3.3 New Guideline Provisions

3.3.1 Intent of Shoreline Environment Designations (WAC 173-26-211)

The original guidelines identified four environments (natural, conservancy, rural, and urban) but allowed local governments to identify additional types of environments. The original guidelines allowed many local governments to use designations such as aquatic, rural residential, suburban, semi-rural, and other subdivisions. The new guidelines identify the six environments described below, but continue to allow local governments discretion to list other types. Unassigned areas are automatically designated either as rural conservancy or urban conservancy, whichever is a more conservative designation, until such areas are properly designated by local jurisdictions.

The ***aquatic environment*** is intended to apply to areas waterward of the ordinary high water mark. Ecological restoration, public access, and water-dependent uses are the only uses that should be allowed in these areas. Structures must be: the minimum size necessary to support the intended use; provide for safe, unobstructed passage of fish and wildlife; minimize interference with navigation; and take into account impacts on views. Even where other shoreland environment designations are applied to water areas (e.g., rural conservancy or high-intensity), development must be consistent with the aquatic environment policies.

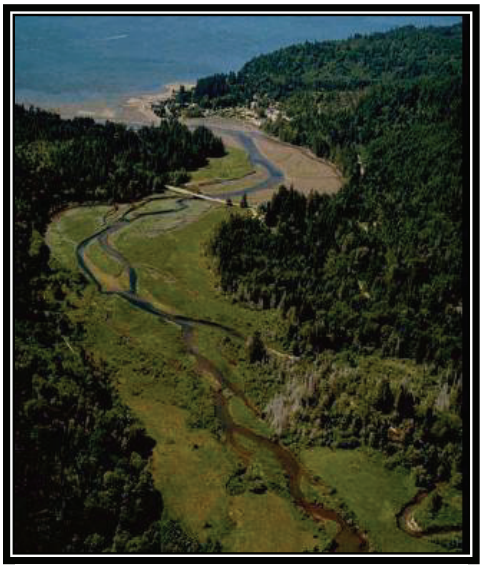


Figure 7. Example of riverine and riparian environment including highway and housing near the mouth entering Puget Sound. Source: WDOE

The ***natural environment*** is intended to be ecologically intact or relatively free of human influence to: accommodate planning for restoration of degraded shorelines; allow low-intensity residential and resource uses such as agriculture and forestry consistent with the state Forest Practices Act; and provide for low-intensity scientific, cultural, and recreational uses. Regulations should generally prohibit subdivision, commercial or industrial uses, non-water recreation, roads, parking, utility corridors, significant vegetation removal, and other activities that would substantially degrade these shoreline areas.

The ***rural conservancy environment*** is intended to: conserve existing natural resources and valuable cultural and historic

Figure 8. Lake Union, example of high-intensity environment. Source: B. Mieremet

areas for sustained resource use; improve natural floodplain processes; and provide recreational opportunities. Generally, no commercial and industrial uses, new shoreline stabilization measures, or flood controls should be allowed. Mining, agriculture, forestry, and recreational uses should be allowed. Impervious surfaces should be limited to ten percent of lot area.

The ***high-intensity environment*** is intended to be applied in incorporated municipalities, urban growth boundaries, or "rural areas of more intense development" (RCW 36.70A.070), in order to provide for water-oriented commercial, transportation, and industrial uses, water enjoyment uses, and mixed-use developments that support water-dependent uses. The new guidelines require public access to be maintained wherever feasible. The new guidelines state that full utilization of urban areas should be achieved before the high-intensity environment designation is geographically expanded.

The ***urban conservancy environment*** is intended to protect and restore functions of open space, floodplains, and other sensitive lands where they exist in urban settings. Uses that promote the preservation of open space, water-oriented uses, and mining (where appropriate) may be allowed in this environment.

The ***shoreline residential environment*** is intended to accommodate residential development in incorporated municipalities, within urban growth boundaries, in rural areas of more intense development (RCW 36.70A.070), or in master planned resorts (RCW 36.70A.360).

3.3.2 Summary of General Shoreline Master Program Requirements (WAC 173-26-221)

The new guidelines require the following provisions be applied to coastal resources. They include applications, principles and standards for shoreline areas where these resources may be located or found.

3.3.2.1 Archaeological and Historic Resources

The new guidelines require that permits issued in areas documented to contain archaeological resources must include a site inspection or evaluation by a professional archeologist in coordination with all affected Indian tribes. In addition, developers and property owners are required to stop work and notify officials if such resources are uncovered during excavation. Archaeological, cultural, and historic resources in shoreline areas must be protected. Assessment and protection measures are expected to add to coastal development costs. These standards are consistent with other laws and ordinances governing preservation of these resources.

3.3.2.2 Critical Areas

Critical areas include the following areas and ecosystems:

- Wetlands
- Areas with a critical recharging effect on aquifers used for potable waters
- Fish and wildlife habitat conservation areas

- Frequently flooded areas
- Geologically hazardous areas

The new guidelines require that critical area shoreline management planning objectives focus on protecting existing ecological functions, ecosystem-wide processes, and restoration of these functions and processes where they are degraded. The regulatory provisions for critical areas are required to promote human uses and values that are compatible with the other objectives of this section, such as public access and aesthetic values, provided they do not result in significant adverse impacts on ecological functions.

Wetlands

The new guidelines require regulations to achieve, at a minimum, no net loss of wetland area and functions, including lost time when the wetland or its buffer does not perform the function. Master programs must require buffer zones around wetlands.

Geologically Hazardous Areas

The new guidelines require development in designated geologically hazardous areas to be regulated in accordance with WAC 365-190-080(4) (B). New developments that require lifetime structural shoreline stabilization are prohibited.

Critical Saltwater Habitats

Critical saltwater habitats are defined to include all kelp beds; eelgrass beds; spawning and holding areas for forage fish such as herring, smelt, and sandlance; commercial and recreational shellfish beds; mudflats; intertidal habitats with vascular plants; and areas with which priority species have a primary association. The new guidelines require structures to generally not intrude into or over critical saltwater habitats, except when required for a public purpose and when ecological functions can be protected. Until an inventory of critical saltwater habitat has been performed, SMPs must condition all over-water and near-shore developments in marine and estuarine waters with the requirement for an inventory of the site and adjacent beach sections.

Critical Freshwater Habitats

The new guidelines define critical freshwater habitats as portions of streams, rivers, wetlands, and lakes, their associated channel migration zones, and designated floodplains. Master programs must, where appropriate, integrate protection of critical freshwater habitat with flood hazard reduction and other river and stream management provisions. No net loss of ecological functions associated with designated stream or river corridors, or their associated hyporheic zone, is permitted.

3.3.2.3 Flood Hazard Reduction

Unless otherwise demonstrated through scientific and technical information, the following areas should not be considered within the channel migration zone: (1) within incorporated municipalities and urban growth areas; (2) areas separated from the active river channel by legally existing artificial channel constraints that limit channel movement; and (3) areas separated from the active channel by a legally existing artificial structure that is likely to restrain channel migration, including transportation facilities, built above or constructed to remain intact through the 100-year flood. In areas outside incorporated municipalities and urban growth areas, channel constraints and flood control structures built below the 100-year flood elevation do not necessarily restrict channel migration and should not be considered to limit the channel migration zone unless demonstrated otherwise using scientific and technical information. SMPs must:

- Give preference to nonstructural flood hazard reduction measures over structural measures;
- Base SMP flood hazard reduction provisions on applicable watershed management plans, comprehensive flood hazard management plans, and other comprehensive planning efforts, provided that those measures are consistent with the SMA;
- Plan for and facilitate returning river and stream corridors to more natural hydrological conditions, recognizing that seasonal flooding is an essential natural process; and
- Development in floodplains should not significantly or cumulatively increase flood hazard or be inconsistent with a comprehensive flood hazard management plan adopted after 1994 and approved by the WDOE. New development or new uses within shoreline jurisdiction, including the subdivision of land, should not be established when the development or use would require structural flood hazard reduction measures within the channel migration zone or floodway.

The new guidelines state that the following uses and activities may be appropriate and necessary within the channel migration zone or floodway:

- Development in incorporated municipalities and designated urban growth areas, as defined in RCW 36.70A, where existing structures prevent active channel movement and flooding;
- New structural flood hazard reduction measures within shoreline jurisdiction, but only when necessary to protect existing development, only where nonstructural measures are not feasible, and only when appropriate vegetation conservation actions are undertaken consistent with WAC 173-26-221(5);
- New structural flood hazard reduction measures, but only where placed landward of associated wetlands and designated vegetation conservation areas, except for actions that increase ecological functions, such as wetland restoration;
- New public structural flood hazard reduction measures, such as dikes and levees, if they include public access pathways; and
- Removal of gravel for flood management purposes if it is consistent with an adopted flood hazard reduction plan.

3.3.2.4 Public Access

The new guidelines generally require shoreline development by public entities to include public access measures as part of each development project. SMPs must require dedication and improvement of public access in developments for water-enjoyment, water-related, and non-water dependent uses and for the subdivision of land into more than four parcels. SMPs must establish provisions such as maximum height limits, setbacks, and view corridors to minimize the impacts on existing views from public property or substantial numbers of residences. Where there is an irreconcilable conflict between water-dependent shoreline uses or physical public access and maintenance of views from adjacent properties, water-dependent uses and physical public access have priority.

3.3.2.5 Shoreline Vegetation Conservation

Vegetation conservation does not include those activities covered under the Washington Forest Practices Act, except for conversion to other uses and forest practice activities over which local governments have authority. Like other master program provisions, vegetation conservation standards do not apply retroactively to existing uses and structures, such as existing agricultural practices. Vegetation conservation provisions apply to all other uses, even to those shoreline uses and developments that are exempt from the requirement to obtain a permit. In establishing vegetation conservation regulations, local governments must use available scientific and technical information. Local governments should identify the ecological processes and functions that are important to the local aquatic and terrestrial ecology and conserve sufficient vegetation to maintain them. Vegetated areas along streams that once supported or could support mature trees should be wide enough to facilitate the woody debris recruitment process. Master programs must establish vegetation conservation standards. Selective pruning of trees for safety and view protection may be allowed, and the removal of noxious weeds should be authorized.

Figure 9. Example of vegetative buffer along braided stream bottom. Source: WDOE

3.3.2.6 Water Quality, Stormwater, and Nonpoint Source Pollution

The new guidelines require SMPs to protect against adverse impacts on the land and its vegetation and wildlife, and on the waters of the State and their aquatic life, through implementation of the following principles:

- Prevent impacts on water quality and stormwater quantity that would result in a net loss of shoreline ecological functions, or a significant impact on aesthetic qualities or recreational opportunities; and
- Ensure mutual consistency between shoreline management provisions and other regulations that address water quality and stormwater quantity, including public health, stormwater, and water discharge standards. The regulations that are most protective of ecological functions shall apply.

3.3.3 Requirements for Shoreline Modifications (WAC 173-26-231)

Shoreline modifications are usually undertaken in support of, or in preparation for, a shoreline use. For example, such projects as fill (a shoreline modification) required for a cargo terminal (an industrial use), or dredging (a shoreline modification) to allow for a marina (a boating facility use). The new guidelines require that structural shoreline modifications be allowed only where they are necessary to support or protect an allowed principle structure or a legally existing shoreline use that is in danger of loss or substantial damage. While accommodating permitted uses, enhancement of impaired ecological functions must be planned where feasible and appropriate.

3.3.3.1 Shoreline Stabilization

Shoreline stabilization is any action taken to address erosion impacts by natural processes such as current, flood, tides, wind, or wave action on shoreline property and dwellings, businesses, or structures. The new guidelines require, to the extent feasible, that new development be located and designed to avoid the need for future shoreline stabilization. SMPs must regulate the subdivision of land to ensure that the lots created do not require shoreline stabilization. New development on steep slopes or bluffs must be set back sufficiently to ensure that shoreline stabilization is unlikely to be necessary during the life of the structure. New development requiring shoreline stabilization that could cause significant impacts on adjacent or down-current properties and shoreline areas should not be allowed. New structural stabilization measures are not allowed, except when necessary (1) to protect existing principal structures; and (2) for the protection of new development and ecological restoration or cleanup projects where nonstructural methods are not feasible or sufficient, and the stabilization structure would not result in a net loss of shoreline ecological functions. When any structural shoreline stabilization measures are necessary, the new guidelines require that:

- The size of stabilization measures be limited to the minimum necessary;
- Publicly financed or subsidized shoreline erosion control measures do not restrict appropriate public access to the shoreline; and
- Adverse impacts on natural sediment conveyance systems (e.g., feeder bluffs) are minimized.

3.3.3.2 Piers and Docks

Figure 10. Example of piers and docks associated with single-family residences. Source: WDOE

The new guidelines require that new piers and docks be allowed only for water-dependent uses or public access. A dock associated with a single-family residence is considered a water-dependent use, provided that it is designed and intended as a facility for access to watercraft. Pier and dock construction must be restricted to the minimum size necessary to meet the needs of the proposed water-dependent use. New pier or dock construction, excluding docks accessory to single-family residences, should be permitted only when the applicant has demonstrated that a specific need exists to support the intended water-dependent uses. New residential development of two or more dwellings must provide for joint use or community dock facilities, when feasible, rather than allow individual docks for each residence. Piers and docks, including those accessory to single-family residences, must be designed and constructed to avoid or, if that is not possible, to minimize and mitigate impacts on ecological functions; critical area resources such as eelgrass beds and fish habitats; and processes such as currents and littoral drift. Structures should be made of materials approved by applicable state agencies.

3.3.3.3 Filling

The new guidelines require that earth fills be located, designed, and constructed to protect shoreline ecological functions and ecosystem-wide processes, including channel migration. Fills waterward of the ordinary high water mark are to be allowed only when necessary to support a water-dependent use, public access, cleanup and disposal of contaminated sediments as part of an interagency environmental cleanup plan, mitigation action, environmental restoration, beach nourishment, or an enhancement project. Fills waterward of the ordinary high water mark for any use except ecological restoration should require a conditional use permit.

3.3.3.4 Breakwaters, Jetties, Groins, and Weirs

The new guidelines require that breakwaters, jetties, groins, and weirs located waterward of the ordinary high water mark be allowed only where necessary to support water-dependent uses, public access, shoreline stabilization, or other specific public purposes. Breakwaters, jetties, groins, weirs, and similar structures should require a conditional use permit, except for those structures installed to protect or restore ecological functions, such as woody debris installed in streams. Breakwaters, jetties, groins, and weirs must be designed to protect critical areas and shall provide for mitigation according to the sequence defined in WAC 173-26-201(2)(f).

3.3.3.5 Beach and Dunes Management

The new guidelines require that coastal master programs institute development setbacks from the shoreline to prevent impacts on the natural, functional, ecological, and aesthetic qualities of dunes. Coastal dunes can be modified consistent with state and federal flood protection standards, only without net loss of shoreline ecological functions or significant adverse impact on other shoreline resources and values. Dunes may be modified to protect views of the water only on properties subdivided and developed prior to adoption of the master program, where the view is completely obstructed for residences or water-enjoyment uses, and where the dunes did not obstruct views at the time of original occupancy.

3.3.3.6 Dredging and Dredge Material Disposal

The new guidelines recommend that new development be sited and designed to avoid or minimize the need for new and maintenance dredging. Dredging for the purpose of establishing, expanding, or relocating navigation channels and basins should be allowed only when significant ecological impacts are minimized and when mitigation is provided. Maintenance dredging of established navigation channels and basins should be restricted to previously dredged and/or existing authorized location, depth, and width unless necessary to improve navigation. Dredging waterward of the ordinary high-water mark for the primary purpose of obtaining fill material cannot be allowed, except when the material is necessary for the restoration of ecological functions. Master programs should include provisions for uses of suitable dredge material that benefit shoreline resources. Disposal of dredge material into river channel migration zones within shoreline jurisdiction, but outside harbor areas, must be discouraged. In the limited instances where it is allowed, such disposal must require a conditional use permit.

3.3.3.7 Shoreline Habitat and Natural Systems Enhancement Projects

The new guidelines recommend that master programs include provisions fostering habitat and natural system enhancement projects. Master program provisions should ensure that the projects address legitimate restoration needs and priorities and facilitate implementation of the restoration plan developed pursuant to WAC 173-26-201(2)(f).

3.3.4 Shoreline Uses (WAC 173-26-241)

The new guidelines require that preference be given to uses that are consistent with the control of pollution and prevention of damage to the natural environment or are unique to or dependent to water-related uses and water-enjoyment uses. Master programs must establish a comprehensive program of use regulations for shorelines and must incorporate provisions for specific uses to ensure consistency with the intent of the statute.

3.3.4.1 Agriculture

The new guidelines do not allow master programs to require modification of or limit existing agricultural activities occurring on agricultural lands. Master programs must include provisions

addressing new agricultural activities on land not meeting the definition of agricultural land, conversion of agricultural lands to other uses, and other development on agricultural land that does not meet the definition of agricultural activities. Master programs must include provisions to ensure that new agricultural activities are consistent with underlying environment designations, are located and designed to ensure no net loss of ecological functions, and do not have a significant adverse impact on other shoreline resources and values. Measures appropriate to meet this requirement include provisions addressing water quality protection and vegetation conservation.

3.3.4.2 Aquaculture

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. Local governments should provide limits and conditions to ensure appropriate, compatible types of aquaculture for the local conditions. Aquaculture should not be permitted in areas where it would adversely impact eelgrass and macroalgae, or significantly conflict with navigation and other water-dependent uses. Aquaculture facilities should be designed and located so as not to spread disease to native aquatic life, establish new nonnative species that cause significant ecological impacts, or significantly affect the aesthetic qualities of the shoreline.

3.3.4.3 Archaeological and Historic Resources

The new guidelines require local SMPs to:

- Require developers and property owners to immediately stop work and notify appropriate officials if archaeological resources are uncovered during excavation; and
- Require permits issued in areas documented to contain archaeological resources to require a site inspection or evaluation by a professional archaeologist in coordination with affected Indian tribes.

3.3.4.4 Boating Facilities

The new guidelines require SMPs to contain provisions assuring no net loss of ecological functions as a result of developing boating facilities while providing the boating public recreational opportunities on waters of the state.

SMPs should, at a minimum, contain provisions to:

- Ensure that boating facilities are located only at sites with suitable environmental conditions, shoreline configuration, access, and neighboring uses;
- Ensure that facilities meet health, safety, and welfare requirements;
- Avoid, or, if that is not possible, mitigate aesthetic impacts;
- Require public access in new marinas;
- Limit the impacts to shoreline resources from boaters living in their vessels;
- Protect the rights of navigation; and

- Restrict vessels from extended mooring on waters of the state except as allowed by applicable state regulations.

3.3.4.5 Commercial Development

The new guidelines require master programs to give preference to: (1) water-dependent commercial uses over non-water-dependent commercial uses; and (2) water-related and water-enjoyment commercial uses over non-water-oriented commercial uses. Master programs must ensure that commercial uses that may be authorized as water-related or water-enjoyment be required to incorporate appropriate design and operational elements so that they function as water-related or water-enjoyment uses.

Master programs should require that public access and ecological restoration are considered as potential mitigation of impacts to shoreline resources and values for all water-related or water-dependent commercial development unless such improvements are demonstrated to be infeasible or inappropriate. Where commercial use is proposed on land in public ownership, public access should be required. Master programs should prohibit non-water-oriented commercial uses on the shoreline unless the project provides a significant public benefit and is either part of a mixed-use project that includes water-dependent uses or is on a site where navigability is severely limited. Non-water-dependent commercial uses should generally not be allowed over water. Master programs must ensure resources and values such as navigation, recreation and public access.

3.3.4.6 Forest Practices

In general, forestry is managed by standards found in the Washington Forest Practices Act. However, where shorelines are being converted or are expected to be converted to non-forest uses, SMPs must establish provisions to ensure that forest practices do not result in significant adverse impacts on other shoreline uses provided for in RCW 90.58.020 such as navigation, recreation, and public access. SMPs must implement the provisions of RCW 90.58.150 regarding selective removal of timber harvest on shorelines of statewide significance. Exceptions to this standard are to be allowed only through issuance of a conditional use permit. Lands designated as *forest lands* must be designated in a manner consistent with the natural or the rural conservancy environment designation pursuant to RCW 36.70A.170.

3.3.4.7 Industry

The new guidelines require SMPs give preference to: (1) water-dependent industrial uses over non-water-dependent industrial uses; and (2) water-related industrial uses over non-water-oriented industrial uses. Lands designated for industrial development should not include shoreline areas with severe environmental limitations, such as critical areas. SMPs should require that industrial development consider incorporating public access as mitigation for impacts to shoreline resources and values unless public access cannot be provided in a manner that does not result in significant interference with operations or hazards to life or property, as provided in WAC 173-26-221(4).

When industrial use is proposed on land in public ownership, public access should be required. Industrial development and redevelopment should be encouraged to locate where environmental cleanup and restoration of the shoreline area can be incorporated. New nonwater-oriented industrial development should be prohibited on shorelines, except when: (1) the use is part of a mixed-use project that includes water-dependent uses; (2) navigability is severely limited; and (3) only if the use is accompanied by a substantial public benefit such as public access or ecological restoration. New non-water-oriented industrial development may also be allowed if the site is physically separated from the shoreline by another property or public right of way.

3.3.4.8 In-Stream Structural Uses

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

3.3.4.9 Mining

An SMP program should: (1) identify where mining may be an appropriate use of the shoreline, and; (2) ensure that when mining or its associated activities in the shoreline are authorized, those activities are properly sited, designed, conducted, and completed so that no net loss of ecological functions occurs. Mining waterward of the ordinary high water mark of a river must not be permitted unless removal of sand, gravel, or other materials at the specific location does not adversely affect the natural processes of gravel transportation for the river system as a whole. In considering renewal, extension, or reauthorization of gravel bar and other in-channel mining operations in locations where they have previously been conducted, local government must require compliance with the new guidelines to the extent that no such review has previously been conducted.

3.3.4.10 Recreational Development

Recreational development must primarily relate to access, enjoyment, and use of the water and shorelines of the state. Commercial recreational development must comply with commercial standards discussed above. Recreational development must be consistent with the shoreline designation and must be designed so that no net loss of ecological functions results. The SMP must mandate consideration of recreational uses on state-owned shorelines. For jurisdictions planning under the state GMA, the SMP recreation policies shall be consistent with growth projections and level of service standards of the applicable comprehensive plan.

3.3.4.11 Residential Development

Local SMPs must provide standards for residential development, including regulations for setbacks and buffer areas, density, shoreline armoring, vegetation conservation requirements, and

where applicable, onsite sewage system standards. New overwater or floating residences are prohibited, but existing overwater or floating homes should be accommodated. New development should be located so as not require shoreline stabilization or to endanger residents from flooding, erosion, or unstable slopes. Multifamily residential development should provide public or community access to the shoreline.

