatives developed since the last assessment are summarized in the table below:

Program	Status	309 $
Statewide comprehensive ocean management statute	No change.	no
Statewide comprehensive ocean management plan	No change.	no
Single purpose statutes related to ocean resources	No change.	no
Statewide ocean resources planning/working groups	No change.	no
Regional ocean resources planning efforts	No change	no
National Marine Sanctuary	No change.	no

Conclusion

1. There are no major gaps in meeting the programmatic objectives for this enhancement area.

2. The prior and proposed priorities for this improvement area are:

1997 Assessment	**This Assessment**
High	High
Medium	Medium
Low	**Low**

3. For reasons discussed above, Washington State resources are aimed primarily at the Puget Sound region. Washington State's Pacific Coast is unlike that of Oregon and California in that most of the State's "coastal" population resides near the Puget Sound. However, the Pacific Coast region is not neglected as evidenced by various national designated areas.

Wetlands

Section 309 Programmatic Objectives

1. *Protect and preserve existing levels of wetlands, as measured by acreage and functions, from direct, indirect and cumulative adverse impacts, by developing or improving regulatory programs.*
2. *Increase acres and associated functions (e.g., fish and wildlife habitat, water quality protection, flood protection) of restored of wetlands, including restoration and monitoring of habitat for threatened and endangered species.*
3. *Utilize non-regulatory and innovative techniques to provide for the protection and acquisition of coastal wetlands.*
4. *Develop and improve wetlands creation programs as the lowest priority.*

Resource Characterization

1. Extent of coastal wetlands:

Wetlands Type	Extent (acres, year of data)	Trends (acres per year)
Tidal	202,000 acres, 1988	Loss rate is estimated to be 700 to 2000 acres per year for all types combined.
Non-tidal	No data	
Freshwater	709,000 acres, 1988	
Other marine	27,000 acres, 1988	
Publicly acquired	No data	No data

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

Palustrine forested wetlands commonly are referred to as swamps or coastal swamps. Palustrine scrub-shrub wetlands commonly are referred to as swamps or bogs. Palustrine emergent wetlands are also known as freshwater marshes, wet meadows, fens, bogs, prairies, potholes, vernal pools, and playas (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 (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. (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).

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). Based on a 1988 estimate by the USFWS, about 20 to 39 percent of Washington's wetlands, had 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 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.

Good data on the current extent of Washington’s wetlands remains limited. While some small, local inventories have been completed in the last five years, there has been no comprehensive work generating or compiling wetland inventory data since the National Wetland Inventory was completed in the early 80’s.

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).

The data indicate an ongoing pressure on wetlands, with many of the losses being small in acreage and exempt from mitigation requirements. Furthermore, wetland impacts that are mitigated are often not mitigated adequately. The results from the first phase of a study to

assess the success of mitigation were disheartening. About two-thirds of the mitigation projects visited were not, or have not, met their performance standards.

2. Direct and indirect threats to coastal wetlands, both natural and man-made are summarized the table below:

Threat	Significance
Development and/or fill	High: development remains the greatest threat to wetlands.
Erosion	Low: shoreline erosion is of little importance as a threat to vegetated coastal wetlands.
Pollution	Medium: nonpoint pollution degrades wetlands in all regions of the state.
Channelization	Low: stream channelization is rarely practiced in the state today. Much of the channelization was done during the early part of the century.
Nuisance or exotic species	High: *Spartina* infestations in Puget Sound are locally of high significance.
Freshwater input to marine or estuarine systems	Low: freshwater input is not an issue in Washington state.

Development

Development continues to be the major threat to wetlands in the coastal zone of Washington State. We continue to see fragmentation of wetland systems from urban sprawl, degradation of wetlands and their buffers from encroaching development, and changes in hydroperiods from development in the watershed. Some impediments to addressing this threat continue to be expanding population pressures, complicated technical and regulatory issues, and a public with mixed opinion on the value or necessity of preserving wetlands and their buffers at the expense of personal economic gain.

Washington does not have a comprehensive law for protecting or regulating development in wetlands. The Department of Ecology issues 401 Water Quality Certifications for wetland impacts requiring a federal 404 permit and also co-administers the Shoreline Management Act (SMA) with local governments. However, the SMA does not have jurisdiction over isolated, freshwater wetlands in the coastal zone. The primary land use regulation in Washington lies with local governments. While the Growth Management Act (GMA) requires that local governments "designate and protect" wetlands, it does not provide specific standards for how to do so. As a result, many local wetland regulations are inadequate to protect wetlands.

Additionally, local governments often lack the necessary information and technical training to protect wetlands based on the functions and the values they represent. Recent revisions to the GMA and the rules for implementing the SMA specify that local governments must include the best available science in their wetland regulations. However, this information is not widely

available to local governments, or is not available in a form that can easily be understood and used. One of the major needs for the next five years is to develop tools, guidance documents, and training for local governments that assists in incorporating the latest scientific information into local programs.

However, long-term protection and restoration of wetland resources in Washington will require changes in our current approach. The "project by project" review of wetland impacts through regulatory processes has caused our wetland protection strategy to be principally focused at a site-specific level, despite the fact that processes operating at a landscape level often control and define the type of wetlands that occur within that watershed (Bedford 1996). The emphasis on site-specific management has resulted in a focus on creating, or re-creating, the structure in wetlands. Today, however, there is a need to shift from re-establishing the physical structure in damaged wetlands to restoring ecological processes and functions, particularly those perceived as ecosystem services (Cairns, 2000). An emphasis on protecting and restoring wetland functions demands a different approach because many functions are a reflection of environmental processes that occur at a landscape scale.

Pollution

Pollution is also a threat to Washington's coastal wetlands. Discharges of materials, primarily from nonpoint sources, continue to degrade wetlands and impair their functional capabilities. Pesticides, herbicides, heavy metals, nutrients, and sediments and other pollutants find their way into wetlands throughout the coastal region. There are many impediments to solving nonpoint pollution problems, many of which are being addressed as Washington develops its Nonpoint Pollution Strategy.

Nuisance or exotic species

Nuisance and exotic species are a problem in both freshwater wetlands (primarily Purple Loosestrife and Reed Canary Grass), and estuaries (Spartina spp). The primary impediment to addressing these problems is the biology of the plants themselves. They are aggressive and very hard to eradicate.

There are three species of Spartina in Washington: S. alterniflora, S. angelica, and S. patens. Spartina is a problem in Pacific Northwest estuaries as it invades mudflats, starting high in the intertidal and accreting sediments. Through sediment accretion, seed production, and vegetative spread, the plant can invade mudflat areas rapidly. These species were accidentally introduced to Willapa Bay as packing material for oysters imported from Chesapeake Bay in the 1890s. They were also planted intentionally in Willapa Bay and various locations in Puget Sound for erosion control, cattle forage, or duck hunting blinds. As invasive species, Spartina displace benthic organisms and shorebirds, and eliminates the mudflat habitat necessary to oyster culture. In some places it can contribute to flooding by impeding water flow out of coastal rivers.

The Washington Department of Agriculture is coordinating Spartina control efforts in the state, and is aided by the Washington departments of Natural Resources and Ecology, the US Fish and Wildlife Service, and local weed control boards. Funding is limited, inventories are incomplete, and unaffected areas need to be monitored for early detection and response.

Control efforts have been focused in Willapa Bay where the infestation began, and in recent years have been initiated in Puget Sound embayments.

Management Characterization

Management Category	Changes since last assessment
Regulatory Programs	Moderate positive, through continuation of the SWIS (State Wetlands Integration Strategy) process. Not a 309 change.
Wetlands Protection Standards	Significant positive, through adoption of the amended Shoreline Master Program Guidelines rule. A 309 change.
Assessment Methodologies	Significant positive, through the Wetlands Function Assessment Project. Not a 309 change.
Impact Analysis	No changes.
Restoration/Enhancement Programs	Significant positive, through the Puget Sound Wetlands Restoration Program in the Nooksack and Snohomish Basins. Not a 309 change.
SAMPs	No changes.
Education/Outreach	No changes.
Wetlands Creation Programs	No changes.
Acquisition Programs	Moderate positive, through the Washington Wildlife and Recreation Program and other state and local programs. Not a 309 change.
Inventories	No changes.

Washington State is continuing the Wetlands Function Assessment Project. The project, another SWIS recommendation, has developed methods for freshwater riverine and depressional wetlands in the lowlands of western Washington and depressional wetlands in the Columbia Basin. During the next five years there is need to develop methods for other types of wetlands that have been identified as under severe development pressure. The statewide technical and policy committees overseeing the project have identified estuarine wetlands and slope wetlands in the lowlands of western Washington as the next priority.

There have been significant changes in wetlands restoration in the last five years as well. The Puget Sound Wetlands Restoration Program has been successfully tested in the Stillaguamish River basin and is being applied in the Nooksack and Snohomish River basins. This watershed-

based restoration program aims to identify priority restoration sites that will solve environmental problems that are important to basin residents.

A new area of emphasis for the state has been to improve the success of wetland compensatory mitigation. Our continuing high growth rate in the state has resulted in continuing unavoidable wetland impacts from infrastructure development and increased residential, commercial and industrial development. Despite an emphasis on avoiding wetland impacts, significant unavoidable impacts to wetlands continue. Thus, we must continue to improve on our ability to create, restore and enhance wetlands to offset the losses. Two recent programs have been developed to assist with this:

1. Development of a wetland mitigation banking program that will allow us to encourage and approve the siting of large-scale wetland restoration projects to be used to compensate for certain unavoidable wetland impacts. If done correctly, this program can provide ecologically-sound mitigation projects to offset unavoidable impacts.
2. The other program is an evaluation of recent compensatory mitigation projects and the development of a compliance tracking program to help ensure the success of future mitigation projects. We are currently completing the second phase of a two-year project to evaluate mitigation projects and develop recommendations for changes in how we permit such projects. We will then develop a new compliance tracking program to enable us to ensure that current and future projects are successfully completed.

