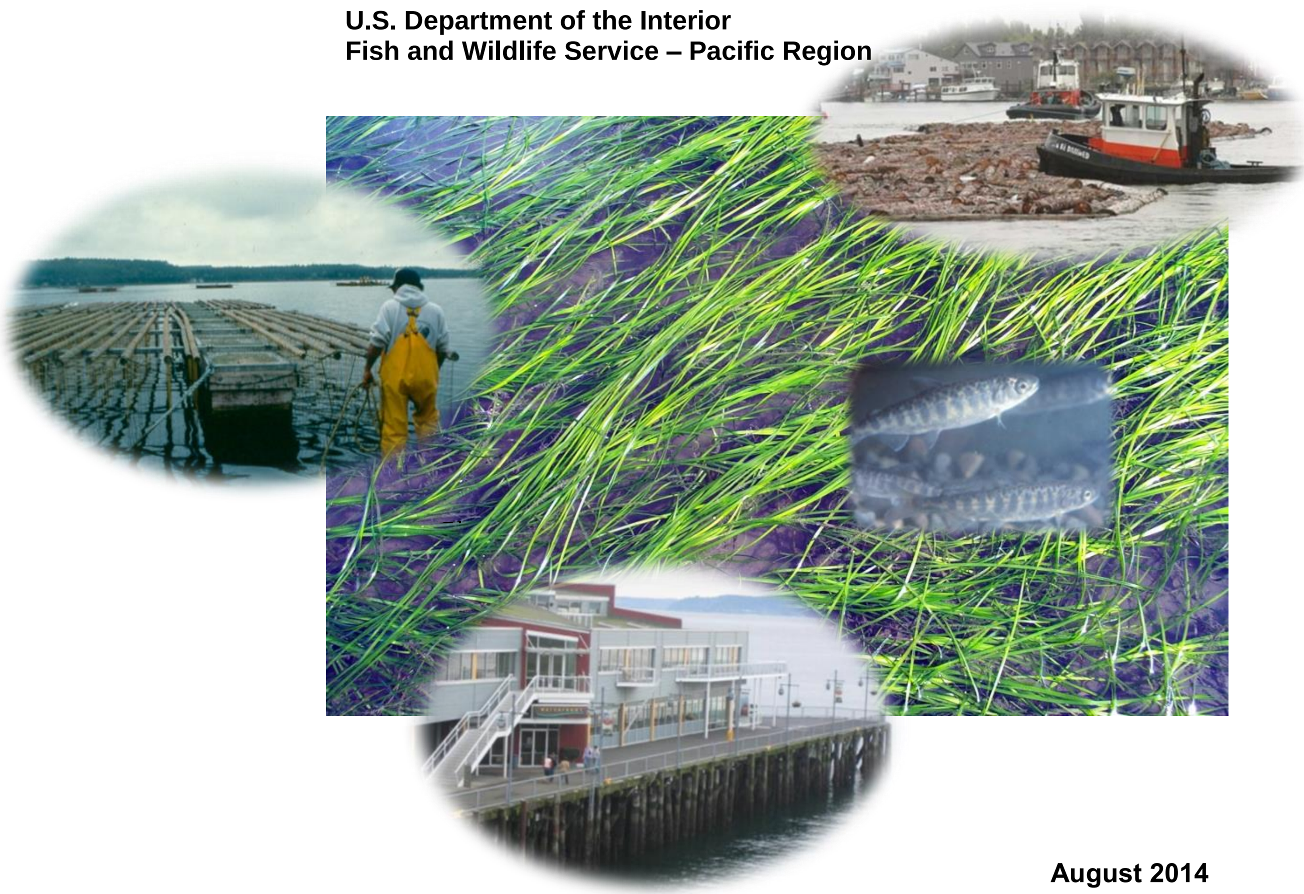
Draft Environmental Impact Statement

To Analyze Impacts of Issuance by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service of Two Incidental Take Permits under Section 10 of the Endangered Species Act for Implementation of the Washington Department of Natural Resources' Aquatic Lands Habitat Conservation Plan

U.S. Department of Commerce
National Marine Fisheries Service – West Coast Region

and

U.S. Department of the Interior
Fish and Wildlife Service – Pacific Region



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Cover Sheet

Title of Environmental Review:	Draft Environmental Impact Statement to Analyze Impacts of Issuance by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service of Two Incidental Take Permits under Section 10 of the Endangered Species Act for Implementation of the Washington Department of Natural Resources' Aquatic Lands Habitat Conservation Plan
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Legal Mandates:	Endangered Species Act of 1973 (ESA, 16 USC 1531 *et seq.*) National Environmental Policy Act (NEPA, 42 USC 4321 *et seq.*)
Location of Proposed Activities:	Throughout Washington State
Proposed Action:	Issuance of incidental take permits for activities that are authorized or conducted by the Washington Department of Natural Resources on state-owned aquatic lands
Abstract:	Washington DNR authorizes and conducts activities on approximately 2.7 million acres of state-owned aquatic lands that, while otherwise legal, might result in incidental take of species listed as threatened or endangered under the Endangered Species Act (ESA). Washington DNR is seeking incidental take authorization under the ESA for its activities on state-owned aquatic lands. Authorization will require implementation of an Aquatic Lands Habitat Conservation Plan that meets issuance criteria under Section 10 of the ESA. The Habitat Conservation Plan will, to the maximum extent practicable, minimize and mitigate the effects of activities on 29 species covered under the authorization, some of which are listed as threatened or endangered under the ESA. Alternatives to the proposed action include no action and implementation of the habitat conservation plan in marine areas only.

TABLE OF CONTENTS

Appendices

List of Figures

List of Tables

ACRONYMS AND ABBREVIATIONS

CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
CRP	Community-based Restoration Program
Ecology	Washington State Department of Ecology
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	evolutionarily significant unit
Fed. Reg.	Federal Register
GIS	geographic information system
HCP	Habitat Conservation Plan
HPA	Hydraulic Project Approval
IPCC	Intergovernmental Panel on Climate Change
ISAB	Independent Science Advisory Board
ITP	incidental take permit
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
PCSRF	Pacific Coastal Salmon Recovery Fund
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
Services	USFWS and NMFS
SRFB	Salmon Recovery Funding Board
TMDL	Total Maximum Daily Load
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
Washington DNR	Washington State Department of Natural Resources
WDFW	Washington Department of Fish and Wildlife

EXECUTIVE SUMMARY

ES-1. Introduction

The National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS), collectively referred to as the Services, have received applications from the Washington State Department of Natural Resources (Washington DNR) for incidental take permits (ITPs), in accordance with Section 10(a)(1)(B) of the federal Endangered Species Act (ESA), as amended. Washington DNR authorizes and conducts activities on approximately 2.7 million acres of state-owned aquatic lands that, while otherwise legal, might result in incidental take of species listed as threatened or endangered under the ESA. Washington DNR is seeking this authorization so that activities associated with implementing the Aquatic Lands Habitat Conservation Plan (HCP or Proposed Action) comply with the ESA, while providing protection as a means to minimize and mitigate, to the extent practicable, for the impact of its activities on 29 species that are either listed under the ESA or that could become listed during the permit term (i.e., the species proposed for ITP coverage; Table ES-1).

Washington DNR's objectives in developing the Aquatic Lands HCP and seeking ITPs are fourfold:

- To ensure that the HCP conservation measures are consistent with the State's authorities and responsibilities defined under Washington Administrative Code (WAC) 332-30-100
- To minimize risks to the State's lease holders in their use of state-owned aquatic lands
- To minimize the State's legal liability under the ESA
- To manage habitat in a way that reduces risks of species extinction by contributing to the survival and recovery of listed species that use state-owned aquatic lands

Federal action on Washington DNR's ITP applications requires environmental review under the National Environmental Policy Act (NEPA). The Services, as co-lead agencies, have drafted this environmental impact statement (EIS) to analyze the environmental effects of issuing ITPs to Washington DNR. Washington DNR intends to adopt the EIS under Washington's State Environmental Policy Act (SEPA).

The ESA is intended "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, [and] to provide a program for the conservation of such endangered species and threatened species" (16 United States Code [USC] 1531). Among other provisions aimed at species conservation, the statute (in section 9(a)(1)(B)) prohibits take of listed species, which includes harassing or harming listed species. Section 10(a)(1)(B) of the ESA provides an exception to this prohibition, saying that the Secretary of the Interior or the Secretary of Commerce (depending on the particular species involved) may permit "any taking otherwise prohibited by section 9(a)(1)(B) if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity."

Table ES-1. Species proposed for ITP coverage through the Aquatic Lands HCP.

Species	Federal Status in Washington State [1]	Washington State Status	Federal Agency with Jurisdiction
Amphibians and Reptiles			
Columbia spotted frog *(Rana luteiventris)*	Candidate	Candidate	USFWS
Oregon spotted frog (*R. pretiosa*)	Proposed Threatened	Endangered	USFWS
Northern leopard frog *(R. pipiens)*	Species of Concern	Endangered	USFWS
Western toad *(Anaxyrus boreas)*	Species of Concern	Candidate	USFWS
Pacific pond turtle *(Actinemys marmorata)*	Species of Concern	Endangered	USFWS
Birds			
Harlequin duck *(Histrionicus histrionicus)*	None	None	USFWS
Common loon *(Gavia immer)*	None	Sensitive	USFWS
Western snowy plover *(Charadrius alexandrinus nivosus)*	Threatened	Endangered	USFWS
Black tern *(Chlidonias niger)*	None	Monitor	USFWS
Marbled murrelet *(Brachyramphus marmoratus)*	Threatened	Threatened	USFWS
Fish			
Pacific lamprey (*Lampetra tridentata*)	Species of Concern	Monitor	USFWS
Green sturgeon *(Acipenser medirostris)*	Threatened	Monitor	NMFS
White sturgeon *(A. transmontanus)*	None	None	USFWS/NMFS
Coastal cutthroat trout *(Oncorhynchus clarki clarki)*	Species of Concern	None	USFWS
Pink salmon *(O. gorbuscha)*	None	None	NMFS
Chum salmon *(O. keta)*	Threatened	Candidate	NMFS
Coho salmon *(O. kisutch)*	Threatened	None	NMFS
Steelhead trout *(O. mykiss)*	Threatened	Candidate	NMFS
Sockeye/kokanee salmon *(O. nerka)*	Endangered Threatened	Candidate	NMFS
Chinook salmon *(O. tshawytscha)*	Endangered Threatened	Candidate	NMFS
Bull trout *(Salvelinus confluentus)*	Threatened	Candidate	USFWS
Pacific herring (*Clupea pallasi*)	None	Candidate	NMFS
Eulachon/Pacific smelt (*Thaleichthys pacificus*)	Threatened	Candidate	NMFS
Bocaccio (*Sebastes paucispinis*)	Endangered	Candidate	NMFS
Canary rockfish (*S. pinniger*)	Threatened	Candidate	NMFS
Yelloweye rockfish (*S. ruberrimus*)	Threatened	Candidate	NMFS
Pacific sand lance (*Ammodytes hexapterus*)	None	None	NMFS
Surf smelt (*Hypomesus pretiosus*)	None	None	NMFS
Marine Mammals			
Southern Resident killer whale *(Orcinus orca)*	Endangered	Endangered	NMFS

[1] For all species in this table, all populations in Washington State are proposed for ITP coverage, regardless of listing status. Table 1-1 provides information about the listing status of and critical habitat designations for individual populations.

The mechanism by which the Services may permit incidental take under ESA section 10(a)(1)(B) to non-Federal entities is the issuance of ITPs, which provide an assurance that when the State conducts the activities listed in the HCP as covered activities, in a manner that is consistent with the ITP and accompanying documents, the State will not be subject to ESA take liability. The secretary will issue the permit if the Services determine that the take would be incidental; the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the take (based on implementation of an HCP); the applicant ensures that it has sufficient funding to implement the HCP; the take will not appreciably reduce the likelihood of survival and recovery of the species in the wild; and any additional measures required by the Secretary(ies) will be met.

Washington DNR is requesting coverage for potential incidental take of covered species for a term of 50 years. The HCP would provide measures to minimize and mitigate impacts of potential incidental take of covered species, to the maximum extent practicable. Washington DNR is proposing specific activities for which take authorization would be provided. These activities are the authorization and management of the following uses of state-owned aquatic lands:

- Aquaculture of shellfish
- Placement of overwater structures (docks, wharves, rafts, boat ramps, boat launches, hoists and lifts, mooring buoys, nearshore buildings, floating homes, marinas, and shipyards and terminals)
- Log booming and storage

Unlike other agencies involved with the management of aquatic habitats and species within Washington State, Washington DNR's role in the management of state-owned aquatic lands is proprietary rather than regulatory. Through its proprietary authority, Washington DNR holds contractual agreements with users of state-owned aquatic lands and acts on behalf of the landowner—that is, the State. Other agencies at the Federal, state, and local levels are charged with ensuring compliance with various statutes and regulations. Those other authorities may be involved in setting conditions associated with the siting, construction, or operation of the uses that Washington DNR authorizes. As the proprietary manager of state-owned aquatic lands, Washington DNR may require different conditions than other state agencies or Federal regulators. In general, when the use of a body of water could affect human health or the environment, several agencies are involved in ensuring that the applicable laws and regulations are followed and appropriate permit conditions are developed. Therefore, there could be other mitigation measures required under other laws, in addition to the conservation measures required in the HCP. These other laws and regulations are described in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws.

ES-2. Purpose and Need

The Federal purposes of this action are 1) for the Services to respond to Washington DNR's application to each agency for an ITP and 2) to ensure that the issuance criteria of ESA section 10(a)(2)(b) are met for the protection and conservation of listed, proposed, and unlisted species. If issued, the proposed ITPs would authorize the incidental take of species listed as either threatened or endangered under the ESA. The ITPs would also provide incidental take coverage for certain other species should they become listed during the term of the permits.

Washington DNR's purpose for the action is to manage habitat on state-owned aquatic lands in a manner that 1) minimizes risks to ESA-listed and other imperiled species through ITP and HCP implementation, 2) minimizes risks to the State's lease holders in their use of state-owned aquatic lands, and 3) minimizes the State's legal liability under the ESA.

The Services' need for the action is to work collaboratively with Washington DNR so its ITP application includes an HCP with measures that protect and conserve listed species by minimizing and mitigating the effects of the covered activities to the maximum extent practicable. Washington DNR's need for the action is to ensure that its management actions are compliant with ESA requirements through implementation of the ITPs and HCP.

ES-3. Alternatives

This EIS analyzes a no-action alternative and two action alternatives. The two action alternatives propose issuance of ITPs as described above and differ in terms of the areas in which the associated HCP would be implemented, as well as the species proposed for ITP coverage. Under Alternative 2 (Proposed Action), an analysis of the effects of implementing the Aquatic Lands HCP on state-owned aquatic lands throughout Washington State is presented. Effects of the same HCP implementation as under Alternative 2 are analyzed under Alternative 3, but the Alternative 3 HCP would cover activities only on the portion of state-owned aquatic lands that are located in marine areas, and would seek take coverage only for the species associated with ecosystems in those areas; other state-owned aquatic lands would be managed as under Alternative 1. Under all three alternatives, Washington DNR would continue to require compliance with all Federal, state, and local permits for both construction and operation before authorizing uses of state-owned aquatic lands. To varying degrees, potential adverse effects on covered species would be avoided or reduced through the implementation of measures required by other agencies with permitting authority. For the analysis contained in this EIS, it is assumed that the measures required by other agencies would not differ among the alternatives. A brief summary of each alternative is provided below. Section 2, Alternatives, provides detailed descriptions of the three alternatives. The Services must determine whether each alternative meets the need identified above with respect to species protection and conservation. The determination of whether the ESA issuance criteria are met will be presented in 1) ESA section 10 findings documents if ITPs are issued under ESA section 10(a)(1)(B), 2) ESA section 7 biological opinions, and 3) a NEPA decision document (Record of Decision).

ES-3.1 Alternative 1 (No Action)

Under the No-action Alternative, Washington DNR would manage requests for uses of state-owned aquatic lands on a site-by-site basis. Washington DNR would not develop an HCP, and the Services would not issue ITPs. Currently, many use authorization agreements issued by Washington DNR require the implementation of practices designed to protect environmental resources. Additionally, Washington DNR has various programs currently in place that help conserve habitat (e.g., the Aquatic Reserves Program, Derelict Vessel Removal Program, and the Aquatic Lands Restoration Program). However, the implementation of conservation measures for habitat and species protection, and the frequency and consistency of implementation, would not be assured over time without an HCP and ITPs because Washington DNR would not be committed to a fully funded agreement (i.e., the HCP and implementation agreement).