3.3.4.12 Transportation and Parking

Transportation uses must be accommodated to provide safe, reasonable, and adequate circulation to shorelines. Transportation uses must be consistent with the standards of applicable shoreline environments and be compatible with existing and proposed shoreline uses. Circulation plans must accommodate pedestrians, bicycles, and public transit. Transportation and parking facilities must have the least possible adverse effect on unique or fragile shoreline features, result in no net loss of shoreline ecological functions, and avoid adversely affecting existing or planned water-dependent uses. Parking shall not be a preferred use in the shoreline and shall only be allowed as necessary to support authorized uses. Visual and environmental impacts of parking facilities shall be minimized.

3.3.4.13 Utilities

These standards apply only to production, storage, and conveyance systems, and not onsite systems serving an individual use. Utility production and processing facilities that are nonwater-oriented shall not be allowed in the shoreline unless it can be demonstrated that no other feasible option is available. Transmission or conveyance facilities shall be located outside of shorelines where feasible. Utilities shall be located in public rights-of-way whenever possible. Development of utilities on tidelands should be discouraged.

3.3.5 Shorelines of Statewide Significance (WAC 173-26-251)

The guidelines place special recognition and special requirements on those shorelines designated to be of statewide significance (WAC 173-26-251). It requires that preference be given to particular uses in order to recognize and protect statewide interest over local interest and to preserve the natural character of the shoreline among others that have previously been discussed.

4. ALTERNATIVES

The proposed federal action is OCRM's approval of the revisions to statute WAC 173-26 as amendments to the WCZMP pursuant to OCRM regulations on Amendments to Approved Management Programs (15 C.F.R. part 923, subpart H). When an amendment is submitted, OCRM must review the request to determine if the federally-approved management program as changed by the amendment request will still constitute an approvable program. This requires a preliminary determination that the WCZMP, as amended by the new statute will still meet the substantive requirements of the CZMA in five categories:

1) Uses subject to management (15 C.F.R. part 923, subpart B)

2) Special Management Areas (15 C.F.R. part 923, subpart C)

3) Boundaries (15 C.F.R. part 923, subpart D)

4) Authorities and Organization (15 C.F.R. part 923, subpart E)

5) Coordination, Public Involvement and National Interest (15 C.F.R. part 923, subpart F)

The preliminary Findings of Approvability have been made and are included in Appendix F. These Findings provide a detailed analysis of approvability of this amendment.

There are three major alternatives for consideration. First, OCRM can approve the WCZMP program change amendment submitted in October 2004, thereby incorporating the amendment into the federally-approved WCZMP. Second, OCRM could find that the WCZMP, as revised by the SMA guidelines, no longer constitutes an approvable program under the CZMA, and deny the program change. Third is the no action alternative, which would occur if OCRM did not act on a State's proposed amendment to a coastal management plan and would result in approval of the proposed amendment by operation of 16 U.S.C. 145. OCRM's preferred alternative is to accept the WDOE's submission with the revised WAC 173-26 statutes as constituting reasonable and appropriate changes that will allow the WCZMP to continue to meet the requirements of the federal CZMA. The three available alternatives are discussed in more detail below, along with a short description of alternatives considered, but denied by Washington as part of their SEPA process.

4.1 Alternative 1: Approve Washington's Request to Incorporate WAC 173-26 (the Guidelines) as an Amendment to the WCZMP (Preferred Alternative)

Alternative 1, OCRM's preferred alternative, is the approval and incorporation of the revised SMA guidelines into the WCZMP. This option will permit WDOE to provide federal funding to local governments participating in the WCZMP and updating their local SMPs using the new requirements and standards of the guidelines. Additionally, federal consistency provisions of the CZMA will apply once SMPs have been modified an approved.

4.2 Alternative 2: Deny Washington's amendments

Alternative 2 is denial of Washington's proposed amendments, based on a finding that approval of the amendment would not satisfy the requirements of the CZMA or other federal law. As a result, the State would not have a federally-approved coastal management plan, and would not be eligible to receive federal funding to implement the WCZMP, nor would federal consistency with the WCMP be required. The revised WCZMP would continue in force under state law, but the State would need to amend the WCZMP and resubmit it for review and approval under the

CZMA to continue to participate in the federal CZMA program. Washington could, of course, potentially amend the WCZMP to seek federal approval in any number of ways, including the alternatives it considered during the development of the new guidelines. These alternatives are described below for context, but are not analyzed in detail because it is purely speculative whether or how the State would choose to amend the WCZMP to seek federal approval under the CZMA.

4.3 Alternative 3: No Action

The no action alternative, required to be analyzed in an EIS by 40 C.F.R. 1502.14(d) , is the most likely outcome that can be expected to occur in the absence of agency action, and is described for comparison with the proposed action and any alternatives. Under the CZMA, if OCRM did not act on a state's proposed amendment to a coastal management plan, the amendment would eventually be conclusively presumed as approved. 16 U.S.C. 1455(e)(2). Thus, the same effects would occur as in Alternative 1, approval of Washington's amendments.

4.4 Alternatives Reviewed by Washington State Prior to Submission of Revision Request

Because of the nature of this federal action, OCRM is limited in the type of alternatives that can be considered. In Washington, in order to amend its program, the State was required as part of its program development process to generate alternatives to be considered and reviewed by all concerned parties, including federal agencies and the public. The process also provided an opportunity for comment at an early stage. However, after this process, laws, regulations, guidelines, and procedures are often approved by the state legislature or other governing bodies which can make it difficult for OCRM to consider or to suggest revisions. Consequently, it is not productive to consider numerous potential changes to policies or guidelines at this stage of the review process. However, as part of the current state program change process, Washington did consider five additional alternatives that were reviewed by WDOE in the development of the new guidelines. Four of the state's alternatives were found to not be acceptable, therefore no further environmental assessment was conducted on these alternatives. Since the program change that was submitted to OCRM was selected as part of this process over the other four alternatives, a brief discussion of the four alternatives considered by the State, but ultimately rejected is provided below for context. These alternatives are more thoroughly described in the WDOE Supplemental FEIS at: http://www.ecy.wa.gov/biblio/0306006.html.

4.4.1 State Alternative A: No Action – Continued Implementation of Existing WAC 173-16

For purposes of environmental impact analysis, continuing to use the existing SMP Guidelines rule (WAC 173-16) was considered to be the state 'no action alternative.' This alternative was rejected for several reasons. First, the original guidelines were no longer providing an adequate level of environmental protection to meet the intent of the SMA and based on science dating from the 1960's with respect to large scale impacts but not cumulative impacts of many small scale development projects. Second, the State needed to integrate the requirements of the SMA with the GMA; the original guidelines did not acknowledge the policies of the GMA, and

inconsistencies were beginning to occur, as well as inconsistencies with other local, state, and federal statutes. Other considerations included the lessons learned through implementation of SMA, guidelines, and SMPs over the years based on new legislative requirements (GMA, flood prevention), SHB and court decisions, and the increasing size and number of development projects, which could not be adequately addressed by the SMP guidelines. Furthermore, the state legislature requires WDOE to update the guidelines at least once every five years (ESHB 1724). For these many reasons, guideline change was inevitable and the status quo could not be considered an acceptable alternative.

4.4.2 State Alternative B: Prescriptive Standards

A special Shoreline Guidelines Commission (1998-1999) considered developing new guidelines with specific prescriptive standards that would result in a rule with specific numerical standards, effective statewide, and set minimum requirements for local governments to achieve through their SMPs for a full range of shoreline uses. Prescriptive standards would provide highly specific direction to local governments with a strict test for compliance. Prescriptive standards could be an effective mechanism in achieving species recovery programs and meeting the objectives of the state's salmon recovery program. Reasons for rejection this alternative included lack of consensus or broad support, as well as the potential reduction in local government autonomy and authority to prepare individual SMPs because of state standards.

4.4.3 State Alternative C: General Policy Guidance

The Shoreline Guidelines Commission also considered using a general policy approach that would provide guidance to local governments and flexibility to implement individual SMPs at the local level. Policy level guidelines would direct local jurisdictions to protect environmental functions in shoreline areas. It would provide local governments with the ability and the direction to integrate their planning efforts (e.g., SMA/GMA integration), reduce unnecessary duplication in the planning process, and develop consistent language for the local plans. However, this alternative was also rejected for several reasons, including concern that policy oriented guidelines would not include standards and a lesser level of certainty of environmental protection could occur; the guidelines would not include tests for compliance; there may be a failure of consistent management between neighboring jurisdictions which could minimize the effectiveness of management for system-wide and watershed shoreline resources and the statewide approach to salmon recovery; and finally, there would be a greater strain on state and local agencies to produce individualized SMPs.

4.4.4 State Alternative D: Dual Path Performance Standards

In the winter of 1999, the status of several of Washington's salmonid species (e.g., Coho, Chinook, Bull nose trout) had become so precarious that they were in the process of being listed as threatened species under the federal ESA and also listed under the provisions of the Washington law. The WDOE amended WAC 173-26 in 2000 by incorporating two new sections known as Part III and Part IV (also known as Path A and Path B), each containing new guidelines for SMPs, and voided the existing SMP guidelines in WAC 173-16. These were dual paths to achieving the same results under the SMA. Part III set forth "mandatory minimum

procedures and performance based standards, but would allow local governments the flexibility to decide how to achieve the performance standards." Part IV, on the other hand, provided greater specificity to aid local governments in developing a master program that achieved the performance standards. All local governments required by the SMA to adopt a SMP would have been required to amend their existing SMP in accordance with Part III, or alternatively, at their choice, under Part IV. The Guidelines Commission determined that additional specific standards under Part IV would be beneficial to local governments, which would encounter water habitats important to the listed species and thereby hopefully avoid potential development problems when meeting federal or state requirements for listed species and avoid adverse taking issues.

There were several reasons for the rejection of this alternative, which was WDOE's preferred alternative. They included: (1) an appeal of the new guidelines to the SHB by a coalition of business organizations, cities and counties in November of 2000; (2) a finding of the SHB in August 2001 that Ecology failed to properly conduct the review process and that certain provisions of Path B exceeded statutory authority, which invalidated the new guidelines (but did not invalidate WDOE's repeal of the previous guidelines (ACC 172-16) – thus leaving the state with no shoreline guidelines, although local master programs would remain in effect); and (3) a negotiated settlement from September 2001 through December 2002, that included new guidelines for proposed rulemaking.

In conclusion, WDOE was legally prevented from implementing this alternative. The guidelines represented minimum requirements for local implementation, and other provisions of state law encourage development of standards that would meet ESA provisions such as the Watersheds Planning Act. Several counties like King County have been working hard through Water Resource Inventory Areas (WRIAs) to meet ESA recommendations by the Services in order to avoid jeopardy opinions. Nothing precludes local governments from implementing stronger standards if local conditions warrant and is permitted by law and they try to obtain incidental take authorizations for a number of activities.[2]

5. THE AFFECTED ENVIRONMENT

5.1 General Description

The boundaries of Washington's coastal zone extend from the seaward extent of the state's territorial sea (3 nautical miles) to the landward extent of the 15 coastal counties. While Washington's SMA guidelines apply to all shorelands of the state in 39 counties and 216 cities, only those located along the shores and up the rivers of the 15 coastal counties (and 115 cities/towns) are included for purposes of the WCZMP.

Within this land/water boundary are areas of direct control and areas that are less managed in SMPs (i.e., an activity further island may still have negative effects on coastal waters and are

[2] (See: http://dnr.metrokc.gov/Wrias/8/chinook-plan/volumeIII/app-e-assurances.pdf)

regulated by certain state authorities (air and water quality, for example) for consistency with the state goals.

The SMA specifically defines the area of direct control.

The SMA extends shoreline management to "shorelines of the state" which are defined as:

RCW 90.58.030 (2)

(c) "Shorelines of the state" are the total of all "shorelines" and "shorelines of state-wide significance" within the state;

(d) "Shorelines" means all of the water areas of the state, including reservoirs, and their associated shorelands, together with the lands underlying them; except

(i) shorelines of statewide significance;

(ii) shorelines on segments of streams upstream of a point where the mean annual flow is twenty cubic feet per second or less and the wetlands associated with such upstream segments; and

(iii) shorelines on lakes less than twenty acres in size and wetlands associated with such small lakes;

(e) "Shorelines of state-wide significance" means the following shorelines of the state:

(i) The area between the ordinary high water mark and the western boundary of the state from Cape Disappointment on the south to Cape Flattery on the north, including harbors, bays, estuaries, and inlets;

(ii) Those areas of Puget Sound and adjacent salt waters and the Strait of Juan de Fuca between the ordinary high water mark and the line of extreme low tide as follows:

(A) Nisqually Delta—from DeWolf Bight to Tatsolo Point,

(B) Birch Bay—from Point Whitehorn to Birch Point,

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

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

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

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

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

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

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

(B) Any east of the crest of the Cascade range downstream of a point where the annual flow is measured at two hundred cubic feet per second or more, or those portions of rivers east of the crest of the Cascade range downstream from the first three hundred square miles of drainage area, whichever is longer;
(vi) Those shorelands associated with (i), (ii), (iv), and (v) of this subsection (2)(e);

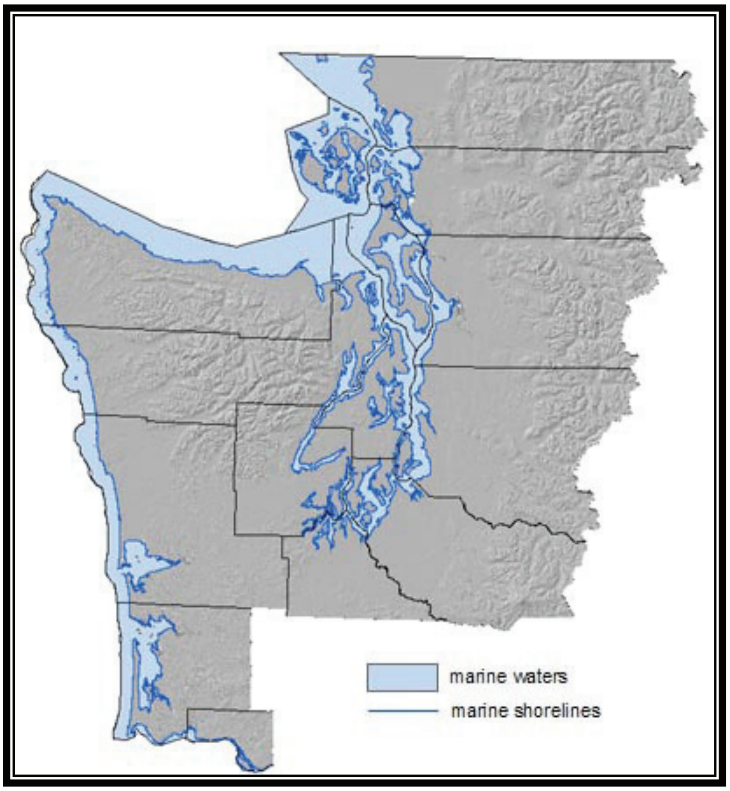


Figure 11. Washington's marine coastline is outlined in blue to include Washington's territorial sea jurisdiction. (Source: WDOE)

(f) "Shorelands" or "shoreland areas" means those lands extending landward for two hundred feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward two hundred feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of this chapter; the same to be designated as to location by the WDOE. Any county or city may determine that portion of a one-hundred-year-flood plain to be included in its master program as long as such portion includes, as a minimum, the floodway and the adjacent land extending landward two hundred feet there from.
(*See*: http://www.ecy.wa.gov/programs/sea/SMA/st_guide/jurisdiction/index.html for further description of the boundaries).

This includes approximately 2,763 miles of marine shorelines that encompasses approximately 105 square miles (to include the 200 ft. shorelands). Rivers and lakes may be included up to the eastern most boundary of the coastal counties. Within this large area, lands excluded from the coastal zone include federal lands and Tribal lands forming a checkerboard of included/excluded lands that are addressed through the WCZMP.

Figures 4 through 10 illustrate some of the complexities of state shorelines, the degree of difficulty local master programs must deal with regarding rivers, lakes, and watersheds that transcend their authorized area of governance, and how the potential impacts associated with development in one area can have consequences for other important areas. Many local governments have included WRIAs as a useful planning area to deal with issues like water quality, fishery recovery, restoration, and other resource issues.

Figure 12 shows the number of WRIAs that are contained in the coastal zone to include the major rivers and streams.

Figure 12. Outline of Water Resource Inventory Areas used as planning units under the Watershed Planning Act. (Source: WDOE)

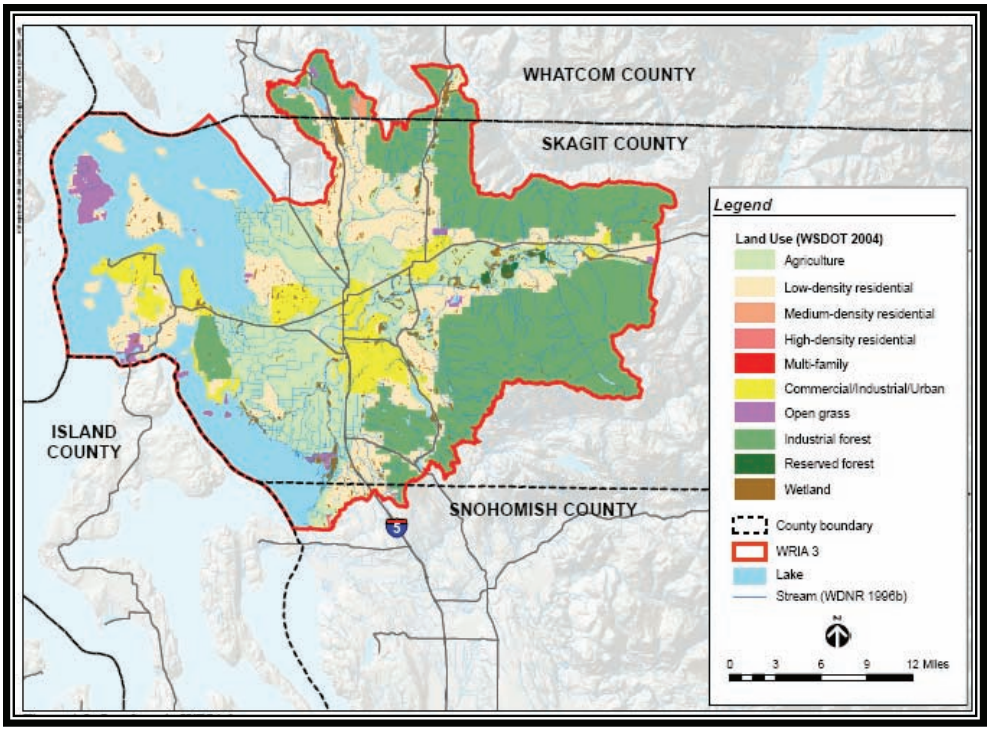
Figure 12 is a good example of how WRIAs transcend county boundaries. WRIA 3 includes Skagit County, as well as Whatcom and Snohomish Counties in its drainage basin. Furthermore, Skagit County must deal with issues from WRIA 4 and WRIA 5.

Figure 13 shows the major types of land use classifications (i.e., forests, agriculture, residential, business, etc.) used for the SMA.

The coastal atlases contain additional maps marking significant resources (i.e., wetlands, submerged vegetation, fish and wildlife habitats including listed species) and development concern issues (i.e., soils, slope stability, land uses) that must be taken into consideration by local planners and managers. Notwithstanding the vast amounts of data that have been collected, there are still significant data gaps that must be filled.

A more specific description of the coastal zone and its resources can be found in the WCZMP, Chapter 2- Washington's Coastal Zone (pages 17-60) at: http://www.ecy.wa.gov/pubs/0006029.pdf . The following provides a brief overview of the environment in western coastal Washington.

Figure 13 illustrates the number of different land use zones identified in WRIA 3.
Notice residential development moving into the industrial forest lands.



5.2 Physical Characteristics

5.2.1 Physiography: Soil, Beaches and Dunes, Erosion, Geologically Hazardous Areas, and Flood Hazard Areas

The Washington coastal zone contains four major geomorphic regions. The narrow, north-south trending, low-lying Pacific Ocean coast is bordered on the east by the Coast Range comprising, from north to south, the Olympic Mountains, the Black Hills,

and the Willapa Hills. The Puget Sound basin is located north and east of the Olympic Mountains and Black Hills (located south of Aberdeen). The Puget Sound basin is bordered on the east by the Cascade Range. Elevations in the coastal zone region range from sea level to 2,428 meters (7,966 feet) in the Coast Range and 4,392 meters (14,410 feet) in the Cascade Range. However, most of the Olympic Mountains and Cascade Range, including these highest elevations, are located on national forest and national park lands and therefore are not under the jurisdiction of the Coastal Zone Management Program. Severe topography, limited soil development, and large areas of exposed bedrock characterize the two mountain ranges.

By contrast, the Pacific Ocean soils are underlain by thick sequences of primarily unconsolidated sediments eroded from the surrounding mountains. The substantial horizontal and vertical variation in compactness, grain size distribution, and other characteristics of these sediments profoundly affect surface and ground water flow, location and type of mineral resource extraction activities, urban development patterns, and the distribution of natural hazards such as landslides. The Pacific Ocean coast, geomorphologically the most energetic part of the coastal zone's marine shoreline, consists of: (1) a southern segment from Cape Disappointment on the south to Point Grenville on the north (approximately 20 miles north of the north end of Grays Harbor); and (2) a northern segment dominated by erosion by erosion from Point Grenville on the south to Cape Flattery on the north (Galster 1989).

The southern segment, most of which is privately owned and falls under coastal zone jurisdiction, is characterized by barrier beaches and two major embayments (Grays Harbor and Willapa Bay) that serve as sinks for sediment carried north from the mouth of the Columbia River (Galster 1989). The northern segment, which lies within Olympic National Park, three national wildlife refuges (Copalis, Quillayute Needles, and Flattery Rocks), and five Indian reservations (Quinault, Hoh, Quileute, Ozette, and Makah), is characterized by near shore bluffs, sea stacks, and other erosional landforms. Major rivers draining from the Olympic Range into the Pacific Ocean include the Willapa, Chehalis, Humptulips, Quinault,

Figure 14. Barrier beach and dune system with public access features along Ocean Shores in Grays Harbor (WDOE)

Queets, Hoh, and Quillayute. These rivers are supported by snow and glacier melts in the upper basins and by ground water recharge in the lower reaches of the basin.

Within the Puget Sound basin, the Strait of Juan de Fuca exhibits a mix of erosional and depositional features. Erosion dominates the western portion of the strait while a mix of erosional and depositional landforms dominate the eastern half. The eastern half is characterized by two lengthy accretionary barrier beaches, Ediz Hook at Port Angeles and Dungeness Spit north of Sequim, along with extensive stretches of near shore bluffs. The inland waters of the Puget Sound basin, geomorphologically the least energetic part of the coastal zone's marine shoreline, exhibit a mix of erosional and depositional landforms. Most of the erosion occurs through the undermining of near-shore bluffs by wave action with resultant land sliding and sloughing (Galster 1989). In the 1980s, Downing (1983) estimated that approximately one-third of the Puget Sound basin shoreline was erosional, another third depositional, and the last third either modified or neutral.