Conclusion

1. Identify major gaps in addressing the programmatic objectives for this enhancement area.

The Department of Ecology has been working to introduce a broader landscape approach for managing wetlands. Projects that are ongoing, or that have been completed, include three regional wetland management plans, the Wetland Function Assessment Project, the Wetland Restoration Project, the River Basin Characterization Program, the Mitigation Banking Program, and the Wetland Mitigation Compliance Evaluation Study.

There are, however, several key components missing from Ecology's existing wetland programs that are limiting the state's ability to effectively manage and regulate wetlands at a landscape scale. The following key components of an effective program are still missing and form the basis of the strategies for future actions.

- Tools for translating landscape information into procedures that can routinely be used in making decisions about wetlands at the local level. We need to develop processes for translating technical information about specific watersheds (such as profiles, current levels of function, assessment of cumulative impacts, or the current status of ecological integrity) into a form that can be easily and directly used by local wetland regulators on a site-specific basis. These tools would help change the focus from site-specific mitigation to a broader landscape scale focus.
- Watershed profiles of wetland types, hydrologic processes, and "stressors". Watershed profiles provide a hydrologic portrait of the wetlands in the landscape as it is now and might be in the future. Profiles of wetland geomorphic types and hydrologic processes are one of the tools that can be used to re-direct the management and regulation of wetlands to

a broader scale. Local governments are not in a position to develop these profiles because watersheds often encompass several local jurisdictions.

- Summaries of "best available science" (BAS) and technical information for local governments to use in drafting revised Comprehensive Plans (Growth Management Act) and Shoreline Master Programs (Shoreline Management Act). Much of the information available for better managing wetlands is in scientific documents that are difficult to use and understand for most decision makers. Local decision makers need the latest scientific information translated into formats that are usable and understandable.
- Function assessment methods for estuarine and slope wetlands in the lowlands of western Washington. Local governments often lack the necessary information and technical training to protect wetlands based on the functions and the values they represent. Function assessment methods provide a scientifically based method for assessing functions in a relatively accurate manner. Estuarine and slope wetlands have been identified as the wetland types most under threat for which methods have not yet been developed.
- Database and GIS application for tracking mitigation bank establishment and use. While wetland mitigation banks can be used to restore ecological functions within a watershed, accurate tracking of wetland mitigation banks is a critical element to ensure that these banks are established and used in an ecologically beneficial manner. The database needs to be administered and maintained in a centralized manner for consistency of data and since banks may include more than one local jurisdiction. The database will be used to perform analysis of the long-term effects on the environment of the use of wetland mitigation banks. Development of the database and a web-based GIS application would provide local governments with accurate and timely information on bank availability and use for permitting decisions.

2. What priority was this area and what priority is it now, in the view of the coastal program?

1997 Assessment	**This Assessment**
High	**High**
Medium	Medium
Low	Low

3. Briefly justify the proposed priority.

We are at a critical point in wetlands protection in Washington. Changes in the Growth Management Act and the Shoreline Management Act regulations have created an opportunity to significantly affect local wetland protection regulations. Local governments are mandated to revise both their wetland regulations and their shoreline master programs during the next five years. The department of Ecology is in a position to provide good technical and scientific information to these jurisdiction to improve wetland protection and restoration.

Additionally, increased attention is being focused on watershed planning and restoration. As more communities are involved in watershed-scale planning and restoration activities it is important for Ecology to provide leadership in how to incorporate wetland protection into these activities. Our increasing understanding of watershed-scale processes has shown us that we

need to shift our focus from a strictly site-specific protection approach to include measures which address the larger-scale processes that drive wetland functions.

Cumulative and Secondary Impacts

Section 309 Programmatic Objectives

1. *Develop, revise or enhance procedures or policies to provide cumulative and secondary impact controls.*

Resource Characterization

Areas in the coastal zone where rapid growth or changes in land use require improved management of CSIs remain largely unchanged from the 1992 and 1997 Assessment and Strategy reports: the Puget Sound counties, especially Mason, Thurston, Pierce, Kitsap, and King. The primary type of growth affecting the Puget Sound counties is population growth leading to residential and associated commercial, industrial and public facility development. This development has secondary impacts of habitat loss, water quality degradation, increased frequency and magnitude of flooding, and demand for infrastructure improvements or expansions. This latter category includes transportation, education, water supply, sewage disposal, and public access facilities.

The areas in the coastal zone which possess sensitive coastal resources, and require a greater degree of protection from the cumulative or secondary impacts of growth are largely unchanged from the 1992 and 1997 Assessment and Strategy reports. However, there is substantially heightened awareness of habitat loss and degradation as significant contributing factors in the decline of certain fish populations in the state leading to listing of some species under the Endangered Species Act. The following table summarizes the issues. Additional information is contained in the 1992 and 1997 Assessment and Strategy reports.

Management Characterization

Significant changes in the state's ability to address cumulative and secondary impacts of growth on shoreline resources will occur as a result of adoption of the amended Shoreline Master Program Guidelines in November 2000. These guidelines will direct the updating of every local shoreline master program in the Coastal Zone. The current timeline for this effort, as established in statute, is two years. However, primarily in response to cost and staffing concerns it is expected that the legislature will extend this time.

The guidelines require local government to inventory the resources and characteristics of their shorelines and address the direct and cumulative impacts of development on the shorelines in a manner that preserves and restores the natural character of the shoreline. Guidance is included related to a wide variety of activities and uses. Preference is given to water oriented uses where such uses are reasonable and appropriate.

Area	CSI Threats
Wetlands	Wetlands are subject to filling or degradation in urbanizing areas; the problems are discussed in detail in the Wetlands section of this assessment.
Fish and Wildlife Habitat	Generalized fish and wildlife habitat remains subject to chronic degradation or replacement by urban land uses. Riverine system degradation resulting from development including flood management measures, bank hardening, vegetation removal and runoff have degraded fish habitat.
Intertidal Fish and Shellfish Habitat	Commercial and recreational shellfish beds in many areas remain at risk from contamination by urban runoff, failing on-site sewage systems, boater wastes, and to a lesser degree other problems. Salmon rearing habitat and migration corridors are affected by water quality and shoreline modifications such as armoring and removal of native vegetation.
Puget Sound Shorelines	Puget Sound shorelines, the area between Puget Sound's banks and bluffs, and the Sound's marine waters, are the least studied, least understood landscape feature in the region. They are affected by the adverse impacts of shoreline armoring (see Coastal Hazards assessment), the proliferation of private docks and other shoreline modifications, habitat loss due to clearing and landscaping in addition to shoreline modifications.
Aesthetics, Open Space, and Public Access	In urban and suburban areas the loss of open space remains a problem, as is deteriorating marine shoreline aesthetics due to larger shoreline modifications such as armoring and stair towers. The provision of public access, either actual or visual, has not kept pace with population growth (see Public Access assessment).

Implementation of these guidelines will not occur automatically or easily. Each local government will require careful consideration of the options and tradeoffs inherent in the program. Implementation will require a depth of scientific understanding of shoreline ecological functions and processes not typically required of local government land use managers. Because of these factors, significant financial and technical assistance will be required as well as an appropriate amount of time to do the work.

Specifically, local governments will for the first time, be required to project the ultimate "full build-out condition" that would be allowed by the proposed master program regulations being considered. This up-front assessment will address potential impacts due to all development, including current conditions and those uses not requiring a shoreline permit (i.e. exempt). This will include cumulative adverse impacts caused by incremental development, such as residential bulkheads, residential piers, or runoff from newly developed properties. Master

programs must also include master program policies and regulations to assess, minimize, and mitigate cumulative impacts. The method to accomplish these requirements is to identify potential ecological impacts that could occur from the maximum amount and extent of development allowed by the master program and establish master program provisions and/or mitigation requirements to address the maximum possible ecological impact.

Conclusion

1. The guidelines, as a part of the state's overall system of land use and environmental management, hold the promise for significant transformation of the management of cumulative and secondary impacts of growth in Washington's Coastal Zone. However, implementation at the local level is the key to realization of this transformation. Significant technical, legal and political questions must be addressed in order for local government to be able to properly implement the guidelines. With the emergence of endangered species as an issue, the technical considerations are even greater that previously expected. Development of comprehensive technical assistance materials and a program for disseminating this information to local government is the next critical step.

2. The prior and proposed priorities for Cumulative and Secondary Impacts are:

1997 Assessment	**This Assessment**
High	**High**
Medium	Medium
Low	Low

3. We are now at that point in time when the objectives of several major efforts now underway present a rare opportunity to make significant progress in addressing CSI concerns. A key component of these efforts include the work of updating local shoreline programs required by the recently adopted shorelines guidelines rule, together with the updating of local critical areas ordinances under the Growth Management Act, addressing the requirements of the ESA for listed species in shoreline jurisdiction and watershed characterization and planning efforts now being conducted across the state. One of the central goals of shoreline guidelines implementation is to recognize and integrate the contributions these efforts make in dealing with the complicated CSI issue. The more efficient we are in integrating such efforts the more effective we will be in realizing the potential of the guidelines and in making real progress in addressing CSI concerns. It would be very unfortunate not to make the most of this opportunity.

In support of shorelines guidelines implementation are commitments by the state to assist local governments in the development of appropriate legislative changes, funding requests, guidance materials (i.e. updating the *Shoreline Master Program Handbook*) and by providing direct hands-on technical assistance. Whether it be protection and restoration of wetlands, floodplain functions, controlling pervasive shoreline armoring or vegetation removal, the guidelines should produce significant advancements in avoiding and/or mitigating the cumulative and secondary impacts of growth.