Under the No-action Alternative, based on Washington DNR's actions to date, it is assumed for this EIS that Washington DNR would continue to issue use authorizations in a manner similar to the current management regime for state-owned aquatic lands. Washington DNR would, therefore, be expected to continue to perform the following tasks in issuing permits for the use of state-owned aquatic lands over the next 50 years:

- Determine whether the general public would be excluded from the area by physical encumbrances, use encumbrances, or changes in aquatic land management
- Determine who has preference rights to lease the land
- Determine whether the proposal is statutorily allowable, environmentally acceptable, and in the best interests of the State
- Determine whether all pertinent regulatory permits have been obtained
- Visit leaseholds to assess if lease conditions are being met

- Protect and restore locations that directly or indirectly support the persistence and recovery of fish and wildlife (including species that would be covered under the HCP) through the Aquatic Reserves Program, the Conservation Leasing Program, Commissioner's Orders, the Aquatic Lands Restoration Program, and the Derelict Vessel Removal Program, as well as applicable state and federal laws
- Collaborate with other agencies to implement the aquatic leasing program in a manner consistent with other regulatory requirements

ES-3.2 Alternative 2 (Proposed Action)

Under Alternative 2, each of the Services would issue an ITP to Washington DNR authorizing the incidental take of the covered species by covered activities through the implementation of the ITP, including the Aquatic Lands HCP. Washington DNR's Aquatic Lands HCP would apply to all state-owned aquatic lands and to the ITP-covered species listed in Table ES-1. The ITPs would be valid for 50 years. The Operating Conservation Program for the Aquatic Lands HCP (HCP Chapter 5) would define how Washington DNR implements the mitigation sequence of avoidance, minimization, and compensation for unavoidable impacts of aquatic lands uses authorized by Washington DNR. The HCP Operating Conservation Program would include measures designed to avoid, minimize, and mitigate, to the maximum extent practicable, for incidental take associated with Washington DNR's management of state-owned aquatic lands. In addition, Washington DNR would implement an adaptive management program and would follow management practices that contribute to meeting the goals and objectives of the HCP. The HCP Operating Conservation Program would also incorporate additional commitments by Washington DNR, including programs to restore or protect aquatic habitat and implement management practices that contribute to meeting the goals and objectives of the HCP.

The requirements of the ITPs would govern Washington DNR's decisions regarding the proposed covered activities as follows:

- **Authorization and management of shellfish aquaculture:** 1) the location of new or expanded aquaculture operations and related facilities, 2) the design of new or expanded structures and sites, 3) how aquaculture operations are conducted, 4) maintenance practices, and 5) the removal of abandoned structures.

- **Authorization and management of log booming and storage:** 1) the location of new or expanded log booming and storage facilities, 2) how log booming and storage operations are conducted, and 3) the removal of wood debris.

- **Authorization and management of uses associated with overwater structures:** 1) the location of new or expanded overwater structures; 2) the physical characteristics of individual new, expanded, or renovated structures; 3) operational elements of the structures; and 4) the removal of abandoned structures or facilities.

As part of the HCP operating program, Washington DNR would require all new and renewed authorization agreements to include specific measures designed to address the potential effects associated with all uses authorized by Washington DNR, including non-covered programs. These conservation measures would focus on water quality, sediment quality, habitat-forming processes, habitat features, and biological communities. The measures would protect aquatic vegetation, forage fish spawning habitat, and important habitats and sensitive life phases for covered species. They would also include specific guidelines for artificial lighting, fill, flotation material, tires, treated wood, breakwaters, covered moorage and boathouses, derelict structures, and abandoned equipment, as well as undertakings such as bank armoring, pressure washing, and sediment removal.

In addition to the HCP measures that address proposed uses of state-owned aquatic lands, Washington DNR's existing habitat protection and restoration programs and actions would provide additional compensation for remaining impacts to covered species and their habitats. These programs include Washington DNR's the Aquatic Reserves Program, Conservation Leasing Program, and Commissioner's Orders, for the protection and restoration of habitats that directly or indirectly support the persistence and recovery of proposed covered species. Other existing programs that would provide additional compensation include the Aquatic Lands Restoration Program and the Derelict Vessel Removal Program.

ES-3.3 Alternative 3 (HCP for Marine Areas Only)

Under Alternative 3, the Services would issue ITPs only for those proposed covered activities and species that occur on state-owned lands in marine areas. The HCP would not cover the Columbia spotted frog, Oregon spotted frog, northern leopard frog, western toad, western pond turtle, or black tern because in Washington State, these species occur only in freshwater habitats. All other species identified in Table ES-1 would be covered. Washington DNR would implement all of the elements of the HCP Operating Conservation Program, but in marine areas only. Washington DNR's ongoing habitat protection and restoration programs and actions would be applied toward compensation for remaining unavoidable impacts from authorized uses in marine and estuarine waters only. In freshwater areas, Washington DNR would manage state-owned aquatic lands as described for Alternative 1, No Action.

ES-4. Environmental Effects

Table ES-2 presents a summary of the major conclusions of this EIS. Key findings from the effects analyses for each of the resource areas addressed in Section 4, Environmental Consequences, are presented here. Broadly, the action alternatives would be expected to result in a reduced potential, compared to the No-action Alternative, for uses of state-owned aquatic lands to adversely affect physical and biological resources. For users of state-owned aquatic lands, the short-term effects of the action alternatives could take the form of reduced options for siting new uses or increased costs for operations, construction, or maintenance. These conclusions are summarized below and described in greater detail in Section 4, Environmental Consequences.

Table ES-2. Comparison of the effects of the alternatives.

Resource Area	Alternative 1 No-action[1]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Land Ownership and Use	Washington DNR would not be required to consider the status of a site as habitat for vulnerable species (as indicated by ESA listing status or other factors) when identifying lands to be considered for conveyance.	Compared to Alternative 1, Washington DNR's emphasis on retention and acquisition of lands most in need of protection may lead to greater retention and acquisition of lands in nearshore and littoral areas that provide habitat for species proposed for ITP coverage through the Aquatic Lands HCP.	As under Alternative 2, Alternative 3 may lead to increased retention and acquisition of lands in nearshore marine areas, compared to Alternative 1. Because HCP conservation priorities would be applied in marine areas only, the levels of retention and acquisition in freshwater areas would likely be similar to those under Alternative 1.
	The overall distribution of use authorizations by ecosystem would likely exhibit the general patterns evident in Table 3-3. The bulk of use authorizations would likely continue to be in nearshore marine areas.	Implementing the HCP Operating Conservation Program could reduce the amount of area available for some types of use authorizations in shallow waters in marine and freshwater areas, thereby altering the overall distribution of uses by ecosystem when compared to Alternative 1.	As under Alternative 2, Alternative 3 would be expected to reduce the amount of area available in shallow and/or nearshore waters for many commercial and recreational use authorizations, compared to Alternative 1. The magnitude of the reduction would be less than under Alternative 2, however, and would be limited to marine areas.
	Uses not authorized by Washington DNR, including the abandonment of vessels and structures, would continue to result in the encumbrance of state-owned aquatic lands. The continuation of Washington DNR's restoration programs, including derelict vessel removal, creosote removal, and restoration, would not be assured with a 50-year commitment.	As a result of the implementation of HCP requirements concerning the removal of derelict structures, the amount of area encumbered by derelict structures would likely decrease more rapidly under Alternative 2 than under Alternative 1. The continuation of Washington DNR's restoration programs, including derelict vessel removal, creosote removal, and restoration, would be assured with a 50-year commitment.	The amount of area encumbered by derelict structures would likely decrease more rapidly than under Alternative 1 but less rapidly than under Alternative 2 because measures requiring the removal of derelict structures would be applied in marine areas only. The continuation of Washington DNR's restoration programs, including derelict vessel removal, creosote removal, and restoration, would be assured with a 50-year commitment.

[1] Under all alternatives, including Alternative 1, No-action, uses authorized by Washington DNR on state-owned aquatic lands would be subject to permitting and regulatory oversight from numerous Federal, state, and local agencies. To varying degrees, potential adverse effects would be avoided or reduced through the implementation of measures required by other agencies with permitting authority.

Resource Area	Alternative 1 No-action[1]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Land Ownership and Use (continued)	Current policy does not establish the duration of Commissioner's Orders that withdraw certain freshwater or marine areas from the option of leasing or that prohibit or limit specific types of uses; such withdrawals or restrictions could be revoked at any time. No *de facto* conservation areas would be established to protect natural habitat value and function in areas that have been identified as habitat for highly vulnerable species. Waterfront sites near aquatic lands would continue to be desirable locations for businesses and residential developments, and existing developments would likely remain in place. The visual quality of aquatic lands would likely continue to influence uses of waterfront areas, either positively or negatively.	The duration of any Commissioner's Orders issued would be at least as long as the ITP term, providing greater certainty that areas would continue to be managed as specified under Commissioner's Orders for a known period under Alternative 2, compared to Alternative 1. *De facto* conservation areas would be established through Washington DNR's commitment to protect natural habitat value and function in areas that have been identified as habitat for highly vulnerable species. By reducing the amount of nearshore and littoral habitat available for log handling facilities, marinas, docks, wharves, and floating homes, the HCP Operating Conservation Program could contribute to reductions in the amount of waterfront development associated with those uses. Conversely, the implementation of measures that reduce the visual impacts of some aquatic land uses may render some waterfront properties more desirable for development as residential areas, park and recreation facilities, restaurants, or other businesses, possibly leading to an increase in such uses, compared to Alternative 1.	Similar to Alternative 2, Alternative 3 would provide greater certainty that areas established under Commissioner's Orders would remain withdrawn or restricted for a known period than under Alternative 1. This would apply only in marine areas, however. No *de facto* conservation areas would be established to protect habitat for highly vulnerable species because no such habitat has been identified on state-owned aquatic lands in marine areas. Such locations could be identified in the future, however, if additional information is collected on the status of species in marine environments and/or if land ownership changes. Compared to Alternative 1, Alternative 3 could reduce the amount of waterfront development associated with log handling facilities, marinas, docks, or wharves, but adjacent to marine waterbodies only. The potential for decreased visual impacts from uses of state-owned aquatic lands to result in an increase in waterfront development in some areas would likely be similar to that under Alternative 2.

Resource Area	Alternative 1 No-action[1]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Substrates and Erosional Processes	In both freshwater and marine areas, Washington DNR use authorizations would not be required to include measures to protect substrates and erosional processes, beyond the measures required through other permitting processes. As a result, many uses of state-owned aquatic lands would likely continue to damage aquatic substrates and interfere with sediment transport. The continued removal of derelict structures through the Creosote Removal Program would not be assured with a 50-year commitment. Also, Washington DNR would not be required to impose use conditions that avoid or minimize the potential for new private recreational docks to degrade aquatic habitat. As a result, these uses would continue to affect substrates and erosional processes at current levels. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspections.	In both freshwater and marine areas, the implementation of conservation measures and management practices as part of the HCP Operating Conservation Program would be expected to decrease the amount of area subject to scour, compaction, changes in sediment composition, and other effects, or at least to increase that amount at a rate slower than under Alternative 1. Washington DNR would, for the 50-year duration of the ITPs, require the removal of derelict structures from state-owned aquatic lands within the footprints of new and reauthorized leaseholds. Washington DNR would also require all new private recreational docks on state-owned aquatic lands to comply with HCP conservation measures. As a result, the amount of area over which derelict structures and private recreational docks damage substrates or interfere with sediment transport would likely be less than under Alternative 1. Implementation of monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring programs would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner, compared to Alternative 1.	In marine areas, the potential for adverse effects on substrates and erosional processes would be as described for Alternative 2, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of land uses that are not authorized by Washington DNR, and 3) the opportunities for adaptive management in response to information gathered from monitoring programs. In freshwater areas, the potential for adverse effects on substrates and erosional processes would be as described for Alternative 1, because the HCP Operating Conservation Program would not be implemented in freshwater areas.

Resource Area	Alternative 1 No-action[1]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Water Resources	In both freshwater and marine areas, Washington DNR use authorizations would not be required to include measures to protect water resources, beyond the measures required through other permitting processes. As a result, many uses of state-owned aquatic lands would likely continue to contribute to the degradation of water and sediment quality. The continued removal of derelict structures through the Creosote Removal Program would not be assured with a 50-year commitment. Also, Washington DNR would not be required to impose use conditions that avoid or minimize the potential for new private recreational docks to degrade aquatic habitat. As a result, these uses would continue to affect water and sediment quality at current levels. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspections.	In both freshwater and marine areas, the implementation of conservation measures and management practices as part of the HCP Operating Conservation Program would be expected to decrease the risk of water and sediment quality degradation, or at least to increase the risk at a rate slower than under Alternative 1. Washington DNR would, for the 50-year duration of the ITPs, require the removal of derelict structures from state-owned aquatic lands within new and reauthorized leasehold footprints. Washington DNR would also require all new private recreational docks on state-owned aquatic lands to comply with HCP conservation measures. As a result, the amount of area over which derelict structures and private recreational docks affect water and sediment quality would likely be less than under Alternative 1. Implementation of monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring programs would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner, compared to Alternative 1.	In marine areas, the potential for adverse effects on water and sediment quality would be as described for Alternative 2, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of land uses that are not authorized by Washington DNR, and 3) the opportunities for adaptive management in response to information gathered from monitoring programs In freshwater areas, the potential for adverse effects on water and sediment quality would be as described for Alternative 1, because the HCP Operating Conservation Program would not be implemented in freshwater areas.
Noise	Noise sources and trends in noise levels would be expected to continue as described in Subsection 3.5, Noise. Proposed projects with the potential to generate noise at levels likely to result in substantial disturbance would be subject to regulatory review and permitting under Federal and state statutes.	Alternative 2 would not be expected to result in substantial changes in noise levels in the analysis area, compared to Alternative 1. Proposed projects with the potential to generate noise at levels likely to result in substantial disturbance would be subject to regulatory review and permitting under Federal and state statutes.	Alternative 3 would not be expected to result in substantial changes in noise levels in the analysis area, compared to Alternative 1. Proposed projects with the potential to generate noise at levels likely to result in substantial disturbance would be subject to regulatory review and permitting under Federal and state statutes.

Resource Area	Alternative 1 No-action[1]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Vegetation	In both freshwater and marine areas, Washington DNR use authorizations would not be required to include measures to protect aquatic vegetation, beyond the measures required through other permitting processes. As a result, many uses of state-owned aquatic lands would likely continue to affect aquatic vegetation. The continued removal of derelict structures through the Creosote Removal Program would not be assured with a 50-year commitment. Also, Washington DNR would not be required to impose use conditions that avoid or minimize the potential for new private recreational docks to degrade aquatic habitat. As a result, these uses would continue to affect aquatic vegetation at current levels. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspections. Uses of state-owned aquatic lands that disrupt habitats in historical floodplains and similar areas could affect populations of Ute ladies'-tresses. Construction of bank armoring could reduce the availability of flood-prone river habitat with which the species is associated.	In both freshwater and marine areas, the implementation of conservation measures and management practices (e.g., buffers) as part of the HCP Operating Conservation Program would be expected to decrease the risk of adverse effects on aquatic vegetation, or at least to increase the risk at a rate slower than under Alternative 1. Washington DNR would, for the 50-year duration of the ITPs, require the removal of derelict structures from state-owned aquatic lands within new and reauthorized leasehold footprints. Washington DNR would also require all new private recreational docks on state-owned aquatic lands to comply with HCP conservation measures. As a result, the amount of area over which derelict structures and private recreational docks affect aquatic vegetation would likely be less than under Alternative 1. Implementation of monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring programs would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner, compared to Alternative 1. Compared to Alternative 1, implementation of the HCP Operating Conservation Program under Alternative 2 would reduce the potential for any populations of Ute ladies'-tresses on historical river channels and floodplains to be affected by uses of state-owned aquatic lands. Restrictions on the construction of bank armoring could lead to increases in the availability of flood-prone river habitat with which the species is associated.	In marine areas, the potential for adverse effects on aquatic vegetation would be as described for Alternative 2, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of land uses that are not authorized by Washington DNR, and 3) the opportunities for adaptive management in response to information gathered from monitoring programs In freshwater areas, the potential for adverse effects on aquatic vegetation would be as described for Alternative 1, because the HCP Operating Conservation Program would not be implemented in freshwater areas. As under Alternative 1, uses of state-owned aquatic lands that disrupt habitats in historical floodplains and similar areas could affect populations of Ute ladies'-tresses. Construction of bank armoring could reduce the availability of flood-prone river habitat with which the species is associated.