The complex arrangement of embayments comprising the inner Puget Sound basin, the widely varying shoreline aspects, fetches (distances wind can travel uninterrupted over water), and quantities of available sediment lead to complex patterns of erosion and deposition.

5.2.2 Aquatic Ecosystems: Drainage, Critical Saltwater and Freshwater Habitats, Wetlands, and Water Quality

Major rivers that drain to the Puget Sound basin originate from the Cascade and Olympic Mountains and include the Hoko, Lyre, Elwha, and Dungeness rivers which drain into the Strait of Juan de Fuca and the Nooksack, Skagit, Snohomish, Snoqualmie, Green/Duwamish, White/Puyallup, and Union rivers, which drain into the inland portion of the basin. These rivers are supported by snow and glacial melt in the upper basins and by ground water recharge in the lower reaches of the basin. From more than 10,000 rivers and streams, approximately 39 million acre-feet of freshwater enters Puget Sound basin annually (Ecology 2001a).

Nearly all lakes in Puget Sound basin, from sea level to timberline, are glacial products. Approximately 3,000 lakes were formed in western Washington after glacial recedence, of which 1,567 are above 2,500 feet and are classified as *high lakes* (Kruckeberg 1991). Lakes in the lowlands tend to be larger, such as Washington and Crescent Lake, both formed when glaciers eroded large, deep valleys in the landscape. The quality of aquatic life in lakes depends on three critical attributes fluctuating over time and aquatic space: light, temperature, and nutrients. The nutrient status is the basis for biological classifications of lakes; lakes are either nutrient-poor (oligotrophic, little nourished) or nutrient rich (eutrophic, well-nourished), with gradations in between these classifications. High montane lakes tend to be oligotrophic, fostering cold-water fish such as salmonids (including trout). Low elevation lakes may have been oligotrophic shortly after deglaciation, but eutrophication due to natural (mineral cycling) and human-induced (i.e., nitrogen and phosphorous) causes have changed these lakes.

Many wetlands occur within the riparian network of Puget Sound basin, mostly within the shoreline regions of the ocean, streams, and lakes. These wetlands range from headwater freshwater wetlands in the upper watershed to large estuarine wetlands at the base of the

watershed. Wetlands play a vital role in maintaining the ecological processes of the coastal zone hydrologic system by providing flood control, base flow to streams and lakes, water quality improvement, nutrient export to adjacent waters, and critical fish and wildlife habitat, particularly for salmonid rearing in estuaries. Because wetlands contain vegetation, biofiltration and bioconversion of nutrients typically occurs, as well as eutrophication.

Estimates of pre-settlement 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; WDOE, 1992b). Based on a 1988 estimate by the FWS, about 20 to 39 percent of Washington's wetlands were lost during the past two centuries. Other estimates place the loss as high as 50 percent, and some urbanized areas of the Puget Sound area experienced losses from 70 to 100 percent. Estimates of continuing wetland loss range from 700 to 2,000 acres per year. In addition, most of the State's remaining wetlands have been significantly degraded (WDOE, 1992b, d). The principal historic causes of wetland loss and degradation were 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; WDOE, 1992b, d).

Surface water quality within the Washington coastal zone is generally good; however, in particular areas water quality is degraded due to human activity and natural conditions (Ecology 1998a). Because of degraded water quality, numerous rivers and streams in the coastal zone are included on the WDOE's 303(d) list of water quality impaired or threatened water bodies. DOE rates water quality using these parameters: temperature, dissolved oxygen, fecal coliform bacteria, ammonia-nitrogen, and 5-day biochemical oxygen demand (BOD). The State's 1998 303(d) list includes the following major rivers: the Nooksack, Skagit, Snohomish, Snoqualmie, Green/Duwamish, White/Puyallup, Union, Willapa, and Chehalis.

A simplified overview of the food web within aquatic ecosystems characterizes the fauna within

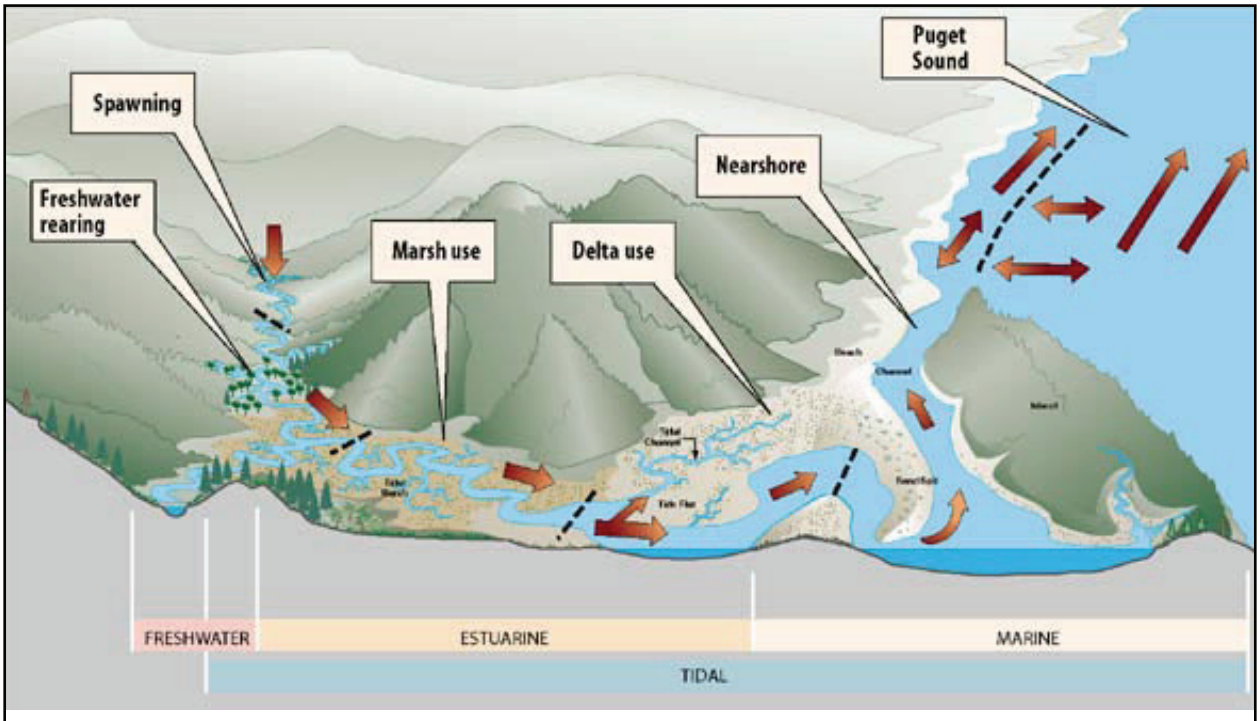


Figure 15. Diagram of shoreline and upper watershed environments utilized by anadromous fish and illustrates the need for comprehensive planning and management when dealing with habitat protection.

these systems. Primary producers are phytoplankton and green plant litter, which are consumed by micro fauna or invertebrates (small crustaceans), which in turn are consumed by vertebrate species, such as mollusks, marine and freshwater shellfish, oysters, bottom fish, smelt, trout, salmon, and marine mammals. Common fish species that are dependent upon both the marine and freshwater systems in Puget Sound basin include salmon, trout, and eel species.

Waterfowl including shorebirds, snow geese, trumpeter swans, and Canada geese, depend on these aquatic ecosystems for nesting, foraging, and refuge. Eagles are also dependent on marine and freshwater systems for their primary food source, which includes fish found throughout the lowland coastal region of the Puget Sound basin. Fragmentation and disturbance of aquatic habitats have caused the decline of several fish, mammal, and bird species in the region, resulting in ESA listings.

5.2.3 Terrestrial Ecosystems; Vegetative Zones and Forests

5.2.3.1 Nearshore Vegetation

Aquatic vegetation is recognized to be important fish and wildlife habitat by ecologists and in regulatory policy. Table 3 summarizes Washington *Shore Zone Inventory* data to show the relative abundance of four types of shoreline vegetation that affect habitat condition.

PERCENT OF SHORELINE WITH AQUATIC VEGETATION

County Name	Total Miles	Eelgrass	Floating Kelp	Non-floating Kelp	Sargassum
Clallum	254	20%	40%	80%	1%
Grays Harbor	187	5%	>1%	6%	>1%
Island	214	63%	10%	18%	8%
Jefferson	254	58%	7%	33%	18%
King	123	62%	13%	27%	25%
Kitsap	254	48%	>1%	21%	21%
Mason	232	28%	>1%	24%	33%
Pacific	276	22%	>1%	1%	>1%
Pierce	239	26%	7%	44%	19%
San Juan	408	41%	31%	63%	47%
Skagit	229	51%	12%	26%	15%
Snohomish	133	22%	1%	1%	3%
Thurston	118	4%	>1%	24%	4%
Whatcom	147	55%	7%	18%	34%
Total	**3067**	**37%**	**11%**	**31%**	**18%**

Table 3. Percentage of Aquatic Vegetation Along Coastal Shorelines in Washington State (By county). Source: Washington Department of Natural Resources (WDNR).

Eelgrass beds (*zostera marina* and *Zostera japonica*) occur along 37 percent of shorelines. Island, King, Whatcom, Kitsap and Skagit Counties have the highest percentage of eelgrass. Eelgrass is not common in South Puget Sound and it does not occur in the extreme reaches,

including Budd Inlet, Eld Inlet and Totten Inlet. While this data provides a useful snapshot of eelgrass distribution, it cannot address temporal trends in eelgrass distribution and abundance. A separate monitoring project within the Nearshore Habitat Program monitors temporal trends in eelgrass beds.

Kelp beds are important nearshore habitats that support commercial and sport fish, invertebrates, marine mammals and marine birds. The *ShoreZone Inventory* shows very different patterns in the distribution of floating kelp (*Macrocystis integrifolia* and *Nereocystis leutkana*) and other non-floating kelp species (*Laminaria spp., Egregia menziesii* and other species). Statewide, shorelines with floating kelp are less common (11 percent) than non-floating kelp (31 percent). Floating kelp is most common in rocky, high-energy environments, corresponding to high percentages of this habitat in Clallum and San Juan Counties. In Jefferson County, floating kelp is common along the rocky outer coast headlands and around Port Townsend, but it is rare in Hood Canal. Floating kelp decreases gradually as energy decreases and rocky habitat becomes less common, leading to intermediate percentages in Whatcom County, Skagit County, Island County and King County. Floating kelp is rare in lower energy areas with predominantly sand and mud shallow substrates, including counties that border Southern Puget Sound, Willapa Bay, and Grays Harbor. Like floating kelp, non-floating kelp is most common in counties with relatively high-energy rocky shorelines, such as San Juan and Clallum Counties. However, non-floating kelp occurs in all counties. In protected, lower energy areas, the principle species is *Laminaria saccharina*. The lowest percentages are found in counties with extensive low angle embayments, such as Grays Harbor, Pacific, and Snohomish Counties.

Sargassum muticum is a non-indigenous brown alga from Asia that has been established in Washington for decades. However, little is known about its distribution or its interaction with local species. *ShoreZone Inventory* data shows that *Sargassum* is present along 18 percent of the state's shorelines, and its distribution is not even. *Sargassum* is found more often along shorelines in the Hood Canal, the San Juan Archipelago and the Strait of Georgia, leading to correspondingly high percentages in San Juan, Mason, and Whatcom counties. It is least common along the outer coast, in Clallum, Grays Harbor and Pacific counties.(WDNR, Summary of Key Findings of *ShoreZone Inventory*, http://www.dnr.wa.gov/htdocs/aqr/nshr/inventory.html, last viewed 6/5/07)

5.2.3.2 Upland Vegetative Zones

Within Puget Sound basin and coastal zone lay three major vegetative zones: (1) the western hemlock (*Tsuga heterophylla*) zone, which ranges from sea level to lower montane slopes; (2) the Pacific silver fir (*Abies amabilis*) zone, forming the midmontane altitudinal belt; and (3) the mountain hemlock (*Tsuga mertensiana*) zone at the upper forested levels (Franklin and Dryness 1973). Possibly a fourth zone should be included, the timberline-to alpine, because the region contains a high, treeless rim where countless drainage systems have their origins. The western hemlock zone is typically dominated by a western hemlock and western red cedar (*Thuja plicata*) climax forest, but Douglas fir (*Pseudotsuga menziesii*) often dominates this zone in the lowland forests (Kruckeberg 1991). Additionally, the western hemlock zone, particularly along marine coastal areas, contains a subzone, the Sitka spruce (*Picea sitchensis*) zone, where Sitka spruce dominate western hemlock at elevations between sea level and approximately 500 feet. There

are generally three types of forest communities that are categorized by their tree and shrub (herb) components within the western hemlock zone: western hemlock/sword fern, western hemlock/Cascade Oregon grape, and Douglas fir/salal (Kruckeberg 1991).

Animal species relying on the western hemlock zone of Puget Sound basin for foraging, reproduction, and refuge can be divided into primary consumers (plant eating) and secondary consumers (carnivores). Primary consumers include: (1) vertebrate grazers and seedeaters, such as deer, elk, rabbits, and seed-and fruit-eating birds; (2) invertebrate grazers and seedeaters; and (3) parasites on plants such as fungi, bacteria, worms, and protozoa (Kruckeberg 1991). Secondary consumers include: (1) vertebrate omnivores such as black bears, raccoons, opossums, and crows; 2) vertebrate carnivores such as coyotes, bats, bobcats, weasels, moles, shrews, and many birds (e.g., owls, flickers, warblers, and raptors); (3) invertebrate carnivores such as beetles and wasps; and (4) animal parasites such as worms, protozoa, bacteria, and fungi.

Extensive logging has occurred since the late 1800s throughout the Puget Sound basin, but most extensively within the lowland forest (western hemlock zone). This zone is economically important in terms of timber production, but due to its proximity to water and moderate topographic relief, agriculture, and commercial and urban development have replaced the natural forest community. Fragmentation has disrupted this forest ecosystem and in some areas caused an extreme decline in forest and plant species.

5.3 Socio-Economic Environment

5.3.1 Coastal Population Growth Trends

More than 4 million people of Washington's nearly 5.9 million residents (or 68 percent of the population) live in the 15 coastal counties (*see* Table 4), with significant growth expected to continue. A review of permitted shoreline projects statewide from 1990-2002 shows the majority of permitted projects occurring in King, Pierce, Whatcom, Snohomish, Skagit, and San Juan counties in the Puget Sound area. This trend is likely to continue into the future.[3]

Table 4. Washington Population Interim Estimates. Source: Washington Office of Financial Management, Forecasting Division[4]

April 1, 2005 Population of Coastal Cities, Towns, and Counties
State of Washington

Evaluate growth by looking at the growth between the last census and most current estimate.

County Municipality	Census 2000	Estimate 2001	Estimate 2002	Estimate 2003	Estimate 2004	Estimate 2005
Clallam	64,179	64,454	64,900	65,300	65,900	66,800

[3] WDOE Supplemental FEIS, op. cit. p. 51-52, and Shorelands Programs' Permit Tracking Database.
[4] Table modified to focus on coastal counties, cities and towns only.

Unincorporated	38,328	38,519	38,970	39,265	39,660	40,305
Incorporated	25,851	25,935	25,930	26,035	26,240	26,495
Forks	3,120	3,145	3,130	3,125	3,125	3,125
Port Angeles	18,397	18,420	18,430	18,470	18,530	18,640
Sequim	4,334	4,370	4,370	4,440	4,585	4,730
Grays Harbor	**67,194**	**68,500**	**68,400**	**68,800**	**69,200**	**69,800**
Unincorporated	25,548	26,770	26,995	27,265	27,295	27,505
Incorporated	41,646	41,730	41,405	41,535	41,905	42,295
Aberdeen	16,461	16,490	16,250	16,320	16,410	16,450
Cosmopolis	1,595	1,595	1,565	1,630	1,590	1,600
Elma	3,049	3,050	3,175	3,060	3,085	3,105
Hoquiam	9,097	9,035	8,945	8,855	8,885	8,875
McCleary	1,484	1,475	1,440	1,450	1,455	1,475
Montesano	3,312	3,325	3,325	3,345	3,375	3,420
Oakville	675	680	670	680	675	680
Ocean Shores	3,836	3,930	3,930	4,065	4,240	4,385
Westport	2,137	2,150	2,105	2,130	2,190	2,305
Island	**71,558**	**72,400**	**73,100**	**74,000**	**74,800**	**76,000**
Unincorporated	49,081	49,635	50,494	50,680	51,085	51,450
Incorporated	22,477	22,765	22,606	23,320	23,715	24,550
Coupeville	1,723	1,735	1,730	1,745	1,745	1,785
Langley	959	970	996	1,005	1,030	1,045
Oak Harbor	19,795	20,060	19,880	20,570	20,940	21,720
Jefferson	**26,299**	**26,446**	**26,600**	**26,700**	**27,000**	**27,600**
Unincorporated	17,965	18,016	18,145	18,270	18,465	18,855
Incorporated	8,334	8,430	8,455	8,430	8,535	8,745
Port Townsend	8,334	8,430	8,455	8,430	8,535	8,745
King	**1,737,046**	**1,758,312**	**1,774,312**	**1,779,300**	**1,788,300**	**1,808,300**
Unincorporated	349,234	353,040	351,136	351,843	356,795	364,498
Incorporated	1,387,812	1,405,272	1,423,176	1,427,457	1,431,505	1,443,802
Algona	2,460	2,500	2,525	2,590	2,605	2,660
Auburn *part*	42,901	43,420	43,970	43,890	43,670	43,540
Beaux Arts Village	307	310	295	302	300	297
Bellevue	109,827	111,500	117,000	116,400	116,500	115,500
Black Diamond	3,970	4,015	4,015	3,995	4,000	4,080
Bothell *part*	16,119	16,244	16,264	16,250	16,250	16,250
Burien	31,881	31,830	31,810	31,480	31,130	31,040
Carnation	1,893	1,920	1,905	1,905	1,895	1,900
Clyde Hill	2,890	2,900	2,895	2,830	2,790	2,780
Covington	13,783	13,840	14,395	14,850	15,190	16,610
Des Moines	29,267	29,600	29,510	29,120	29,020	28,960
Duvall	4,616	4,860	5,190	5,460	5,545	5,595
Enumclaw *part*	11,116	11,180	11,195	11,140	11,160	11,190
Federal Way	83,259	83,890	83,850	83,500	83,590	85,800
Hunts Point	443	455	455	445	450	450
Issaquah	11,212	12,950	13,790	15,110	15,510	17,060
Kenmore	18,678	18,790	19,180	19,200	19,170	19,290

Kent	79,524	81,900	84,275	84,210	84,560	84,920
Kirkland	45,054	45,770	45,790	45,630	45,800	45,740
Lake Forest Park	12,871	12,889	12,860	12,750	12,770	12,730
Maple Valley	14,209	14,590	15,040	15,730	16,280	17,870
Medina	3,011	2,990	3,010	2,970	2,955	2,930
Mercer Island	22,036	21,970	21,955	21,840	21,830	21,710
Milton *part*	814	815	815	820	800	815
Newcastle	7,737	7,815	8,205	8,320	8,375	8,890
Normandy Park	6,392	6,405	6,395	6,345	6,400	6,385
North Bend	4,746	4,755	4,735	4,680	4,660	4,685
Pacific *part*	5,373	5,380	5,405	5,525	5,545	5,640
Redmond	45,256	45,490	46,040	46,480	46,900	47,600
Renton	50,052	51,140	53,840	54,900	55,360	56,840
Sammamish	34,104	34,560	34,660	35,930	36,560	38,640
SeaTac	25,496	25,380	25,320	25,100	25,130	25,140
Seattle	563,376	568,102	570,802	571,900	572,600	573,000
Shoreline	53,296	53,421	53,250	52,730	52,740	52,500
Skykomish	214	215	215	210	210	210
Snoqualmie	1,631	3,416	4,210	4,785	5,110	6,345
Tukwila	17,181	17,230	17,270	17,230	17,240	17,110
Woodinville	9,809	9,825	9,830	9,905	9,915	10,140
Yarrow Point	1,008	1,010	1,010	1,000	990	960
Kitsap	**231,969**	**233,400**	**234,700**	**237,000**	**239,500**	**240,400**
Unincorporated	159,896	160,625	161,345	162,000	164,960	167,920
Incorporated	72,073	72,775	73,355	75,000	74,540	72,480
Bainbridge Island	20,308	20,740	20,920	21,350	21,760	22,200
Bremerton	37,259	37,260	37,530	38,730	37,520	34,580
Port Orchard	7,693	7,810	7,900	7,910	8,060	8,250
Poulsbo	6,813	6,965	7,005	7,010	7,200	7,450
Mason	**49,405**	**49,600**	**49,800**	**50,200**	**50,800**	**51,900**
Unincorporated	40,963	41,130	41,305	41,655	42,105	43,165
Incorporated	8,442	8,470	8,495	8,545	8,695	8,735
Shelton	8,442	8,470	8,495	8,545	8,695	8,735
Pacific	**20,984**	**21,000**	**21,000**	**20,900**	**21,000**	**21,300**
Unincorporated	13,969	13,885	13,940	13,880	13,955	14,200
Incorporated	7,015	7,115	7,060	7,020	7,045	7,100
Ilwaco	950	950	945	940	955	975
Long Beach	1,283	1,385	1,340	1,345	1,360	1,395
Raymond	2,975	2,975	2,985	2,960	2,970	2,975
South Bend	1,807	1,805	1,790	1,775	1,760	1,755
Pierce	**700,818**	**713,398**	**724,998**	**733,700**	**744,000**	**755,900**
Unincorporated	315,359	323,741	329,124	332,980	339,477	345,940
Incorporated	385,459	389,657	395,874	400,720	404,523	409,960
Auburn *part*	146	565	1,040	1,465	2,465	3,930
Bonney Lake	9,687	9,980	12,360	12,950	13,740	14,370
Buckley	4,145	4,330	4,410	4,505	4,510	4,515
Carbonado	621	650	647	655	658	645