Marine Debris

Section 309 Programmatic Objectives

1. Develop or revise programs that reduce the amount of marine and lake debris in the coastal zone.

Marine Debris Characterization

1. The extent of marine and lake debris and its impact on the coastal zone is characterized in the table below.

Source	Impact	Type of Impact
Debris from ships at sea.	Insignificant-to-moderate amount washes up on ocean beaches.	Aesthetic.
Urban litter.	Moderate-to-insignificant amounts washes down urban streams and is deposited on Puget Sound beaches near the stream mouth.	Aesthetic; rarely there are public health or environmental concerns.
Floating dock buoyancy disintegration	The disintegration of foamed plastic buoyancy materials results in floating and stranded fragments; primarily a problem in Puget Sound embayments.	Aesthetic; smaller fragments may be ingested by marine life.
Public access litter.	Moderate amounts are disposed of at public access sites lacking trash collection facilities.	Mostly aesthetic; rarely there are public health concerns.

2. The degree of change in severity of any class of marine debris cannot be assessed due to a lack of monitoring or other information necessary to make such a judgment. Public education on and monitoring of marine debris by private volunteer groups was once extensive. Recent state budget cuts have resulted in greatly diminished grants to accomplish that education and monitoring.

Management Characterization

1. State ocean and lake management programs and initiatives developed or changed since the last assessment are summarized in the table below.

In 1992, the Department of Natural Resources discontinued its Marine Plastic Debris Program, citing budget restrictions as the reason. No other statewide program has been implemented and there is no plan to do so. Inasmuch as the Marine Plastic Debris Program was never fully funded, its demise is expected to have little effect.

Program	Status	309 $
State or local programs requiring recycling	No change.	none
State or local programs to reduce littering and wasteful packaging	No change.	none
State or local regulations consistent with Marine Plastic Pollution Research and Control Act	No change.	none
Marine debris concerns incorporated into harbor, port, marina and coastal solid waste management plans	No change.	none
Education programs	No change.	none

Conclusion

1. Major gaps in addressing the programmatic objectives for this enhancement area are primarily budgetary, and secondarily a perception that marine debris is not a major problem in Washington State.

2. Previous and proposed priorities:

1997 Assessment	**This Assessment**
High	High
Medium	Medium
Low	**Low**

3. Marine debris is ranked as a low priority largely because there are other, more pressing needs with a more direct effect on ecological functions of the coastal zone.

Special Area Management Planning

Section 309 Programmatic Objectives

1. Develop and implement special area management planning in coastal areas applying the following criteria:

- *areas including significant coastal resources (e.g., threatened and endangered species and their critical habitats, wetlands, waterbodies, fish and wildlife habitat) that are being severely affected by cumulative or secondary impacts;*
- *areas where a multiplicity of local, state, and federal authorities prevents effective coordination and cooperation in addressing coastal development on an ecosystem basis;*
- *areas with a history of long-standing disputes between various levels of government over coastal resources that has resulted in protracted negotiations over the acceptability of proposed uses;*
- *there is a strong commitment at all levels of government to enter into a collaborative planning process to produce enforceable plans;*
- *a strong state or regional entity exists which is willing and able to sponsor the planning program.*

Special Area Management Planning Characterization

1. In light of the criteria listed above, areas of the coast subject to use conflicts that might be addressed through special area management planning are [1] integrated management of Grays Harbor and [2] coastal erosion management on Washington's southwest coast.

Grays Harbor

As described in Chapter 2, much progress was made to update the Grays Harbor Estuary Management Plan (GHEMP) in 1997-99, but in the end the GHEMP Task Force determined that too much uncertainty existed with respect to [1] pending Endangered Species Act listing and [2] a proposed amendment of the Shoreline Master Program Guidelines regulation, both of which impeded further progress and completion of the update process. By acclamation the Task Force determined to suspend further work on an update of the GHEMP until uncertainties were resolved.

The management issues for Grays Harbor remain essentially the same as they were in 1997:

- a need for mitigation banking has been expressed by local port districts and the City of Ocean Shores;
- water quality in Grays Harbor, especially in regards to commercial shellfish harvest is a continuing concern;
- habitat management is an issue in a variety of settings including the Lower Chehalis River surge plain;

- typical of the Pacific Northwest, management of wild stocks of salmon is a concern in the Grays Harbor drainages; and
- invasion by various Spartina species, a problem in Willapa Bay and portions of Puget Sound, which has now reached Grays Harbor.

Southwest Washington Coastal Erosion

As described in the Coastal Hazards section of Chapter 3, severe but localized coastal erosion on the state's southwest coast beaches during the most recent El Niño event prompted Washington's Governor to mandate an inter-agency and inter-governmental task force to develop policy alternatives and proposals for comprehensive coastal erosion management. The task force failed to reach consensus, with a majority of the local governments issuing a Minority Report and Dissent. Please refer to the Coastal Hazards section above for a comprehensive discussion of coastal erosion in southwest Washington.

Other Programs

Other small special area management planning efforts in the coastal zone include the Mill Creek Wetland Integration Plan (Mill Creek drainage, King County), the Skagit Wetland Integration Plan (Skagit River delta, Skagit County), and the Snohomish Estuary Wetland Integration Plan (Snohomish River delta, Snohomish County).

Management Characterization

The recent adoption of amended Shoreline Master Program Guidelines regulations (see Chapter 3, Cumulative and Secondary Effects of Growth section) will require local governments to assess their Shoreline Master Program (SMP) and develop an updated SMP accordingly. Many of the outstanding issues in Grays Harbor and on the southwest Washington coast will likely have to be addressed in this context, but in a less comprehensive or integrated manner than is contemplated by the goals for special area management planning.

Conclusion

1. Special area management planning in Washington's coastal zone is diverse in its subject geographical extent and the nature of the issues addressed. The only SAMP formally adopted as a part of Washington's coastal zone management program is the Grays Harbor Estuary Management Plan.

2. Previous and proposed priorities:

1997 Assessment	**This Assessment**
High	High
Medium	**Medium**
Low	Low

3. Special Area Management Planning is ranked as a medium priority largely because while there are important unresolved issues, there is no indication that the conditions which lead to

the suspension of the GHEMP amendment process or the lack of consensus regarding coastal erosion management in southwest Washington have changed.

Energy and Government Facility Siting

Section 309 Programmatic Objectives

1. *Enhance existing procedures and long range planning processes for considering the needs of energy-related and government facilities and activities of greater than local significance.*
2. *Improve program policies and standards which affect the subject uses and activities so as to facilitate siting while maintaining current levels of coastal resource protection.*

Management Characterization

Since the last assessment, there have been no changes in Washington's ability to address the siting of energy facilities; the Energy Facility Site Evaluation Council (EFSEC), authorized by Chapter 80.50 RCW, remains as the fundamental authority for coordinating permit review for major energy facilities.

Conclusion

1. There are no known major gaps in meeting the programmatic objectives for this enhancement area. The 1993 Legislature reviewed EFSEC for needed change and none were proposed by the Legislature. The regulatory reform amendments are expected to improve the permitting and siting of government facilities, but it will be a few years before the effectiveness of the most recent legislation and regulation can be assessed.

2. Previous and proposed priorities:

1997 Assessment	**This Assessment**
High	High
Medium	Medium
Low	**Low**

3. As concluded, there are no known major gaps in meeting the programmatic objectives for this enhancement area.

Aquaculture

Section 309 Programmatic Objective

1. *Enhance existing procedures and long range planning processes for considering the siting of public and private marine aquaculture facilities in the coastal zone.*
2. *Improve program policies and standards which affect aquaculture activities and uses so as to facilitate siting while maintaining current levels of coastal resource protection.*

Aquaculture Characterization

Washington's aquaculture industry is dominated by salmon net pen facilities in Puget Sound; oyster and clam cultivation in Puget Sound, Grays Harbor, and Willapa Bay; and mussel growing in Puget Sound. In addition, new culture techniques have been developed for the cultivation of Geoduck clams in the intertidal zone. In recent years the shellfish industry, aided by federal grants, have invested substantial funds to further improve Geoduck culture methods. (The traditional ship-based deep-water harvest of Geoduck clams in Puget Sound is co-managed as a wild fishery by Department of Natural Resources and the Department of Fish and Wildlife.)

Currently, Washington State leads all other West Coast States in total production of aquaculture products and is one of the top producers of oysters in the United States, (Toba and Chew, 1999) and is the top producer in the United States of Manila clams.

The principal environmental concerns are [1] water quality and other environmental issues, [2] land use patterns and conflicts, and [3] introduced pests and predators.

Water Quality

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.

Commercial shellfish growing areas can be negatively affected not only by the pathogenic inputs that make the shellfish unfit for human consumption, but also nutrient inputs that can result in increased plankton production which, in turn, can lead to low dissolved oxygen concentrations, especially where the receiving waters are nutrient limited. On the other hand, in areas of intensive shellfish aquaculture production, these effects can be mitigated to the extent that shellfish (as filter feeders) consume the "excess" phytoplankton. The National Academy of Sciences recently produced a report on the negative impacts of nutrient over-enrichment. It states, "Estuaries and coastal zones are among the most productive ecosystems on earth. There is strong concern that the natural resources they represent are in danger from eutrophication and other problems caused by excess input of nutrients." (Committee on the Causes and Management of Eutrophication, 2000).

The Washington Department of Health classifies more than 100 commercial shellfish growing areas in Puget Sound and in Pacific coastal embayments. Over 200,000 acres are classified as Approved or Conditionally Approved. (This acreage does not include subtidal Geoduck tracts.)

Since 1981, the department has downgraded the classification of more than 47,000 acres as the result of declines in sanitary conditions, but has upgraded only about 13,000 acres. In the 1980s, the department downgraded the classification of almost 33,000 acres, but upgraded only about 1,000 acres. However, in the 1990s, the total acres upgraded and downgraded were nearly equal. (Office of Food Safety and Shellfish Programs, 2000.)

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 general water quality and benthic improvements of marine systems.

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. That favorable trend, however, may be reversed if shoreline development continues at its current rate, particularly in light of projected population increases.