Resource Area	Alternative 1 No-action[1]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Wetlands and Riparian Areas	In both freshwater and marine areas, Washington DNR use authorizations would not be required to include measures to minimize the risk of adverse effects on erosional processes, water quality, and vegetation, beyond the measures required through other permitting processes. As a result, many uses of state-owned aquatic lands would likely continue to affect wetlands and riparian areas. The continued removal of derelict structures through the Creosote Removal Program would not be assured with a 50-year commitment. Also, Washington DNR would not be required to impose use conditions that avoid or minimize the potential for new private recreational docks to degrade aquatic habitat. As a result, these uses would continue to affect wetlands and riparian areas at current levels. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspections.	In both freshwater and marine areas, the implementation of conservation measures and management practices as part of the HCP Operating Conservation Program would be expected to decrease the risk of adverse effects on erosional processes, water quality, and vegetation, or at least to increase the risk at a rate slower than under Alternative 1, thereby reducing the potential for adverse effects on wetlands and riparian areas. Washington DNR would, for the 50-year duration of the ITPs, require the removal of derelict structures from state-owned aquatic lands within new and reauthorized leasehold footprints. Washington DNR would also require all new private recreational docks on state-owned aquatic lands to comply with HCP conservation measures that reduce the risk of adverse effects of the structure and associated activities on substrates and erosional processes, water quality, species, and habitat. As a result, the amount of area over which derelict structures and private recreational docks affect wetlands and riparian areas would likely be less than under Alternative 1. Implementation of monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring programs would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner, compared to Alternative 1.	In marine areas, the potential for adverse effects on wetlands and riparian areas would be as described for Alternative 2, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of land uses that are not authorized by Washington DNR, and 3) the opportunities for adaptive management in response to information gathered from monitoring programs. In freshwater areas, the potential for adverse effects on wetlands and riparian areas would be as described for Alternative 1, because the HCP Operating Conservation Program would not be implemented in freshwater areas.

Resource Area	Alternative 1 No-action[1]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Fish, Aquatic Invertebrates, and Associated Habitats	In both freshwater and marine areas, Washington DNR use authorizations would not be required to include measures to minimize the risk of adverse effects on aquatic species and habitats, beyond the measures required through other permitting processes. As a result, many uses of state-owned aquatic lands would likely continue to affect fish, aquatic invertebrates, and their habitats. The continued removal of derelict structures through the Creosote Removal Program would not be assured with a 50-year commitment. Also, Washington DNR would not be required to impose use conditions that avoid or minimize the potential for new private recreational docks to degrade aquatic habitat. As a result, these uses would continue to affect fish, aquatic invertebrates, and their habitats at current levels. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspections. Uses of state-owned aquatic lands would continue to disturb individuals and contribute to the degradation of habitat conditions for species proposed for ITP coverage.	In both freshwater and marine areas, the implementation of conservation measures and management practices as part of the HCP Operating Conservation Program would be expected to decrease the risk of adverse effects on erosional processes, water quality, and the physical habitat features and biological communities that support covered species, or at least to increase the risk at a rate slower than under Alternative 1, thereby reducing the potential for adverse effects on fish, aquatic invertebrates, and their habitats. Washington DNR would, for the 50-year duration of the ITPs, require the removal of derelict structures from state-owned aquatic lands within new and reauthorized leasehold footprints. Washington DNR would also require all new private recreational docks on state-owned aquatic lands to comply with HCP conservation measures. As a result, the amount of area over which derelict structures and private recreational docks affect fish, aquatic invertebrates, and their habitats would likely be less than under Alternative 1. Implementation of monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring programs would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner, compared to Alternative 1. Implementation of the HCP Operating Conservation Program would be expected to reduce the risk of adverse effects on species proposed for ITP coverage, compared to Alternative 1.	In marine areas, the potential for adverse effects on fish, aquatic invertebrates, and their habitats would be as described for Alternative 2, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of land uses that are not authorized by Washington DNR, and 3) the opportunities for adaptive management in response to information gathered from monitoring programs. In freshwater areas, the potential for adverse effects on fish, aquatic invertebrates, and their habitats would be as described for Alternative 1, because the HCP Operating Conservation Program would not be implemented in freshwater areas. Implementation of the HCP Operating Conservation Program would be expected to reduce the risk of adverse effects on species proposed for ITP coverage, compared to Alternative 1. This risk reduction would occur only in marine areas, however, benefitting adult Pacific lamprey; subadult and adult green sturgeon and white sturgeon; juvenile and adult salmonids and eulachon; and all life stages of rockfish and forage fish. In freshwater areas, uses of state-owned aquatic lands would continue to disturb individuals and contribute the degradation of habitat conditions for larval Pacific lamprey and eggs and newly hatched white sturgeon, salmonids, and eulachon.

Resource Area	Alternative 1 No-action[1]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Wildlife and Wildlife Habitat	In both freshwater and marine areas, Washington DNR use authorizations would not be required to include measures to minimize the risk of adverse effects on wildlife species and habitats, beyond the measures required through other permitting processes. t As a result, many uses of state-owned aquatic lands would likely continue to affect wildlife and wildlife habitat. The continued removal of derelict structures through the Creosote Removal Program would not be assured with a 50-year commitment. Also, Washington DNR would not be required to impose use conditions that avoid or minimize the potential for new private recreational docks to degrade aquatic habitat. As a result, these uses would continue to affect wildlife and wildlife habitat at current levels. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspections. Uses of state-owned aquatic lands would continue to disturb individuals and contribute to the degradation of habitat conditions for species proposed for ITP coverage.	In both freshwater and marine areas, the implementation of conservation measures and management practices as part of the HCP Operating Conservation Program would be expected to decrease the risk of adverse effects on forage and prey species, as well as on habitat integrity and accessibility (including effects related to light, noise, and disturbance), or at least to increase the risk at a rate slower than under Alternative 1, thereby reducing the potential for adverse effects on wildlife and wildlife habitat. Washington DNR would, for the 50-year duration of the ITPs, require the removal of derelict structures from state-owned aquatic lands within new and reauthorized leasehold footprints. Washington DNR would also require all new private recreational docks on state-owned aquatic lands to comply with HCP conservation measures. As a result, the amount of area over which derelict structures and private recreational docks affect wildlife and wildlife habitat would likely be less than under Alternative 1. Implementation of monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring programs would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner, compared to Alternative 1. Implementation of the HCP Operating Conservation Program would be expected to reduce the risk of adverse effects on species proposed for ITP coverage, compared to Alternative 1.	In marine areas, the potential for adverse effects on wildlife and wildlife habitat would be as described for Alternative 2, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of land uses that are not authorized by Washington DNR, and 3) the opportunities for adaptive management in response to information gathered from monitoring programs. In freshwater areas, the potential for adverse effects on habitats would be as described for Alternative 1, because the HCP Operating Conservation Program would not be implemented in freshwater areas. Implementation of the HCP Operating Conservation Program would be expected to reduce the risk of adverse effects on species proposed for ITP coverage, compared to Alternative 1. This risk reduction would occur only in marine areas, however, benefitting foraging marbled murrelets; western snowy plovers; wintering and molting common loons and harlequin ducks; and Southern Resident killer whales. In freshwater areas, uses of state-owned aquatic lands would continue to disturb individuals and contribute to the degradation of habitat conditions for breeding, resting, and overwintering amphibians and pond turtles; and nesting and foraging black terns, common loons, and harlequin ducks.

Resource Area	Alternative 1 No-action[1]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Recreation	Washington DNR would not require the implementation of additional protective measures or management practices, beyond the measures required through other permitting processes that would require the relocation or reconfiguration of existing overwater structures used for recreation.	If structures that are not attached to shore (e.g., rafts, floats, mooring buoys) are moved away from shore, persons who use human-powered means (e.g., rowboats, kayaks) to travel between moored motor vessels and shore may encounter increased physical challenges, compared to Alternative 1. If this occurs, some persons may be less likely to use certain recreational facilities on state-owned aquatic lands.	As under Alternative 2, the accessibility of some rafts, floats, and mooring buoys could be reduced compared to Alternative 1. Such changes would occur in marine areas only, however.
Visual Resources	Derelict structures would continue to create visual impacts in many areas. Washington DNR would not be required to implement additional protective measures or management practices, beyond the measures required through other permitting processes, that could reduce the visual impact of shellfish aquaculture, nor would Washington DNR require certain uses to occur farther offshore, where they may be less visible to shore-based viewers.	Requirements for the removal of derelict structures may reduce the visual impacts of such structures. Some of the measures that would be required at shellfish aquaculture facilities may reduce the visual evidence of human activity in such areas, compared to Alternative 1. Also, implementing the HCP Operating Conservation Program could reduce the amount of area available for some types of use authorizations in shallow waters in marine and freshwater areas, causing some facilities and structures to be placed farther offshore, potentially reducing their visibility to viewers on shore.	The potential for uses of state-owned aquatic lands to create visual impacts would be less under Alternative 3 than under Alternative 1 in marine areas (where all shellfish aquaculture facilities occur), but the same in freshwater areas.
Cultural Resources	Washington DNR would comply with all Federal and state laws and requirements regarding the protection of cultural resources. In both freshwater and marine areas, Washington DNR use authorizations would not be required to include additional measures that may result in the protection of cultural resources, beyond the measures required through other permitting processes. Washington DNR would not be required to implement protective measures or management practices	Through the implementation of the HCP Operating Conservation Program, the number of cultural sites damaged or destroyed by ground-disturbing activities would likely be lower than under Alternative 1. Some elements of the program—for example, the requirement to remove derelict structures—could result in an increased risk of adverse effects on cultural resources, compared to Alternative 1.	As under Alternative 2, implementation of the HCP Operating Conservation Program under Alternative 3 would be expected to reduce the risk of adverse effects on cultural resources, compared to Alternative 1, but only in marine areas. The potential for adverse effects on cultural resources in freshwater areas would be as described for Alternative 1, because the HCP Operating Conservation Program would not be implemented in freshwater areas.

Resource Area	Alternative 1 No-action[1]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
	aimed at reducing substrate damage or that would reduce the amount of construction of new structures in shallow and nearshore waters. As a result, the risk that uses of state-owned aquatic lands could result in adverse effects on cultural resources would likely continue at current levels.		
Social and Economic Environment	Operators of shellfish aquaculture facilities, log handling facilities, and overwater structures would not see a reduction in the amount of aquatic areas available for private use and would not face operational, materials, or installation costs to comply with measures required by Washington DNR that restrict the location and/or operation of facilities or the materials that may be used for structures. Project reviews under various Federal, state, and local statutes, regulations, rules, and policies commonly result in the implementation of measures that restrict the location and conduct of many uses of state-owned aquatic lands, potentially leading to increased operational or materials and installation costs. The annualized life-cycle costs of some materials that meet permitting requirements are equal to or less than the annualized costs of other commonly used materials. Uses of state-owned aquatic lands would continue to contribute to adverse effects on natural ecosystem functions	Implementation of measures that place restrictions on the location and/or operation of shellfish aquaculture facilities, log handling facilities, and overwater structures would reduce the amount of aquatic areas available for private use. In addition, implementation of these measures may result in increased operational costs for industries and individuals associated with these uses compared to Alternative 1. Holders of existing authorizations could face increased materials and installation costs, compared to Alternative 1, to comply with the requirements of the HCP Operating Conservation Program. However, the life-cycle costs of materials that would be consistent with the Aquatic Lands HCP requirements for light transmission and protection of water and sediment quality would likely be similar to the replacement costs anticipated under Alternative 1. To the extent that implementation of the HCP Operating Conservation Program would contribute to improved ecosystem function in the marine and fresh waters of Washington State, Alternative 2 would be expected to provide both economic and human use benefits, compared to	As under Alternative 2, implementing the HCP Operating Conservation Program under Alternative 3 would reduce the amount of aquatic areas available for private use and could necessitate some changes in leaseholders' investments in infrastructure, operations, or both. Although effects would be limited to marine areas, approximately 90 percent of leases most likely to be affected by implementation of the HCP Operating Conservation Program (including all shellfish aquaculture leases) occur in marine areas. As under Alternative 2, the life-cycle costs of materials that would be consistent with the Aquatic Lands HCP requirements would likely be similar to the replacement costs anticipated under Alternative 1. The potential for increased costs to lead to decreases in revenue, jobs, or income in the aquaculture, forestry, recreation, or commerce industries would be limited to counties in western Washington that border or include Puget Sound, the Pacific Ocean, or the lower Columbia River. As under Alternative 2, improved ecosystem function under Alternative 3 would be

Resource Area	Alternative 1 No-action[1]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
	that have values both in economic terms and in terms of human well-being.	Alternative 1.	expected to provide both economic and human well-being benefits, compared to Alternative 1. Although the improvements to ecosystem function would occur in marine areas only, the benefits to human well-being could accrue to individuals living throughout the state.
Environmental Justice	There would be no potential for low-income or minority populations to be affected disproportionately by changes in the rules that govern uses of state-owned aquatic lands.	Compared to Alternative 1, increased upfront materials and installation costs and operational costs could disproportionately adversely affect low-income populations in Pacific, Grays Harbor, and Mason counties. Similarly, increased operational costs associated with HCP compliance for recreational and commercial facilities in Clark, Cowlitz, Mason, and Whatcom counties could be borne disproportionately by low-income populations. In light of the small number of use authorizations in counties with minority populations that exceed statewide averages by at least 20 percentage points, the potential for HCP implementation under Alternative 2 to result in adverse effects that would be felt disproportionately by minority populations would be extremely low.	The potential for increased operational costs to be borne disproportionately by low-income populations in Pacific, Grays Harbor, and Mason counties would be as described for Alternative 2. Because not all authorizations for recreational and commercial facilities are in marine areas, the potential for HCP implementation under Alternative 3 to result in disproportionately high and adverse effects on low-income populations in Clark, Cowlitz, Mason, and Whatcom counties would be lower than under Alternative 2, but higher than under Alternative 1. The four counties with minority populations that exceed statewide averages by at least 20 percentage points are all in eastern Washington. For this reason, there would be no potential for HCP implementation under Alternative 3 to result in adverse effects that would be felt disproportionately by minority populations in those counties.

ES-5. Areas of Controversy

Areas of controversy will be identified after public comments on the DEIS have been received.

1. PURPOSE AND NEED

1.1 Introduction

The Washington State Department of Natural Resources (hereinafter referred to as Washington DNR) has submitted applications to the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) (collectively referred to as the Services) for permits that would authorize incidental take of species listed as threatened or endangered under the Endangered Species Act (ESA). Washington DNR authorizes and conducts activities on approximately 2.7 million acres of state-owned aquatic lands (Figure 1-1) that, while otherwise legal, might result in incidental take of species listed as threatened or endangered under the ESA. The applications are based on the draft Aquatic Lands Habitat Conservation Plan (HCP), which is intended to cover Washington DNR's authorization and management of specific activities on state-owned aquatic lands. Washington DNR is applying to the Services for two separate incidental take permits (ITPs) under section 10(a)(1)(B) of the ESA, one from each Service to cover take of species under their respective statutory authorities.

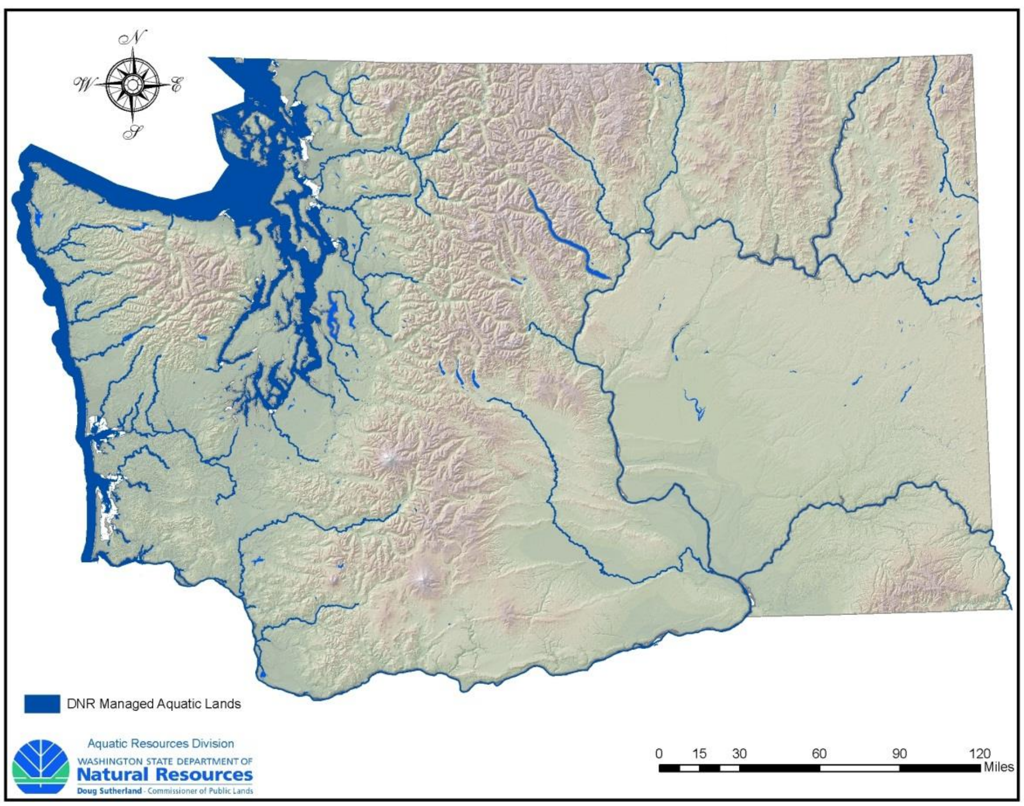

Figure 1-1. Geographic extent of state-owned aquatic lands.