DuPont	2,452	2,855	3,295	3,685	4,425	5,410
Eatonville	2,012	2,040	2,070	2,095	2,165	2,330
Edgewood	9,089	9,220	9,320	9,405	9,440	9,460
Enumclaw *part*	0	0	0	0	0	0
Fife	4,784	4,820	4,815	4,905	4,885	4,855
Fircrest	5,868	5,890	5,925	5,935	5,995	6,080
Gig Harbor	6,465	6,485	6,540	6,655	6,680	6,765
Lakewood	58,293	58,272	58,662	58,940	59,010	58,850
Milton *part*	4,981	5,005	5,180	5,205	5,225	5,285
Orting	3,931	4,186	4,060	4,295	4,440	4,820
Pacific *part*	154	145	145	140	135	130
Puyallup	33,014	33,900	34,920	35,490	35,690	35,830
Roy	260	367	865	870	865	865
Ruston	738	740	740	745	745	745
South Prairie	382	430	440	440	435	440
Steilacoom	6,049	6,085	6,095	6,120	6,160	6,175
Sumner	8,504	8,585	8,670	8,780	8,835	8,940
Tacoma	193,556	194,500	194,900	196,300	196,800	198,100
University Place	29,933	30,190	30,350	30,720	30,800	30,980
Wilkeson	395	417	425	420	420	440
San Juan	**14,077**	**14,400**	**14,600**	**14,800**	**15,100**	**15,500**
Unincorporated	12,088	12,380	12,555	12,760	13,025	13,350
Incorporated	1,989	2,020	2,045	2,040	2,075	2,150
Friday Harbor	1,989	2,020	2,045	2,040	2,075	2,150
Skagit	**102,979**	**104,100**	**105,100**	**106,700**	**108,800**	**110,900**
Unincorporated	44,506	44,815	45,205	45,830	46,455	47,250
Incorporated	58,473	59,285	59,895	60,870	62,345	63,650
Anacortes	14,557	14,840	14,910	15,110	15,470	15,700
Burlington	6,757	6,995	7,190	7,315	7,425	7,550
Concrete	790	790	790	780	785	815
Hamilton	309	325	340	340	340	330
La Conner	761	765	775	760	785	795
Lyman	409	410	415	425	440	450
Mount Vernon	26,232	26,460	26,670	27,060	27,720	28,210
Sedro-Woolley	8,658	8,700	8,805	9,080	9,380	9,800
Snohomish	**606,024**	**618,600**	**628,000**	**637,500**	**644,800**	**655,800**
Unincorporated	291,142	294,088	300,460	305,730	309,418	315,390
Incorporated	314,882	324,512	327,540	331,770	335,382	340,410
Arlington	11,927	12,770	13,280	14,330	14,700	14,980
Bothell *part*	13,965	14,160	14,490	14,660	14,680	14,750
Brier	6,383	6,440	6,445	6,450	6,460	6,475
Darrington	1,136	1,307	1,335	1,385	1,405	1,435
Edmonds	39,544	39,590	39,460	39,580	39,620	39,860
Everett	91,488	95,990	96,070	95,470	96,840	97,500
Gold Bar	2,014	2,035	2,055	2,075	2,075	2,085
Granite Falls	2,347	2,540	2,760	2,915	3,010	3,060
Index	157	160	160	160	157	155
Lake Stevens	6,361	6,590	6,640	6,910	7,135	7,185

Lynnwood	33,847	34,010	33,990	34,500	34,540	34,830
Marysville	25,315	26,770	27,580	28,370	28,800	29,460
Mill Creek	11,525	11,970	12,055	12,260	12,760	14,320
Monroe	13,795	14,210	14,670	15,160	15,480	15,920
Mountlake Terrace	20,362	20,370	20,470	20,380	20,390	20,390
Mukilteo	18,019	18,340	18,520	19,190	19,220	19,360
Snohomish	8,494	8,565	8,575	8,640	8,585	8,700
Stanwood	3,923	3,975	4,085	4,190	4,315	4,580
Sultan	3,344	3,775	3,910	4,095	4,135	4,225
Woodway	936	945	990	1,050	1,075	1,140
Thurston	**207,355**	**210,200**	**212,300**	**214,800**	**218,500**	**224,100**
Unincorporated	114,061	116,300	117,935	119,475	122,265	126,450
Incorporated	93,294	93,900	94,365	95,325	96,235	97,650
Bucoda	628	635	640	645	645	650
Lacey	31,226	31,600	31,860	32,240	32,530	33,180
Olympia	42,514	42,530	42,690	42,860	43,040	43,330
Rainier	1,492	1,485	1,490	1,515	1,540	1,585
Tenino	1,447	1,460	1,470	1,495	1,480	1,500
Tumwater	12,698	12,770	12,730	12,740	12,850	12,950
Yelm	3,289	3,420	3,485	3,830	4,150	4,455
Wahkiakum	**3,824**	**3,800**	**3,800**	**3,800**	**3,800**	**3,900**
Unincorporated	3,259	3,240	3,240	3,240	3,250	3,350
Incorporated	565	560	560	560	550	550
Cathlamet	565	560	560	560	550	550
Whatcom	**166,826**	**170,600**	**172,200**	**174,500**	**177,300**	**180,800**
Unincorporated	74,231	75,682	76,718	77,796	78,746	79,848
Incorporated	92,595	94,918	95,482	96,704	98,554	100,952
Bellingham	67,171	68,890	69,260	69,850	71,080	72,320
Blaine	3,770	3,855	3,975	4,025	4,115	4,240
Everson	2,035	2,050	2,015	2,030	2,055	2,080
Ferndale	8,758	8,925	8,925	9,155	9,305	9,750
Lynden	9,020	9,285	9,380	9,740	10,010	10,480
Nooksack	863	918	920	902	910	970
Sumas	978	995	1,007	1,002	1,079	1,112
Washington State	**5,894,143**	**5,974,910**	**6,041,710**	**6,098,300**	**6,167,800**	**6,256,400**
Unincorporated	2,374,593	2,407,904	2,423,073	2,361,802	2,395,226	2,438,882
Incorporated	3,519,550	3,567,006	3,618,637	3,736,498	3,772,574	3,817,518

Another estimate shows the growth in density per square mile since 1980. Table 5 shows a density in coastal counties growing from 126 to an anticipated 209 persons per square mile from 1980 to 2008.

Table 5. Washington Coastal Population, 1980-2008. Source: U.S. Census Bureau and W&PE, Inc. from NOAA "Population Trends Along the Coastal United States: 1980-2008."

	1980	1990	2000	2003	2008
	Absolute / Density	Absolute / Density	Absolute / Density	Absolute / Density	Absolute / Density
Washington	4,132 / 62	4,867 / 73	5,894 / 89	6,131 / 92	6,591 / 99
Coastal	3,109 / 126	3,777 / 153	4,587 / 186	4,778 / 193	5,160 / 209
Coastal Percent	75	78	78	78	78

5.3.2 The Growth Management Act and Local-State Government Balance

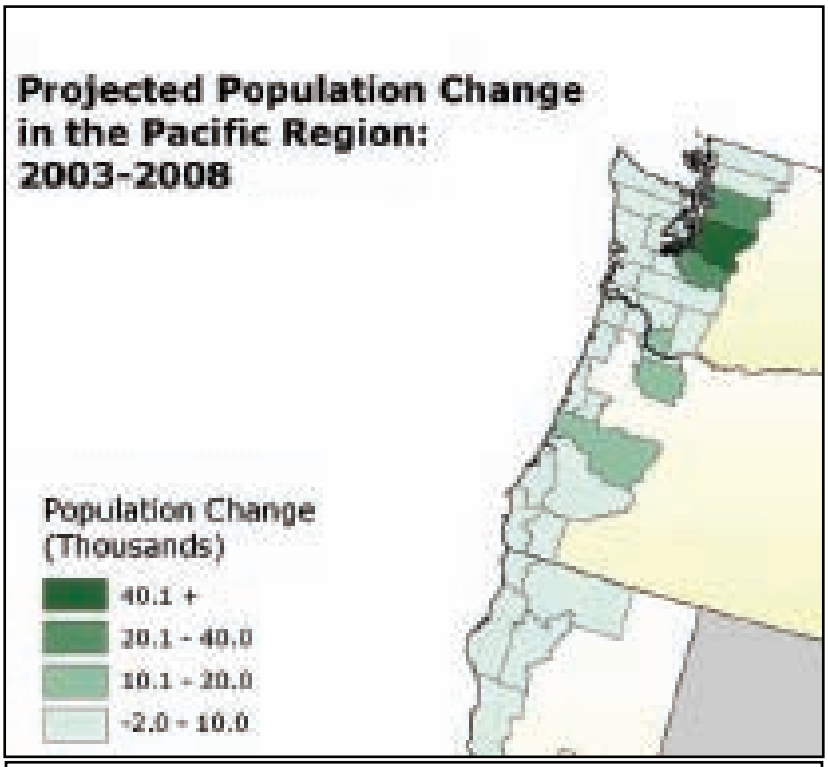


Figure 16. Source: Population trends along the coastal United States: 1980-2008, NOAA

Washington's GMA was crafted to strike a balance between local control and the need for some consistency in planning. The act requires some Washington counties and cities, and encourages others to plan for growth that is expected to increase to about 1.5 million people by 2020. Of the 29 counties covered by the GMA, 18 were required to plan and 11 have volunteered. These 29 counties have a full set of GMA planning requirements, including preparing comprehensive plans and development regulations. Ten other counties are planning for natural resource lands and critical areas only. The GMA protects local autonomy by requiring that specific decisions be made at the local level, such as how to protect critical areas and where to draw urban boundaries. Jurisdictions are using a variety of approaches to tackle land use decisions.

Unlike growth management efforts in some other states, which require state approval of plans and regulations, Washington law presumes that local plans and regulations are valid upon adoption. (An exception is the transportation chapter of the comprehensive plan, which is certified by a regional transportation planning organization.) However, the state, other local governments, and certain individuals can petition one of three regional growth management hearing boards if they think a local action does not meet growth management requirements.

Local communities may amend local plans and regulations to accommodate new conditions. Plans may be amended no more than once a year to ensure proposed amendments are reviewed

comprehensively. Every seven years, cities and counties review their growth management work to determine if it complies with the GMA; revisions are made if needed.

5.3.3. Coastal Washington Economic Growth

One of the goals of the GMA is to encourage development in urban areas where adequate public facilities and services exist or can be provided in an efficient manner. Since 1990 when the GMA was passed, development patterns have changed in the state. Urban sprawl is being reduced, and the pattern of growth is clearly changing. Neighborhoods are beginning to see significant amounts of infill development; thousands of units are being built, including in downtowns and town centers. The changes are happening in communities of all sizes; entire neighborhoods are emerging.

Residential density is increasing in six of the State's fastest growing counties. The Buildable Lands Program, created in 1997, is a review and evaluation program aimed at determining if these counties have enough residential, commercial, and industrial land to meet growth needs. The first coastal county reports under the program show the following dwelling units per acre in urban growth areas: Clark 6, King 7.3, Pierce 4.02, Thurston 3.59, Kitsap, 3.87, and Snohomish 8.89. In Pierce County, residential densities have increased from under two to more than four units per acre from 1995 to 2000. Density trends in urban King County show a significant movement toward greater residential density.

In the Puget Sound region, new growth is happening in and near designated urban centers within cities, slowing the rate of urban sprawl into nearby rural areas. From 1995 to 2000, 87 percent of population growth and 96 percent of job growth occurred inside UGAs, according to the Puget Sound Regional Council.

In King County, land development in urban areas is increasing, while development in rural areas is declining, according to the *2002 King County Benchmark Report*. The county is nearing its goal of 25 percent of growth occurring in urban centers.

Economic development is another GMA goal. Many communities are using growth management planning to help achieve economic development. The City of Cheney decided to use GMA capital facilities planning to provide infrastructure for new businesses. As a result, Cheney has been able to bring more than 900 new jobs to the community.

5.4 Socio-Economic Environment (Human Use)

With financial assistance from NOAA through the CZMA, WDOE photographed Washington's entire marine shoreline, not including the upper reaches of rivers streams and inland lakes (*see*: http://apps.ecy.wa.gov/shorephotos/index.html). With respect to shoreline modification, the photographs reveal that a large percentage of the coastal zone remains in pristine condition (*see* Figure 17). They also illustrate how

Figure 17. Example of undeveloped shoreline environment. Source: WDOE

Washington's coastal zone has been modified over the past century by urbanization, resource extraction, and other human activities. These activities have resulted in vegetation removal, soil disturbance, and conversion to impervious surfaces, having an observably negative effect on many coastal zone areas.[5] Development has additionally resulted in substantial changes to the ecological processes and functions of coastal aquatic systems. For example, floodplains have been disconnected from streams, shorelines have been heavily armored, and contaminants in stormwater have been carried into waters from adjacent urban development and agricultural and forestry activities.[6] Because these activities degrade ecological functions and processes, they adversely affect fish and wildlife that use these ecosystems. Some species, such as chinook salmon, have been severely affected and are federally listed as threatened species.

5.4.1 Resource Lands: Agriculture, Forestry, and Mining

5.4.1.1 Agriculture

Washington agriculture is a multi-billion dollar sector of the state's economy and Washington's leading employer. It is one of the central elements of economic development for both rural and urban counties' rural areas. Washington continues to be a leader in many areas of agricultural production. Agriculture represents $29 billion of Washington's $145 billion economy. Washington farmers produce $5.8 billion worth of agricultural products annually. In addition to primary production, supporting industries include food processing, transportation, farm implements, fertilizers, and computerized irrigation systems.

Agriculture in Washington is a diverse industry that encompasses everything from very large commercial livestock operations to very small part-time crop or livestock producers. Large commercial livestock operations include dairy herds, poultry raised for eggs and meat, and beef operations. Smaller operations include horse breeding, and the raising of pigs, sheep, dairy

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[5] "Riparian habitats have been altered or degraded by forestry and agricultural practices, and clearing for various urban and suburban lands uses. Stream channel hydrology and ecology has been altered for the worse and degraded. Wetlands loss continues, apparently at undiminished rates. Estuarine water quality is variable, and in places is substandard. Overall more commercial shellfish beds are being downgraded than are being upgraded due to on-going pollution problems. As more and more people build larger and larger houses on and near unstable slopes, the problems associated with land sliding become greater. Nearly two miles of Puget Sound shorelines are armored each year, adversely affecting beach and nearshore habitats, and the creatures which depend on those habitats for all or a portion of their life cycle."
WDOE, Supplemental FEIS, p. 5

[6] See Puget Sound Action Team's 2004 State of the Sound Report. "Ecology estimates that stormwater runoff has polluted more than 30 percent of the state's waters. Urban development is fragmenting Puget Sound's habitat. Two hundred forty square miles of forest were converted into housing units and business complexes during an eight-year period in the 1990s. One third of Puget Sound's shorelines (about 800 miles) have been impaired by bulkheads, armoring, and dredging." See Seattle Post/intelligencer Editorial, February 20, 2005 for contemporary commentary: "[Hood C)anal's oxygen levels have remained at perilously low levels with no sign of returning to a healthy state. The oxygen dead zone already has led to three major fish kills in recent years. Marine bird populations are well below those of a few decades ago. In August, the state Fish and Wildlife Commission permanently closed a host of fisheries in the canal."

goats, geese/ducks, rabbits, llamas, emus, and ostriches. Rural farms bring fresh produce to farmers' markets in nearby cities and towns, operate u-pick farms and roadside stands, and grow specialty crops.

Productive farms vary in size throughout the state. In western Washington's temperate climate, farms average less than 100 acres, but produce most of the state's berries, Christmas trees, green peas, milk (valued at $848 million in 1998), eggs, and seafood. Berry farms, nurseries, tree farms, and specialty lettuce have done well in coastal zone counties with large urban centers such as King and Snohomish

Over 250 crops are grown in the state, representing about 20 percent of the gross state product at the retail level. These crops include vegetables, fruits, orchards, vineyards, pasture grass and other crops for silage, hay, and grains. Plant-based agriculture includes nursery and greenhouse products. The rich, moist soil west of the Cascades produces some of the world's finest bulbs and flowering plants, and Washington is the nation's largest produce of tulips, daffodils, and bulbous irises. Cranberries have grown wild in Washington coast peat bogs since the end of the last Ice Age. Miles of bogs line the long Beach Peninsula and stretch northward from Tokeland to Grayland.

Washington is nationally known for its many apple varieties. In 1998, apples ranked second after milk products as Washington's top commodity. Red raspberries, hops, spearmint oil, sweet cherries, lentils, and pears from Washington ranked number one in the nation's agriculture production. Washington ranks second in the nation for asparagus, peppermint oil, apricots, grapes, and fall potatoes. Potatoes are one of the state's most valuable commodities. Washington's 395 growers produce more potatoes per acre than do growers anywhere else in the world. In 1999, Washington produced more than 4.7 million tons of potatoes on 170,000 acres.

Washington's agricultural lands have often been a casualty of development. Urban sprawl tends to favor the prime, highly-productive agricultural lands that occupy valley floors where land is flat and easy to develop. The American Farmland Trust has identified the Puget Sound Valley and the Willamette Valley in Oregon as the nation's fifth most threatened farming regions. Not only does development consume prime agricultural lands, but development-related land speculation pushes up prices and makes farming less profitable.

5.4.1.2 Forestry

Washingtonians have traditionally counted on the forests for jobs and products and forestry remains a leading industry in the state, employing 54,536 people. Washington's soils and climate make it one of the few areas in the nation capable of rapidly growing high-quality timber. More than sixteen million acres of forest lands support timber harvesting or other commodity production. Forest products in Washington are the second largest manufacturing industry after transportation. In 1995, forest products' direct gross income for lumber and wood products, paper and allied products, and private forestry was $12.5 billion.

Forestry is an important part of the economy for both rural and urban counties. Although the public tends to view forest lands and the forest industry in rural counties as most important and

in the most need of conservation, the three fastest growing coastal counties in the decade from 1978 to 1997 were also high in timber production. In that decade, King County was number six in timber production in private lands. Pierce County was number eight, and Snohomish County was number ten.

In 1970, Washington had 23.1 million acres of forest. In 1992, there were 20.9 million acres left—a decrease of at least 2.2 million acres. Nearly ten percent of the state's forests were converted to other uses such as roads, suburbs, cities, and farms. In 1970, 18.4 million of those forested acres were timber lands, managed for forest commodity production. In 1997, 16.1 million acres were timber lands—a loss of 2.3 million acres in less than thirty years. Excluding the value of the timber, land zoned as residential can be much more valuable than timber land. Consequently, many timber lands have been converted to residential areas. Large, continuous tracts of forest have been lost in western Washington. Urban expansion is responsible for about 48 percent of the forest conversion.

Other types of forest conversion include forest practices, like clear cuts. Intensive management of the highly productive Coast Range and Cascade Range foothills have resulted in extensive areas of well-stocked forests of young, nursery-grown Douglas-fir trees. Widespread harvest and replanting have reduced the diversity of species and forest structure in many areas, resulting in loss of biological diversity.

5.4.1.3 Sand and Gravel Mining

In Washington, during periods of rapid land development, people have turned to rivers (dredging and gravel bar mining) and flood plains (gravel pit lakes) as sources of sand and gravel for construction aggregates. Gravel mining practices such as channel dredging are typically done with either a dragline or suction dredge and are conducted mostly in the Columbia River, where a shipping channel is maintained, and the Cowlitz River, where large volumes of sediment from the 1980 Mount St. Helens eruption are still being deposited. Gravel bar mining (scalping) is performed in many Washington rivers for aggregate and in an attempt at flood control. Miners no longer dig into the banks of rivers. Also, the U.S. Army Corps of Engineers (USACOE), state agencies, and some local governments have recognized the environmental effects of in-stream mining. The Grays Harbor County Planning Department, for example, has mandated reduced rates of gravel removal on the Satsop, Wynoochee, and Humptulips Rivers. Otherwise, flood-plain mining, digging gravel pit lakes adjacent to rivers, is a common activity in Washington. "Flood plain" as defined in the SMA means the 100-year flood plain, the area susceptible to flooding by a stream for which there is a one percent chance of inundation in any given year.

Flood-plain mining has occurred on many rivers in Washington State and is highly concentrated along the Yakima River and its tributaries(Naches and Cle Elum Rivers), the Chehalis River and its tributaries (Wynoochee, Satsop, Newaukum, and Skookumchuck Rivers), the Cowlitz River, and East Fork Lew Rivers (Collins, 1996, 1997). Collins estimates that about one-sixth of Washington's gravel production was removed from riverine sources between 1970 and 1991, and most of this mining was located on flood plains and active gravel bars. Many mines permitted in the 1990s cover several hundred acres of flood plain that have been excavated or are scheduled

for excavation. The depth and size of many of those mines was previously restricted by economics and types of machinery used.

Rivers in Washington generally have steep gradients and V-shaped cross sections in their upper reaches. Headward erosion occurs where stream gradients rapidly steepen, as in the Olympic and Cascade mountains. As the rivers approach the ocean or find their way across the Columbia Basin, gradients decrease, valleys broaden, flow velocity decreases, and gravels are deposited. Deposition is greatest at the gradient changes. The river accommodates this aggradation by lateral horizontal migration. Traces of channel shifts and stream meanders are common flood plain features; oxbow lakes and side channels are testament to the history of this activity.

Flood-plain gravel mining generally occurs where the gravel bed load has been deposited, for example, at gradient changes or above or below topographic constrictions through which a river flows (such as Union or Selah gaps on the Yakima River). In Washington, many gravel pits near rivers have been excavated for fill material for major highway projects, a process that further complicates flood-plain functions. Examples are I-90 along the Yakima River, I-82 near metropolitan Yakima on the Yakima and Naches Rivers, and in several places along the East Fort Lewis River near Vancouver. Gravel sources located near the point of use significantly reduce the cost of the aggregate.

Gravel mining has created pit lakes ranging from a few acres to several hundred acres and with depths averaging about 30 feet. Several mined lakes are as deep as 90 feet, and some are as much as five times as deep as the adjacent river. Some of these deep lakes are within 50 feet of the active river channels. This head differential makes them highly vulnerable to river avulsion during high flows. Rivers have avulsed (where gravel pits have a lower base elevation, the stream can become channeled into the pits during high flows) at several mines in Washington in the last 24 years, most of them during storms in 1995 and 1996. (David K. Norman, “Flood Plains, Salmon Habitat, and Sand and Gravel Mining, Washington Geology, vol. 26, no 2/3, September 1998.

5.4.2 Residential Development

Development activities are not necessarily related to any particular resource-based industry. Merely living and/or working in or visiting Washington’s coastal areas affects the land, water, and wildlife. Building houses, planting and maintaining laws, keeping pets, and owning cars may seem like innocuous pursuits, but they can harm the environment. Commuters require extensive highway systems; tourists rely on plentiful accommodations; and residents need stores, hospitals, libraries, police and fire stations, sewage treatment plans, and other types of infrastructure.

Nearly three million people live near the shores of Washington’s marine waters, with another 1.2 million anticipated by the year 2025 for the coastal counties (County Population Projections: 2000 to 2025). Their bulkheads, docks, and buildings result in dramatic modification of the shorelines. Humans modify the shoreline and destroy natural habitat directly through construction of bulk heads and other structures; construction and repair of new and existing

structures; and placement of railroad grades and roads along the shoreline and shoreline recreation.

Shoreline slope and bluff erosion are major natural mechanisms supplying sediments to Puget Sound beaches. In an attempt to prevent these natural processes, shoreline property owners often armor (the use of bulkheads, rip-rap, or other hard structures) the shoreline to protect their property; in the long term armoring may increase erosion of the adjacent beach, exacerbating the original problem. Armoring is linked to a number of physical changes in shore processes that eventually result in a reduction in beach height and width. The WDNR estimates that humans have modified one-third of Puget Sound's shorelines through such practices.