Burrowing Shrimp Management

Washington States' coastal estuaries are productive shallow water environments that support commercial fisheries for Dungeness crabs (*Cancer magister*) and English sole (*Parophrys vetulus*) by providing 0+ (settlement to age 1) populations with critical refuge and foraging habitats until subadults migrate to the nearshore coast. Intertidal mudflats also constitute prime areas for commercial oyster (*Crassostrea gigas*) culture, an important industry for the coastal communities of Willapa Bay and Grays Harbor that supply much of the nation's oysters. Debates over natural resources and estuarine utilization have arisen over the last 37 years due to the use of carbaryl (an organocarbamate pesticide) by oyster growers on their grounds to control populations of burrowing thalassinidian shrimp (*Neotrypaea californensis* and *Upogebia pugettensis*). Burrowing shrimp, which have an indirect negative effect on oyster survival and growth by resuspending sediments and softening the substrate resulting in oysters sinking or being buried, thus inhibiting growth or killing the crop, are killed by carbaryl, as are the 0+ and subadult Dungeness crabs, 0+ English sole, and other nontarget species on the tideflats at the time of application. No long-term adverse effects to estuarine communities (including benthic invertebrate communities) have clearly been attributed to carbaryl applications. Under present practices, carbaryl is applied directly to exposed tideflats at low tide. Current licensing requires 200-foot application setbacks from tidal channels. (Bentley, 200;, Dewey, 2001; Feldman, et al., 2000; Memorandum of Agreement. 2001.)

In January, 2001, the oyster industry signed an agreement with various state agencies to study ways to reduce the industry's reliance on carbaryl through the development of an integrated pest management (IPM) plan by March 2002 (Memorandum of Agreement, 2001). Prior to the early 1960s the burrowing shrimp populations in Willapa Bay and Grays Harbor were not a problem for commercial oyster growers. Part of the goals of the IMP research program will be to determine why former natural controls over burrowing shrimp have changed. (Wilkins, 2001.)

Land Use Conflicts

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 opposed to the siting of floating 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. While other industries potentially have the option of moving to less developed areas of the State, the aquaculture industry is limited to the same shoreline areas that attract the most shoreland development.

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. While there are a number of possible solutions, currently this remains an unresolved issue for private aquaculturists, as well as the regulatory agencies.

Introduced Pests and Predators

Pest and predator introductions have the potential to threaten every facet of aquaculture. Habitat alteration affects primarily oyster culture in Willapa Bay which is increasingly threatened by an infestation of nonindigenous species of *Spartina*. *Spartina* infestation spread to Grays Harbor and some embayments of Puget Sound in the mid 1990s, and continues to gain ground. Please refer to the Wetlands assessment for a comprehensive discussion of *Spartina*. The European Green Crab, a nonindigenous species first found in Willapa Bay in the late 1990s, has the potential to severely affect shellfish production as well as the Dungeness crab industry. The Green Crab is an effective predator of shellfish, and can out-compete native crabs for food and habitat. As more and more international and interstate movement occurs in our waterways, the potential for introductions of nonindigenous and aquatic nuisance species increases. The State Department of Fish and Wildlife has created a State Aquatic Nuisance Task Force dedicated to developing a state-wide plan for the control and/or eradication of aquatic nuisance species.

Management Characterization

Federal Policies on Aquaculture

The US Department of Commerce (DOC) through the National Oceanographic and Atmospheric Administration (NOAA) has identified several conservation strategies that include building sustainable fisheries. Within that strategic plan is the objective of “promoting the development of robust and environmentally sound aquaculture.” It states, in part, “[w]hile aquaculture is not a substitute for wise management of wild stock fisheries, it is a vital tool to help meet the growing demand for seafood in the next century…” (NOAA, 1995).

To meet the objective of a sound and robust aquaculture program, the National Marine Fisheries Service (NMFS), in partnership with other elements of DOC and NOAA, will study new candidate species for culture, address user conflicts affecting aquaculture development, and will work with the aquaculture industry to develop, identify and evaluate transfer technologies for efficient aquaculture that is also environmentally sound.

Aquaculture development activities are regulated for the prevention of environmental impacts by the US Army Corps of Engineers through the Clean Water Act (Section 404), and the Rivers and Harbors Act (Section 10), and the NPDES (National Pollution Discharge Elimination System) permit program.

Recent threatened and endangered salmon listings have required the aquaculture industry to review operations and ensure activities do not result in a "take." Through the course of this review, the industry determined a comprehensive plan was needed that would allow the continuation of industry activities in the marine environment while still protecting the State's wild salmon resources. Discussions with NMFS have led the industry to begin the development of an industry wide programmatic Habitat Conservation Plan (HCP) for shellfish culture. As a first step to an HCP, the shellfish industry has embarked on the adoption of a comprehensive Environmental Management System.

State Policies on Aquaculture

Washington's legislative policy regarding the fostering and regulation of aquaculture is principally embodied in six 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); the Water Pollution Control Act (Chapter 90.48 RCW), and the Growth Management Act (Chapter 36.70 RCW). Additional regulations can be found in Department of Fish and Wildlife statutes.

The Aquaculture Marketing A*ct* 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 Shoreline Management Act (SMA) sets forth state policy for the management of all shorelands, public and private. The SMA is implemented by local governments (under state Department of Ecology oversight) through local shoreline master programs. The SMA provides direction for prioritizing shoreline uses and identifies water-dependent industry as a preferred use of the shoreline environment. Recently adopted changes to Department of

Ecology's Shoreline Guidelines, which establish minimum requirements for local government master programs, recognize aquaculture as an activity "…of statewide and national interest." And, "…can result in long-term over short-term benefit and can protect the resources and ecology of the shoreline." Additionally, the Guidelines state, "Aquaculture is dependent on the use of the water area and, when consistent with control of pollution and prevention of damage to the environment, is a preferred use of the water area."

The Water Pollution Control Act regulates aquaculture such as salmon net pen operations through the Sediment Management Standards.

The Growth Management Act requires local governments through their comprehensive planning processes to identify provide for protection of critical fish and wildlife habitats which can include commercial shellfish beds.

Aquaculture activities are regulated for disease and pest transfer through Washington State Department of Fish and Wildlife's Food Fish and Shellfish statutes.

Conclusion

1. There are four unresolved aquaculture issues in Washington State: [1] the problem of declining water quality adversely affecting commercial shellfish beds [2] land use conflicts between abutting residential and aquaculture land uses [3] introduction of nonindigenous and aquatic nuisance species, and [4] uncoordinated and diverse state policies which do not necessarily appear to be consistent with federal policies.

Water quality is an issue which must be addressed on a watershed basis, as it is through the existing Puget Sound Plan or the various watershed planning programs.

Land use conflicts and policy consistency are issues which can be addressed through local Shoreline Master Programs under the Shoreline Management Act, and the state's federally-approved Coastal Zone Management Program.

Exotic species management is an issue which requires coordination and cooperation between local governments and the Washington Department of Agriculture and/or the Washington Department of Fish and Wildlife.

2. The priority assigned to this area, in the view of the coastal program, is "High."

1997 Assessment	**This Assessment**
High	**High**
Medium	Medium
Low	Low

3. The aquaculture improvement area is ranked high because of the aquaculture's role as an indicator of the overall health of Washington's marine environments. Aquaculturists are often the first to identify water quality problems and are often the first line of defense when water quality is threatened. Therefore, ensuring a viable aquaculture industry may become more and more important if population projections are realized and current growth patterns continue. However, to ensure the aquaculture industry remains viable will be difficult because of local government funding issues and unclear and/or undefined State aquaculture polices. The

problem is also one of both funding and public awareness, as well as overcoming a long-term pattern of degradation. Education programs may be key to long-term resolution.

4 • Public Comments

The public review period was open from January 8 through February 12, 2001. Approximately 7,000 notices were sent to the Washington state addresses on the *Confluence* newsletter mailing list; 75 persons requested a paper copy of the Draft Assessment report, and an indeterminate number of people viewed, printed, or down-loaded the report from our web site.

Eleven comment letters or e-mails were received; nine letters were pertinent to the 309 assessment process, and two persons unrelated to this process.

The four proposed high priorities received the following support:

- Cumulative and Secondary Impacts: 2
- Coastal Hazards: 5
- Aquaculture: 2
- Wetlands: 3

Alternative high priorities supported were:

- Public Access: 3
- Siting Energy Facilities: 1
- Grays Harbor Estuary Management Plan: 1

Comments on public access generally agreed with the assessment analysis that the provision of public access to shorelines has fallen behind population increase. We agree that public access is an issue deserving of attention. However, no recommendations were offered as to how to address the problem in the framework of the section 309 improvement grants program. The fundamental problem remains: inadequate state and local funding for site acquisition, development, and maintenance. Section 309 funds cannot be used for site acquisition, development, or maintenance. Please refer to the public access section for additional discussion.

The one comment on "Siting Energy Facilities" argued that the energy supply situation of the winter of 2000-2001 indicated a need to place a higher priority on this issue, but did not identify any deficiencies on Washington's current energy siting and permitting processes which could and should be remedied through the coastal zone management planning process.

The one comment encouraging Ecology to resume the Grays Harbor Estuary Management Plan special area management planning process did not offer any remedy for the conditions leading to a suspension of the planning process by mutual agreement of the members of the GHEMP Task Force. Those conditions have not changed.

5 • Strategies

Four high priority strategies are presented. Within this framework, Washington state's highest and immediate priority is the Cumulative and Secondary Effects of Growth improvement area. We anticipate devoting all our 309-funded efforts to this improvement area during the first year (FY 2002) of the third 309 funding cycle.

Work in the other three improvement areas — Coastal Hazards, Wetlands, and Aquaculture — will be delayed until the out years of the third 309 funding cycle. At this time (April, 2001) we have no schedule or priorities for implementing work in these other three improvement areas.

Cumulative and Secondary Impacts of Growth

a. Problem Statement

Significant changes in the state's ability to address cumulative and secondary impacts of growth on shoreline resources will occur as a result of Ecology's adoption of the amended Shoreline Master Program Guidelines in November 2000. These guidelines will direct the updating of every local shoreline master program in the Coastal Zone. The current timeline for this effort, as established in statute, is two years. However, primarily in response to cost and staffing concerns, it is expected that the legislature will extend this time for up to five years.