As part of its applications to the Services for ITP issuances, Washington DNR has developed a comprehensive HCP for the conservation of habitat for 29 species of fish and wildlife that occur on these lands and that might be affected by activities that Washington DNR conducts or authorizes. Washington DNR's objectives for implementation of the Aquatic Lands HCP are fourfold:

- To ensure that the HCP conservation measures are consistent with the State's authorities and responsibilities defined under WAC 332-30-100
- To minimize risks to the State's lease holders in their use of state-owned aquatic lands
- To minimize the State's legal liability under the ESA
- To manage habitat in a way that reduces risks of species extinction by contributing to the survival and recovery of listed species that use state-owned aquatic lands

Federal action of ITP issuances to Washington DNR requires environmental review under the National Environmental Policy Act (NEPA). The Services have drafted this environmental impact statement (EIS) to analyze the effects of issuing ITPs to Washington DNR, including implementation of the Aquatic Lands HCP. Washington DNR intends to adopt the EIS under Washington's State Environmental Policy Act (SEPA).

1.1.1 Role of the Endangered Species Act

Congress enacted the ESA in 1973 "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, [and] to provide a program for the conservation of such endangered species and threatened species" (16 United States Code [USC] 1531). Among the provisions aimed at species conservation is the prohibition of take, which includes harassing or harming listed species (Subsection 1.4.1.1, Federal Regulations – Endangered Species Act). ESA section 9(a)(1) contains the following language:

> …it is unlawful for any person subject to the jurisdiction of the United States to … (B) take any [endangered species of fish or wildlife] within the United States or the territorial sea of the United States…." (16 USC 1538(a)(1)).

Section 10(a)(1)(B) of the ESA qualifies this prohibition, saying that the Secretary of the Interior or the Secretary of Commerce (depending on the particular species involved) may permit "any taking otherwise prohibited by [ESA section 9(a)(1)(B)] if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity" (16 USC 1539(a)(1)(B)).

The mechanism by which the Services may permit incidental take under ESA section 10(a)(1)(B) to non-Federal entities is the issuance of ITPs, which provide an assurance that conducting otherwise lawful activities will not be subject to ESA take liability if those activities are conducted according to the terms of the ITP, including implementation of a Services-approved HCP, and a finding by the Services that the issuance of the ITPs would not jeopardize the continued existence of federally listed species.

1.1.2 Washington DNR's Aquatic Lands Habitat Conservation Plan

To obtain the ITPs, Washington DNR must prepare an HCP that meets the issuance criteria established by the Services (Subsection 1.2.3.1, Decisions to be Made—ESA Section 10). Accordingly, Washington DNR has prepared a draft Aquatic Lands HCP in support of its ITP applications (Washington DNR 2013). The Aquatic Lands HCP describes the impacts of take on listed species for which Washington DNR has requested ESA section 10 coverage. It includes a conservation strategy to minimize and mitigate those impacts to the maximum extent practicable. With assistance from the Services, Washington DNR developed conservation measures for fish and wildlife and their associated habitats. The proposed Aquatic Lands HCP is hereby incorporated into this EIS by reference.

With the Aquatic Lands HCP, Washington DNR plans to maintain, improve, and protect habitat for several species of fish and wildlife that are listed as threatened or endangered as well as some unlisted species (i.e., the species proposed for ITP coverage) (Table 1-1). Generally, anadromous fish and marine mammals are under the jurisdiction of NMFS, while amphibians, reptiles, birds, non-anadromous fish are under the jurisdiction of USFWS. Several species proposed for ITP coverage through Washington DNR's Aquatic Lands HCP currently have no listing status under the ESA, but 1) may become listed during the proposed permit term, and 2) would benefit from the conservation measures implemented under the Aquatic Lands HCP.

Washington DNR would implement the proposed Aquatic Lands HCP for 50 years (i.e., ITP term). During this time, Washington DNR would continue to manage state-owned aquatic lands directly and would authorize others to use portions of those lands through leases or other agreements, such as easements and licenses (all such legal instruments authorizing the use of state-owned aquatic lands are referred to as authorization agreements in this EIS). Most aquatic land-use authorizations have a term of 30 or fewer years. Washington DNR would implement conservation strategies and monitoring for the duration of the ITPs.

1.1.3 Summary of the Proposed Action

Under the Proposed Action (described in greater detail in Section 2, Alternatives), each of the Services would issue an ITP to Washington DNR, authorizing the incidental take of the covered species by covered activities, through the implementation of the Aquatic Lands HCP. Washington DNR's Aquatic Lands HCP would apply to all state-owned aquatic lands and to the ITP-covered species listed in Table 1-1. The ITPs would be valid for 50 years. The Operating Conservation Program for the Aquatic

Table 1-1. Species proposed for ITP coverage through the Aquatic Lands HCP

Species Group	Species Name	Federal Status in Washington State [1]	Washington State Status	Federal Agency with Oversight
Amphibians and Reptiles	Columbia spotted frog *(Rana luteiventris)*	Candidate [2]	Candidate	USFWS
	Oregon spotted frog (*R. pretiosa*)	Proposed Threatened	Endangered	USFWS
	Northern leopard frog *(R. pipiens)*	Species of Concern	Endangered	USFWS
	Western toad *(Anaxyrus boreas)*	Species of Concern	Candidate	USFWS
	Pacific pond turtle *(Actinemys marmorata)*	Species of Concern	Endangered	USFWS
Birds	Harlequin duck *(Histrionicus histrionicus)*	None	None	USFWS
	Common loon *(Gavia immer)*	None	Sensitive	USFWS
	Western snowy plover *(Charadrius alexandrinus nivosus)*	Threatened; Critical Habitat Designated	Endangered	USFWS
	Black tern *(Chlidonias niger)*	None	Monitor	USFWS
	Marbled murrelet *(Brachyramphus marmoratus)*	Threatened; Critical Habitat Designated	Threatened	USFWS
Fish	Pacific lamprey (*Lampetra tridentata*)	Species of Concern	Monitor	USFWS
	Green sturgeon *(Acipenser medirostris)*	Threatened; Critical Habitat Designated [3]	Monitor	NMFS
	White sturgeon *(A. transmontanus)*	None [4]	None	USFWS/NMFS [5]
	Coastal cutthroat trout *(Oncorhynchus clarki clarki)*	Species of Concern	None	USFWS
	Pink salmon *(O. gorbuscha)*	None	None	NMFS
	Chum salmon *(O. keta)*	Threatened; Critical Habitat Designated [6]	Candidate	NMFS
	Coho salmon *(O. kisutch)*	Threatened; Critical Habitat Proposed [7] Species of Concern [8]	None	NMFS
	Steelhead trout *(O. mykiss)*	Threatened; Critical Habitat Designated [9]	Candidate	NMFS
	Sockeye/kokanee salmon *(O. nerka)*	Endangered [10] Threatened [11] Critical Habitat Designated [10, 11]	Candidate	NMFS

Table 1-1. Species proposed for ITP coverage through the Aquatic Lands HCP

Species Group	Species Name	Federal Status in Washington State [1]	Washington State Status	Federal Agency with Oversight
	Chinook salmon *(O. tshawytscha)*	Endangered [12] Threatened [13] Critical Habitat Designated [12, 13]	Candidate	NMFS
	Bull trout *(Salvelinus confluentus)*	Threatened; Critical Habitat Designated	Candidate	USFWS
	Pacific herring (*Clupea pallasi*)	None [14]	Candidate	NMFS
	Eulachon/Pacific smelt (*Thaleichthys pacificus*)	Threatened; Critical Habitat Designated[15]	Candidate	NMFS
	Bocaccio (*Sebastes paucispinis*)	Endangered [16]	Candidate	NMFS
	Canary rockfish (*S. pinniger*)	Threatened [16]	Candidate	NMFS
	Yelloweye rockfish (*S. ruberrimus*)	Threatened [16]	Candidate	NMFS
	Pacific sand lance (*Ammodytes hexapterus*)	None	None	NMFS
	Surf smelt (*Hypomesus pretiosus*)	None	None	NMFS
Marine Mammals	Southern Resident killer whale *(Orcinus orca)*	Endangered; Critical Habitat Designated	Endangered	NMFS

[1] For all species in this table, all populations in Washington State are proposed for coverage, regardless of listing status. **Endangered** = In danger of becoming extinct throughout all or a significant portion of its range, either nationwide (Federal status) or in Washington (State status); **Threatened** = Likely to become endangered (Federal or State status) in the foreseeable future; **Candidate** = actively being considered for listing as endangered or threatened (Federal or State status); **Species of Concern** = Species about which NMFS or USFWS has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA; **Sensitive** = Vulnerable or declining and likely to become endangered or threatened throughout a significant portion of its range within Washington State; **Monitor** = Monitored for status and distribution and managed by WDFW to prevent from becoming endangered, threatened, or sensitive.

[2] Great Basin distinct population segment (south of the Snake River)

[3] The southern distinct population segment, which spawns in the Eel and Sacramento Rivers in California, is listed as threatened. Fish from the southern distinct population segment are known to migrate to the coastal waters and estuaries of Washington State.

[4] Populations in Washington have no listing status; the Kootenai River population in Idaho and Montana is listed as endangered.

[5] Anadromous populations (below Bonneville Dam) are under the jurisdiction of NMFS; inland (landlocked) populations are under the jurisdiction of USFWS.

[6] Hood Canal summer-run and Columbia River evolutionarily significant units (ESUs)

[7] Lower Columbia River ESU

[8] Puget Sound/Strait of Georgia ESU

[9] Upper Columbia River, Snake River Basin, Lower Columbia River, Upper Willamette River, Middle Columbia River, and Puget Sound ESUs

[10] Snake River ESU. Fish from this ESU migrate through the waters of Washington State.

[11] Ozette Lake ESU

[12] Upper Columbia River spring-run ESU

[13] Snake River spring/summer-run, Snake River fall-run, and Puget Sound, Lower Columbia River, and Upper Willamette River ESUs

[14] The Southeast Alaska distinct population segment is a candidate for ESA listing, but that stock is discrete from the populations that occur in Washington waters.

[15] Southern distinct population segment.

[16] Puget Sound/Georgia Basin distinct population segments.

Lands HCP (HCP Chapter 5) would define how Washington DNR implements the mitigation sequence of avoidance, minimization, and compensation for unavoidable impacts of aquatic lands uses authorized by Washington DNR. To satisfy these requirements, the HCP Operating Conservation Program would include measures designed to avoid, minimize, and mitigate, to the maximum extent practicable, for incidental take associated with Washington DNR's management of state-owned aquatic lands. In addition, Washington DNR would implement an adaptive management program and would follow management practices that contribute to meeting the goals and objectives of the Aquatic Lands HCP. The HCP Operating Conservation Program would also incorporate additional commitments by Washington DNR that may provide additional mitigation under the HCP, including programs to restore or protect aquatic habitat and implement management practices that contribute to meeting the goals and objectives of the Aquatic Lands HCP.

The requirements of the ITPs would govern Washington DNR's decisions regarding the proposed covered activities as follows:

- **Authorization and management of shellfish aquaculture:** 1) the location of new or expanded aquaculture operations and related facilities, 2) the design of new or expanded structures and sites, 3) how aquaculture operations are conducted, 4) maintenance practices, and 5) the removal of abandoned structures.
- **Authorization and management of log booming and storage:** 1) the location of new or expanded log booming and storage facilities, 2) how log booming and storage operations are conducted, and 3) the removal of wood debris.
- **Authorization and management of uses associated with overwater structures:** 1) the location of new or expanded overwater structures; 2) the physical characteristics of individual new, expanded, or renovated structures; 3) operational elements of the structures; and 4) the removal of abandoned structures or facilities.

As part of the HCP operating program, Washington DNR would require all new and renewed authorization agreements to include specific measures designed to address the potential effects associated with all uses authorized by Washington DNR, including non-covered programs. As existing authorizations are renewed, the associated uses would be brought into compliance with the terms and conditions specified in the Aquatic Lands HCP. These conservation measures would focus on water quality, sediment quality, habitat-forming processes, habitat features, and biological communities. The measures would protect aquatic vegetation, forage fish spawning habitat, and important habitats and sensitive life phases for ITP-covered species. They would also include specific guidelines for artificial lighting, fill, flotation material, tires, treated wood, breakwaters, covered moorage and boathouses, derelict structures, and abandoned equipment, as well as undertakings such as bank armoring, pressure washing, and sediment removal.

In addition to the HCP measures that address proposed uses of state-owned aquatic lands, Washington DNR's existing habitat protection and restoration programs and actions would provide additional compensation for remaining impacts to covered species and their habitats. These programs include Washington DNR's Aquatic Reserves Program, Conservation Leasing Program, and Commissioner's Orders, for the protection and restoration of habitats that directly or indirectly support the persistence and recovery of proposed covered species. Other programs that would be provide additional compensation include the Aquatic Lands Restoration Program and the Derelict Vessel Removal Program.

1.2 Purpose and Need for Action

1.2.1 Purpose of the Proposed Action

The Federal purposes of this action are 1) for the Services to respond to Washington DNR's application to each agency for an ITP and 2) to ensure that the issuance criteria of ESA section 10(a)(2)(b) are met for the protection and conservation of listed, proposed, and unlisted species. If issued, the proposed ITPs would authorize the incidental take of species listed as either threatened or endangered under the ESA. The ITPs would also provide incidental take coverage for certain other species should they become listed during the term of the permits.

Washington DNR's purpose for the action is to manage habitat on state-owned aquatic lands in a manner that 1) minimizes risks to ESA-listed and other imperiled species through ITP and HCP implementation, 2) minimizes risks to the State's lease holders in their use of state-owned aquatic lands, and 3) minimizes the State's legal liability under the ESA.

1.2.2 Need for Action

The Services' need for the action is to work collaboratively with Washington DNR so its ITP application includes an HCP with measures that protect and conserve listed species by minimizing and mitigating the effects of the covered activities to the maximum extent practicable. Washington DNR's need for the action is to ensure that its management actions are compliant with ESA requirements through implementation of the ITPs and HCP.

1.2.3 Decisions to be Made

This subsection describes how the Services will determine whether the purpose and need is met with respect to species protection and conservation. The determination whether the ESA issuance criteria have been met will be made after the Aquatic Lands HCP, Draft EIS, and Final EIS are finalized and following consideration of public input. At the end of the process, the determination of whether the criteria are met will be presented in 1) ESA section 10 findings documents if ITPs are issued under ESA section 10(a)(1)(B), 2) ESA section 7 biological opinions, and 3) a NEPA decision document (Record of Decision).

1.2.3.1 Endangered Species Act, Section 10

Under provisions of the ESA, the Secretary of the Interior (through the USFWS) and the Secretary of Commerce (through NMFS) may issue a permit for the incidental taking of a listed species if they find that the application conforms to the issuance criteria identified in 16 USC 1539(a)(2)(A) and (B), 50 Code of Federal Regulations (CFR) 17.22, (USFWS's regulations) and 50 CFR 222.307 (NMFS's regulations). The issuance criteria are as follows:

- The taking will be incidental.
- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking.
- The applicant will ensure that adequate funding for the conservation plan and procedures to deal with unforeseen circumstances will be provided.
- The taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild.
- The applicant will apply other measures the Services may require as necessary or appropriate for the purposes of the HCP.

As a condition of receiving an ITP, an applicant must prepare and submit an HCP to the Services for approval. The HCP must contain the mandatory elements of ESA section 10(a)(2)(A) and must specify the following:

- The impact that will likely result from such taking
- What steps the applicant will take to monitor, minimize, and mitigate such impacts, the funding that will be available to implement such steps, and the procedures to be used to deal with unforeseen circumstances

- What alternative actions to such taking the applicant considered and the reasons why such alternatives are not being used
- Such other measures that the Secretaries may require as being necessary or appropriate for purposes of the plan (ESA section 10(a)(2)(A)(i)-(iv))

The Services' ESA section 10 determinations are documented in a section 10 findings document produced by the Services at the end of the process. If the Services find that an application conforms to the issuance criteria listed above, the ESA requires the Services to issue ITPs. In such cases, the Services decide whether to issue permits conditioned on implementation of a proposed HCP as submitted, or to issue permits conditioned on implementation of a proposed HCP as submitted, together with other measures specified by the Services. If the Services find that the above criteria are not satisfied, the permit request will be denied.

1.2.3.2 Endangered Species Act, Section 7

ESA section 7(a)(2) requires all Federal agencies to consult with the Services to ensure any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the adverse modification or destruction of designated critical habitat. This consultation requirement also applies to the Services when they propose conducting an action that may affect listed species or critical habitat. The Services' action of issuing ITPs under ESA section 10(a)(1)(B) is a Federal action and is, therefore, subject to consultation under ESA section 7(a)(2). Accordingly, before issuing an ITP (if the decision is made to issue ITPs), each Service will conduct an intra-agency consultation regarding the anticipated effects of the Aquatic Lands HCP on listed species and critical habitat under its jurisdiction. Upon completion of these consultation processes, each Service will produce a biological opinion. The biological opinions will document each Service's conclusions regarding the likelihood of jeopardizing the continued existence of any listed species or of adversely modifying designated critical habitat for any listed species.