The sprawl of cities and suburbs into rural areas means there are more cars on the roads carrying people farther and farther to shop, work, and recreate. Since 1960, the State's population has nearly doubled and the number of cars tripled. In fact, cars have been multiplying faster than roads, resulting in congestion. Road expansion may seem an obvious solution, however roads and highways also have impacts. Roads and highways collect and concentrate water and toxins, degrading and polluting streams. As impervious surfaces, they prevent water from soaking into the ground, thereby lowering groundwater tables. Streams are constricted into culverts, making it difficult or impossible for fish to pass through. Perhaps the most direct impact is that roads and highways lead to wildlife habitat fragmentation.

Section 5.3.3 above discusses the growth of residential development under the GMA in the coastal counties. In another study, the ShoreZone Inventory, in order to determine the relative significance of single-family residences in overall shoreline modification, scientists in the Nearshore Habitat Program at the WDNR collected data on the proportion of shoreline modification along state saltwater shorelines associated with single-family residences. They found that approximately half of all shoreline modification in Washington State is associated with single-family residences (55 percent +/- nine percent). This finding suggests that shoreline modification associated with single-family residences is a major component of total shoreline modification. WDNR, Summary of Key Findings of *ShoreZone Inventory*, http://www.dnr.wa.gov/htdocs/aqr/nshr/inventory.html, last viewed 6/5/07).

5.4.3 Commercial and Industrial Development

From 1980 to 2000, U.S. wage and salary employment grew by 42.5 percent while Washington wage and salary employment grew by 64 percent. Employment growth in Washington outpaced U.S. employment growth in every major industry division of the economy with the exception of agricultural services, forestry, and fishing. Manufacturing employment in Washington grew by 14 percent from 1980 to 2000 while U.S. manufacturing employment fell by 9 percent. Washington employment in mining, transportation, public utilities, wholesale trade, retail trade, and services grew 50 percent faster than U.S. employment in the same sectors. After the recent recession, total employment in Washington rose 6.7 percent by the first quarter of 2006, more than double the national growth of 2.9 percent (**http://www.ofm.wa.gov/trends/tables/fig103.asp**, last viewed 6/26/2007). On June 14, 2007, Washington's chief revenue forecaster, Dr. Chang Mook Sohn, stated in a press release that the Washington economy continued to outperform the U.S. economy, especially in the areas of

construction and real estate. Dr. Sohn further noted that Washington's real estate market is holding up well and not slowing down as much as the rest of the nation, due in part to strong export markets, including aerospace. Exports originating in Washington totaled $53.1 billion in 2006, a 40 percent increase over 2005.
(**http://www.ofm.wa.gov/news/release/2007/070614.asp**, last viewed 6/26.2007)

Habitat loss associated with industrial and commercial development is a major threat to biodiversity and ecosystem health. Human alteration of the natural environment during the 19th and 20th centuries drastically changed many natural habitats in Washington. Human activities and development have altered wetlands, estuaries, forests, and other ecosystems at a rate of between 30,000 to 80,000 acres a year. These acres are destroyed or degraded by urban development, agricultural practices, timber harvesting, highway construction and other activities. Chronic chemical inputs and larger spills of oils and other chemicals also degrade habitat quality and affect many organisms directly. Degradation of habitat occurs both along saltwater shorelines and upstream in watersheds. Logging, dam-building, land-clearing for development and other land uses can significantly harm riverine habitats for anadromous fishes. Moreover, these activities can harm the downstream estuary. Commercial and industrial developments, as well as roads and streets create impervious surfaces from which storm water rapidly runs, adding more toxic chemicals to coastal habitats.

5.4.4 Utilities

Washington has few fossil fuel resources but has tremendous renewable power potential. The Columbia and Snake Rivers are immense hydroelectric power resources. The State's western forests offer fuel wood resources, and large areas of the State are conducive to wind and geothermal power development. Washington's population and total energy consumption are relatively high. Transportation is the leading energy-consuming sector in the State, followed by the industrial and residential sectors. Washington is a leader in the energy-intensive forest products industry and is the site of several large U.S. military bases.

Petroleum

Although Washington has no indigenous crude oil production, it is a principal refining center serving Pacific Northwest markets. Five refineries receive crude oil supply primarily by tanker from Alaska. However, because Alaskan production is in decline, Washington's refineries are becoming increasingly dependant on crude oil imports from Canada and other countries. The Trans Mountain Pipeline from Alberta supplies more than one-tenth of Washington's crude oil supply. Washington's total petroleum demand is high. Jet fuel consumption is among the highest in the Nation, due in part to several large Air Force and Navy installations. To reduce air pollution, the use of oxygenated motor gasoline is required in the Spokane area during the winter months.

Natural Gas

Washington relies heavily on natural gas produced in Canada and transported by pipeline to U.S. markets. The Sumas Center, in Canada near the border between Washington and British

Columbia, is the principal natural gas trading and transportation hub for the U.S. Northwest. The Northwest Pipeline Corp. system supplies markets in western Washington and Oregon, and the Gas Transmission Northwest line supplies eastern Washington. The residential sector leads Washington's natural gas consumption, followed closely by the industrial and electric power generating sectors. Roughly one-third of Washington households use natural gas as their primary energy source for home heating.

Coal, Electricity, and Renewables

Typically accounting for close to three fourths of State electricity generation, hydroelectric power dominates the electricity market is Washington. Coal-fired, natural gas-fired, and nuclear powered plants account for roughly equal shares of the remaining generation. Washington is the leading hydroelectric power producer in the nation, typically generating about twice that of the next leading state. Eight of the State's ten largest power plants run on hydroelectric power, primarily from the Columbia and Snake Rivers. The 7,079-megawatt Grand Coulee hydroelectric facility, located on the Columbia River, is the largest generating plant in the United States. Grand Coulee's generation capacity is almost twice that of Arizona's Palo Verde nuclear plant, the second-ranked U.S. electric plant. Washington has one large coal-fired plant located near the State's only coal mine in the southwest. Coal production has fallen slightly in recent years due in part to increased hydroelectric production. The State's only nuclear plant, the Columbia Generating Station, is located near the Columbia River in the south-central part of the State, and generates nearly one-tenth of the State's electricity.

Washington State is a major net electricity exporter, supplying electricity to the Canadian power grid, and to U.S. markets as far away as California. The State transmits large amounts of cheaply produced hydroelectric power via the Western USA Interconnection, which runs from northern Oregon to southern California. The system, also known as the Pacific Intertie, is the largest single electricity transmission program in the United States. Although the Pacific Intertie was originally designed to transmit electricity south during California's peak summer demand season, flow is sometimes reversed overnight and has occasionally been reversed during periods of reduced hydroelectric generation in the Northwest.
(**http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=WA**; last viewed 6/26/07)

5.4.5 Transportation

Roads

Four major interstate highways, I-5, I-405, I-90, and I-82 serve Washington and provide direct access to markets within the state and throughout the North American continent. Additionally, I-205 and I-182 allow inter-loop connections for the Vancouver and Tri-Cities (Richland-Kennewick-Pasco areas). (www.choosewashington.com)

Since 1990, the Federal Highway Administration (FHWA) has required states to report road roughness according to the International Roughness Index (IRI), a set of standard codes dictated by the Highway Performance Monitoring System Field Manual for the Continuing Analytical and Statistical Database. This information is then collected and published in a consistent format

in the FHWA's Highway Statistics. This measure reports the percentage of interstate miles that have an IRI of 171 or greater. In 2004, Washington's percentage of interstate miles in poor condition increased from 3.4 to 8.5 percent, decreasing its rank from 36th to 41st. Washington's five-year average value of 3.4 percent, slightly below the national average of 3.6 percent, ranked 32nd. (Washington State Economic Climate Study, 2006)

The Travel Time Index (TTI), calculated by the Texas Transportation Institute, is the ratio of travel time during periods of peak commuting activity to travel time in periods with no traffic congestion. For example, a TTI of 1.35 indicates that a trip that takes 20 minutes when there is no congestion takes an average of 27 minutes during peak commuting periods. The institute publishes indexes for 85 urban areas selected to represent the major metropolitan areas within each state. In 2003, the Seattle-Everett-Tacoma region had a TTI of 1.38, up from a value of 1.36 in 2002. Its five-year average is 1.37, just over the national average of 1.36, ranking it the 13th most congested city of those studied for that period. Spokane, the only other Washington city in the survey, fared better with a TTI of 1.08 and a five-year average of the same value. This ranked the city as the 10th least congested of the 85 cities studied in 2003 and the 12th least congested in its five-year average value. (Washington State Economic Climate Study, 2006)

Washington State trucking/shipping carriers provide scheduled daily departures to principal urban areas in the western, mountain, and mid-western regions of the U.S. and western Canada. Washington State ranks among the top ten states in general freight tonnage carried by truck interstate. This level of competition results in favorable negotiated freight rates. Overland shipping distances from the state's metropolitan areas to the mid-west are shorter than routes from other major western coastal cities. Typical shipping times include one day to San Francisco; two days to Los Angeles; two-to-three days to the mid-west; and five-to-seven days to East Coast cities. (www.choosewashington.com)

Air Transport

Washington State is supported by an air infrastructure of 129 public-use airports, including 14 scheduled commercial-service airports and two international airports providing passenger service access across the state, the nation, and the world. Air freight is moved through 26 primary locations in the state. Seattle-Tacoma International Airport, King County/Boeing Airfield, and Spokane International Airport support the majority of air freight. (www.choosewashington.com) The Federal Aviation Administration's annual Air Traffic Activity and Delay Report provides air traffic information for the 55 largest airports. Air traffic delays can occur at any phase of the flight and are characterized as delays that exceed 15 minutes. For comparison purposes, the report states the number of delays per 1000 operations. In 2005, the Seattle-Tacoma airport ranked 27th among the 55 largest airports with 2.8 delays per 1000 operations, a large improvement from 2004's value of 5.9 delays and well below the largest airports' average of 11.9 delays. The airport's five-year average value of 8.2 delays per 1000 operations was also well below the multiple-airport average value of 13.7 delays and ranked 34th among the 55 largest airports. (Washington State Economic Climate Study, 2006)

Ports

Washington State has seven deep-draft ports on Puget Sound, one on its Pacific Coast and three on the Columbia River. These ports work together to move goods into, through, and out of the state for distribution all over the nation. Asia Pacific markets can be reached one to two days faster from Washington than from California.

The ports of Seattle and Tacoma are world-class facilities that move a combined cargo volume ranking them as the second largest port complex in the Western Hemisphere and the 11th largest in the world. The Port of Tacoma provides double-stack service for railroad shippers and operates its own intermodal rail facility and dockside-to-mainline switching rail.

Ports on Washington's Pacific Coast and lower Columbia River are also important trans-shipment points for ocean vessels and river barges. The state's water transport system extends 352 river miles inland with additional port facilities on the mid and upper Columbia River and Snake River. (www.choosewashington.com)

Railroads

Union Pacific and Burlington Northern Santa Fe are the major transcontinental rail providers in Washington. Both offer intermodal double-stack container rail transport that allows goods to be transported to the mid-west in less than three days, whiles eastern U.S. coastal cities can be reached within five days. Intermodal facilities are located in Seattle, Tacoma, and Spokane. In addition, there are 17 local service railroads.

5.4.6 Historic and Cultural Resources

Washington State has a rich archaeological heritage that spans over 12,000 years dating back to the arrival of the first humans who crossed the land bridge in the Bering Sea. Typical prehistoric archaeological sites in Washington include shell middens, open sites or campsites, pictographs and petroglyphs, caves or rockshelters, wet sites, lithic sites, quarries, culturally modified trees, and burial sites or cemeteries.

Northwest coast societies broke the anthropological rule that agriculture is necessary for large complex villages. On the Washington coast and along major rivers, people lived in large villages where monumental architecture and elaborate art flourished. The economic basis for these societies was the harvest and storage of salmon, coming in dense, predictable runs.

The families of the coast and forest moved with the seasons. Usually, they lived in a village during the winter. When resources became seasonally available, families would leave the village and camp near those resources to collect and process them for storage. This type of residence and economic system is known as a "seasonal round" and produces a large number and wide variety of sites—spring root camps, summer fishing camps, fall hunting camps, and sheltered winter villages. Many activities took place at these sites. There were also spots where only a single activity occurred, such as logging or bark-stripping sites, rock quarries, burial islands, or areas that had religious and spiritual meaning such a pictographs and petroglyphs.

Typical archaeological sites of western Washington include the following:

1) Shell Middens: Shell middens are villages, camp sites, or shellfish processing areas, composed of dark, organically rich soil with shell or shell fragments, artifacts and fire-cracked rock. These sites are found along the saltwater shorelines of western Washington. The village or residential sites may have rectangular house depressions and will be near a source of fresh water. Most of the state's marine shell middens are less than 3,000 years old, the date when the current sea level stabilized. Old Man House State Park at Suquamish is an example of a village site. People processed shellfish at the Manette site near the Manette Bridge in Bremerton.

2) Open Sites or Campsites: These sites are mainly found along rivers and streams and inland. They contain lithic artifacts and flakes of fire-altered rock. Some have small amounts of shell and bone. They are seasonal living sites or short-term camps where people fished, hunted, or gathered plants. Fishing sites such as Tualdad Altu in Renton and Marymoor Park on the Sammamish River have high percentages of blades or microblades (thin narrow flakes of stone) used for filleting fish.

3) Pictographs and Petroglyphys: A pictograph is an image drawn on a rock surface with a mixture of pigments that can include ochre, charcoal or other plant and animal materials. A petroglyph is an image pecked into a rock surface. Images are geometric, human or animal forms. Many petroglyphs are found on prominent boulders along the shoreline or on rock outcrops. There is a southern Puget Sound petroglyph complex characterized by curvilinear faces and designs which occur on beach bounders near or below the high tide line often near village sites. Northern Puget Sound rock art sites are also found on beach boulders. Easily accessible sites include Lime Kiln Petroglyphs on San Juan Island and the Wedding Rock petroglyphs near Cape Alava.

4) Caves or Rockshelters: Caves or rockshelters used as living areas or camping spots are rare in western Washington. They offer the potential for well-preserved deposits. Judd Peak and Layser Cave have yielded information on the use of the foothills of the Cascades from 6,700 years ago to 400 years B.P.

5) Wet Sites: These are rare sites in which normally perishable materials like basketry, wooden artifacts, or wool and hair are preserved, usually because they are saturated by water. Wet sites offer a more complete of people's artifacts, tools and materials. On the Northwest Coast, an estimated 60 to 90 percent of artifacts were made of wood or fiber. Wet sites can be sections of whole villages such as Ozette, over bank refuse deposits such as Biderboost on the Snoqualmie River or Hoko on the Hoko River, or fish weirs such as Wapato Creek Fish Weir in Tacoma.

6) Culturally Modified Trees (CMTs), Basket Trees or Peeled Cedars: These are living trees from which bark has been stripped or planks split off their sides. The bark was used for making baskets or clothing. The planks were used in buildings or making boxes.

CMTs are frequently found in old growth stands of cedar. The cultural modifications on some CMTs have been dated tot 300 years ago. In a recent study on the Makah Indian Rservation, archaeologists identified, eight different types of CMTs, including plank-stripped logs, cut logs, notched trees and chopped trees. Partially finished canoes have also been found.

7) Burial Sites, Islands, or Cemetaries: The locations of burial sites varied over time and among groups. In some parts of western Washington, small off-shore islands or wooded slopes adjacent to villages were cemetery areas. Isolated burials are found in a variety of locations. Shortly after Euroamerican contact, entire villages were decimated by disease and thus became cemeteries. These areas are to be respected and left undisturbed.

In addition to the various types of archaeological sites, Native Americans of the saltwater coasts and forests left artifacts from both flora and fauna. Tools were made from stone, bone, antler and wood. They made projectile points from the dark basalts found along rocky beaches. Points, fish hooks, and harpoons were made from antler, bone and wood. Harpoon lines were fashioned from twisted cedar. Clothing was made from woven cedar bark, spruce roots and fur.

Northwest Coast societies did not make pottery. People boiled water and cooked food in watertight wooden boxes or baskets by heating rocks and dropping them into the water. As a result, a major component of sites is fire-cracked rocks, reddened or blackened by fire and then broken in the cooling process.

Besides artifacts and fire-altered rock, sites contain much biological data. Shellfish remains can help identify the species that were used for food, materials or decoration and can provide evidence on the local environmental setting. Archaeologists use bird remains, fish and land mammal bones to reconstruct the diet and time of year the site was occupied and carbonized plant remains, pollen and charcoal to reconstruct the local vegetation. They also use the new DNA techniques to analyze the amino acids preserved on stone tools to identify the species of animals killed and butchered by those tools.

While archaeology is more often attributed to ancient peoples and site, more recent peoples also have left traces of their lives on the landscape. In Washington, these sites can range in scope from fur trade sites and early missions to military areas and homestead sites, as well as logging, mining, and railroad features. (A Field Guide to Washington Archaeology, 2003, Stilson, M. Leland, et.al., Olympa, WA)

5.4.7 Recreational Development

Washington's coastal zone offers a wide array of recreational attractions. From the picturesque Pacific Ocean and the lush rain forests of the Olympic Peninsula to the vibrant cities and snowcapped mountains in the Puget Sound Basin, the western side of the "Evergreen State" offers outstanding recreation and entertainment in one of the Northwest's most beautiful natural settings.

Washington lays claim to one of the largest and busiest state park systems in the United States. With over 250 parks and recreation areas covering more than 250,000 acres, Washington ranks 15th among all 50 states in the number of areas operating and 13th in the amount of acreage managed, but is ranked 6th in terms of total number of visitors, with over 40 million entering in 2005. Washington park and recreation area visits per capita decreased slightly from 6.5 in 2004 to 6.4 in 2005, decreasing its rank among the states from 5th to 6th. The state's five-year average visits per capita of 7.3, however, ranked 4th. Both measures were well above the national average. Since state park visits per capita began being recorded in 1987, Washington has always placed 6th or higher in the state rankings. (Washington State Economic Climate Study, 2006)

The travel industry is one of the largest and most rapidly growing segments of the Washington economy, providing business opportunities, employment, and revenue throughout the state. Natural resources and outdoor recreation are particularly important attractions. State and National parks are very popular draws, while Washington's part public, part private, ferry system makes traveling the state's network of waterways easy. Outdoor recreational activities include camping, wildlife viewing, nature walks, bicycling, bird watching, boating, fishing and hunting, hiking, horseback riding, kayaking, llama trekking, and mountaineering. Even skiing and snowboarding are popular in Washington's coastal zone. Ski slopes are as little as two hours away from the major metropolitan areas.

Marine recreation includes fresh and saltwater activities; on ocean beaches, along the shores of rivers, streams, and lakes; and the waterfront of Puget Sound. Approximately 72 percent of all Washington households engage in recreational water activities. These activities encompass a variety of pursuits: fishing, swimming, Scuba diving, and windsurfing. Over the last years of the 20th century, whale watching became a very popular outdoor experience. Boat and kayak-based whale watching activities occur in May through September near the San Juan Islands in Haro Strait, an area where orcas are common. Surveys conducted by the Whale Museum in Friday Harbor on San Juan Island reveal a trend of consistent increase in whale watching activities. Boat-based whale watch tour operators first arrived in 1977, and by 1996, represented over 50 vessels carrying in excess of 80,000 passengers. In 1997, growth increased by more than 50 percent, with 83 commercial boats operated by 53 companies.

5.4.8 Public Access

Public access to Washington's shore includes features such as boat launches, beaches, shoreline trails, and observation overlooks. Primarily, local government park and recreation agencies, public port districts, and the state's Park and Recreation Commission provide public access. Other providers include the state departments of Fish and Wildlife, and Natural Resources, plus the National Park Service and the National Forest Service. The Interagency Committee for Outdoor Recreation, as well as local funding initiatives, provide the state and local funding.

The trend toward 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 Treasure; (2) enable "wharfing out" to deep water 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 public access 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.

Public use of shorelines and the demand for public access can be characterized from a 1996 statewide 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 89 percent go at least several times a year. Lakes, rivers, streams, and Puget Sound are about equally popular as "most frequently visited," while the ocean is the least frequent first choice (13 percent).

When asked, "Is there adequate public access to shorelines in Washington?"; 63 percent responded "enough" and 37 percent "not enough." When asked what they found "bothersome" to their shoreline visits, 75 percent 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 some existing launches. Launch facilities every 10-to-12 miles along the river were considered adequate. Presently there are 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.

5.4.9 Piers and Docks (Ports)

There are 76 public ports of all sizes in Washington State, which has the largest locally-controlled port system in the world. Forty-two ports operate industrial areas, and 41 operate recreational piers, marinas, and docks. While Washington comprises just two percent of the U.S. population; it handles seven percent of all U.S. exports and six percent of all imports. The Ports of Seattle and Tacoma combined make up the second largest container complex in North America, second only to Los Angeles/Long Beach and ahead of New York/New Jersey. Washington is more dependent upon trade, and the jobs it provides, than any other state in the U.S. International trade supports almost one third of Washington's workforce; 25 percent in exports, and seven percent in imports. Nearly 740,000 workers and proprietors depend on exports; 161,000 depend upon imports. Forecasters predict that international trade through Washington's ports will continue to increase about four to five percent each year until 2020.

Ports in Washington evolved in much the same was as in other parts of the nation. Wherever people settled near the waters, boats, ships, rafts, and barges were needed to move people and goods. Docks, floats, piers, gangways, and other conveniences were built to accommodate

watercraft traffic. Washington's ports can own and operate shipping terminals, marinas and docks, airports, industrial sites, railroads, parks and recreational facilities, and even promote tourism. Consequently, most of Washington's public piers and docks are located in areas traditionally used for heavy industry.

These days, Washington's ports are cleaning up pollution from past activities, re-claiming vacant industrial land, and exercising tighter environmental control over use of public lands. Ongoing environmental issues include urban harbor sediment cleanup when ports dredge up sediments for shoreline development or to improve harbor navigation; dredging sediment and the disposal of dredged materials to allow deep-draft navigation; habitat protection where shoreline development and dredging can affect marine or freshwater habitats; invasive species released through ballast water; and expanding transportation needs

5.4.10 Marinas

Thousands of residents and tourists enjoy the coastal zone waters through various boating activities. In 1990, Washington residents owned nearly 656,000 boats, kayaks, canoes, rowboats, sailboards and other watercraft, the vast majority of which were located in the Puget Sound. Within Washington's coastal areas, there are approximately 450 marinas providing roughly 37,400 wet moorage slips. Most marinas are small, providing less than 200 slips. Port authorities own four out of five marinas that have over 1,000 slips. Over half the total numbers of marinas are located in the central Puget Sound counties of King, Pierce, Kitsap, and Snohomish. The 29 marinas in San Juan County reflect the popularity of that part of the state as a boater destination.