Implementation of these guidelines will not occur automatically or easily. Each local government will require careful consideration of the options and tradeoffs inherent in the program. The guidelines require local government to inventory the resources and characteristics of their shorelines and address the direct and cumulative impacts of development on the shorelines in a manner that preserves and restores the natural character of the shoreline. Implementation will require a depth of scientific understanding of shoreline ecological functions and processes not typically required of local government land use managers. Because of these factors, significant financial and technical assistance will be required as well as an appropriate amount of time to do the work.

b. Proposed Program Changes/Implementation Activities

For the past 5 years, CZM 309 funding has been used to support the adoption of the Shoreline Master Program Guidelines (Washington Administrative Code 173-26). Now that the Guidelines are adopted, CZM 309 funding should be used to implement this rule.

The following areas will be supported by CZM 309 funding:

- Legal Defense of the Guidelines: Funding is needed to address the recent appeal of the Guidelines. The amount of workload is unknown depending on the outcome of the legal process. There is a potential that all or part of the Guidelines will be remanded back to Ecology to make changes, reconvene committees, and re-issue another version of the Guidelines complete with public involvement.
- Legislative Changes related to the Guidelines: Funding is needed to address potential changes to the Shoreline Management Act (SMA) in response to the new Guidelines.

Legislative bills are currently being considered which may impact how the Guidelines will be implemented.

- Amendment of Coastal Zone Management Program Document: The revised Guidelines will need to be submitted to NOAA as an amendment to our federally approved Coastal Zone Management Program. This will result in a consultation with NMFS and USFWS and the preparation of a biological assessment, biological opinion, and an incidental take statement. Ecology will need to initiate this change and be prepared to assist in the analysis and respond to inquiries during this process.
- Guidebook Preparation: The 800-page Shorelines Guidebook is probably the single most useful tool that Ecology and local governments can use to jointly implement the Guidelines. The existing Guidebook must be revised to account for the new Guidelines. Document preparation, technical writing, and policy analysis will be required by Ecology and their consultants. Funding is also needed for public outreach efforts, printing, and training.
- Support and Implementation Tools: Other forms of support will be developed and implemented to assist local governments in preparing master program updates. These may include conferences, training, support committees, technical research, legal defense of individual SMPs, etc.
- Regulatory Updates: Three other regulations exist which determine the geographical extent of applying the SMA and the Guidelines. One is for streams and rivers, one is for lakes, and one is for wetlands. All three of these regulations need to be updated.
- Specific Impact Areas: There are some specific issue areas where cumulative and secondary impacts are noted. These include impacts from single family residences, bulkheads, and piers and docks. CZM 309 funding could be used to develop written State policy documents related to the use, impact and management of these impacting structures.

c. Justification for Proposed Changes

The Guidelines, as a part of the state's overall system of land use and environmental management, hold the promise for significant transformation of the management of cumulative and secondary impacts of growth in Washington's Coastal Zone. However, implementation at the local level is the key to realization of this transformation. Significant technical, legal and political questions must be addressed in order for local government to be able to properly implement the guidelines. With the emergence of endangered species as an issue, the technical considerations are even greater than previously expected. Development of comprehensive technical assistance materials and a program for disseminating this information to local government is the next critical step.

In support of shoreline Guidelines implementation are commitments by the state to assist local governments in the development of appropriate legislative changes, funding requests, guidance materials (i.e. updating the Shoreline Master Program Guidebook) and by providing direct hands-on technical assistance. Whether it is protection and restoration of wetlands, floodplain functions, controlling pervasive shoreline armoring or vegetation removal, the guidelines should produce significant advancements in avoiding and/or mitigating the cumulative and secondary impacts of growth.

d. Implementation

For the past 5 years, Ecology has worked to revise the shoreline regulation which provides guidance for local governments to manage their critical marine and freshwater habitat. Ecology was successful in adopting this regulation in November 2000. Details of this 5-year effort are described in Section 2 of this Section 309 Strategy and Assessment. Ecology appreciates NOAA's support during this lengthy process, as CZM 309 funding was instrumental in the adoption of the Guidelines.

Ecology's adoption of the new Guidelines was the critical first step in providing protection of shoreline habitat. However, the Guidelines are not enough in themselves. It is now up to local governments, with the support of Ecology, to incorporate the Guidelines into their local Shoreline Master Programs (SMPs). The implementation steps listed above are needed to keep the Guidelines legally defensible, technically possible, and fiscally manageable.

e. Rationale

Two key aspects of the assessment are technical assistance and cooperation with other efforts.

For local governments to be successful, it is imperative that the State provide technical. Although some jurisdictions have the financial and technical capabilities to incorporate the Guidelines into their SMP, most of them do not. The types of technical tools to be developed through this strategy will enable all jurisdictions to consistently incorporate the Guidelines into their SMPs which will lead to properly managed shorelines and will reduce the cumulative and secondary impacts of growth.

Given the limited resources of all stakeholders, combining resources and managing issues collaboratively will result in greater protection of coastal resources. Three other significant and related efforts are underway which can converge to maximize our resources. Updating of local critical area ordinances through the State's Growth Management Act, organizing and implementing the State's Watershed Planning Act, and developing responses to the Endangered Species Act all relate to protection of coastal resources and management of cumulative and secondary issues. The strategies listed above will allow Ecology to bring these other efforts together to help local communities manage their coastal resources in an effective and efficient manner.

f. Workplan

The implementation work that needs to be done for the Guidelines can be split into two primary tasks: 1) Support the Adopted Guidelines, and, 2) Develop Guidance for the Guidelines.

Task 1 Support the Adopted Guidelines

Although the Guidelines were formally adopted by Ecology in November 2000, additional activities are needed to maintain their usefulness. The following activities must be completed to support the adopted guidelines:

1A. Legal Defense of the Guidelines: The new Guidelines were appealed to the State's Shorelines Hearings Board. Ecology fills a critical role in supporting the State's Attorney

General's Office to defend the Guidelines. Ecology will prepare materials and legal strategies, provide testimony, analyze legal and technical documents related to the appeal, and coordinate with other state and federal resource agencies. Although hearings with the SHB are planned for early summer of 2001, the outcome of that process may be appealed to higher courts which will drive additional workload. The amount of workload after the legal process is unknown pending the outcome. There is a potential that all or part of the Guidelines will be remanded back to Ecology to make changes, reconvene committees, and re-issue another version of the Guidelines complete with public involvement. (Year 1)

1B. Legislative Changes related to the Guidelines: Ecology prepared and is supporting a Governor-endorsed bill which would provide more time and funding to local governments and Ecology to implement the Guidelines. That bill is still "alive" in the 2001 legislative session. Other bills are being considered which could dramatically change the Shoreline Management Act (SMA) and how it is implemented in response to the new Guidelines. Although legislative changes should be complete prior to the effective date of this CZM 309 Assessment and Strategy, the impacts of any changes will be experienced during the effective period of this document. Whatever changes are made by the Legislature, Ecology must be prepared to accept and implement changes related to the Guidelines. (Year 1)

1C. Amendment of Coastal Zone Management Program Document: The revised Guidelines will be submitted to NOAA as an amendment to our federally approved Coastal Zone Management Program. This will result in a consultation with NMFS and USFWS and the preparation of a biological assessment, biological opinion, and an incidental take statement. Ecology will need to initiate this change and be prepared to assist in the analysis and respond to inquiries during this process. (Year 1)

1D. Regulatory Updates: Three other regulations exist which determine the geographical extent of applying the SMA and the Guidelines. One is for streams and rivers, one is for lakes, and one is for wetlands. All three of these regulations need to be updated. (Year 2 through Year 3)

Task 2 Develop Guidance for the Guidelines

Implementation of the Guidelines is accomplished by local governments incorporating the Guidelines into their Shoreline Master Programs. In order for this to happen, most local governments need technical and regulatory support. The following activities will provide that support:

2A. Guidebook Preparation: The existing 800-page Guidebook must be revised to account for the new Guidelines. Revision of this document is already underway using current year CZM 309 funds. This process requires the assistance of an outside consultant, a local government steering committee, an internal technical workgroup, and an internal regulatory workgroup. Document preparation, technical writing, and policy analysis will be required. Preparation of the document also requires public outreach efforts, printing, and training. (Year 1)

2B. Support and Implementation Tools: Other forms of support will be assessed, developed and implemented to assist local government prepare master program updates. These may

include conferences, training, support committees, newsletters, technical research, and legal defense of individual SMPs. (Year 2 through Year 3)

2C. Specific Impact Areas: There are some specific areas which may demand special attention to best address cumulative and secondary impacts. These include impacts from single family residences, aquaculture, bulkheads, and piers and docks. Furthermore, some cumulative and secondary impacts are best assessed on a geographic basis such as wetlands, ocean coast, or floodplains. CZM 309 funding could be used to develop written State policy documents, either technical or regulatory, related to the use, impact and management of certain structures or geographic areas. (Year 2 through Year 3)

g. Estimated Costs

All costs assume salaries, benefits and overhead of Ecology staff as well as standard travel, goods and services, and equipment. Contractor support and extraordinary printing and travel are included as necessary.

Year 1 costs include:	Task 1A	$ 50,000
	Task 1B	$ 50,000
	Task 1C	$ 50,000
	Task 2A	$350,000
	Total	$500,000
Year 2 costs include:	Task 1D	$ 50,000
	Task 2B	$ 25,000
	Task 2C	$ 50,000
	Total	$125,000

Year 3 costs are identical to Year 2 costs

h. Likelihood of Success

With the adoption of the Shoreline Master Program Guidelines by Ecology in November 2000, we have completed the most difficult part of improving Washington's management of cumulative and secondary impacts. As the culmination of 5 years of work has already resulted in this success, the issue now is just how successful we want this program change to be. Through the 5 years, we have highlighted the importance of shoreline management, not just to the coastal community, but to the entire state as well. We have full support from the Governor's Office to proceed as evidenced by a $8.1M budget request to the legislature to fund implementation of the Guidelines. We have also developed a collaborative relationship with NMFS and USFWS who have endorsed the Guidelines as a significant means to address ESA concerns. Regardless of a current appeal of the Guidelines, there are already local governments who are revising their SMPs to meet the new standards because they believe it is essential to saving salmon and other critical coastal resources. Development of the Guidebook will provide another opportunity for Ecology to work with local government and other interested stakeholders to collectively develop science and policy aimed at addressing cumulative and

secondary impacts of development in the shoreline environment. The final steps of implementing the new Guidelines will certainly bring success.