1.2.3.3 National Environmental Policy Act

Issuance of an ITP is a Federal action subject to NEPA compliance. NEPA (42 USC 4321 *et seq.*) requires Federal agencies to conduct an environmental analysis of their proposed actions to determine if the actions may significantly affect the human environment. NEPA promotes analysis and disclosure of environmental issues surrounding a proposed Federal action to reach a decision that reflects the statute's mandate to strive for harmony between human activity and the natural world (42 USC 4321 *et seq.*). NEPA analysis requirements differ from those specified under ESA section 10(a)(2)(A) and (B), described above. In comparison to the ESA section 10 requirements for an HCP, NEPA requires a broader analysis that examines additional environmental impacts of a proposed HCP and considers all reasonable alternatives, including No-action. The NEPA process must also analyze the effects, beneficial as well as adverse, of issuing an ITP, compared to what would occur if the permit were not issued.

An EIS is required when a proposed project or activity is a major Federal action with the potential to significantly affect the quality of the human environment. An EIS provides a detailed statement of the environmental impacts of the action, reasonable alternatives, and measures to mitigate adverse effects of the proposed actions. The process of developing an EIS culminates in a Record of Decision. The Record of Decision documents the alternative selected for implementation and any conditions that may be required; the environmentally preferred alternative, which may differ from the alternative selected for implementation; and a summary of impacts expected to result from the alternative selected for implementation.

1.2.4 Background and Context

The Federal government granted Washington State title to certain navigable fresh and marine waters upon statehood, and the State asserted ownership in Article XVII, Section 1, of the Washington State Constitution. Waters that are navigable for the purpose of establishing State title are those lands that are capable of serving as a highway for commerce in their natural and ordinary condition, using customary modes of travel and trade on water. Federal regulations define navigable waterways as those waters that are subject to the ebb and flow of the tide and/or are used for the transport of interstate or foreign commerce either historically, currently, or in the future (33 CFR 329). Washington DNR presumes ". . . all bodies of water meandered by government surveyors. . . " to be navigable for the purpose of establishing state title unless declared otherwise by a court (WAC 332-30-106(41)). If there is a dispute about whether a water body is navigable for the purpose of vesting title in the state, the judiciary makes the final determination.

While state ownership in marine areas is generally well established, the extent of state-owned aquatic lands underlying fresh water is less known because the navigability of some waterbodies has yet to be analyzed or adjudicated. In addition, state ownership and, thus, Washington DNR's management authority generally follow gradual changes in the boundary of the water body caused by natural accretion, erosion, or recession of water from a shoreline. For this reason, the location of aquatic lands managed by Washington DNR may change over time.

State-owned aquatic lands managed by Washington DNR include tidelands, shorelands, and bedlands. Tidelands are those lands associated with marine and estuarine waters affected by the ebb and flow of tides. Generally, tidelands are located between the ordinary high tide line and extreme low tide (Figure 1-2). Shorelands are usually submerged and are associated with navigable rivers and lakes. They are affected by seasonal and anthropogenic changes in water level. For purposes of ownership, shorelands are located between the line of ordinary high water and the line of navigability (Figure 1-3). Bedlands, or "beds of navigable waters," are always submerged and are found waterward of adjoining tidelands or shorelands (Figure 1-2 and Figure 1-3).

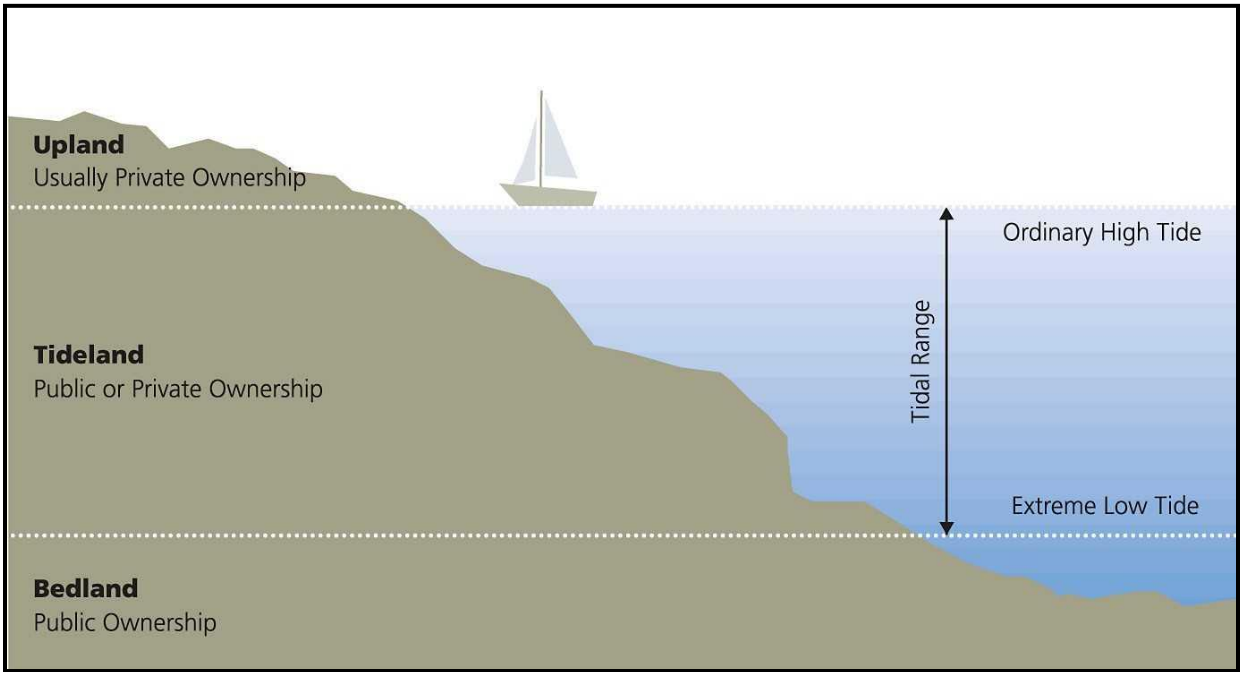

Figure 1-2. Marine tidelands and bedlands.

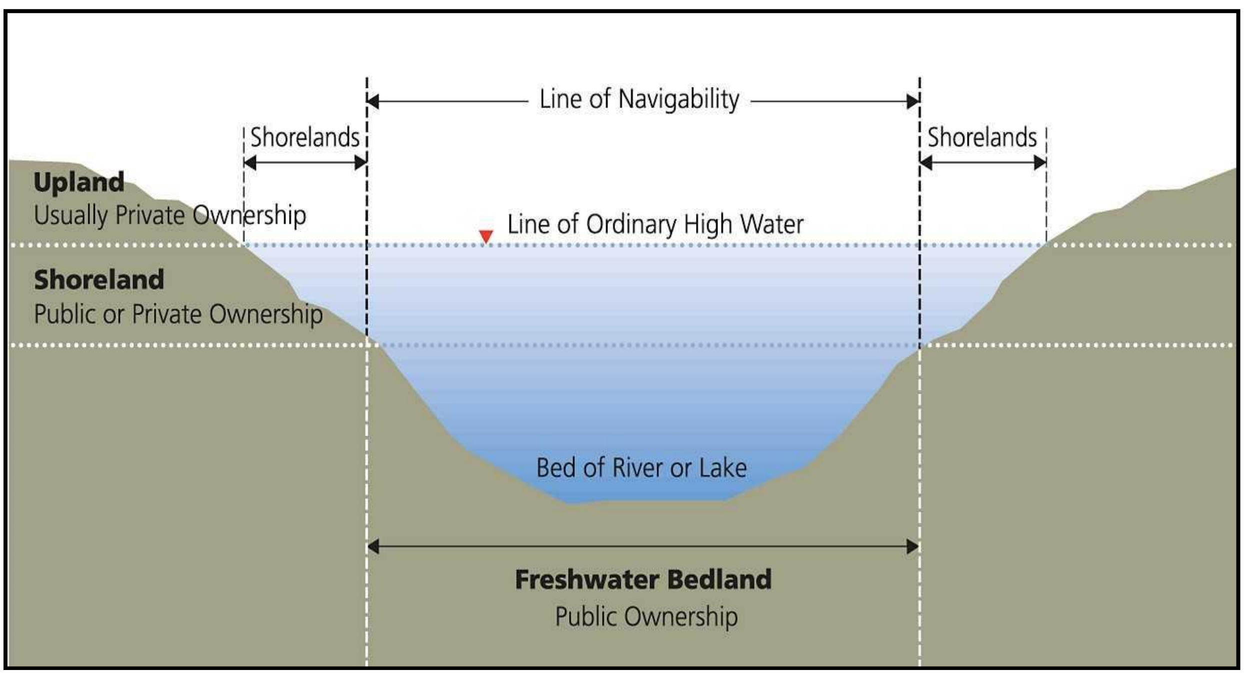

Figure 1-3. Freshwater shorelands and bedlands.

Washington DNR authorizes a wide variety of uses of state-owned aquatic lands by individuals, businesses, and government entities. It also conducts management practices on state-owned aquatic lands, including derelict vessel removal, control of aquatic nuisance species, identification and management of areas for conservation or restoration, and designation of aquatic reserves.

1.2.5 Incidental Take Permit Covered Activities

Washington DNR analyzed all uses of state-owned aquatic lands for potential effects on ESA-listed species. The list of potentially covered activities was focused using the following set of criteria:

- The activity occurs on state-owned aquatic lands.
- Washington DNR authorizes or carries out the activity.
- The activity is not already covered by another ESA compliance or management mechanism.
- Washington DNR exercises a sufficiently high degree of control over how the activity occurs on the landscape and how the activity affects sensitive species and habitats.
- The effects of the activity have the potential to result in incidental take under ESA.
- Identifiable conservation measures exist to avoid, minimize, or mitigate for the harm.

Washington DNR proposes including the authorization and management of the following uses of state-owned aquatic lands as covered activities in the Aquatic Lands HCP:

- Aquaculture of shellfish
- Placement of overwater structures (docks, wharves, rafts, boat ramps, boat launches, hoists and lifts, mooring buoys, nearshore buildings, floating homes, marinas, and shipyards and terminals)
- Log booming and storage

1.2.6 Washington DNR's Aquatics Division

Aquatic lands are considered "a finite natural resource of great value and an irreplaceable public heritage," to be managed to "provide a balance of public benefits for all citizens of the state" (Revised Code of Washington [RCW] 79.105.010, 79.105.020, and 79.105.030). Washington DNR is directed to "manage these lands as a public trust and provide a rich land base for a variety of recreational, economic, and natural process activities" (WAC 332-30-100). Management concepts, philosophies, and programs for state-owned aquatic lands are expected to be consistent with this responsibility to the public (WAC 332-30-100). Washington DNR's authority includes the stewardship and management of resources attached to or embedded in aquatic lands (e.g., seaweed, shellfish, sand, minerals, and oil), as well as the management of man-made structures in the water and air space above state-owned aquatic lands.

Per RCW 79.105.210, Aquatic Lands—Preservation and Enhancement of Water-Dependent Uses—Leasing Authority, Washington DNR has the authorities described below:

- Washington DNR must manage state-owned aquatic lands to preserve and enhance water-dependent uses. The agency must favor water-dependent uses[2] over other uses in state-owned aquatic land planning and resolve conflicts between competing lease applications. In cases of conflict between water-dependent uses, Washington DNR must give priority to uses that enhance renewable resources, water-borne commerce, and the navigational and biological capacity of the waters, and to statewide interests, as distinguished from local interests.
- Washington DNR must manage non-water-dependent use of state-owned aquatic lands as a low priority that provides minimal public benefits. Washington DNR may not permit expansion or establishing of new areas with non-water-dependent uses, unless exceptional circumstances exist under which the activity is compatible with water-dependent uses occurring in or planned for the area.
- Washington DNR must consider the natural values of state-owned aquatic lands as wildlife habitat, natural area preserve, representative ecosystem, or spawning area before issuing any initial lease or authorizing any change in use. Washington DNR may withhold lands from leasing that it finds to have significant natural values, or may provide for the protection of such values within any lease.
- The power to lease state-owned aquatic lands is vested in Washington DNR, which has the authority to make leases upon terms, conditions, and length of time in conformance with the Washington State Constitution and 79.105 through 79.140 RCW.

[2] **Water-dependent** uses are those that cannot logically exist in any location but on the water (RCW 79.105.060). Examples include water-borne commerce, aquaculture, log booming, moorage and launching facilities, public fishing piers and parks, and ferry terminals. A **non-water-dependent** use can operate in a location other than on the waterfront. Examples include hotels, condominiums, apartments, restaurants, retail stores, and warehouses that are not part of a marine terminal or transfer facility. **Water-oriented** uses, as defined in RCW 79.105.060, are uses that historically have been dependent on a waterfront location, but with existing technology could be located away from the waterfront. Examples specified in the definition include watercraft sales, fish processing, and houseboats. Per WAC 332-30-137, Washington DNR cannot authorize new, expanded, or additional non-water-dependent uses or water-oriented uses except in certain exceptional circumstances and when compatible with water-dependent uses.

- Washington DNR may not lease state-owned aquatic lands to persons or organizations that discriminate on the basis of race, color, creed, religion, sex, age, or physical or mental handicap.

Currently, land may be sold to, or exchanged with, public entities but only under carefully prescribed circumstances. Washington DNR's authority to sell state-owned aquatic lands to private entities was discontinued in 1971. By that time, however, the State had sold much of its tidelands and shorelands. Currently, approximately 50 percent of the tidelands, 10 percent of the shorelands, and 98 percent of the bedlands in Washington State are state-owned (Washington DNR 2013).

Shorelands and tidelands may be sold, but only to public entities for public purposes (RCW 79.125.200, 79.125.700, and 79.125.710). Washington DNR may also sell shorelands to owners of neighboring uplands if the shorelands are more than 2 miles from cities and the sale is not contrary to the public interest (RCW 79.125.450). Washington DNR may exchange tidelands and shorelands with private or public entities, but only if the exchange is in the public interest (RCW 79.105.400). Washington DNR has no power to convey bedlands out of state ownership. Notably, lands potentially eligible for sale make up only 1 percent of state-owned aquatic lands (Washington DNR 2013 [Table 1.1]). Washington DNR can accept gifts of aquatic lands (RCW 79.105.410). Outright purchase of aquatic lands, however, requires legislative approval and appropriation.

1.3 Scoping and the Relevant Issues

Publication of this Draft EIS is a key milestone in the environmental review process for the proposed Aquatic Lands HCP. Early actions include public scoping and definition of issues and concerns. The purpose of scoping is to identify the relevant human environmental issues, to eliminate insignificant issues from detailed study, and to identify the alternatives to be analyzed in the EIS. Scoping can also help determine the level of analysis and the types of data required for analysis.

1.3.1 Public Scoping Process

The Services initiated the public scoping process with the publication of a Notice of Intent to prepare this Draft EIS. The notice, published in the Federal Register (Fed. Reg.) on October 24, 2006 (71 Fed. Reg. 62251), stated that there would be a 45-day public comment period to gather information on the scope of the issues and the range of alternatives to be analyzed in the EIS. The comment period extended from October 4 to December 11, 2006. The Services considered whether to add another scoping and comment period to allow the public a more current opportunity to inform this EIS development process, but decided the same purpose would be achieved by publishing the DEIS for public comment. The Services and Washington DNR also issued a joint media release and mailed an initial informational brochure to a mailing list of approximately 4,300 Federal, state, county, and local agencies; elected officials; Native American organizations; non-governmental organizations; businesses; media outlets; libraries; and individuals. The Washington DNR web page[3] was updated with an announcement identifying meeting dates and locations and including a link to the informational brochure as well as contact information for the project leads at NMFS and USFWS. Public scoping meetings were held from October 24 to November 8, 2006. Table 1-2 details the locations of the meetings and the number of attendees.

During the scoping meetings, staff introduced the proposed Washington DNR Aquatic Lands HCP and explained the NEPA review process. The public and agencies submitted written comments during the scoping period. The Services also conducted internal scoping activities to address key components of alternative descriptions, to develop the level of detail for impact and cumulative impact analyses, and to prepare the Draft EIS framework and schedule. Washington DNR was invited to participate in the Federal internal scoping process to assist with technical information necessary to develop alternative descriptions and to frame the analyses.

Table 1-2. Public scoping meeting locations, dates, and registered attendance.

Washington State Locations	**Date**	**Sign-ins**
Spokane	October 24, 2006	No attendees
Ellensburg	October 25, 2006	2
Bellingham	November 1, 2006	10
Longview	November 7, 2006	10
Seattle,	November 8, 2006	18
TOTAL		**40**

1.3.2 Issues and Concerns

Issues and concerns regarding the Proposed Action and alternatives were raised during the public scoping process. After the scoping comment period, the Services reviewed all comments received and wrote a scoping report summarizing issues that arose out of the scoping process. This Draft EIS has been prepared in consideration of issues raised during the public scoping process.