5.4.11 Instream Structural Uses

"Instream structural uses" refers to management practices that either increase or harm habitat complexity through direct manipulation of streams. Examples of instream structural uses that positively affect instream habitat by increasing complexity include gabions (inexpensive wire baskets filled with rocks), and boulder and log structures that accelerate recovery of fish habitat. Examples of instream structures that negatively affect instream habitat can include such things as culverts, dams, weirs, and spillways that block fish from migrating to upstream habitat.

Few endeavors in resource and environmental management in the Pacific Northwest are more compelling than rapidly expanding efforts to restore the region's streams and rivers. The region's history and strongly held values are inseparably intertwined with its streams and rivers. In coastal and inland settings, historic and current settlement and development patterns have centered on streams for transportation, residential, municipal, agricultural, and industrial water supply, power generation, and crop irrigation. Pacific Northwest streams and rivers, and their floodplains provide: food, construction aggregates, and recreational opportunities. Their floodplains also provide relatively flat, fertile agricultural land and their forested riparian zones historically supplied timber. However, competing uses of stream corridors in modern society, combined with large-scale alteration of watersheds, have directly and indirectly impacted the abundance, quality, and stability of stream and riparian habitats. Streams, with their associated floodplain and riparian ecosystems compose the sole habitat, or critical habitat elements for a

majority of the region's native fish and wildlife. Approximately 85 percent of Washington's terrestrial vertebrate wildlife species depend on riparian habitats for all or critical portions of their life histories. This rich, floral and faunal biodiversity is the basis for much of the state's cultural heritage, economy, and famous quality of life.

Under Washington State laws, the WDOE oversees both the appropriation of water for out-of-stream uses (e.g., irrigation, municipalities, commercial and industrial uses) and the protection of instream uses (e.g., water for fish habitat and recreational use). Ecology does this by adopting and enforcing regulations, as well as by providing assistance to citizens regarding both public and private water management issues. Protection of instream uses is closely tied to the management and protection of existing and future water rights. Assistance to citizens includes funding for such activities as Regional Fisheries Enhancement Groups (RFEGs), which are citizen-based, nonprofit organizations that work to recover salmon in their own communities by partnering with local, state, and federal agencies, tribes, local businesses, community members and landowners. RFEGs receive pass-through funds for projects such as stream-side fencing, construction of off-channel rearing habitat, and estuarine and riparian habitat restoration; basically restoration, education and monitoring projects. The program improves fish habitat on private lands with little to no cost to the landowner. Technical assistance is provided by Washington Departments of Fisheries and Wildlife (WDFW) field staff who assist in project design and implementation. Other programs include the Family Forest Fish Passage Program, which provides financial and technical assistance to rural landowners who have fish barriers on their forestland. The program provides 75 to 100 percent of the cost of fixing fish barriers on qualifying lands, including such activities as removing, repairing, or replacing artificial in-stream structures such as culverts, dams, weirs, spillways; assessing in-stream structures to confirm they are fish barriers; and technical assistance with determining appropriate fish passage structures.

In 1994 the WDOE and the WDFW were combined to more effectively protect and enhance the fish and wildlife of Washington. The WDFW enforces the state anadromous fish and shellfish harvest and management laws. It also participates in long-range planning involving streams, maintains a fish habitat enhancement program, issues hydraulic project applications permits, provides technical assistance in design of in-stream structures affecting anadromous fish, assures conservation and preservation of salmon resources in the state through intensive fish culture facilities, and cooperates in fish rearing projects with sport groups, tribal organizations, educational facilities, and civic groups. The WDFW also contains the Game Commission and its staff. It enforces state fish and game laws, classifies, monitors, and enhances wildlife species, numbers, and habitat; improves hunting and fishing access; and advises individual and groups on ways to minimize man-made impacts to wildlife.

The WDWF administers the Fisheries Restoration and Irrigation Mitigation Act (a USFWS program), which seeks to match federal funds with local, state and tribal programs to increase native fish survival, reduce entrainment in existing waters distribution systems, and increase access to productive fish habitat by constructing fish screening and passage projects. Local, state, and tribal governments are primary applicants. Other private and public landowners may partner with local governments in submitting applications. A proposed project must be associated with an active water diversion and must benefit fish species native to the project area.

5.4.12 Dredging and Dredged Material Disposal

Marine Waters

Marine dredging in Washington can generally be characterized as either: (1) dredging for the creation of new projects (e.g., marinas, channels and port facilities) and waterway deepening; or (2) maintenance dredging to maintain existing facilities and hydrologic features. Dredging to maintain navigational channels in Washington occurs mainly in salt and brackish waters. (Dredging for mining of gravels and/or sand, beach nourishment and to provide cement production materials is discussed above under sand and gravel mining.) Marine dredging activities also include the disposal of dredged materials in marine areas and associated activities where the materials are deposited at a different marine site from where the sediments were removed. The locations of marine dredging activities in Washington State are characterized by region. The three major areas are described as follows:

1) Puget Sound (i.e. inlets and bays of the Strait of Juan De Fuca and the Georgia Strait, Bellingham, Anacortes, Swinomish Channel, Everett, Seattle, Lake Washington, Tacoma to Olympia);

2) Grays Harbor, Willapa Bay, and Quillayute coastal estuaries;

3) Colubmia River from the mouth up to river mile 38. Dredging above river mile 38 is considered "freshwater dredging."

Mechanical dredges are the most commonly used dredging method in Puget Sound (USACOE 1983). Generally, mechanical dredging is used at the larger ports and embayments of the Puget Sound and the Straits area with small-scale suction dredging being used for marina projects and under-pier clearing. In Grays Harbor and Willapa Bay, suction and hopper dredging are utilized except in the upper reaches of the navigation channel such as along the Chehalis River, where clamshell dredges are used. The type of equipment used for marine dredging at the lower reach of the Columbia River include the clamshell, hopper, and pipeline dredges. Hydraulic dredging is reserved for a limited number of under-pier or other "special needs" projects, and typically involves relatively small volumes of dredged material. Projects using hydraulic methods with direct placement from the pipeline include Snohomish River, Keystone Ferry Terminal, and Quillayute River.

In Washington State, the management of dredging and disposal pursuant to the Clean Water Act is accomplished through an interagency approach that includes the USACOE Seattle District, US Environmental Protection Agency (USEPA) Region 10, WDOE, and WDNR. This cooperative management is the Dredged Material Management Program (DMMP). Three separate programs are combined under the DMMP: The Puget Sound Dredged Disposal Analysis, Grays Harbor and Willapa Bay, and the Lower Columbia River programs. The Columbia River jurisdiction is shared with USACOE, Portland District.

Volumes of materials dredged are reported to the DMMP agencies. These agencies, which all regulate some aspect of dredging or disposal are: the USACOE, WDNR, WDOE, and USEPA. Approximately 7 million cubic yards of sediments are dredged from Washington State waterways annually, including the amount of dredged sediment removed from the Columbia River estuary. This dredging has been primarily for the purpose of maintaining navigation systems for commercial, national defense, recreational purposes, and existing geomorphologic and hydrologic characteristics. According to the DMMP report, annual dredging volumes for 1998 and 1999 were approximately 1 to 3 million cubic yards from Grays Harbor, Willapa Bay and Quillayute combined, and approximately 600-800 thousand cubic yards from Puget Sound and the Straits. (Freshwater Gravel Mining and Dredging Issues White Paper, Kondolf, et.al., WDF&W, WDOE, WDOT, December 10, 2001)

Fresh Water

Freshwater navigational dredging occurs in the Cowlitz and Columbia Rivers (Norman et. al 1998), and in the Snake River upstream to the international ports of Lewiston and Clarkston (USACOE 2000). From 1961 to 1999 about 9.2 million cubic yards of sediment was dredged from the Snake River and McNary Reservoirs, most for navigational channels, harbors, and marinas. Disposal sites for the approximately 4.7 million cubic yards dredged from about 1961 to 1982 was not reported, but of the material dredged since 1982, 1.9 million cubic yards was disposed in upland sites and 2.6 million cubic yards was disposed in the riverine reservoirs outside the navigational channels. The USACOE (2000) proposed to dredge another 244 thousand cubic yards in 2000-2001, and to dispose of the spoils in the reservoirs. The Environmental Assessment (USACOE 2000) emphasized expected habitat benefits from disposing of sand to cobble-sized sediment in shallower parts of the reservoirs, but did not address issues such as predation of juvenile salmon by warm water fish, nor potential downstream effects of sediment starvation.

The USACOE has dredged sediment from the lower Columbia River for navigation at least since 1904. Through 1955, most of the dredge material was disposed on land, but since 1956 most disposal has been to deepwater sites offshore. Since 1939, and average of 3.3 million cubic yards of sediment was removed by dredging (George Kaminsky, Washington Dept. of Ecology, Olympia, unpublished data, 2001). The likely cumulative effect of this dredging on the sediment budget of the lower Columbia River are appreciated only when viewed in light of the combined effects of upstream dams on the river's sediment budget. The pre-dam (pre-1934) sand supply to the lower river was about 5.7 million cubic yards per year, but sediment trapping in dams has reduced the sediment rate supply by 66 percent to only 1.8 million cubic yards per year. Thus, the post-dam dredging rate of 3.3 million cubic yards has exceeded the post-dam sand supply by 80 percent (Kaminsky, unpublished data.)

The USACOE has now proposed to deepen the navigational channel from 40 feet to 43 feet along the lower 11.6 miles of the Willamette and lower 103.5 miles of the Columbia River below Vancouver, Washington. The net increase in depth will require a significant increase in dredging.

The Columbia River is the source of sand for a littoral cell extending 100 miles along the Pacific coast, from Point Grenville, Washington, to Tillamook Head, Oregon. The coast there has experienced accelerated erosion, with recent coastal erosion in the Westport area alone costing $30 million in repairs. (Freshwater Gravel Mining and Dredging Issues: White Paper, Kondolf, et. al, December 10, 2001)

5.4.13 Aquaculture

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, has invested substantial funds to improve geoduck culture methods. This has led to increased development of geoduck aquaculture on privately held and state-owned intertidal lands. Currently, Washington State leads all other west coast states in total production of aquaculture products and is one of the top producers of oysters and the top producer of Manila clams in the United States.

The three principal environmental concerns related to aquaculture in Washington State are: (1) water quality; (2) land use patterns and conflicts; and (3) introduced pests and predators. 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 aquaculture productions, these effects can be mitigated to the extent that shellfish (as filter feeders) consume the "excess" phytoplankton.

Land use conflicts are diverse, complex, and widespread, and not all are limited to nearshore areas. Broad land use patterns and density also contribute to the problems of water quality and habitat degradation. Nearshore land use conflicts can often be perceived as aesthetic. 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 among property owners. However, residential stormwater runoff, on-site sewage effluents, and boater wastes adversely affect aquaculturists. 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 more shoreland development.

Pest and predator species introductions have the potential to threaten every facet of aquaculture. Habitat alteration primarily affects 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. The European Green Crab, a nonindigenous species first found in Willapa Bay in the late 1990s, has the potential to 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 Washington's waterways, the potential for introductions of nonindigenous and aquatic nuisance species increases.

5.5 Endangered and Threatened Species.

Information from the USFWS (Dettlaff 2003) and NMFS (Hooper 2003) indicates the potential presence of a number of endangered, threatened, proposed and candidate species in Washington's coastal zone boundaries. These species are identified in Table 6 according to their listing status under USFWS and NMFS jurisdiction, respectively.

Table 6. Species under USFWS and NMFS jurisdiction that potentially could be located in Washington's Coastal Zone Boundary

Regulatory Jurisdiction	Species Type	Federal Status	[a] Common Name	[b] Scientific Name
USFWS	Mammal	E	Gray wolf	*Canis lupis*
	Plant	E	Marsh sandwort	*Arenaria paludicola*
	Mammal	T	Canada lynx	*Lynx Canadensis*
	Mammal	T	Grizzly bear	*Ursus arctos horribilis*
	Bird	T	Bald eagle	*Haliaeetus leucocephalus*
	Bird	T	Marbled murrelet	*Brachyramphus marmoratus*
	Bird	T	Northern spotted owl	*Strix occidentalis caurina*
	Fish	T	Coastal/Puget Sound bull trout (DPS)	*Salvelinus confluentus*
	Plant	T	Water howellia	*Howellia aquatilis*
	Plant	T	Golden paintbrush	*Castilleja levisecta*
	Mammal	C	Mazama pocket gopher	*Thomomys mazama c*
	Mammal	C	Fisher	*Martes pennanti*
	Bird	C	Streaked horned lark	*Eremophila alpestris strigata*
	Bird	C	Yellow-billed cuckoo	*Coccyzus americanus*
	Amphibian	C	Oregon spotted frog	*Rana pretiosa*
	Insect	C	Mardon skipper	*Polites mardon*
	Insect	C	Whulge (Edith's) checkerspot	*Euphydryas editha taylori*
NMFS	Mammal	E	Humpback whale	*Megaptera novaeanglia*
	Mammal	E	Southern Resident killer whale	*Orcinus orca*
	Reptile	E	Leatherback sea turtle	*Dermochelys coriacea*
	Mammal	T	Steller sea lion	*Eumetopias jubatus*
	Fish	T	Puget Sound chinook salmon (ESU)	*Oncorhynchus tshawytscha*
	Fish	T	Hood Canal summer-run	*Oncorhynchus keta*

			chum salmon (ESU)	
	Fish	C	Puget Sound/Strait of Georgia coho salmon (ESU)	*Oncorhynchus kisutch*
	Mammal	D	AT1 Group of Killer Whales	*Orcinus orca*

[a] T = threatened; E = endangered; P = proposed; C = candidate; D = Depleted.
[b] DPS = distinct population segment; ESU = evolutionarily significant unit.
[c] Also includes couchi, glacialis, louiei, melanops, pugetensis, tacomensis, tumuli, and yelmensis species.
Each species listed in Table 6 is presented first by jurisdictional authority (USFWS or NMFS), and then by level of listing severity: endangered, threatened, proposed or candidate

In addition, the Washington State Fish and Wildlife Commission listed twelve more species as endangered or threatened (*see*: http://wdfw.wa.gov/wlm/diversity/soc/soc.htm). These species are important to the people of the Washington, and taken together, they present a major issue and challenge for land and water use programs.

5.5.1 Brief Background of the Listed Species

The summary descriptions of protected species listed below are more fully described in Part V of OCRM's biological assessment (BA). This BA, entitled *Washington State Shoreline Master Program Guidelines Programmatic Biological Assessment*, prepared by Herrera Environmental Consultants, March 2005, is hereby incorporated by reference in its entirety. Additional information on salmon species is provided in Appendix E.

5.5.1.1 USFWS Endangered Species

Gray Wolf (*Canis lupis*)
Gray wolf packs usually consist of a set of parents (alpha pair), offspring, and other non-breeding adults. Dens are often reused, but wolves may also dig new dens or use some other type of shelter, such as a cave (Fritts et al. 1981. Packs use a traditional area and defend it from unrelated wolves.

The gray wolf is native to most of North America north of Mexico City, except for the southeastern United States, where a similar species, the red wolf (*Canis rufus*), is found. The gray wolf once occupied nearly every area in North America that supported ungulate populations. The drastic reduction in distribution and abundance of grey wolves in North America is directly related to human activities, such as over hunting, conversion of habitat into agricultural lands, and extensive predator control efforts by private, state, and federal agencies (USDA 2003).

Originally 24 subspecies of gray wolf were recognized in North America (USFWS 1994a). Recent research efforts indicate that the wolf type once occupying the northern Rocky Mountains of the United States is more widely distributed than previously understood. As a result, fewer

than five subspecies or group types of gray wolf are now recognized in North America. Gray wolf populations have been extirpated from most of the western United States and are listed as endangered. There are no known gray wolf populations within the coastal zone at this time.

Marsh Sandwort (*Arenaria paludicola*)

The marsh sandwort (*Arenaria paludicola*) occurs in swamps and freshwater marshes along the Pacific Coast. Marsh sandwort is a slender perennial plant, classified in the pink family (Caryophyllaceae) that flowers from May to August. Historically, the plant occurred from California to Washington at elevations from sea level to 1, 476 feet (Morey 1990). The one remaining population is located in Black Lake Canyon in San Luis Obispo, California. This species and its coastal wetland habitat are threatened by urban development, conversion of land to agriculture, alteration of hydrology, competition with invasive exotic species, and random extinction due to the vulnerability of the species as a whole. The species has not been found in Washington for over 106 years (Thomas 2002).

Figure 18. Marsh sandwort in bloom. Source: WDOT

5.5.1.2 USFWS Threatened Species

Canada Lynx (*Lynx canadensis*)

The Canada lynx is a secretive, forest-dwelling cat of northern latitudes and high mountains. A medium-sized cat, the Canada lynx has long tufts on its ears and a short, black-tipped tail (USFWS 2003). Similar to the bobcat, the lynx has longer legs and large, well-furred paws, adaptations for maneuvering through deep winter snow. Lynx are most likely to inhabit and are best adapted to areas that receive abundant snow. Lynx use large woody debris such as windfalls and downed logs for den sites, where young can be protected and insulated from the elements. In Washington, lynx use *Pinus contorta* (lodgepole pine), *Picea* spp. (spruce), and *Abies lasiocarpa* (subalpine fir) forests older than 200 years with an abundance of downed woody debris for denning (Koehler 1990). Since 1993, the lynx has been listed as a threatened species in Washington (WDF, WDW, and WWTIT 1993). Richardson (1999) recommended retaining the lynx as a threatened species in the state because the status of the lynx had not changed appreciably in Washington. Critical habitat has not yet been designated for Canada lynx. The closest populations occur about 100 miles to the east-northeast within North Cascades National Park (WDFW 2002).

Grizzly Bear (*Ursus arctos horribilis*)

The grizzly is the second-largest terrestrial North American carnivore. It has a prominent hump over the shoulders formed by the muscles of its massive forelegs. Its color ranges from nearly white or ivory yellow to black. Although considered a meat eater, the grizzly is generally omnivorous; plants make up 80 to 90 percent of its diet. Grizzlies prey on mammals and migrating salmon, when available, but rely primarily on vegetation for food (CWS 2003).

The grizzly bear was originally distributed in various habitats throughout western North America, from central Mexico to the Arctic Ocean. Current distribution is reduced to less than two percent of the grizzly's former range south of Canada in five or six, small populations with

an estimated total population of 800 to 1,000 bears. Four regions or ecosystems— the northern Continental Divide and Cabinet-Yaak in Montana, the Selkirks of Idaho and Washington, and the north Cascades of Washington—accommodate grizzly populations contiguous with Canadian populations. A grizzly population also exists in the Yellowstone ecosystem. The USFWS species lists for Skagit, Whatcom, and Snohomish counties indicate potential presence of this species (USFWS 2005a). However, there are no known grizzly bear populations within WRIA 3 (Thomas 2002 personal communication). The closest populations occur about 100 miles to the east-northeast within North Cascades National Park (WDFW 2002).

Bald Eagle (*Haliaeetus leucocephalus*)

In the Pacific Northwest, bald eagle populations include local nesting birds and wintering birds. Wintering bald eagles congregate along Washington rivers between October 31 and March 31 to feed on stranded, spawned-out salmon. Wide, braided river reaches with numerous gravel bars are the optimal areas for feeding, because the gravel bars catch and retain salmon carcasses and provide the eagles with unrestricted flight paths. A recovery plan for the Pacific bald eagle prepared in 1986 identifies habitat loss as the most significant long-term threat to bald eagle populations (USFWS 1986). The recovery plan recommends habitat management as the most important element in species recovery.

USFW has not designated critical habitat for the bald eagle. The lower Skagit study area contains 20 nesting locations and excellent foraging resources within this relatively undeveloped deltaic floodplain and tidal marsh area. This area is also heavily used as a wintering area and as a stopover for bald eagles en route to wintering areas along the middle Skagit.

Marbled Murrelet (*Brachyramphus marmoratus*)

A seabird, the marbled murrelet nests inland in coastal old-growth forests but winters on marine waters. During late spring and summer, reproductive adults fly substantial distances inland to establish nests in late-successional or old-growth coniferous forest. Most nest sites are found within 70.8 kilometers (40 miles) of the coast, but they range to a maximum distance of 106 kilometers (66 miles) (Marshall 1988).

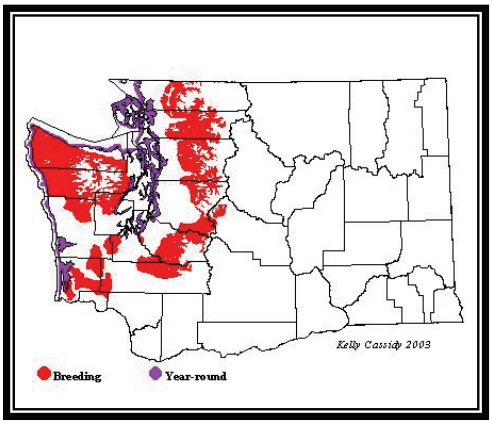


Figure 19. Map from Seattle Audubon Society showing habitats for feeding and nesting. (Source: Kelly Cassidy, 2003)

The USFW listed the marbled murrelet as a threatened species in Washington, Oregon, and California on September 28, 1992. Among other provisions, this rule requires protection for all occupied marbled murrelet sites. It also establishes detection areas: the one square mile (2.59 square kilometers) section of land in which a marbled murrelet is detected plus the surrounding eight sections. A final rule for designating critical habitat for the marbled murrelet was published on May 24,

1996. It identified 32 critical habitat units encompassing approximately 3,907,660 (15,814 square kilometers) of federal and nonfederal lands, consisting primarily of old-growth forest, in Washington, Oregon, and California (USFWS 1996).

Northern Spotted Owl (*Strix occidentalis caurina*)

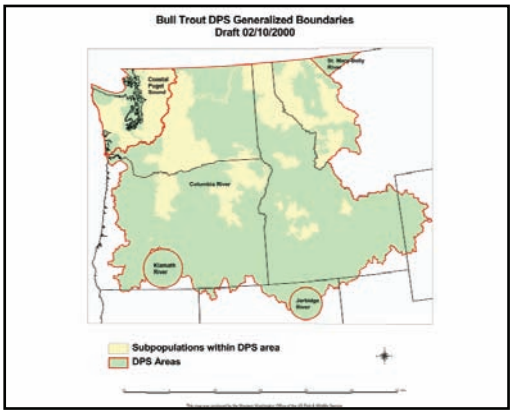
Spotted owls prefer old-growth or undisturbed stands of mature conifers for both nesting and roosting. They occupy relatively large home ranges, the size of which increase as the amount of old-growth forest decreases. Suitable habitat consists of multi-layered, mature forests with average canopy cover greater than 70 percent, containing relatively high densities of logs and snags.

Figure 20. Northern spotted owl. Source: USFWS.