Coastal Hazards

a. Problem Statement

The southwest Washington ocean coast contains the most rapidly growing communities in both Grays Harbor and Pacific Counties (OFM, 2000). Recent coastal community growth patterns mark the onset of the transition from fishing villages to tourist destinations, complete with hotels, condominiums and the commercial capacity to support a rapidly increasing part-time population. The combination of a dynamic coastal region and increased development pressure present unique challenges for planners to develop economically feasible and environmentally sensitive long-term plans that protect existing economic investment while preserving the pristine coastal environment that initially drew residents and tourists to the coast (Voigt, 1999). In an effort to avoid future problems associated with unsuitable (uninformed) development, it is imperative to focus attention on the implications of an expanding population in a region susceptible to coastal hazards such as erosion, flooding, sea level rise, earthquakes and subsidence.

Currently, ocean coast hazards are not sufficiently defined in the Shoreline Management Act to effectively guide sustainable development in southwest Washington. The Shoreline Master Program Guidelines do not adequately distinguish ocean coast hazards or environments from those associated with living on the Puget Sound or near a river in eastern Washington, and provides little management guidance for effectively avoiding or mitigating these hazards. The historical trend of accretion along the southwest Washington coast has reduced the perceived threat of natural hazards on development for most of the past century, and placed few, if any, demands on coastal managers for direction on appropriate private development or public investment in community infrastructure. However, the importance of recognizing ocean coast hazards was highlighted in the 1990s as severe erosion events led to emergency declarations in both the City of Westport and the City of Ocean Shores. Since 1993, nearly $70 million has been spent on coastal erosion problems. Many of the shoreline impacts would not have been surprises if the state had been actively engaged in monitoring coastal conditions and providing relevant information to coastal decision-makers. The current Shoreline Master Program Guidelines do not provide meaningful management direction for analyzing the risks associated with coastal living. Further, the lack of a regional planning framework to effectively deal with the beneficial use of dredge material from the Columbia River leaves coastal communities of southwest Washington increasingly susceptible to coastal hazards as a result of a diminishing sand supply.

In an effort to develop an understanding of the complex coastal system of southwest Washington, the US Geological Survey Coastal & Marine Geology Program, Department of Ecology and the coastal communities of Grays Harbor and Pacific counties initiated a five-year regional research program to support coastal management and decision-making. The Study has developed baseline data that can facilitate improved coastal decision-making, yet additional work is necessary to further develop the information so that it can be successfully employed as a science-based management framework. In large part, what remains to be done consists of

fostering an appropriate linkage between science and management of coastal resources. One way to accomplish this would be through the development of an Ocean Coast Management section of the Shoreline Master Program Guidelines. The purpose of this section would be to offer guidance to coastal communities for managing development and protecting ecosystem functions appropriate for the dynamic environment along the Pacific Ocean coast of Washington.

b. Proposed program changes/implementation activities

Efforts to implement the Coastal Hazards Strategy will be conducted over a period of three years. Initially, the effort will support the completion of the revised Shoreline Master Program Guidebook. The bulk of this strategy focuses on assessing current laws and regulations that direct coastal management and making changes to the Shoreline Management Act (SMA), Ocean Resources Management Act (ORMA), the Growth Management Act (GMA) and / or the Shoreline Master Program Guidelines as necessary.

Specifically, the following activities are proposed:

- Identify shortcomings in Washington's existing policies and guidance in relation to managing coastal hazards to be addressed through changes to SMA, ORMA, GMA and / or the Shoreline Master Program Guidelines. The Department of Ecology will collaborate with local stakeholders and other interested parties to outline a strategy to:

  1) develop a coastal classification scheme based on geomorphological shoreline characteristics,

  2) define a physical beach feature (e.g. shoreline or beachface elevation) and a methodology to survey that feature to calculate shoreline change rates, identify critical erosion areas, and serve as the basis for coastal planning and management,

  3) implement a beach morphology monitoring program to assess the "state of the beach",

  4) develop a methodology to disseminate survey data in a useful format for coastal decision makers, and

  5) maintain an ocean coast geographic information system (GIS) database.

- Clarify definitions provided in WAC 365-190-080 (4) (DCTED - Minimum guidelines to classify agriculture, forest, mineral lands and critical areas) for geologically hazardous areas and RCW 90.58.030 (Shoreline Management Act – Definitions and concepts) in relation to ocean coast environments, and expand existing list of definitions to specifically include ocean coast hazards terminology.

- Develop an amendment to require management of dredged material disposal and sand resources compatible with the natural functioning of the littoral system, including physical, biological and habitat function. The amendment will focus on the development of a systems approach to both sediment and coastal management through the recognition of the importance of sediment supply on changing shoreline conditions. A littoral cell planning initiative (similar to the ongoing watershed planning effort) would be developed and implemented through updated and integrated local Shoreline Master Programs.

c. Justification of proposed changes

In general, the southwest coast of Washington has featured a steadily prograding shoreline and relatively few impacts from coastal hazards. However, throughout the 1990s erosion events at Westport and Ocean Shores, as well as ongoing erosion at North Cove (Cape Shoalwater) identified a critical lack of scientific information to guide management and decision-making. As a result communities have been relatively unprepared to deal with the magnitude of the problems associated with recent coastal erosion trends (Kaminsky and Gelfenbaum 2000). To date, none of the coastal communities have developed a contingency plan for avoiding or mitigating shoreline change trend reversals that endanger community infrastructure, private property and the environmental health of the coastal communities.

In 1996, the Department of Ecology embarked on a five-year cooperative research program to address the information needs and develop an understanding of the physical processes that influence coastal change in southwest Washington. This research program, the Southwest Washington Coastal Erosion Study, required a significant financial investment from the state legislature and the federal government. The end result of this study is a solid body of scientific knowledge capable of estimating realistic future coastal conditions to serve as the basis for long-range coastal planning and management (Voigt, et al, 2000). In order to realize the full value of the investment in this rigorous scientific investigation, it is imperative that management direction be developed directly from the research results in the form of technical assistance documents and revised or new legislation.

The southwest Washington coast is one of the most rapidly developing regions within the state, yet compared to the Puget Sound or the US east coast, the area is relatively undeveloped. In order to guide sustainable development as well as preserve the natural qualities of this unique coastal environment, it is imperative to implement a coastal hazards strategy today that facilitates the avoidance of impending crises as opposed to a future strategy which attempts to mitigate the effects of inappropriate development.

d. Implementation

The Department of Ecology recently adopted a major revision of the Shoreline Master Program Guidelines that will require local governments to apply best available science for land use planning and decision making. The Coastal Hazards Strategy aims to formalize the research results of the Southwest Washington Coastal Erosion Study in an effort to help guide sustainable development and natural resource management along the southwest coast of Washington. The strategy calls for the development of data and information that are directly applicable to land use planning and resource management. This work will necessarily be conducted with the assistance of the coastal communities that will be impacted by revised regulations and the State Legislature that will be called upon to fund a majority of the long-term workload associated with maintaining current and accurate information to facilitate this process. Finally, data generated through this process will be maintained in a geographic information system (GIS) database to ensure the development, maintenance and distribution of required information is scientifically defensible and meets required standards for data quality.

e. Rationale

The Southwest Washington Coastal Erosion Study has been actively engaged in coastal research for the past five years. The results of this study have already proved to be of significant value for planning and resource management decisions, and technical assistance publications prepared by the Study team have been well-received by the intended user community (Gillespe, 2000). Additionally, the call for implementing best available science in the revised Shoreline Master Program Guidelines necessitates the development of technical guidance to ensure the results of the Study can appropriately be applied to land use planning and resource management and support the completion of the revised Guidelines. Finally, rapid economic development along Washington's southwest coast and a decline in productivity of the natural system (timber, fish, etc.) combined with the dynamic nature of the coastal region and the susceptibility of coastal development to an array of natural hazards implies a need for enhanced management of natural resources as well as prudent fiscal investment in both private property and public infrastructure.

f. Work Plan

First Year Tasks:

- Provide guidance, technical assistance and documentation to facilitate the completion of the geologic hazards section in the Shoreline Master Program Guidebook.
- Work with the State Legislature and coastal communities to develop an amendment to existing rules or regulations to implement a long-term beach morphology monitoring program based on the survey design developed by the Southwest Washington Coastal Erosion Study. The amendment will require beach morphology monitoring surveys for the purpose of supporting coastal decision-making and long range planning.
- Begin the development of an amendment to require a regional sediment management plan for the Columbia River littoral cell that establishes state guidelines for dredging activities in the Columbia River, Grays Harbor, and Willapa Bay and appropriate dredge material disposal practices.

Second Year Tasks:

- Develop a coastal classification scheme based on geomorphological characteristics of the shoreline for the southwest Washington Pacific Coast, including a methodology that can be used to extend the classification scheme along Washington's entire marine shoreline.
- Develop a guidance document that identifies specific management strategies (including model language) for avoiding, managing and mitigating hazards within each of the coast types.
- Identify key terminology for coastal hazards that is currently lacking in both Chapter 173-26 WAC (Shoreline Master Program Guidelines) and RCW 90.58.030 (Shoreline Management Act – Definitions and Concepts). Make additions and revision to both Chapter 173-26 WAC and RCW 90.58.30 as necessary.

- Finalize the development of an amendment to require a regional sediment management plan for the Columbia River littoral cell to establish state guidelines for dredging activities in the Columbia River, Grays Harbor, and Willapa Bay and appropriate dredge material disposal practices.
- Begin the development of an amendment to SMA, ORMA, GMA and / or the Shoreline Master Program Guidelines to direct ocean coast management efforts.
- Continue beach morphology monitoring effort.