1.4 Relationship to Other Plans, Regulations, and Laws

Discussions in this subsection address the Federal, state, and local laws and regulations that apply to the Proposed Action and alternatives (Section 2, Alternatives). The Federal requirements governing the development of the Aquatic Lands HCP and the related EIS are described in EIS Subsection 1.2.3,

[3] http://www.dnr.wa.gov/ResearchScience/Topics/AquaticHCP/Pages/aqr_aquatics_hcp.aspx

Decisions to be Made. At the state level, the requirements for developing an EIS under SEPA are similar to those under NEPA. This subsection describes the Federal, state, and local laws and regulations applicable to uses of state-owned aquatic lands. Although most of these laws and regulations do not apply directly to the Proposed Action (i.e., the issuance of ITPs to Washington DNR; see Subsection 1.1.3, Summary of the Proposed Action, and Subsection 2.2, Alternatives Analyzed in Detail), they establish the regulatory environment in which the Aquatics Division operates, and in many cases they limit the degree to which aquatic land uses may affect the environment.

Unlike other agencies involved with the management of aquatic habitats and species within Washington State, Washington DNR's role in the management of state-owned aquatic lands is proprietary rather than regulatory. Through its proprietary authority, Washington DNR holds contractual agreements with users of state-owned aquatic lands and acts on behalf of the landowner—that is, the State. Other agencies at the Federal, state, and local levels are charged with ensuring compliance with various statutes and regulations. Those other authorities may be involved in setting conditions associated with the siting, construction, or operation of the uses that Washington DNR authorizes. As the proprietary manager of state-owned aquatic lands, Washington DNR may require different conditions than other state agencies or Federal regulators. In general, when the use of a body of water could affect human health or the environment, several agencies are involved in ensuring that the applicable laws and regulations are followed and appropriate permit conditions are developed.

Many regulations require approval procedures, such as the issuance of environmental permits, before project implementation; others require agency consultation. The following two tables identify the types of projects and activities that are subject to approval by (Table 1-3) or consultation with (Table 1-4) various Federal, state, and local agencies. A brief summary of regulations, laws, and plans or policies that govern the uses of state-owned aquatic lands follows the tables.

Table 1-3. Permits, approvals, or processes that may be required for uses of state-owned aquatic lands.

Permit, Approval, or Process (Oversight Agency)	Activities with Nexus to Lease Permit Requirements
Federal Permits, Approvals, or Processes	
ESA Section 10 ITP (USFWS and NMFS)	Potential incidental take of federally listed threatened and endangered species
NEPA Review (EPA)	Major Federal actions (projects or plans) with the potential to significantly affect the quality of the human environment
National Pollutant Discharge Elimination System Construction Stormwater General Permit (Washington State Department of Ecology)	Construction activities that disturb 1 acre or more of land and that have the potential to discharge stormwater or storm drain runoff to surface water
Clean Water Act Section 404 Permit (U.S. Army Corps of Engineers)	Excavating, land clearing, or discharging dredged or fill material into waters of the United States, including wetlands
Rivers and Harbors Act Section 10 Permit (U.S. Army Corps of Engineers)	1) Construction of any structure in or over any navigable water of the United States, including wetlands, 2) excavation, dredging, or deposition of material in navigable waters, or 3) creation of any obstruction or alteration in a navigable water
Nationwide Permit, Regional General Permit (U.S. Army Corps of Engineers)	Certain activities (in limited geographic areas, for Regional General Permits), subject to permitting under the Clean Water Act and/or the Rivers and Harbors Act, that are expected to have minimal environmental impacts
Federal Energy Regulatory Commission License	Interstate transmission of electricity, natural gas, and oil; construction and operation of hydroelectric projects
Marine Mammal Protection Act Take Authorization (NMFS)	Activities with the potential to harass, hunt, capture, collect, or kill marine mammals
Private Aids to Navigation Permit (U.S. Coast Guard)	Installation of fixed structures or floating objects within the waters of the United States
Comprehensive Environmental Response, Compensation, and Liability Act Consent Decree (EPA)	Uses with the potential to disturb remediation actions
State and Local Permits, Approvals, or Processes	
SEPA Review	Agency actions such as the issuance of a permit, license, lease, or other project approval; projects affecting aquatic lands often require SEPA review
Hydraulic Project Approval (Washington Department of Fish and Wildlife)	Projects that use, divert, obstruct, or change the natural flow or bed of waters (marine or fresh)
Clean Water Act Section 401 Water Quality Certification (Washington State Department	Projects that require Federal licenses or permits and that may involve the discharge of dredge or fill material into water or non-isolated wetlands (i.e., projects requiring a section 404 permit)

Table 1-3. Permits, approvals, or processes that may be required for uses of state-owned aquatic lands.

Permit, Approval, or Process (Oversight Agency)	**Activities with Nexus to Lease Permit Requirements**
of Ecology)	
Land Use Permit (local government)	Activities in or near locally designated critical areas (e.g., wetlands, fish and wildlife habitat conservation areas, frequently flooded areas) or in protective buffer zones
Shoreline Management Permit (Washington State Department of Ecology or local government)	Activities with a value equal to or greater than $2,500 taking place within 200 feet of shorelines of the state or within associated wetlands
Coastal Zone Management Act Consistency Determination (administered by Washington State Department of Ecology)	Federally permitted, licensed, or funded projects affecting coastal resources in one or more of Washington's 15 coastal counties
Shellfish Operation License and Certificate of Approval (Department of Health, implementing the National Shellfish Sanitation Program)	Commercially harvesting and/or processing shellfish (clams, oysters, mussels, scallops)
Aquaculture Registration and Transfer Permit (Washington Department of Fish and Wildlife)	Culturing or transferring food fish, shellfish, and certain aquatic animals
Forest Practices Permit (Washington DNR)	Road construction or timber harvest near waters of the state
Archaeological Excavation Permit (State Department of Archaeology and Historic Preservation)	Excavating, altering, defacing, or removing archaeological objects or resources or American Indian graves, cairns, or glyptic records

Table 1-4. Other Federal and state environmental review and consultation requirements.

Consultation Requirement (Oversight Agency)	Activities with Nexus to Consultation Requirements
Federal Requirements	
ESA Section 7 Consultation (USFWS and NMFS)	Federal actions (including issuance of an ITP) that may affect species listed as threatened or endangered under the ESA
Magnuson-Stevens Fishery Management and Conservation Act Consultation (NMFS)	Federal actions that may adversely affect essential fish habitat
Clean Water Act and NEPA Compliance Review (EPA)	Federal and state actions subject to the provisions of the Clean Water Act and NEPA
National Historic Preservation Act (all Federal agencies)	Any Federal action with the potential to affect historic properties
American Indian Religious Freedom Act (any Federal agency)	Actions that may affect American Indians' practice of traditional religions, including access to religious sites
State Requirements	
Growth Management Act Critical Areas Ordinances	Proposed projects in or near critical areas or in protective buffer zones
Governor's Executive Order 05-05 (State Department of Archaeology and Historic Preservation)	Capital construction projects and land acquisition must determine potential effects on cultural resources in consultation with the State Department of Archaeology and Historic Preservation and affected American Indian tribes.

1.4.1 Federal Regulations

Discussions in this subsection provide additional background on Federal laws and regulations that are identified in Table 1-3 and Table 1-4, as well as describing how those laws and regulations apply to uses of state-owned aquatic lands. In addition to the laws identified below, *U.S. v. Washington* establishes that Tribes have a right to up to 50 per cent of harvestable fish, based on their treaty right to fish in their usual and accustomed fishing grounds. Also, per Secretarial Order 3206, "American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act," the agencies, bureaus, and offices of the Department of the Interior and the Department of Commerce must consider effects on American Indian lands, Indian trust resources, and the exercise of American Indian tribal rights when taking actions under the authority of the ESA and associated implementing regulations.

1.4.1.1 Endangered Species Act

The purpose of the ESA is described in Subsection 1.1, Introduction. The processes for obtaining ITPs and conducting consultation with the Services are described in Subsection 1.2.3, Decisions to be Made. This section presents additional information on ESA processes that was not explained above.

An endangered species is "any species which is in danger of extinction throughout all or a significant portion of its range" (16 USC 1532(6)) and a threatened species is one "which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (16 USC 1532(20)). Different populations of an individual species can have different listing status under the ESA. For example, NMFS has designated more than 50 distinct population segments (called DPSs) and evolutionarily significant units (called ESUs) of salmonids on the Pacific coast. For some species, various ESUs are listed as threatened or endangered under the ESA, while others are not.

In the context of the ESA, the word 'take' means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC 1532 (19)). USFWS further defines harm to include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, and sheltering (50 CFR 17.3). NMFS' definition of harm includes significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, spawning, migrating, rearing, and sheltering (50 CFR 222.102).

ESA section 9 prohibits the take of a species listed as endangered by the Federal government. For species listed as threatened, USFWS has an existing protective regulation that automatically extends the section 9 take prohibition to threatened species when listed. NMFS uses rulemaking to extend the take prohibition to threatened species after listing. The Services may bring civil and criminal proceedings against persons for violation of ESA section 9. In addition, ESA section 11(g) allows any third party to enforce section 9 (or any other provision of the ESA) through civil action.

1.4.1.2 National Environmental Policy Act

See Subsection 1.2.3, Decisions to be Made, for a discussion of NEPA.

1.4.1.3 Clean Water Act

The Clean Water Act, administered by the U.S. Army Corps of Engineers (Corps) and U.S. Environmental Protection Agency (EPA), is the principal Federal legislation directed at protecting water quality. The Corps is responsible for ensuring compliance with section 404 of the Act, regarding issuance of permits to place dredge or fill materials into waters of the United States. Examples of projects that require such permits include construction and maintenance of piers, wharves, dolphins, breakwaters, bulkheads, groins, jetties, mooring buoys, and boat ramps. Under section 401 of the Act, Washington State Department of Ecology (Ecology) has the authority (as delegated by EPA) to approve, deny, or condition any project requiring a section 404 permit and to ensure that the work will meet state water quality standards. Ecology establishes the standards and regulations, subject to approval by EPA, under which waters of the state must be managed to meet Federal requirements. Ecology has the authority to prohibit any activity that has an unacceptable impact on municipal water supplies, shellfish beds, fishery areas, and wildlife and recreational areas.

As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. In addition to addressing construction and stormwater-related pollution, EPA has adopted special regulations to govern permitting of silvicultural activities under the NPDES program. Some of these activities occur on state-owned aquatic lands. A permit is required for "any discernible, confined, and discrete conveyance related to rock crushing, gravel washing, log sorting, or log storage facilities which are operated in connection with silvicultural activities" (40 CFR 122.27(b)(1)).

In addition to issuing individual permits for projects that involve the discharge of dredge or fill, the Corps administers programs intended to provide timely authorization for certain activities determined to have minimal environmental impacts. Such permits are called nationwide permits or (for projects in several specific geographic areas) regional general permits. Examples of projects that may be permitted through these programs include aids to navigation, utility lines, bank stabilization activities, road crossings, stream and wetland restoration activities, residential developments, mining activities, and commercial shellfish aquaculture activities. The nationwide permit for existing commercial shellfish aquaculture activities, for example, authorizes 1) the installation of structures necessary for the continued operation of an existing commercial aquaculture activity and 2) discharges of dredged or fill material necessary for shellfish seeding, rearing, cultivating, transplanting, and harvesting activities. The nationwide permit does not authorize new operations or expansions of the project areas of existing activities, nor does it authorize attendant features such as piers, boat ramps, stockpiles, staging areas, or the deposition of shell material into waters of the United States.

1.4.1.4 Rivers and Harbors Act

The Corps is directed by Congress under section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) to regulate all work or structures in or affecting the course, condition, or capacity of navigable waters of the United States. The intent of this law is to protect the navigable capacity of waters important to interstate commerce. Navigable waters of the United States are defined in 33 CFR 329 as "those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce."

1.4.1.5 Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; 42 USC 9601 *et seq.*), provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. Among other provisions, the law authorizes remedial response actions to reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life-threatening. Consent decrees under CERCLA are legal agreements entered into by the United States (through EPA and the Department of Justice) and parties responsible for contaminated sediment cleanup and remediation activities under Federal jurisdiction. One such consent decree requires Washington DNR to impose restrictive covenants on uses authorized on certain state-owned aquatic lands to protect sediment caps.

1.4.1.6 Coastal Zone Management Act

The Coastal Zone Management Act (16 USC 1451 *et seq.*) requires Federal agencies to ensure that activities carried out in or outside of Washington State's coastal zone are consistent with the enforceable policies of approved state management plans, to the maximum extent practicable. Under federally granted Coastal Zone Management Act authority, Ecology administers Washington State's coastal zone management program on the state's shoreline (under the State Shoreline Management Act) and waters (under the Aquatic Land Management statutes), except for excluded Federal lands (i.e., lands that the Federal government owns, leases, holds in trust, or for which it has sole discretion to determine their uses, such as the Olympic National Park coastal strip and the Makah and Ozette Reservations).

Both the National Park Service and Ecology manage the aesthetics of the shoreline under federally granted Coastal Zone Management Act authority. The Coastal Zone Management Act identifies beaches as aesthetic resources of the nation (16 USC 1451(b)). As federally delegated, Washington State's Shoreline Management Act establishes a program to coordinate the protection and development of the state's shoreline, preserving to the greatest extent possible the public's opportunity to enjoy the physical and aesthetic qualities of state natural shorelines (RCW 90.58.020).

1.4.1.7 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fisheries Conservation and Management Act (16 USC 1801 *et seq.*) addresses the productivity and sustainability of United States marine fisheries. The amended act mandates the identification of essential fish habitat for managed species as well as measures to conserve and enhance the habitat necessary to fish for spawning, breeding, feeding, or growth to maturity. The Magnuson-Stevens Act is implemented by the Secretary of Commerce, acting through NMFS. Under the act, Federal agencies must consult with NMFS regarding any action that may adversely affect essential fish habitat that has been formally designated in the fishery management plan for the affected region. NMFS then provides recommendations to the Federal agency on measures to avoid, minimize, compensate for, or otherwise offset adverse effects on essential fish habitat resulting from such actions. Essential fish habitat consultations are often conducted concurrently with ESA section 7 consultations. In the action area for the Aquatic Lands HCP, fishery management plans have been developed for West Coast groundfish, coastal pelagic species, and Pacific salmon, and essential fish habitat and habitat areas of particular concern have been designated.

1.4.1.8 National Historic Preservation Act

The National Historic Preservation Act (16 USC 470) is the primary Federal law governing the preservation of cultural and historic resources in the United States. This act established a national preservation program and the basic structure for encouraging the identification and protection of cultural and historic resources of national, state, tribal, and local significance. A key element of the preservation program is the National Register of Historic Places, which is the Federal list of historic, archaeological, and other cultural resources deemed worthy of preservation. In Washington State, the National Register is administered by the Washington State Department of Archaeology and Historic Preservation (see Subsection 1.4.2.9, State Historic Preservation Office). Resources listed, or determined eligible for listing, are considered historic properties. Section 106 of the act requires Federal agencies to consider the effects of their undertakings (including funding, licensing, or permitting the undertakings of other entities) on historic properties and stipulates that affected American Indian tribes must be consulted. Issuance of ITPs is a Federal action requiring review under the National Historic Preservation Act.

1.4.1.9 American Indian Religious Freedom Act

The American Indian Religious Freedom Act protects the inherent rights of American Indian tribes to the free exercise of their traditional religions. Agencies are required to consult with tribes if an anticipated action is expected to affect their practice of traditional religions or their access to religious sites. In addition, under Executive Order 13007, Federal agencies are required to avoid physical damage as much as possible to American Indian sacred sites located on Federal and American Indian lands. A site need not be a historic property to merit protection under this Executive Order.

1.4.1.10 Other Federal Statutes and Regulations

The Migratory Bird Treaty Act (16 USC 703 *et seq.*). This act makes it unlawful to take, import, export, possess, sell, purchase, or barter any migratory bird, as well as the nests, eggs, and feathers of migratory birds. Nearly all bird species that may occur in Washington State are protected under the Migratory Bird Treaty Act. Exceptions include the house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*), and rock pigeon (*Columba livia*).

The Bald and Golden Eagle Protection Act (16 USC 668 *et seq.*). This act protects bald and golden eagles by prohibiting, except under certain specified conditions, take (which is defined to include pursuing, shooting, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbing bald or golden eagles), possession, and commerce of such birds.

The Marine Mammal Protection Act (16 USC 1361). This act prohibits take (defined to include harassing, hunting, capturing, killing, or collecting marine mammals, or attempting to engage in any of those activities) of all marine mammals unless under special circumstances.

The Antiquities Act of 1906 (16 USC 431 *et seq.*). This act prohibits the unauthorized excavation, removal, and defacement of objects of antiquity on public lands. The Archaeological Resources Protection Act of 1979 (25 CFR 262.3) strengthens the Antiquities Act by prohibiting the unauthorized excavation, removal, and damage of archaeological resources on federal and tribal lands.