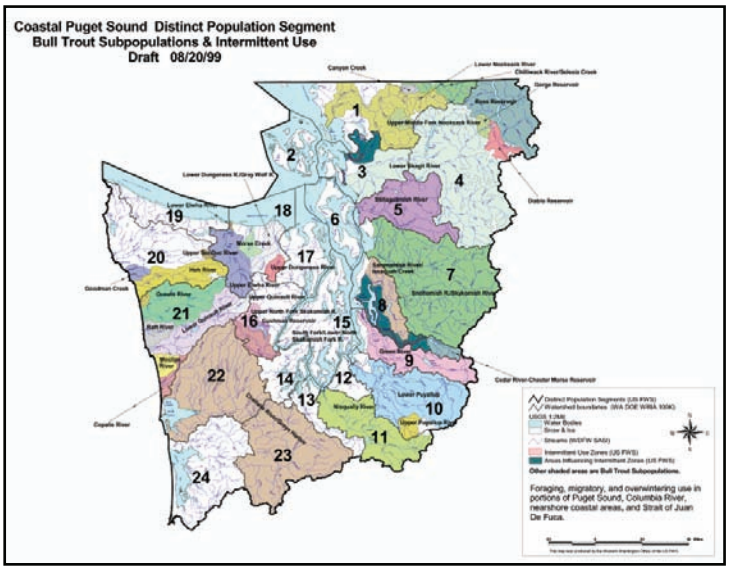
The northern spotted owl was listed by the USFWS as a threatened species in 1990 and has been listed as endangered by Washington since 1999. To protect remaining critical late successional and old-growth forest habitat for the spotted owl and to reduce fragmentation, the USFWS designated several critical habitat units in 1991. A proposed 4(d) rule under the ESA would establish six northern spotted owl special emphasis areas in Washington in which incidental *take* prohibitions would continue to apply. These areas are designed to protect spotted owl habitat on nonfederal lands. The USFWS species lists for Skagit, Whatcom, and Snohomish counties indicate presence of this species (USFWS 2005a). Spotted owls may also occur within WRIA 3. (Thomas 2002 personal communication)

Bull Trout (*Salvelinus confluentus*)

Bull trout occur in four life-history forms: anadromous (associated with marine waters), resident (remains in the headwater areas), adfluvial (associated with lake areas), and fluvial (associated with river areas). Fluvial, anadromous, and resident adults can spawn in the same area (WDFW 1998). After spawning, fluvial adults move throughout the upper river areas and remain in pools throughout the winter, spring, and early summer. Bull trout return to their spawning staging areas in late summer. After spawning, anadromous adults begin the downstream migration from late fall through the winter and enter the estuary area in the spring, where they remain until late spring or early summer when they begin their upstream spawning run again.



Bull trout have more specific habitat requirements than other salmonids and are most often associated with undisturbed habitat having diverse cover and structure. Spawning and rearing activities are restricted primarily to relatively pristine, cold streams, often within headwater reaches. Water temperature is also a critical factor for bull trout, where water temperatures exceed 15 degrees Celsius (°C) which limits distribution (Rieman and McIntyre 1993).



The Coastal-Puget Sound distinct population segment is located west of the Cascade Mountains in the State of Washington. It includes bull trout in the Puget Sound Management Unit and the Olympic Peninsula Management Unit. The Puget Sound Management Unit includes all watersheds within the Puget Sound basin and the marine near-shore areas of Puget Sound. The Olympic Peninsula Management Unit includes all watersheds within the Olympic Peninsula and the near-shore marine waters of the Pacific Ocean, Strait of Juan de Fuca, and Hood Canal (USFWS 2005b). More specifically, the Coastal/Puget Sound bull trout distinct population segment occurs in the following WRIAs: Nooksack (WRIA 1), lower Skagit-Samish (WRIA 3), upper Skagit (WRIA 4), Stillaguamish (WRIA 5), Snohomish (WRIA 7), Cedar-Sammamish (WRIA 8), Duwamish-Green (WRIA 9), Puyallup-White (WRIA 10), Nisqually (WRIA 11), Elwha-Dungeness (WRIA 18), Queets-Quinault (WRIA 21), lower Chehalis (WRIA 22), and upper Chehalis (WRIA 23). This population segment is segregated from the other subpopulations by the Pacific Ocean and the crest of the Cascade Mountain range. The population segment is significant to the species as a whole because it occurs in a unique ecological setting. No bull trout exist in coastal drainages south of the Columbia River (USACOE 2001a).

Land and water management activities and alterations degrade bull trout habitat and continue to threaten all of the bull trout population segments. These activities include river damming, forest management practices, livestock grazing, agriculture, and road building and mining (Beschta et al. 1987; Furniss et al. 1991; Meehan 1991; Nehlsen et al. 1991; Sedell and Everest 1991; Craig and Wissmar 1993; MBTSG 1998). Fish barriers, timber harvesting, agricultural practices, and urban development are also thought to be major factors affecting the Coastal/Puget Sound bull trout (Federal Register 1999). [7]

The USFWS drafted a recovery plan for the Coastal-Puget Sound distinct population segment of bull trout; it is available on the following USFWS website (USFWS 2004b): <http://pacific.fws.gov/bulltrout/Recovery.html>.

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[7] A more thorough description of the natural and human factors affecting the natural and built environments is described in Chapter 5 of the Final Environmental Impact Statement for the Wild Salmonid Policy. This can be found on the Washington Department of Fish and Wildlife site at: http://wdfw.wa.gov/fish/wsp/wspeis.pdf .

The limiting factors affecting the Coastal/Puget Sound bull trout are briefly summarized in the bulleted list below. This synopsis of limiting factors has been compiled from those WRIAs for which a limiting factors analysis has been completed (Kerwin 1999; Haring 2000).

Figure 21. Bull trout. Source: WDFW

- Large percentages of tidal marshes, estuaries, and historical wetlands have been adversely affected or have lost tidal connectivity when converted to human use (e.g., agriculture, residential development, or roads).
- Estuarine and marine near-shore functions have been substantially affected by physical alteration of natural estuaries, alteration of near-shore ecological function due to extensive shoreline armoring, loss of shoreline large woody debris, loss of shoreline riparian shade, poor water and sediment quality, and loss of sediment influx from rivers.
- Cordgrass (*Spartina* sp.) invasions have eliminated native salt marsh vegetation, displaced native plants and animals, raised the elevation of the estuary substrate, and increased flooding.
- Poor water quality conditions have been associated with dredging impacts.
- Floodplain and side-channel habitats and the natural sinuosity of rivers have been lost, primarily due to the construction of dikes, railroads, levee systems, and roads, as well as earthfilling associated with revetments, agriculture, and development.
- Gravel bar scalping and roads in riparian areas have affected the floodplains of some systems.
- Large percentages of floodplain forests along most of the main stem rivers, as well as riparian forests, have been harvested or lost as a result of surrounding agricultural and residential land uses, resulting in a dramatic decrease in large woody debris.
- Adequate large woody debris in streams is lacking, particularly larger pieces that are critical to developing pools, logjams, and other habitat diversity important to salmonids. Stream cleaning has contributed to the lack of large woody debris.
- Loss of riparian function due to removal or alteration of natural riparian vegetation has adversely affected water quality, lateral erosion, stream bank stability, and instream habitat conditions.
- Extensive commercial timber harvesting has resulted in increased sediment loads, reduced large woody debris input and recruitment potential, and altered precipitation runoff patterns. Landslides and debris flows associated with human land uses (e.g., timber practices, road building, and agriculture) are the primary sources of sedimentation.
- Naturally high rates of channel erosion, stream bank erosion, and substrate instability in geologically young basins have been further exacerbated by the loss of stream bank and riparian integrity, as well as alteration of natural hydrology.
- Substrate sediment transport processes have been altered by excess sediment contribution due to land use practices, and by preclusion of sediment transport due to dam construction, resulting in stream morphology changes, channel instability, channel incision, and adverse effects on spawning success and benthic invertebrate production.

- Low summer stream flows have been exacerbated by the cumulative effects of ground water withdrawals and loss of wetlands.
- Low summer flows have permitted saline waters from Puget Sound to move upstream in the main stem Stillaguamish River.
- Seasonally high water temperatures and low dissolved oxygen levels have been exacerbated by low flows and loss of riparian cover.
- Nonpoint source pollution associated with agricultural practices, onsite septic systems, urban runoff, and forest practices has adversely affected water quality.
- Culverts, tide gates, and dikes impede or prevent fish passage.
- Substantial increases in peak flow frequency and magnitude have resulted from alterations in the age and type of surrounding forests, channelization, and increased stormwater runoff from deforested lands.
- Portions of the Coastal/Puget Sound bull trout distinct population segment occur within Olympic National Park and have high quality habitat conditions. However, most of this habitat is inaccessible to fish because of migration barriers in the lower stream reaches.

Water Howellia (*Howellia aquatilis*)

Water howellia is a self-pollinating wetland plant in the bellflower family (Camanulaceae). It is an aquatic annual that grows from 1 to 60 centimeters in height. Its submerged or floating stems are branched with narrow leaves 1 to 5 centimeters in length. The plant can produce two types of flowers: small flowers beneath the water's surface, and emergent white flowers 2 to 2.7 millimeters in length. Howellia reproduces from seed, and germination occurs only in areas of the wetlands that become seasonally dry, allowing seeds to be exposed to the air (Lesica 1990, 1992). The plant usually grows in ephemeral glacial pothole ponds and former river oxbows (Lesica 1992) partially surrounded by deciduous forest that are filled by spring rains and snow runoff and exhibit seasonal drying during the summer (the plant's growing season). Howellia grows in shallow water or along the edges of deep ponds (Shelly and Moseley 1988). The population size depends upon the extent of drying in these wetlands during the growing and germination season (Lesica 1992). In Washington, the plant has been historically reported in Clark, Mason, Thurston, and Spokane counties; however, it appears to have been extirpated in Mason and Thurston counties. Nearly all of the remaining populations are concentrated into two clusters near Spokane, Washington and in Latnah County, Idaho. A third site near Vancouver, Washington contains two small populations (Gamon 1992). Of the 47 known populations in Washington, 34 populations occur on Forest Service land, 11 are on private lands, one is on state land, and one is on Bureau of Land Management land (USFWS 1994b).

The water howellia was listed as threatened on July 14, 1994. The water howellia is threatened by the loss of wetland habitat and habitat changes due to timber harvesting, grazing, development, and competition with other plant species, reed canary grass in particular. In Washington, reed canary grass is considered a major threat to howellia because it is present in 87 percent of the pools that howellia occupies (USFWS 1994b). Purple loosestrife is also considered a threat to howellia; this species is found in the vicinity of the Spokane howellia meta population (West 1990). Critical habitat for water howellia was never designated, as formal designation was considered potentially threatening to the species because it could lead to increased vandalism and *take* (as defined under the ESA). More recently, the USFWS increased sightings of water howellia in ephemeral and low elevation wetlands (Thomas 2002 personal

communication). If these wetlands occur within the study area considered in this project, then there is a chance that water howellia may be present.

Golden Paintbrush (*Castilleja levisecta*)
Golden paintbrush is a perennial herb in the figwort family. It typically has 1-15 erect to spreading un-branched stems reaching a height of 12 inches. The stems and leaves of the plant are covered with soft sticky hairs. It is distinguished from other paintbrush by brilliant golden yellow floral bracts. The plant flowers from April to June, and is relatively inconspicuous when not in bloom. The plant has been observed growing in clumps in open grasslands at elevations below 328 feet. Populations are distributed throughout the Puget Trough on glacial outwash or glacio-lacustrine sediments where annual rainfall averages 31-53 inches. Low intensity fires that maintain native grassland habitat by limiting encroachment of trees and shrubs can maintain suitable habitat for the species (Agee 1993; Kruckeberg 1991; Sheehan and Sprague 1984). Historically the species occurred at over 30 sites in the Puget Trough and south into Oregon.

The plant has been extirpated from the areas in Oregon where it was historically found, and currently forms only ten extant populations (Sheehan and Sprague 1984), eight of which are located in Washington including: one in Thurston County, five on Whidbey Island, one on San Juan Island, and one on Lopez. These populations exist on a mix of public and privately owned lands. Populations of fewer than five plants are not considered viable. Primary threats to golden paintbrush include conversion of open grassland to agricultural or development, fire suppression, picking, resource extraction impacting suitable habitats, grazing by livestock or rabbits, or trampling. Direct human caused impacts include conversion of habitats for residential and commercial development, conversion to agriculture, and potentially impacts associated with road maintenance activities. On June 11, 1997, USFWS listed the golden paintbrush as threatened under the ESA.

5.5.1.3 USFWS Candidate Species

Mazama Pocket Gopher (*Thomomys mazama*)
Adult Mazama pocket gophers are reddish brown to black with lead-colored under parts. Lips, nose, and patches behind the ears are black, and the wrists are white. Adults range from 7 to 11 inches in total length, with tails that range from 2 to 3 inches (Hall 1981). The Mazama pocket gopher is associated with glacial outwash prairies in western Washington, an ecosystem of conservation concern (Hartway and Steinberg 1997). Ninety-seven percent of the Puget Sound basin grasslands have been altered by agricultural expansion, livestock grazing, fire suppression, exotic plant invasion, and urban and suburban sprawl. These Actions have severely reduced suitable pocket gopher habitat (CBD 2002). Pocket gophers are also threatened by pesticide and herbicide spraying. The Mazama pocket gopher (*Thomomys mazama,* including subspecies *couchi*, *glacialis*, *louiei*, *melanops*, *pugetensis*, *tacomensis*, *tumuli*, and *yelmensis*), is a candidate species for listing under the ESA, as identified by USFWS (2003).

Fisher (*Martes pennanti*)
The fisher is a medium-sized forest predator in the weasel family (*Mustelidae*). The fisher's body is light to dark brown with a face, neck and shoulders occasionally having a grayer color. The chest and underside often have irregular white patches. Fishers have long bodies and short

legs with long bushy tails and range in size from 2.5 to four feet long. Fishers occur in the northern coniferous and mixed forests of Canada and the northern United States. Their range extends from the southern Yukon to the Laborador provinces in Canada southward to central California, Wyoming, the Great Lakes region, the Appalachian region, and New England. Over-trapping, predator pest control programs, and alterations of forested habitats by natural and predominantly anthropogenic means in the 1800s and early 1900s drastically reduced the fisher's range. In Washington, the fisher historically occurred on both the east and west sides of the Cascade crest. Historic habitats in the state likely included all low to mid-elevation wet and moderately wet forest habitats. There is historical evidence that fishers occurred throughout the Cascades, Olympic Peninsula, and southwestern and northwestern Washington (USFWS 2004a). More recent evidence (from 1955 through 1991) indicates that on the west side of the Cascade Mountains, fishers occurred from 328 to 5,900 feet in elevation and on the east side from 1,970 to 7,200 feet. Due to a lack of trapping reports or sightings, the fisher is now considered extirpated or reduced to scattered individuals in Washington (USFWS 2004a). The west coast population of the fisher (*Martes pennanti*) is a candidate for listing under the ESA, as identified by the USFWS (2004).

Streaked Horned Lark (*Eremophila alpestris strigata*)

The streaked horned lark is a small, ground-dwelling songbird with a feather-tufted head. Its back is heavily streaked with black, contrasting sharply with its deeply ruddy nape and yellow under parts. The streaked horned lark is active diurnally during all seasons of the year (CDFG 2003). It forages by walking on the ground searching for insects, snails, and spiders during the breeding season, adding grass and other plant matter to its diet during other seasons (Bent 1942). The lark builds grass-lined nests on the ground and in the open. The greatest threat to the streaked horned lark's survival is the dramatic loss of native grasslands. Puget Sound lowland prairies have been reduced from 150,000 to 4,000 acres (CBD 2002). Agricultural expansion, livestock grazing, urban and suburban sprawl, and fire suppression have caused the loss.

The streaked horned lark nests on the ground in sparsely vegetated sites in short-grass-dominated habitats. Historically, this type of habitat was found in prairies throughout western Oregon and Washington (CBD 2002). More recently, streaked horned larks have used manmade habitats for nesting, such as fallow agricultural fields, lightly to moderately grazed pastures, seasonal mudflats, airports, and dredged material islands (Gabrielson and Jewett 1940; Rogers 1999). Streaked horned larks are also found in dune habitats along the coast (Rogers 1999). The primary factors contributing to the loss and degradation of streaked horned lark habitat have been the conversion of grasslands to other uses such as agriculture and residential development, encroachment of woody vegetation due to fire suppression activities, and encroachment into prairies by nonnative plant species such as Scotch broom (*Cytisus scoparius*) and sod-forming grasses (*Holcus* sp. and *Arrhenatherum elatius*) (CBD 2002).

The streaked horned lark is a USFWS candidate species for listing under the ESA. The species is also protected by the federal Migratory Bird Treaty Act (16 U.S.C. 703 et seq.) and by state laws as a non-game species. Breeding habitat, however, receives little protection from these laws. The lark was once a common nesting species in grasslands and prairies west of the Cascade Mountains from southern British Columbia through Washington and Oregon. The destruction of 95 percent of native grasslands on the west coast, however, caused cataclysmic population

declines. The streaked horned lark is currently considered rare and has been extirpated from much of its range, particularly in Washington (USFWS 2002b). Although common around Puget Sound up to the 1950s, it is now extirpated in the San Juan Islands. A total of about 100 pairs remain, divided between south Puget Sound and islands near the mouth of the Columbia River (CBD 2002). In 2000, 58 streaked horned larks (51 males and 7 females) were detected at the 11 known breeding sites in the southern Puget Sound lowlands and the outer coast (MacLaren 2000).

Yellow-Billed Cuckoo (*Coccyzus americanus*)

The yellow-billed cuckoo is a medium-sized bird of about 12 inches (30 centimeters) in length, weighing about 2 ounces (60 grams). The species has a slender, long-tailed profile, with a stout and slightly down-curved bill, which is blue-black with yellow on the basal half of the lower mandible. Plumage is grayish-brown above and white below, with reddish-brown primary flight feathers. The tail feathers are black and white patterned. The legs are short and bluish gray, and adults have a narrow, yellow eye ring (paragraph adapted from USFWS 2005c). Western cuckoos (the western distinct population segment is west of the crest of the Rocky Mountains) breed in densely vegetated deciduous riparian habitats (particularly woodlands with cottonwoods (*Populus fremontii*) and willows (*Salix* sp.) (Ehrlich et al. 1988). Yellow-billed cuckoos feed exclusively on insects and have been documented timing their nesting activities to coincide with insect hatches (WDFW 2005). Yellow-billed cuckoos winter in South America, generally east of the Andes. The primary factor contributing to population decline is habitat loss. In the west, cuckoos are closely associated with broadleaf riparian (i.e., streamside) forests. Logging, cattle grazing, dams, water developments, and river channelization have eradicated many of the west's riparian forests. In most western states, 60 to 95 percent of the riparian forests have been destroyed (CBD 2005).

The yellow-billed cuckoo is a USFWS candidate species for listing under the ESA. The species is also protected by the federal Migratory Bird Treaty Act (16 U.S.C. 703 et seq.) and by state laws as a nongame species. Breeding habitat, however, receives little protection from these laws. In the Pacific Northwest, the species was fairly common locally in willow bottoms along the Willamette and Columbia rivers in Oregon, and in the Puget Sound lowlands and along the lower Columbia River in Washington (Gabrielson and Jewett 1940; Jewett et al. 1953; Roberson 1980; Marshall 1996). The last confirmed breeding records were in the 1930s and the species may now be extirpated from Washington.

Oregon Spotted Frog (*Rana pretiosa*)

The Oregon spotted frog is a medium to large aquatic frog (adults range from 2 to 4 inches in snout-to-vent length). The dorsal color is olive-brown to brick red with black spots that have ragged edges and light centers. The undersides of the legs and margin of the abdomen are orange-red to red (McAllister and Leonard 1997). The legs are relatively short and the toes are nearly fully webbed. The frog’s call is a series of six to nine low-pitched clucks. This species is highly aquatic and is rarely found away from water (McAllister and Leonard 1997). Extant populations occur in large shallow wetland systems associated with a stream or stream network. Breeding habitat is in seasonally flooded margins of wetlands. Egg masses are placed in areas where they receive little or no shading from vegetation. Waters that remain aerobic and do not freeze to the sediments are necessary for winter survival in areas subject to freezing (McAllister

and Leonard 1997). The historic range in Washington for this species includes the Puget Trough physiographic province and the southern extent of the Western Cascade physiographic province.

The Oregon spotted frog is a candidate species under the ESA. This species has declined dramatically from its original distribution because of the filling and alteration of wetlands. The four remaining populations are isolated and vulnerable to a wide variety of factors that may interfere with reproduction or survival. Until recently, only four populations had been reported in Washington: two in Thurston County and two in Klickitat County (WDNR 2003a). Recently, USFWS (2003) identified the Oregon spotted frog as potentially occurring in Pierce County (WRIA 10) and in Kitsap County (WRIA 15).

Mardon Skipper (*Polites mardon*)
The Mardon skipper is a small, tawny-orange butterfly with an adult wing span of 1 inch (USGS 2003). Males can be identified by reddish-orange spots on the upper side of the otherwise dark brown body. The forewing has a short, black stigma. The female is darker than the male, with spots that are lighter and more apparent (USGS 2003). On the female, the underside is similar to the upper side. Males perch on grasses to wait for receptive females. The chrysalids hibernate for the winter before taking flight. Mardon skippers have only one brood, which pupate from May through July (USGS 2003). Adult skippers feed mainly on flower nectar.

In the Puget lowlands, the Mardon skipper is found on glacial outwash prairies where it inhabits open grasslands (Larsen et al. 1995). In the southern Cascades, the Mardon skipper is found in open, fescue grasslands within Ponderosa pine savanna/woodland areas. Southern Cascade sites vary in size from small meadows of 0.5 acres (or less) to large grassland complexes (Larsen et al. 1995). Site conditions range from dry, open ridgetops to areas associated with wetlands or riparian habitats. Human structures, including roads and trails, logging landings, helicopter pads, buildings, towers, livestock corrals, trail destinations, and campgrounds, are often built in forest openings. Construction in these areas results in direct habitat loss and degradation of remaining habitat for the Mardon skipper. In Washington, roads, trails, and buildings have destroyed habitat at many previously pristine sites. The Mardon skipper is endemic to the Pacific Northwest. In Washington, the distribution includes small concentrations in the Tenino prairies and the south-central Cascades (Larsen et al. 1995). Suitable habitat consists of grasslands on glacial outwash prairies, as well as openings and ridgetops within Ponderosa pine stands. Idaho fescue (*Festuca idahoensis*) is the suspected host plant.

The Mardon skipper has been designated as a candidate species under the ESA. The skipper is known to occur in Washington. Mardon skippers were likely more widespread and abundant before the large-scale loss of their open, fescue-dominated grassland habitat. More than 95 percent of the original prairie grasslands are gone from western Washington (WDFW 2002d).