Third Year Tasks:

- Continue beach morphology monitoring effort and publish / distribute an update to Ecology Publication 00-06-26, *Beach Monitoring in the Columbia River Littoral Cell*.
- Finalize the development of an amendment to SMA, ORMA, GMA and / or the Shoreline Master Program Guidelines to direct ocean coast management efforts, including model language.
- Develop methodology for surveying physical beach features to serve as basis for shoreline change calculation. Collaborate with coastal communities to establish a methodology for distributing information in the most useful format for coastal decision makers.
- Complete survey of new "shoreline feature", perform analysis of shoreline change, and prepare results for distribution to coastal communities for inclusion in Shoreline Master Program updates.

Additionally, many of the aforementioned tasks will necessitate the establishment and maintenance of an ocean coast geographic information system (GIS) database as the primary mechanism for storing, maintaining and distributing information to coastal decision makers.

g. Estimated Costs

The following costs are based on estimated staff time / contractual work. Existing Department of Ecology headquarters and regional staff will carry out a bulk of the strategy with the assistance of an intern.

First Year Budget: $200,000 for 2 FTE, 1 intern, (UNIX & PC) software and hardware maintenance, field equipment operation and maintenance (vehicle, GPS hardware & software, CLAMMER), data acquisition, printing costs and travel expenses.

Second Year Budget: $200,000 for 2 FTE, 1 intern, (UNIX & PC) software and hardware maintenance, field equipment operation and maintenance (vehicle, GPS hardware & software, CLAMMER), data acquisition, printing costs and travel expenses.

Third Year Budget: $200,000 for 2 FTE, 1 intern, (UNIX & PC) software and hardware maintenance, field equipment operation and maintenance (vehicle, GPS hardware & software, CLAMMER), data acquisition, printing costs and travel expenses.

h. Likelihood of Success

The Coastal Hazards Strategy will build upon the earlier accomplishments of the Southwest Washington Coastal Erosion Study. The Study goals of understanding the regional sediment system dynamics and predicting coastal behavior at a management scale of decades and tens of kilometers directly feed into the objectives of the Coastal Hazards Strategy. These objectives include developing an amendment to SMA, ORMA, GMA, and / or the Shoreline Master Program Guidelines to guide coastal management practices, creating a Regional Sediment Management Program to deal with dredge material disposal along the ocean coast and implementing a long-term beach morphology monitoring program to support coastal resource management decisions. The Study established a successful beach morphology monitoring program, and it is expected with appropriate funding, this effort would continue to flourish. The initial offering of Ecology Publication 00-06-26 Beach Monitoring in the Columbia River Littoral Cell, was well received by the intended user community as evidenced by the subsequent USGS customer satisfaction survey (Gillespe, 2000). Maintaining accurate and up to date information regarding the "state of the beach" will serve in the communities best interest to help avoid the costly problems of the 1990s.

Finally, the success of this endeavor will necessarily rely on the support of local constituents. Although initial reluctance to participate is likely, the intent of the strategy is not to limit the amount of development, rather it is intended to guide sustainable development in this rapidly growing region. Coastal resources are the most important commodity many of the southwest Washington communities have to offer. A realization by both the Department of Ecology and the coastal communities that science-based management may be in the region's best economic interest should ensure the successful implementation of technical guidance and policy direction to accomplish the resource protection and economic growth objectives of the Coastal Hazards Strategy.

Wetlands Strategy

a. Problem Statement

Development (commercial, residential, roads, etc.) continues to be the major threat to wetlands in the coastal zone of Washington State. We continue to see fragmentation of wetland systems from urban sprawl, degradation of wetlands and their buffers from encroaching development, and changes in wetland hydroperiods from development in the watershed.

Washington does not have a comprehensive law for protecting or regulating development in wetlands. The Department of Ecology issues 401 Water Quality Certifications for wetland impacts requiring a federal 404 permit and also co-administers the Shoreline Management Act (SMA) with local governments. However, the SMA does not have jurisdiction over isolated, freshwater wetlands and wetlands associated with small streams in the coastal zone. The primary land use regulation in Washington lies with local governments. However, while the Growth Management Act (GMA) requires that local governments "designate and protect" wetlands, it does not provide specific standards for how to do so. As a result, many local wetland regulations are inadequate to protect wetlands.

Additionally, local governments often lack the necessary information and technical training to protect wetlands based on the functions and the values they provide. Recent revisions to the GMA and the rules for implementing the SMA specify that local governments must include the best available science in their wetland regulations. However, this information is not widely available to local governments, or is unavailable in a form that can easily be understood and used. One of the major needs for the next five years is to develop tools, guidance documents, and training for local governments that assists in incorporating the latest scientific information about wetlands into local programs.

However, long-term protection and restoration of wetland resources in Washington will require changes in our current approach. The "project by project" review of wetland impacts through regulatory processes has caused our wetland protection strategy to be principally focused at a site-specific level, despite the fact that processes operating at a landscape level often control and define the type of wetlands that occur within that watershed (Bedford 1996). The emphasis on site-specific management has resulted in a focus on creating, or re-creating, the structure in wetlands. Today, however, there is a need to shift from re-establishing the physical structure in damaged wetlands to restoring ecological processes and functions, particularly those perceived as ecosystem services (Cairns, 2000). An emphasis on protecting and restoring wetland functions demands a different approach because many functions are a reflection of environmental processes that occur at a landscape scale.

Finally, the reality of the tremendous economic development we are experiencing in Washington is that many wetland impacts are unavoidable. In situations where wetland impacts cannot be avoided we must ensure that equivalent wetland resources are created, restored or enhanced. A recent evaluation of wetland mitigation projects in Washington points out that we are moderately successful at replacing lost wetland functions and values and concludes that consistent tracking and follow-up of mitigation projects is an essential component of assuring success. Thus, we need to develop a database and GIS application for tracking wetland mitigation projects and mitigation banks in Washington.

b. Proposed program changes/implementation activities

Washington is in the process of making a major program change through the adoption of new Shoreline Master Program (SMP) guidelines. These new guidelines will require local governments to include current scientific information and address watershed processes as they update their local SMPs. The bulk of our wetland strategy is aimed at helping implement this program change. In addition to the more general guidance information Ecology is currently developing to assist with the implementation of the Shoreline Guidelines, we plan to develop more specific science-based guidance on wetland protection. We also plan to develop specific science-based model regulations for local governments to use in revising their SMPs and local GMA regulations and we plan to provide training for local government staff on how to incorporate the current scientific information into their wetland protection programs. Finally, we need to develop a database and GIS application for tracking wetland mitigation projects and mitigation banks in Washington.

c. Justification of proposed changes

We believe that implementation of the proposed strategy will significantly improve the protection of wetlands in Washington. These steps will result in state and local wetland programs that are based on the best available scientific information and that address watershed-scale processes. Many local governments look to Ecology for guidance and direction on wetland protection efforts and will readily incorporate the information provided by this strategy. Other local governments that typically do not look to Ecology are required to include the best available science and will find it difficult to ignore guidance documents that incorporate current scientific information. Additionally, the development of a GIS-database will help ensure wetland mitigation projects are successfully implemented.

d. Implementation

Washington is in the process of making a major program change through the adoption of new Shoreline Master Program (SMP) guidelines. These new guidelines will require local governments to include current scientific information and address watershed processes as they update their local SMPs. The bulk of our wetland strategy is aimed at helping implement this program change. In addition to the more general guidance information Ecology is currently developing to assist with the implementation of the Shoreline Guidelines, we plan to develop more specific science-based guidance on wetland protection. We also plan to develop specific science-based model regulations for local governments to use in revising their SMPs and local GMA regulations and we plan to provide training for local government staff on how to incorporate the current scientific information into their wetland protection programs. Finally, we need to develop a database and GIS application for tracking wetland mitigation projects and mitigation banks in Washington.

e. Rationale

We believe the proposed strategy for wetlands is the most appropriate means of addressing the problems we are seeing with wetland loss and degradation. The State of Washington has clearly directed local governments to take the lead role in land use planning and wetlands protection through the Shoreline Management Act and the Growth Management Act. Ecology plays a critical role as the state agency with expertise in wetlands ecology and management and is looked to by other state and local agencies to provide guidance and direction on how wetlands should be protected. Given the mandate in the SMA and GMA to incorporate current scientific information into wetland protection programs, developing science-based wetland guidance documents will provide us with the greatest "bang for the buck".

When we developed similar technical guidance documents in the late-1980s, they were well-received and widely used. In today's climate, when science-based management is the popular mantra for government agencies, it is even more likely that technical guidance materials will be widely used. Finally, we have consistently heard from local governments that providing guidance documents is not enough: they want and need training workshops to help them figure out how to incorporate the technical information into land-use policies and regulations.

f. Work Plan

The primary emphasis will be to develop science-based tools for regulating and managing wetlands at the local level. This will involve development of several guidance documents and tools including:

1. Documents that summarize the current scientific information on the following:

- Wetland classification
- Ecosystem-level processes that drive wetland structure and function
- Wetland functions and values
- Land-use impacts on wetland processes, functions and values
- Management tools for protecting wetland processes, function, and values.

2. Model wetland policies & regulations

3. Watershed profiles that provide information on wetland geomorphic types and hydrologic processes.

4. Function assessment methods for estuarine and slope wetlands.

These tasks will be completed in the order listed above. The timeline for completion of each of these tasks will depend on the level of funding devoted to each task in a given year. Additionally, we will develop a GIS-database for tracking wetland mitigation projects and mitigation banks in Washington within the next two years.

g. Estimated Costs

The following costs are estimated for each of the tasks in the strategy. The cost is based on staff time and/or contractual work with wetland consultants.