The Federal Food, Drug, and Cosmetic Act (21 USC 351 *et seq.*). Under this act, the U.S. Food and Drug Administration restricts salmon farmers to the use and conditions of veterinary medicines, drugs, growth enhancers, and other licensed chemical supplements. In addition, the Federal Insecticide, Fungicide, and Rodenticide Act (7 USC 135) regulates application of pesticides, including those used at aquaculture operations.

1.4.2 State Regulations

Major state regulations that are relevant to Washington DNR aquatic resource activities in Washington are summarized below to assist the reviewer by providing additional context for the Proposed Action. They include Aquatic Land Management statutes, the State Shoreline Management Act, the State Environmental Policy Act, the Water Quality Protection Act, the Hydraulic Code, and the Growth Management Act.

1.4.2.1 Aquatic Land Management Statutes

The management of state-owned aquatic lands (RCW 79.105.030) must conform to constitutional and statutory requirements. As the managing state agency, Washington DNR strives to provide a balance of public benefits for all citizens of the state. The public benefits provided by state-owned lands are varied and include the following:

- Encouraging direct public use and access
- Promoting navigation and commerce by fostering water-dependent uses
- Ensuring environmental protection
- Using renewable resources

Generating revenue in ways that are consistent with the four benefits listed above is a public benefit according to state regulations (WAC 332-30-106).

1.4.2.2 State Shoreline Management Act

The Shoreline Management Act (90.58 RCW) applies to all marine waters, submerged tidelands, lakes over 20 acres, and all streams with a mean annual flow greater than 20 cubic feet per second. Wetlands associated with the above waters are also included, as is a 200-foot-wide shoreline area landward from the water's edge and all or a portion of the 100-year floodplain on rivers and streams. The primary intent of the Shoreline Management Act is to "provide for the management of the shorelines of the state by planning for and fostering all reasonable and appropriate uses." This policy is designed to ensure development of these shorelines in a manner that, while allowing for limited reduction of rights of the public in the navigable waters, will promote and enhance the public interest. The Shoreline Management Act directs that this goal be attained through protection of natural shorelines and encouragement of water-related and water-dependent uses. Local governments develop master programs and administer shoreline substantial development permits, shoreline conditional use permits, and shoreline variance permits.

Under the Shoreline Management Act, “development” means a use consisting of the construction or exterior alteration of structures; dredging; drilling; dumping; filling; removal of any sand, gravel, or minerals; bulkheading; driving of piling; placing of obstructions; or any project of a permanent or temporary nature that interferes with the normal public use of the surface of waters overlying lands subject to the act at any stage of water level. All developments within the shorelines of the state must be consistent with the policies of the Shoreline Management Act and the requirements of the local shoreline master program.

The Shoreline Management Act recognizes that in addition to protecting natural resources, cultural resources found in shoreline environments also merit protection and appropriate management by the State and local governments. As a result, RCW 90.58.100 requires that each shoreline master program developed by a local jurisdiction include “an historic, cultural, scientific, and educational element for the protection and restoration of buildings, sites, and areas having historic, cultural, scientific, or educational values.”

Any waterways considered navigable for the purpose of establishing State title (i.e., potential state-owned aquatic lands) are likely to fall under the jurisdiction of the Shoreline Management Act. By definition, all marine waters fall within the purview of the act. All 70 lakes identified by Washington DNR (2013) as having state-owned aquatic lands are larger than 20 acres and/or are listed in WAC 173-20 as lakes constituting shorelines of the state. As for other fresh waterbodies, Magirl and Olsen (2009) modeled the potential navigability of rivers and streams in Washington State, based on various physical and geomorphic factors. That analysis found that a river would have to have a mean annual discharge of 360 cubic feet per second or less to be modeled as “probably not navigable.” That discharge rate is substantially greater than the flow criterion (20 cubic feet per second) that establishes eligibility for management under the Shoreline Management Act.

1.4.2.3 State Environmental Policy Act

SEPA (43.21C RCW) is Washington State’s fundamental environmental law, ensuring that governmental agencies consider the environmental consequences of their proposed actions prior to their decision-making process. SEPA requires that state and local agencies review proposals to identify environmental impacts. Agency permits and approvals (e.g., use authorizations for state-owned aquatic lands) can be conditioned or denied to mitigate or avoid the impacts identified in SEPA documents.

1.4.2.4 State Water Quality Protection Act

The State Water Quality Protection Act (90.71 RCW), enacted in 2007, created the Puget Sound Partnership and gave it the responsibility of restoring the health of Puget Sound by 2020. The following paragraph details legislative findings:

> Puget Sound, including Hood Canal, and the waters that flow to it are a national treasure and a unique resource. Residents enjoy a way of life centered around these waters that depends upon clean and healthy marine and freshwater resources. Puget Sound is in serious decline, and Hood Canal is in a serious crisis. This decline is indicated by loss of and damage to critical habit, rapid decline in species populations, increases in aquatic nuisance species, numerous toxics contaminated sites, urbanization and attendant storm water drainage, closure of beaches to shellfish harvest due to disease risks, low-dissolved oxygen levels causing death of marine life, and other phenomena. If left unchecked, these conditions will worsen. Puget Sound must be restored and protected in a more coherent and effective manner. The current system is highly fragmented. Immediate and concerted action is necessary by all levels of government working with the public, nongovernmental organizations, and the private sector to ensure a thriving natural system that exists in harmony with a vibrant economy. Leadership, accountability, government transparency, thoughtful and responsible spending of public funds, and public involvement will be integral to the success of efforts to restore and protect Puget Sound (RCW 90.71.005).

To address the issues listed above, the Legislature created the Puget Sound Partnership to coordinate and lead the effort to restore and protect Puget Sound. The Water Quality Protection Act intends that all governmental entities, including Federal and state agencies, tribes, cities, counties, ports, and special purpose districts, support and help implement the partnership's restoration efforts. The Legislature further intends that the partnership will achieve the following:

- Define a strategic action agenda prioritizing necessary actions, both basin-wide and within specific areas, and creating an approach that addresses all of the complex connections among the land, water, web of species, and human needs. The action agenda will be based on science and include clear, measurable goals for the recovery of Puget Sound by 2020.
- Determine accountability for performance, oversee the efficiency and effectiveness of money spent, educate and engage the public, and track and report results to the Legislature, the governor, and the public.

The Legislature also made a point that the Puget Sound Partnership will lack regulatory authority, authority to transfer the responsibility for, or authority to implement any state regulatory program, unless otherwise specifically authorized by the Legislature.

1.4.2.5 Washington State Water Pollution Control Act

The Washington State Water Pollution Control Act, codified as 90.48 RCW, designates Ecology as the agency responsible for carrying out provisions of the Federal Clean Water Act within Washington. Ecology is responsible for establishing water quality standards, making and enforcing water quality rules, and operating waste discharge permit programs. One of the purposes of this act is to achieve compliance with all applicable requirements of Federal and state law with respect to non-point sources of water pollution (RCW 76.09.010(2)(g)).

1.4.2.6 Hydraulic Code

Under the Hydraulic Code (77.55 RCW), a Hydraulic Project Approval (HPA) from the Washington Department of Fish and Wildlife (WDFW) is required for any construction activity occurring in or near state waters that will affect fish life. An HPA is also required for performance of other work that would use, divert, obstruct, or change the natural flow or bed of any waters of the state, including some wetlands. This permit allows WDFW to place conditions on activities to protect fish, shellfish, and their habitats. In marine environments, activities that commonly require an HPA include but are not limited to construction of bulkheads, fills, boat launches, piers, dry docks, artificial reefs, dock floats, and marinas; placement of utility lines; pile driving; and dredging. Major freshwater activities that require an HPA include stream bank protection; construction or repair of bridges, piers, and docks; pile driving; channel change or realignment; conduit (pipeline) crossings; culvert installation; dredging; gravel removal; pond construction; placement of outfall structures; log, log jam, or debris removal; installation or maintenance of water diversions; and mineral prospecting.

1.4.2.7 Growth Management Act

The Washington State Legislature passed the Growth Management Act (36.70A RCW) in 1990 and amended it in 1991. This act addresses the consequences of population growth in Washington State. The Growth Management Act requires all cities and counties in the state to protect critical areas and designate resource lands of long-term commercial significance. Proposed developments and land use activities are subject to review by local governments to ensure consistency with regulations established for the protection of critical areas pursuant to RCW 36.70A.170. Critical area reviews are processed with other local land use and development permits.

The Growth Management Act also requires the largest and fastest growing counties and cities in the state to prepare comprehensive land use plans. For cities, comprehensive plans also address urban growth areas beyond the city limits. Pursuant to the Growth Management Act, urban growth must occur in designated urban growth areas.

1.4.2.8 Forest Practices Act

Anyone proposing timber harvest or other related activities on state or private lands in Washington State must submit a forest practices application to Washington DNR. Forest practices permits specify protective measures for wetlands and riparian areas, with the goal of protecting public resources such as water quality and fish habitat while maintaining a viable timber industry.

1.4.2.9 State Historic Preservation Office

The State Historic Preservation Office was created under section 101 of the National Historic Preservation Act. In Washington State, the State Department of Archaeology and Historic Preservation houses the State Historic Preservation Office, cooperating with Federal and State agencies, local governments, organizations, and individuals to ensure that historic properties are taken into consideration at all levels of planning and development. Both the State Department of Archaeology and Historic Preservation and affected tribes must be consulted when projects are subject to review under section 106 of the National Historic Preservation Act. In addition, the Governor's Executive Order 05-05 requires that all state agencies integrate the State Department of Archaeology and Historic Preservation, the Governor's Office of Indian Affairs, and concerned tribes into their planning process for capital projects not subject to section 106 review, with the goal of protecting the public interest in historic and cultural sites. In order to comply with these regulations and with NEPA and SEPA, agencies must consider the effects of proposed projects on previously identified resources as well as resources not yet identified. In addition, per the Archaeological Sites and Resources Act (RCW 27.53) and the Indian Graves and Records Act (RCW 27.44), a permit must be obtained from the State Department of Archaeology and Historic Preservation before any excavation that will alter, dig into, deface, or remove archaeological resources, American Indian graves, cairns, or glyptic records. The State Historic Preservation Officer reviews and comments on archaeological surveys performed on site and makes determinations regarding eligibility and effect.

1.5 Organization of this EIS

This Draft EIS has been prepared in accordance with NEPA, Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR Parts 1500-1508), and CEQ Forty Most Asked Questions Concerning CEQ's NEPA Regulations (CEQ 1981). Additionally, the EIS complies with USFWS and

NOAA NEPA implementing regulations. The Draft EIS is a stand-alone document; however, it should be reviewed together with the proposed Aquatic Lands HCP (Subsection 1.1.2, Washington DNR's Aquatic Lands Habitat Conservation Plan), which contains detailed background information and details of the Proposed Action.

Major divisions of this Draft EIS include the following:

Section 1 – Purpose and Need. This section describes the purpose and need for the Proposed Action. It also presents information on background and context, scoping, and information on relevant plans, regulations, and laws.

Section 2 – Alternatives. This section describes the Proposed Action and alternatives (including No-action) to the Proposed Action. Other options considered but not carried forward for detailed analysis as alternatives are also described in this section.

Section 3 – Affected Environment. This section describes the existing environmental conditions of the geographic area to be covered by the proposed Aquatic Lands HCP. The discussion of the affected environment is grouped into various subsections corresponding to the resources potentially affected by the Proposed Action.

Section 4 – Environmental Consequences. This section describes the potential effects resulting from each of the alternatives to the resources described in Section 3, Affected Environment. The environmental consequences of each alternative are described relative to the environmental consequences of the No-action Alternative.

Section 5 – Cumulative Effects. This section describes the impacts of the Proposed Action and alternatives in combination with other projects or proposals (i.e., past, present, and reasonably foreseeable future projects) that, when considered together, may have a cumulative adverse impact on the elements of the natural and human environment.

Section 6 – Literature Cited

Section 7 – Distribution List

Section 8 – List of Preparers

Glossary of Key Terms

Index

2. ALTERNATIVES

2.1 Introduction

Under NEPA, the Services are required to analyze the environmental impacts of a proposed action and to consider all reasonable alternatives, including no action. The action under consideration for this analysis is the issuance of ITPs for activities that are authorized or conducted by Washington DNR on state-owned aquatic lands. This section describes and compares the Proposed Action and alternatives under consideration in this EIS. The EIS informs the Services' decision whether to issue permits that grant take authorization for activities covered in Washington DNR's Aquatic Lands HCP. Figure 1-1 in Section 1 provides a map of the state-owned aquatic lands managed by Washington DNR and covered by the proposed HCP. The subsections below describe the alternatives analyzed in detail, identify the alternatives considered but eliminated from detailed analysis, and present a comparison of the components that make up the alternatives.

Twelve alternatives were identified during the scoping process for possible analysis. Three of these capture the full range of reasonable alternatives and are analyzed in detail in this EIS. The other nine potential alternatives were considered, but were eliminated from detailed analysis because they would not fulfill the purpose and need for action (Subsection 1.2, Purpose and Need for Action).

2.2 Alternatives Analyzed in Detail

The three alternatives analyzed in detail in this EIS are the No-action Alternative and two action alternatives. The two action alternatives propose issuance of ITPs as described above, and differ in terms of the ecosystems in which the Aquatic Lands HCP would be implemented, as well as the species proposed for ITP coverage. Alternative 1 (No-action) and Alternative 2 (Proposed Action) analyze the effects of not implementing or implementing the Aquatic Lands HCP on state-owned aquatic lands throughout Washington State, respectively (Figure 1-1).

Under Alternative 3, the Aquatic Lands HCP would cover activities only on the portion of state-owned aquatic lands that are located in marine and estuarine waters, and would seek take coverage only for the species associated with those ecosystems; other state-owned aquatic lands would be managed as under Alternative 1. Detailed comparisons of the requirements for Washington DNR-authorized uses of state-owned aquatic lands under the No-action and action alternatives are provided in Table 2-1 at the end of this section. Table 2-2 compares Washington DNR's management commitments under the No-action Alternative and the action alternatives, and Table 2-3 summarizes the differences in the key management elements that define the alternatives.

2.2.1 Elements Common to All Alternatives

Washington DNR is responsible for the management of state-owned aquatic lands. Washington DNR has the authority to issue proprietary authorizations such as leases, to use state-owned aquatic lands. When the use of a body of water could result in a physical, chemical, or biological change, however, several agencies are involved in ensuring that the applicable laws and regulations are followed, and that appropriate permit conditions are developed (Subsection 1.4, Relationship to Other Plans, Regulations, and Laws). Under all three alternatives, Washington DNR would continue to require compliance with all Federal, state, and local permits for both construction and operation before authorizing uses of state-owned aquatic lands. For the EIS analysis, it is assumed that Washington DNR would continue to manage state-owned aquatic lands based on current agency practices, policies, laws, and rules over the next 50 years (i.e., the proposed term of the Aquatic Lands HCP) because it is not known how these laws would change. The following subsections summarize Washington DNR's existing program for authorizing uses of state-owned aquatic lands, as well as other programs and actions that are assumed to continue under all alternatives.

2.2.1.1 Authorization of Uses of State-owned Aquatic Lands

Uses of state-owned aquatic lands are authorized under Washington DNR's general leasing authority (RCW 79.105.210(4)) and specific authority related to easements (RCW 79.36.355), aquaculture (79.135 RCW), and permits to use waterways (RCW 79.120.040). The general procedure for authorizing uses of state-owned aquatic lands includes the following steps:

- The proponent submits an application to Washington DNR.
- Washington DNR reviews the application, determines whether the land is state-owned and available for use, evaluates the proposed use, and meets with the proponent.
- If appropriate, Washington DNR coordinates with the appropriate local, state, or Federal entities regarding permit conditions and conservation measures.
- Washington DNR informs the proponent of survey requests, contract conditions, and habitat stewardship measures.
- Washington DNR management reviews the use authorization agreement and either authorizes or disallows the contract.

Washington DNR has the authority to reject the application and the project at any point during the authorization or reauthorization process (RCW 79.105.130 – Reconsideration of official acts). No work may commence until all permits have been received and the Washington DNR use authorization or reauthorization has been signed by both parties.

In fulfillment of its statutory duty to balance public benefits, Washington DNR issues three types of use authorizations: leases, easements (or rights-of-way), and licenses (e.g., rights of entry or waterway permits). These use authorization types, and the general procedure for authorizing uses of state-owned aquatic lands, are described below, followed by descriptions of the various types of uses that are authorized on state-owned aquatic lands. The Aquatics Division is responsible for issuing use authorizations to qualified applicants.

Leases

A lease grants the lessee (or tenant) the temporary right to possess the leased property (leasehold) subject to the terms and conditions of the lease agreement imposed by Washington DNR. This means the property can be used as security for loans and assigned to others if permitted under the terms of the lease. A lease is the most comprehensive legal instrument granting use of state-owned aquatic land. A lease is not revocable at will, but may be terminated by expiration, mutual agreement, or breach of the lease terms. Usually, a lessee has exclusive use of the leasehold and can exclude others from using it. This right is limited in lease agreements for state-owned aquatic lands in that Washington DNR typically reserves the right to grant other uses within the leasehold that do not unreasonably interfere with the lessee's use. In addition, the lessee's possession is subject to third-party interests such as provided by the Public Trust Doctrine[4].