Whulge (Edith's) Checkerspot (*Euphydryas editha taylori*)
The Whulge (Edith's) checkerspot, also known as Taylor's checkerspot, is a medium-sized, colorfully checkered butterfly with a wingspan of less than 2.25 inches. It formerly occurred throughout the extensive grasslands, prairies, and oak woodlands of Vancouver Island, the Puget Sound basin, and the Willamette valley (CBD 2002). Many butterflies have very specific requirements for larval food plants. Whulge (Edith's) checkerspot larvae have been documented

feeding on members of the figwort or snapdragon family (Scrophulariaceae), including paintbrush *(Castilleja hispida*), as well as native and nonnative *Plantago* species in the plantain family (Plantaginacea) (Xerces Society et al. 2002; Guppy and Shepard 2001).

The Whulge (Edith's) checkerspot is threatened primarily by habitat loss and degradation. Grasslands covered hundreds of thousands of acres in the Puget Sound basin lowlands prior to European settlement. Today, less than three percent of that original landscape remains, and much of it is degraded. In the southern Puget Sound region, the species inhabits glacial outwash prairie habitat (USFWS 2002d). Host plants include members of the figwort or snapdragon family such as paintbrushes (*Castilleja* sp.) and owl's clover (*Orthocarpus* sp.). Whulge checkerspots also use native and nonnative plantains (*Plantago* sp.).

The Whulge (Edith's) checkerspot is a USFWS-designated candidate species for listing under the ESA. Locations in Washington that currently harbor the species are San Juan County (one population), Pierce County (two populations), and Thurston County (three populations, although one of them is likely extirpated).

5.5.1.4 NMFS Endangered Species

Humpback Whale (*Megaptera novaeangliae*)

The humpback has a bulky head with bumpy protuberances (tubercles), each with a bristle. Humpback whales grow to be about 52 feet long, weighing 30-50 tons. The females are slightly larger than males, as with all baleen whales. The four-chambered heart of the average humpback whale weighs about 430 pounds. Humpbacks come in four different color schemes, ranging from white to gray to black to mottled. There are distinctive patches of white on underside of the flukes. These markings are unique to each individual whale, like a fingerprint. The humpback's skin is frequently scarred and may have patches covered with diatoms. Humpback whales have 14-35 throat grooves that run from the chin to the navel. These grooves allow their throat to expand during the huge intake of water during filter feeding. They have small, round bumps on the front of the head (called knobs or tubercles), edging the jaws.
Humpbacks have huge, mottled white flippers with rough edges that are up to one-third of their body length; these are the largest flippers of any whale. The humpback's genus, Megaptera, means "huge-wings," referring to its flippers. The flippers may have barnacles growing on them. The deeply-notched flukes are up to 12 feet wide. Humpbacks have a small dorsal fin toward the flukes.

Humpback whales (like all baleen whales) are seasonal feeders and carnivores that filter feed tiny crustaceans from the water. Humpback whales feed upon krill, copepods, juvenile salmonids, Arctic cod, walleye pollack, pollack, cephalopods, and pteropods (Johnson and Wolman 1984). They are gulpers (not skimmers), filter feeders that alternatively swim then gulp a mouthful of plankton or fish. Concentrated masses of prey are preferable for this method of feeding. Humpbacks cooperate in hunting and have developed a method of rounding up highly concentrated masses of prey that is called bubble-net feeding. The hunting members of a pod form a circle 10-100 feet across and about 50 feet under the water. Then the humpbacks blow a wall of bubbles as they swim to the surface in a spiral path. The cylindrical wall of bubbles makes the trapped krill, plankton, and/or small fish move to the surface of the water in a giant,

concentrated mass which the humpbacks consume. (http://www.enchantedlearning.com/subjects/whales/species/Humpbackwhale.shtml) An average-sized humpback whale will eat 4,400-5,500 pounds of plankton, krill and small, schooling fish each day during the feeding season in cold waters (about 120 days). They eat twice a day.

There are significant genetic differences between the Alaska and California humpback feeding groups based on mitochondrial (Baker et al. 1990) and nuclear DNA analysis (Baker 1992). Results from photographic research also suggests a division between the summer feeding aggregations off the western United States (California, Oregon, and Washington) and those aggregations occurring farther north, with the Canadian border serving as an approximate boundary between the different populations (Calambokidis et al. 1996; 2000). Photo identification studies in Alaska also indicate that humpback whales use discrete, geographically isolated feeding areas that are revisited by the same individual year after year (Straley 1994).

Humpbacks feed during the summer in high-latitude waters and migrate into low-latitude tropical waters for the winter months where they breed and calf. Gestation averages 12 months and lactation continues for approximately one year (Rice 1967). Most calves are weaned at one year (Clapham 1997). The calving interval ranges from one to three years (Clapham 1997). Estimated age at sexual maturity for humpback whales is uncertain.

Causes of natural mortality in this species are not well understood (Dolphin 1987; Whitehead 1987). Strandings in coastal areas, especially on the Atlantic coast, have been documented, and in 1987 and 1988, 14 humpback whales died from ingestion of dinoflagellate saxitocin-infected mackerel. Anthropogenic factors in humpback mortality include historical whaling impacts, collisions with ships (vessel strikes), and entanglement with fishing gear. Noise-related impacts (associated with whale-watching vessels, oil and gas exploration, coastal development, low-flying aircraft, and fishing and recreational vessels) are believed to disturb humpback whales, as evidenced by avoidance behaviors or displacement, damage to hearing, and disruption of low-frequency communication between individuals. Habituation to vessel traffic may also contribute to vessel strikes (Swingle et al. 1993; Wiley et al. 1995).

The humpback whale was listed as endangered under the ESA in 1973. This status is applied to all stocks in United States waters.

Southern Resident Killer Whale (Orcinus orca)

Killer whales are toothed-whales that are black dorsally and white ventrally, with a conspicuous white oval patch located above and behind the eye. A highly variable gray or white saddle is usually present behind the dorsal fin. Killer whales grow to considerable size. The males can reach lengths of 25 feet or more and weigh 10,000 pounds. Females are slightly smaller, and sexual dimorphism also occurs in flipper size and height of the dorsal fin. On average, males are not reproductively mature until 15 years of age, whereas females can reach sexual maturity as early as age 11 (Krahn et al. 2004).

The killer whale is one of the most widely distributed marine mammals, ranging throughout the Pacific and Atlantic oceans as far north as Iceland and as far south as Antarctica (NOAA 2005; Leatherwood and Dahlheim 1978; Heyning and Dahlheim 1988). There are two killer whale forms (ecotypes) found in Puget Sound: transients and residents. Transient killer whales travel in pods and hunt other marine mammals for food. Resident killer whales spend more time in Puget Sound, traveling in large, stable pods ranging from ten to approximately 60 whales (NMFS 2005). Resident populations are heavily reliant upon salmon as a food source. The dorsal fin of resident whales is rounded at the tip and falcate (curved and tapering). Resident whales have a variety of saddle patch pigmentations, with five different patterns recognized (Baird and Stacey 1988).

The southern resident killer whale assemblage contains three pods—J pod, K pod, and L pod—and is considered a stock under the Marine Mammal Protection Act. Their range during the spring, summer, and fall includes the inland waterways of Puget Sound, the Strait of Juan de Fuca, and the southern Georgia Strait. The west side of San Juan Island and Haro Strait is the most commonly used area among all three pods, but other regions (e.g., the south end of Vancouver Island) are used to varying extents by the pods (Krahn et al. 2004). Little is known about the winter movements and range of the southern resident stock. However, the assemblage has been recently documented in non-summer months in the coastal waters off Oregon, Washington, Vancouver Island, central California, and the Queen Charlotte Islands (Krahn et al. 2004).

Salmon, particularly Chinook, are considered the major prey of southern residents, although information on food habits outside the Puget Sound region is very limited. There have been recent reports of southern resident pods feeding along the Washington and California coasts during Chinook salmon runs (Krahn et al. 2004). Factors causing the population decline of southern residents are not well understood. Some potential causes of decline are reduced quantity and quality of prey; persistent pollutants that could cause immune or reproductive system dysfunction; oil spills; and noise and disturbance from vessels (NMFS 2005). Detailed life history information is available in the Biological Review Team's status review documents (NMFS 2002a, 2004) and the *Washington State Status Report for the Killer Whale* (Wiles 2004).

The NOAA Marine Fisheries Service listed Southern Resident killer whales as endangered on November 15, 2005. This was based on concerns regarding the population decline, the limited number of reproductive-age males, and the presence of females of reproductive age that are not having calves (NMFS 2005). This distinct population segment is at risk of extinction because of either small-scale impacts over time (e.g., reduced fecundity or subadult survivorship) or a major catastrophe (e.g., disease outbreak or oil spill). In addition, the small population size makes the southern resident distinct population segment more vulnerable to inbreeding depression (69 FR 245, December 22, 2004).

Leatherback Sea Turtle (*Dermochelys coriacea*)

The leatherback is the largest living turtle and is so distinctive as to be placed in a separate taxonomic family, Dermochelyidae. The carapace consists primarily of a 1.6-inch thick, tough, oil-saturated connective tissue distinguished by a rubber like texture. The adult skin is black and

scaleless, and the undersurface is mottled pinkish-white and black. The average curved carapace length for adult turtles is 61 inches and weight ranges from 441 to 1,543 pounds (NMFS 2003).

The leatherback is typically associated with continental shelf habitats and pelagic environments. Reports of foraging adults in north Pacific waters document feeding on the jellyfish *Aurelia* species off the coast of Washington State (Eisenberg and Frazier 1983). There are clearly areas under United States jurisdiction that are predictably frequented by leatherback turtles (such as Monterey Bay, California), but specific feeding areas have not been identified. Roughly one-half the global population of adult females are believed to nest on the west coast of Mexico (Pritchard 1984). If so, the waters off the west coast of the United States may represent some of the most important foraging habitat in the entire world for the leatherback turtle (NMFS 2001a, 2001b). Aerial surveys of California, Oregon, and Washington waters suggest that most leatherbacks are found in continental slope waters, whereas fewer occur west of the continental shelf (NMFS 2001a, 2001b).

The leatherback was listed as endangered on June 2, 1970. It is currently estimated that 20,000 to 30,000 female leatherbacks exist worldwide. The collapse of these populations is attributed to an over harvesting of eggs and the turtles themselves, incidental catch in commercial fisheries, and habitat destruction. Along the Pacific coast of the United States, incidental catch poses a threat to leatherback turtles in pelagic foraging and transit areas, coastal feeding grounds, and migratory corridors that probably exist along the coast and south into Mexico. Entanglement and ingestion of marine debris also continues to pose a threat to leatherbacks.

5.5.1.5 NMFS Threatened Species

Steller Sea Lion (*Eumetopias jubatus*)

Steller sea lions range from California to northern Japan along the northern Pacific Rim (Loughlin et al. 1984). The Gulf of Alaska and the Aleutian Islands support concentrations of the species. Steller sea lions are not migratory, although outside of breeding season (May through July) they are known to distribute widely. Juveniles and adult males have particularly wide-reaching ranges.

Figure 22. Stellar sea lion. (Source: NOAA Photo Library)

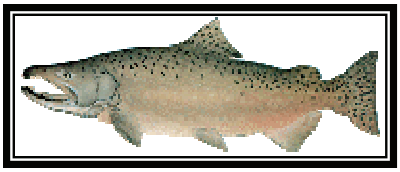
As marine carnivores, Steller sea lions eat a wide variety of fish, including pollack, flounder, herring, capelin, Pacific cod, salmon, rockfish, and sculpins, and invertebrates such as squid and octopus. Most of the top-ranked prey of sea lions are off-bottom, schooling species. Feeding occurs from the intertidal zone to the continental shelf. Steller sea lions gather on well-defined, traditionally used rookeries to pup and breed.

In April 1990, NMFS listed the Steller sea lion as threatened under the ESA. The population of the western stock (i.e., individuals found from Cape Suckling, Alaska, westward into the north Pacific) has shown an ongoing decline since the 1970s. The Steller sea lion is recognized as depleted under the Marine Mammal Protection Act. Many theories have been proposed for the decline of Steller sea lion populations, in particular the western stock, including overfishing resulting in sea lions being out-competed for food resources, disease, killer whale predation, and

environmental changes. However, a clear cause for the decline has not been established. The eastern stock is believed to be increasing in the northern portion of its range (Southeast Alaska and British Columbia). In the southern portion of its range, the eastern stock has been declining as a result of decreased prey availability, contaminants, and disease (Sydeman and Allen 1999).

Critical habitat was designated for the Steller sea lion in 1993 by NMFS. Critical habitat includes all rookeries, major haul-out sites, and aquatic feeding areas. There are no rookeries or major haul-out areas along the Washington coast. Rookeries and major haul-outs in the eastern Pacific occur along coastal California, Oregon, and Alaska. Occasional haul-outs may occur on islands offshore of the northern coast of Washington.

Chinook Salmon (*Oncorhynchus tshawytscha*)



The chinook salmon is the largest of the Pacific salmon, averaging 90 centimeters in length and 8 to 19 kilograms in weight. Because of their large size and inability to jump significant heights, adult chinook salmon prefer large, low-gradient rivers and streams for spawning. Consequently, the species has been significantly affected by the construction of dams in major river systems (Wydoski and Whitney 1979). Population decline can also be attributed to degradation of water quality and loss of spawning habitat from the effects of logging, road construction, and urbanization on streams and rivers (WDF et al. 1993). For a more detailed description of this important species, see Appendix E.

Chum Salmon (*Oncorhynchus keta*)

Hood Canal summer-run chum spawn from late August to late October (WDFW and PNPTT 2000). Spawning normally begins immediately above the tidal influence and extends upstream as far as good spawning gravels are accessible. Adults generally spawn in low gradient, lower main stem reaches of natal streams, typically in center channel areas due to the low flows encountered in the late summer and early fall. Chum salmon prefer to spawn in shallower, slower-running streams and side channels than sites preferred by other salmonid species. The females lay from 2,000 to 3,600 eggs in gravels ranging from 0.5 to four inches, although survival is higher in larger gravels two to four inches. Eggs incubate in reeds for five to six months, and fry emerge between January and May, depending on water temperature, dissolved oxygen, and gravel composition (Emmet et al. 1991). Successful incubation and rearing condition include:

- the presence of adequate large woody debris to reduce scour of incubating eggs and moderate peak winter flow velocities,
- the absence of excessive fines within spawning gravel,
- stable channel configuration, and
- access to floodplain and off-channel areas October (WDFW and PNPTT 2000).

After hatching, fry move rapidly downstream to sub-estuarine habitats. Chum salmon juveniles out-migrate to estuaries immediately after emergence, unlike the other salmonids that rear in

freshwater for up to a year. Therefore, chum salmon are more dependent on habitat in the lower reaches of coastal rivers and estuaries than are other salmonids. Sub-estuary deltas support a diverse array of habitats (tidal channels, mudflats, marshes, and eelgrass meadows) that provide essential rearing and transition environments for this evolutionarily significant unit (69 FR 239, December 14, 2004). Juveniles rear in these habitats for days to weeks before entering the ocean, and returning adults stage in sub-estuaries before ascending natal streams to spawn. Juveniles feed primarily on plankton and epibenthic organisms, while subadults feed on similar items as well as larger prey (including fishes and squid) (69 FR 239, December 14, 2004). Most adults mature and spawn as three and four year old fish (WDFW and PNPTT 2000).

Alterations and loss of freshwater habitat for salmonids have been extensively documented in many regions. Large woody debris plays a significant role in creating and maintaining Pacific salmon spawning and rearing habitat. Many rivers have been cleared for navigation, and streams have been modified extensively to facilitate log drives. Some of the more adverse impacts on the estuarine and freshwater habitats used by chum resulted from stream work in the 1800s and early 1900s, when logs were transported down streams and stored in main stems of rivers, lakes, and estuaries. Factors listed as most significant to chum salmon include:

- water withdrawal, conveyance, storage, and flood control resulting in insufficient flows, stranding, juvenile entrainment, and instream temperature increases;
- logging and agriculture resulting in loss of large woody debris, increased sedimentation, loss of riparian vegetation, and habitat simplification;
- mining resulting in degraded habitat and pollution from gravel removal and dredging; and
- urbanization resulting in stream channelization, increased runoff, pollution, and habitat simplification.

5.5.1.6 NMFS Candidate Species

Coho Salmon (*Oncorhynchus kisutch*)

The coho salmon is an anadromous species found in many coastal streams. In general, river entry and spawn timing show considerable spatial and temporal variability. Despite this high variability, some regional patterns have been observed. Most Pacific coast coho salmon enter rivers in October and spawn from November through December and occasionally into January (Weitkamp et al. 1995). Coho typically spawn in relatively shallow water (less than a foot deep), in small streams that are fast-flowing (0.98 to 1.6 feet per second) (Laufle et al. 1986; Emmet et al. 1991). Spawning occurs in riffles with stable gravel substrates ranging in size from 0.4 to 7.9 inches, with less than 30 percent fine grained sediment (Reeves et al. 1989).

Early rearing habitat consists of shallow areas associated with backwater pools, beaver ponds, or side channels (Reeves et al. 1989). Beaver ponds and pools of all types are preferred for summer rearing (Laufle et al. 1986; Reeves et al. 1989). Overwinter habitat includes streams having mean temperatures below 44.6°F and abundant cover, mainly large woody debris (Reeves et al. 1989). Optimal rearing habitat contains a mixture of riffles and pools, abundant instream and streamside vegetation, and water temperatures that average 50°F to 59°F in summer (Laufle et al.

1986). Summer stream flows are an important factor in the survival of coho salmon (Emmet et al. 1991).

Coho salmon support an important commercial and recreational fishery. Coho population declines are attributed to environmental degradation and habitat changes. Logging, agriculture, urban development, and dams cause severe chemical and physical changes to the stream environment, resulting in a high mortality of coho salmon from egg to 1-year smolt.

The Puget Sound/Strait of Georgia coho salmon ESU includes the following WRIAs: Nooksack (WRIA 1), San Juan (WRIA 2), lower Skagit-Samish (WRIA 3), upper Skagit (WRIA 4), Stillaguamish (WRIA 5), Island (WRIA 6), Snohomish (WRIA 7), Cedar-Sammamish (WRIA 8), Duwamish-Green (WRIA 9), Puyallup-White (WRIA 10), Nisqually (WRIA 11), Chambers-Clover (WRIA 12), Deschutes (WRIA 13), Kennedy- Goldsborough (WRIA 14), east Kitsap (WRIA 15), Skokomish-Dosewallips (WRIA 16), Quilcene-Snow (WRIA 17), Elwha-Dungeness (WRIA 18), and a small portion of Lyre-Hoko (WRIA 19).

On July 25, 1995, NMFS determined that listing coho salmon was not warranted for the Puget Sound/Strait of Georgia evolutionarily significant unit. However, the Puget Sound/Strait of Georgia coho is currently designated as a candidate for listing because of concerns over specific risk factors. The Puget Sound/Strait of Georgia evolutionarily significant unit includes all naturally spawned populations of coho salmon from drainages of Puget Sound and Hood Canal, the eastern Olympic Peninsula (east of Salt Creek), and the Strait of Georgia from the eastern side of Vancouver Island and the British Columbia mainland (north to and including the Campbell and Powell rivers), excluding the upper Fraser River above Hope, British Columbia. The following Washington State counties lie partially or wholly within basins containing coho: Clallam, Grays Harbor, Island, Jefferson, King, Kitsap, Kittitas, Lewis, Mason, Pierce, San Juan, Skagit, Snohomish, Thurston, and Whatcom. The 1992 Washington State salmon and steelhead stock inventory identifies the presence of 46 coho stocks within the Puget Sound/Strait of Georgia ESU. Twenty of those stocks are classified as healthy, 16 are depressed, one is critical (Discovery Bay coho), and the status of nine is currently unknown.

No coho salmon critical habitat is proposed at this time.

5.5.1.7 NMFS Depleted Species

AT1 Group of Killer Whale (*Orcinus orca*)

The AT1 group of killer whales was first recognized as a separate group of killer whales in 1982, when a group of 22 transient-type whales were documented in Prince William Sound (Leatherwood et. al. 1984a, Heise et. al. 1992), through individual whales from the group had been photographed as early as 1978. AT1 transients are similar to other transient populations in the North Pacific in their dietary specialization on marine mammals (ford et al. 1998), their hunting strategy, that relies on passive listening and stealth (Barrett-Lennard et al. 1996) and their life history (Ford and Ellis 1999). The AT1 transients travel in groups of one to twelve, and at least seasonally appear to specialize on hunting harbor seals and Dall's porpoises in Prince William Sound and the Kenai Fjords region (Saulitis et al. 2000). They behave much like the

transients described in British Columbia waters; however, unlike other transients, that are resighted sporadically, most of the AT1 transients are resighted in Prince William Sound and Kenai Fjords every year.In addition, acoustic behavior (Saulitis 1993) and genetics (Barrett-Lennard 2000) indicate the AT1 group is a genetically distince, socially isolated group of killer whales.

Eleven members of the AT1 group have not been seen since the 1989 Exxon Valdez oil spill; one of these indivduals is know to have died and the rest are presumed dead (Matkin et al. 1999a). Sightings of the remaining individuals in the AT1 group have also declined in the years following the oil spill, and the population of one of their primary pretty species, the harbor seal, has declined in recent years (Frost et al. 1999).

The AT1 Transient stock of killer whales was designated as "depleted" under the MMPA. Therefore, the AT1 Transient stock of killer whales is classified as a strategic stock. At least 11 animals were alive in 1998, but it appears that as of 2004, only 8 individuals may be alive. Therefore, the AT1 group has been reduced to at least 50% (11/22) of its 1984 level, and has likely been reduced to 36% (8/22) of its 1984 level. The AT1 Transient stock of killer whales is not listed as "threatened" or "endangered" under the Endangered Species Act.

6. ENVIRONMENTAL EFFECTS

6.1 Discussion of General Effects

Section 6 discusses the environmental effects of the alternatives for the three actions evaluated in this EIS: approving Washington's request to incorporate WAC 173-26 (the guidelines) as an amendment to the WCZMP (Section 4.1, preferred alternative); (2) denying Washington's request (section 4.2); and (3) the "no action" alternative (section 4.3). The effects under the "no action" alternative are the same as those for alternative one, since OCRM taking no action would result in the Washington presuming concurrence.

Washington itself has already approved and started implementing the new guidelines through the SMA update process previously described in Section 3, however the changes have not been approved by OCRM, therefore, the State cannot use federal CZMA funds to implement the changes, and the new guidelines can not be applied as enforceable policies for federal consistency purposes.

6.2 Criteria for Evaluating the Effects of Approving or Denying Amendments to the WCZMP

Under the new guidelines there are a number of new or improved program requirements that will apply to future amendments to SMPs. Implementation of these requirements will result in more informed land and water use decision making over and above the original guidelines, with fewer negative environmental consequences. However, the results associated with the new guideline implementation will only be experienced a number of years after local SMPs have been modified and adopted when future development is required to meet the new standards and procedures. In addition, many of the effects of approving or denying amendments to the WCZMP are secondary