1. Documents that summarize the current scientific information on wetlands - $75,000.

2. Model wetland policies & regulations - $50,000

3. Watershed profiles that provide information on wetland geomorphic types and hydrologic processes - $50,000

4. Function assessment methods for estuarine and slope wetlands - $200,000 - $300,000.

5. GIS-database - $80,000.

h. Likelihood of Success

This strategy is a logical next step for Ecology to implement our long-standing approach to wetlands protection. Our wetland protection efforts in Washington have been based on a comprehensive approach that includes a mix of direct state regulation, non-regulatory methods and a heavy emphasis on helping local governments develop policies, regulations and expertise to adequately protect wetlands. We continue to believe that local land-use planning efforts are the best tool to ensure maintenance of wetland functions and values across the state. The state's ability to adequately regulate wetland impacts is hampered by a lack of authority to regulate

land-uses and a lack of funding and political support. We get the greatest "bang for the buck" by helping local governments do a better job.

Additionally, recent trends in natural resource protection and management have brought us to a point where decision-makers increasingly look to current scientific information as a basis for developing and implementing policies and regulations. This perspective is reflected in the recently adopted SMA Guidelines and Best Available Science regulations adopted by the State in 2000. These changes provide us with a great opportunity to improve local wetland protection efforts that we must seize. The key is for Ecology to provide scientifically-sound and administratively practical tools and regulations. We have tremendous support for playing this role - from other state agencies and from local governments who look to Ecology as the "wetland experts" in Washington.

We will continue to foster broad support by on-going outreach activities. As part of our effort to develop new science-based tools and guidance we will involve other state agencies, local governments, and the environmental and regulated communities through steering committees, focus groups, peer review efforts and public workshops.

Aquaculture

The aquaculture strategy is necessarily dynamic — the cumulative and secondary effects of growth strategy is Washington state's highest priority for the first year or two of this 309 funding cycle. Therefore ,work on the aquaculture strategy would not begin until one of the out-years. However, Ecology and the aquaculture industry are pursuing other funding sources to begin work on the first aquaculture strategy task, an Aquaculture Policy Alternatives Analysis. Also, the outcome of that policy alternatives analysis will determine the directions of the remainder of the aquaculture strategy and its outcomes.

a. Problem Statement

Of the four unresolved issues (see Chapter 3, Aquaculture section), programs exist or are being developed to address water quality problems and the introduction of aquatic nuisance species. However, on-going land use conflicts between abutting residential and aquaculture land uses are not currently addressed by any existing management improvement program. The aquaculture industry has identified this issue as the single largest threat to their existing operations and obstacle to future expansion. Additionally, bringing consistency to state and federal aquaculture policies is clearly desirable.

b. Proposed program changes/implementation activities

Depending on the outcome of tasks 1 and 2, program changes could include legislative action, regulatory amendments, development of a CZMA (Coastal Zone Management Act) Special Area Management Plan, and at the least would include substantive amendment of the Shoreline Management Guidebook.

c. Justification of proposed changes

Implementation of the proposed strategy is highly likely to improve the management of aquaculture in Washington state vis a vis the land use conflict issue. This could be taken as an

unsupported statement, but the fact is that there has been no prior focused attempt to comprehensively address the conflict. The proposed process is a logical, open approach which brings all involved and affected parties to the table.

d. Implementation

Implementation is based on the application of standard, proven techniques and procedures in an open process. See Work Plan below for details.

e. Rationale

The Washington state aquaculture industry has been beleaguered by water quality, pest and predator introductions, and land use conflicts for many years. Attention has been devoted to the first two issues, and some progress is evident. No focused attention has been devoted to the land use conflicts issue which unsurprisingly remains unchanged. Bringing consistency to state and federal aquaculture policies can only be beneficial.

f. Work Plan

The tentative work plan is as follows; work plan elements subsequent to task 1 are somewhat speculative at this time, depending on the outcome of task 1 and the decisions flowing from it. Therefore, the level-of-detail of the tasks is progressively less detailed in this work plan.

1. Aquaculture Policy Alternatives Analysis

As described in Chapter 3, Assessment, there are an abundance of existing state and federal aquaculture polices, laws, and management programs. Despite this, or maybe partly because of this, the land use problem remains unsolved. Task 1 addresses a fundamental need to objectively understand aquaculture policy and management in Washington State — how all the disparate pieces fit together (or don't) — and to be able to compare Washington's aquaculture policy scheme with that of selected other states so as to better understand the strengths and weaknesses of Washington's system.

As expressed in a grant application jointly submitted by the Pacific Aquaculture Caucus (PAC) and the School of Marine Affairs (SMA), University of Washington, to the Office of Oceanic and Atmospheric Research (OAR), National Oceanic and Atmospheric Administration, this task would be organized as follows:

- Task 1. Organize an introductory workshop with public and private sector participation to identify regulatory issues of local and regional concern. A similar workshop is already planned provisionally by PAC and the Western Regional Aquaculture Center (WRAC) in Anchorage in 2001 to help the legislature evaluate constraining shellfish regulations proposed for Alaska.
- Task 2. Analyze the policy and regulatory framework for the aquaculture sector (in all its forms) in the States of Alaska, California, and Washington, with additional consideration of Oregon and Idaho where appropriate to circumstances in Washington. Currently these are the five regional States which constitute original membership in the Caucus.

- Task 3. For comparative purposes, the screening of a number of non-Pacific Northwest states' (e.g. Florida, Maine, North and South Carolina, Texas) aquaculture policies and supporting regulatory framework will be completed, and two will be selected for detailed sub-sector analysis (one for shellfish, one for finfish).
- Task 4. Analyze the aquaculture sector of each of the five target States (3 regional and 2 non-regional) using a multi-level sector study framework developed by ADCP (Nash 1995).
- Task 5. Analyze the current regulatory climate vis-à-vis the current status of the aquaculture sector in each of the five target States.
- Task 6. Develop a profile of enabling (and conversely disabling) laws and regulations for successful responsible aquaculture development in a coastal State.
- Task 7. Present the research results through outreach activities. These may include workshops with policy-makers and resource managers, presentations at legislative sessions, industry association meetings, and the production and distribution of printed materials.

2. Aquaculture Advisory Committee

The goal of this committee would be to:

- Recommend and review proposed revisions to the Shoreline Master Program Handbook and Shoreline Administrator's Handbook based in part on the outcome of Task 1, and the research of the Committee.
- Recommend, if appropriate, amendments to existing Washington state law or regulation based upon the outcomes of Task 1.
- Develop recommendations for the state on how best to develop, support and manage an economically viable and environmentally sound aquaculture industry.

This committee should include representatives from:

- the aquaculture industry (shellfish and fin fish)
- state regulatory and resource management agencies (e.g. Ecology, Fish and Wildlife; Natural Resources; Agriculture)
- federal regulatory and resource management agencies (e.g. National Marine Fisheries Service; US Fish and Wildlife Service; US Army Corps of Engineers)
- affected parties (e.g. Indian tribes; property owner groups)

3. Update Shoreline Management Guidebook Aquaculture Section

The Guidebook will be undergoing updating in 2001-2002 by Ecology in response to the recently amended Shoreline Master Program Guidelines rule, including the aquaculture chapter. Subsequent to the completion of tasks 1 and 2, additional improvement potentials to the Guidebook are expected to emerge.

Aside from acknowledging state policies regarding aquaculture, these documents could be updated to reflect national aquaculture policies. This could include the recently adopted U.S.

Department of Commerce aquaculture policy and the National Aquaculture Development Plan being developed by the Joint Subcommittee on Aquaculture.

4. Aquaculture SAMP as a Pilot Management Program

One possible approach to comprehensive implementation of improvements to Washington's aquaculture polices and programs on a pilot basis would be development of an aquaculture Special Area Management Plan (SAMP) for some discrete embayment where (1) aquaculture is economically important, (2) trial-and-error lessons might be learned about the practical viability of the proposed new management regime, and (3) local parties are amenable to a SAMP.

5. Aquaculture Implementation Position

Upon completion of tasks 1 through 4, 309 implementation activities for the aquaculture priority would require one FTE for one or two years to ease the transition to a new framework for doing business.

g. Estimated Costs

Task 1: If we assume that the grant proposal outlined above is not funded, the cost of an 18-month, university-based research program would be $200,000. It is likely that other funding sources will be acquired to complete this task.

Task 2: Dependent on the need for staff support to the advisory committee, and the scope of their charge, costs are expected to be in the range of $50,000 to $100,000 per year for the term of the committee.

Task 3: Dependent on the scope work necessary, costs are expected to be in the range of $50,000 to $75,000.

Task 4: Unknown at this time.

Task 5: One FTE plus expenses at approximately $100,000 per year.

h. Likelihood of Success

The likelihood of success is high to very high. We feel that successful updating of the Shoreline Management Guidebook and dissemination to local governments is assured. Because Washington state's aquaculture industry is already engaged in development of environmental codes of practice and other responsible self-governance measures, they are well positioned to engage in a positive program to address the land use conflict issue. The establishment of a broad-based advisory committee with explicit powers to develop recommendations can only serve to further build support for the outcome.

6 • Fiscal and Technical Needs

Fiscal Needs

Washington State Budget:

Washington currently operates under an initiative, passed by the people of Washington State, that limits general fund expenditures. This limit affects all state operations that are funded with general funds. Increases in tax revenues do not translate into an increase in spending authority. Additionally, severe problems exist due to chronic funding needs for education and transportation, and emergency funding needs to respond to damage caused by the February 28, 2001 Nisqually Earthquake.

Department of Ecology Budget:

Throughout the early 1990s the Ecology budget was subjected to chronic cuts. During the past five years Ecology's over-all budget has been stable, but has not, of course, kept pace with inflation. (Any budget increases have been dedicated by the legislature to specific programs.)

Shorelands and Coastal Zone Management Program Budget:

The Shorelands and Environmental Assistance Program budget was reduced by $675,000 in July 1995. This severely affected our ability to meet coastal zone management grant match requirements. The funding was never restored.

Technical Needs

Any special technical knowledge, skills, or equipment are needed to carry out the proposed projects are identified in the corresponding strategies.

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