The duration of a lease can vary with land classification and landscape or business needs. As a matter of practice, however, Washington DNR generally does not grant leases for longer than 30 years, and may limit the terms of uses with the potential to significantly degrade the environment to even shorter duration (e.g., 10 to 15 years). Washington DNR may grant terms of up to 99 years in instances where the project is part of a determined infrastructure need (e.g., bridges).

Easements

An easement, also known as a right-of-way, is a more limited grant of authority compared to a lease. An easement does not grant a right to possess the land, only a right to use the land for a specific purpose. Similar to a lease, an easement is not revocable at will, but may be terminated by expiration, mutual agreement, breech, or non-use. In contrast to a lease, an easement is not exclusive; typically, parcels with easements are available for other uses. Traditionally, many easements are perpetual and intended to benefit another parcel of land regardless of who owns the land. In contrast, Washington DNR issues only easements that are limited to a specific period of time and intended to benefit the easement holder.

[4] The Public Trust Doctrine is an ancient and universal legal principle that recognizes the need for public access to water and aquatic resources. It acts like an easement over the aquatic lands. Under the Trust, no matter who owns the land below, the public has the right to use navigable waters (Washington DNR 2013).

Generally, Washington DNR is willing to consider requests for assignment (i.e., transfer) of easements. Easements are typically provided for utility lines or similar uses that do not fully encumber the aquatic land. Washington DNR cannot place conditions on assignments (e.g., to require the implementation of measures that protect environmental resources), but can condition easements.

Licenses

The third and most limited form of authorization is a license. Like the easement, a license does not grant the right to possess land, only the privilege to temporarily use the land for a specific purpose. Unlike leases and easements, licenses are revocable. A license holder (or licensee or grantee) cannot assign the license to another person. Washington DNR issues two types of licenses: waterway permits and rights of entry. Typically, a waterway permit is for temporary use of a portion of state-owned aquatic lands reserved for navigation. A right of entry may be issued for any state-owned aquatic lands. As with leases and easements, Washington DNR can include terms and conditions in licenses that require the implementation of measures that protect environmental resources.

Uses of State-owned Aquatic Lands

The following discussions briefly describe uses of state-owned aquatic lands. Particular emphasis is given to the uses that would be affected by the implementation of the HCP Operating Conservation Program under the action alternatives. These include shellfish aquaculture, log booming and storage, and overwater structures (Washington DNR's authorization and management of which would be HCP-covered activities under the action alternatives), as well as other uses to which HCP Operating Conservation Program conservation measures would apply. These uses are described in greater detail in HCP Chapter 3, Description of Activities. Also included in this subsection are short descriptions of uses that would not be affected under the action alternatives but that represent major commitments of lands and resources under the Aquatics Division.

Shellfish Aquaculture, Log Booming and Storage, and Overwater Structures

Aquaculture is defined as "the culture and/or farming of food fish, shellfish, and other aquatic plants and animals in fresh water, brackish water or salt water areas" (WAC 332- 30-106). Washington DNR's authorization and management of finfish aquaculture is not proposed as a covered activity under the Aquatic Lands HCP, but some finfish aquaculture facilities could be affected by the implementation of the HCP Operating Conservation Program. For the Aquatic Lands HCP, shellfish aquaculture includes the operations, facilities, and structures that Washington DNR authorizes on state-owned aquatic lands associated with the commercial planting and harvesting of shellfish. Techniques for shellfish aquaculture vary based on the species being grown, local site conditions, and the desired marketable product. The

Aquatic Lands HCP distinguishes between ground-based techniques and floating techniques. Existing ground-based aquaculture involves growing shellfish directly on or in the substrate (bottom culture), in bags laid on racks or directly onto the substrate (bag culture), or on lines staked into the ground to raise the shellfish above the substrate (longline culture). Floating aquaculture involves placing shellfish on longlines, trays, baskets, or nets that are suspended from floats or rafts so that they hang below the surface of the water.

Log booming includes the placement of logs into the water, the removal of such logs from the water, assembly and disassembly of log rafts, and water-based sorting and temporary holding of logs. **Log storage** includes storing logs in water, either assembled in rafts or otherwise prepared for shipment. Per RCW 79.105.060, log storage does not include the temporary holding of logs to be taken directly into a vessel or processing facility. Log booming is defined as a water-dependent use (WAC 332-30-145(7)), meaning it is a preferred use of state-owned aquatic lands (Subsection 1.2.6, Washington DNR's Aquatics Division). Transporting logs by towing rafts of log bundles, flat log rafts, or barges loaded with logs is not in Washington DNR's jurisdiction.

Overwater structures are all structures built over, or placed in, state-owned aquatic lands at or below the ordinary high water line. These structures can be for recreational use, industrial use, or public habitation. When overwater structures are a part of complex facility, such as a marina or a ferry terminal, they may or may not be classified as separate authorizations within the accounting systems used by the State.

Examples of overwater structures include the following:

- Docks and wharves – Structures used by boats and ships for taking on or landing cargo or passengers. They are typically attached to shore via fixed piers with walkways or gangways. Docks are typically perpendicular to shore, often having a "T" or "L" shape with a portion of the dock parallel to shore. Docks can be floating (i.e., able to rise or fall with water level fluctuations) or raised, and are supported by various arrangements of pilings, floats, or both. Raised docks may have skirting covering the open space between the decking and the water. Skirting is used to limit access to areas under the dock, to prevent flotsam from accumulating under the dock, for safety purposes, or for aesthetic reasons. Wharves are very similar to docks but because the associated vessels tie up to load or unload, they are always raised above the water on pilings and are attached directly to shore with no floating docks.

- Piers – Typically, raised platforms attached to shore and supported by pilings driven into the substrate. These structures are usually connected to a floating dock by a gangway, but they do not provide moorage. The space where ships may moor between two piers or wharves is called a berth or slip. "Slip" is also the term used for a sloping ramp constructed where the shore is high and water is shallow. Because they are parts of other structures, piers and slips are not tracked as distinct uses for authorization.

- Boathouses – Buildings, usually built partly over water, for housing or storing boats. Boathouses are commonly attached to or part of a series of docks. In lakes, boathouses are generally permanent structures built partially on terrestrial lands and are, therefore, also considered to be nearshore buildings.
- Boat ramps and launches – Inclines or short roadways extending beyond the ordinary low water line to provide for vehicles launching or retrieving boats. Boat launches are distinguished from boat ramps by the presence of mechanical tackles or lifts to move boats into and out of the water.
- Nearshore buildings – Buildings built partly over or near the water and used for commercial enterprises such as boat rentals, supplies, offices, or restaurants.
- Mooring buoys – Buoys are floating objects moored to the bottom and used to mark a channel or navigational hazard. Mooring buoys are distinguished by the addition of a fitting to receive a vessel's mooring chain or hawser. A mooring buoy typically consists of an anchor, a tether, and a float marking the location of the anchoring system. Mooring buoys on state-owned aquatic lands include single buoys associated with private residences, commercial buoys used for barge moorage, and buoy fields for temporary moorage near marinas, harbors, and parks.
- Floats and rafts – Floating platforms connected to underwater anchoring systems (i.e., not attached to shore) and used for recreation by swimmers or for temporary boat moorage.
- Floating homes – Houses placed upon barges or similar flat-bottomed structures incapable of self-propulsion. They are typically moored to pilings, with a gangplank or dock providing access to the home from the shoreline.

Examples of complex facilities that typically incorporate overwater structures include the following:

- Marinas – These are typically composed of numerous structures and may include other overwater structures and interrelated activities that support boating activities. Examples of structures that may be found at marinas include boat ramps, launches, hoists, floating homes, mooring buoys, nearshore buildings, covered moorage, stormwater outfalls, treated water outfalls, sewage pump-out stations, fueling facilities, bulkheads, breakwaters, bank armoring, utility cables, pipelines, and dry docks.

- Shipyards and terminals – Shipyards are facilities for the maintenance and repair of vessels. Terminals are facilities used for the transfer of cargo between boats and land; some terminals accommodate both cargo transfer and recreational moorage. Similar to marinas, shipyards and terminals may include boathouses, boat hoists, cranes, nearshore buildings, fueling facilities, dry docks, outfalls, and utility cables and pipelines.

Other Uses That Would be Affected by the Implementation of the HCP Operating Conservation Program

Outfalls are the terminal ends of pipes or structures that discharge stormwater or wastewater directly into the sea, rivers, or lakes and their aquatic ecosystems. Per the Federal Clean Water Act, an outfall is considered a point source discharge that may require an NPDES permit. In Washington State, the EPA has delegated authority for NPDES permitting requirements to Ecology. Washington DNR authorizes the use of state-owned aquatic lands for outfalls from stormwater discharge drainage systems, industrial facilities, municipal wastewater treatment plants, combined sewer overflow systems, and desalinization plants.

Fill and bank armoring, dikes, dams, and breakwaters are all designed to control erosion. Fill is soil, rock material, trash, or other debris used to extend the margins of land into a waterbody, or to convert wetlands into terrestrial lands. Fill is usually protected on the waterward margin by bank armoring, which is a structural modification installed to control shoreline erosion or flooding, or to limit shoreline migration. Bulkheads are a form of armoring generally built on private lands above the ordinary high water line (i.e., outside the area of state ownership). Most existing fill and armoring falls outside Washington DNR's management authority due to its location above ordinary high water or on privately held lands. The amount of existing fill and bank armoring on state-owned aquatic lands is difficult to determine because the activity occurs in conjunction with other uses and is generally not identified as a distinct use. Dikes are earthen structures constructed for flood control or to prevent river channel migration, while dams are barriers built to prevent or confine the flow of water. The Washington State Legislature has authorized the formation of diking districts with the power to appropriate and condemn property for the construction of dikes to protect property from erosion and flood risks. As a result, only a small fraction of existing dikes are on state-owned aquatic land. Breakwaters are offshore structures used for dissipating the force of waves as they approach a marina, harbor, or beach. Breakwaters typically extend perpendicular from the shore into the water, redirecting currents or creating sheltered moorage.

Sediment removal and fill are the result of activities on state-owned aquatic land where removal is a deliberate and expected part of a planned use such as dredging, mining, or the removal of derelict structures such as pilings. Washington DNR manages the disposal of dredged material at designated open-water disposal sites, but it does not maintain any regulatory authority over dredging. Depending on their makeup, dredged sediments can be sold, disposed of in an approved terrestrial or aquatic site, used beneficially for projects such as beach nourishment or terrestrial fill, or used in remedial actions related to contaminated sediments. In addition to removal for dredging, sand and gravel may also be removed from bodies of water to provide material for a variety of purposes (e.g., landscaping).

Other Uses of State-owned Aquatic Lands

Utilities include physical structures that carry water, wastewater, sewage, natural gas and petroleum products, electricity, and transmission lines for telephone, television, and other electronic communications. Washington DNR grants rights-of-way, or easements, for these uses. While utility and petroleum lines are considered non-water-dependent uses of state-owned aquatic lands and are considered to be a low priority (RCW 79.105.210), the Washington State Legislature has given them a higher priority than other non-water-dependent uses due to the public benefit the services provide (RCW 79.110.240). Utility lines may be buried, suspended over, or simply laid on submerged lands. The current trend is to bury the lines for increased protection. Pipelines and cables suspended from existing structures such as bridges require authorization under a separate agreement from that for the structure itself.

Transportation-related structures include highways, roads, bridges, railroads, railroad trestles, ferry routes, and ferry terminals. With the exception of ferries, transportation projects are considered non-water-dependent and are therefore a lower priority than water-dependent uses. However, public transportation projects are generally considered essential infrastructure projects and as a result are given a higher priority due to their perceived public benefit. While Washington DNR grants new public projects for no fee, the entity operating the structure must pay administrative fees for processing the authorization, and may also be assessed natural resource damages. Private projects are charged based on full market value and may also be assessed natural resource damages.

Mitigation and enhancement include all Washington DNR-authorized land uses that have the objectives of improving, enhancing, stabilizing, or monitoring aquatic and/or nearshore habitat. These uses include remediation, artificial habitat creation, and invasive species management. Remediation is the design and implementation of actions to clean up or contain contaminated material. The creation of artificial habitat is generally understood to mean the intentional placement of introduced material onto the bed of a waterbody for the purpose of establishing feeding, spawning, rearing, and/or cover habitat for aquatic organisms in places where it did not previously exist. Invasive species management refers to actions taken to control the establishment and spread of aquatic nuisance species, which are non-native aquatic plants or animals that "...threaten the diversity or abundance of native species, the ecological stability of infested waters, or the commercial, agricultural or recreational activities that depend on such waters" (RCW 77.60.130).

Washington DNR's programs for conserving and protecting state-owned aquatic lands are described in Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands.

Public access is an authorized use when Washington DNR leases lands for the purpose of providing public access to state parks fronting the water. Public access leases may also be granted for structures such as boat ramps, docks, and buoys.

2.2.1.2 Protection and Restoration of Aquatic Lands

Washington DNR has the legal authority to delineate areas appropriate for specific uses, including assigning limits to protect the land and the species that depend on it. Washington DNR identifies and protects key areas through the Aquatic Reserves Program, the Conservation Leasing Program, and Commissioner's Orders. In this EIS, areas established through these programs are referred to collectively as conservation areas. Washington DNR places limits on allowable uses (if any uses are allowed) in conservation areas, depending on the management plan and authorizing language for each area. Habitat restoration is accomplished through a program specifically established for that purpose, and through the removal of derelict vessels. These programs and processes are described in the subsections below.

Aquatic Reserves Program

The Aquatic Reserves Program (WAC 332-30-151) focuses on conserving high-quality native aquatic ecosystems in freshwater, marine, and estuarine environments. The program emphasizes management on a reach or embayment scale to ensure protection of entire communities of important and unique organisms and their habitat. Aquatic reserve status does not preclude all use authorizations but only those inconsistent with the purpose of the reserve. Site-specific management plans define the type and number of authorized uses that may occur, desired biological and physical conditions within the reserve, and time frames for achieving the reserve's defined goals. Aquatic reserve status is designated for a 90-year term.

Conservation Leasing Program

Washington DNR can enter into leases specifically for the purpose of restoring, enhancing, creating, and preserving aquatic habitat on state-owned aquatic lands. The goal of the conservation leasing program is to protect and improve the biota, ecological services, and natural functions of aquatic environments. These leases are exclusive in nature: the lessee has the expectation that the habitat improvements made to the site will not be disturbed by other Washington DNR use authorizations during the term of the agreement.

Commissioner's Orders

Some parcels of state-owned aquatic land include habitat areas that Washington DNR determines to have significant natural value. Under RCW 79.105.210(3) the Commissioner of Public Lands has the authority to identify and protect such areas by withdrawing them from the option of leasing, or by prohibiting or limiting specific types of use. A Commissioner's Order is the document by which such a commitment is established. Unlike other protection efforts described in this section, withdrawn areas are not necessarily linked to conservation activities and are not evaluated based on established criteria or required to have a management plan. In addition, the Commissioner has the discretion to revoke a previously issued withdrawal order. Depending on the circumstances, issuance or revocation of a particular withdrawal order may be subject to other legal requirements such as review under SEPA.

Aquatic Lands Restoration Program

This program is designed to seek out restoration opportunities and to partner with other entities to restore state-owned aquatic lands when those opportunities arise. The goal of the program is for Washington DNR to serve as the lead entity or offer support to other entities working on restoration projects that take place on or adjacent to state-owned aquatic lands. Restoration work includes, but is not limited to, beach litter cleanup, removal of derelict and hazardous fishing gear, enhancement of salmon habitat, and revegetation with native plants.

Under the existing restoration program, Washington DNR is the lead entity providing financial and organizational support for the design, planning, permitting, implementation, and funding of restoration projects. The projects undertaken are intended to restore, enhance, create, or protect favorable biological and ecological conditions of freshwater, marine, and estuarine aquatic systems.

An element of the Aquatic Lands Restoration Program is the Creosote Removal Program, which Washington DNR created in 2004 to help fund public and private community restoration projects that remove creosote-treated debris and pilings on or adjacent to state-owned aquatic lands. Through the Creosote Removal Program, more than 10,000 pilings and 223,000 square feet of overwater structures have been removed from shoreline areas, primarily in Puget Sound (Washington DNR 2012a). Goals of the program include reducing sources of contamination and improving the quality of nearshore habitats.

Derelict Vessel Removal Program

This program allows Washington DNR to take custody of derelict and abandoned vessels in the state's waterways. Derelict vessels are both a source of contamination and a navigational hazard. The goals of this program include reducing pollutants and hazards posed by derelict vessels, avoiding and minimizing effects on species and their habitats, and compensating for impacts from vessels that have displaced or damaged habitat by releasing pollutants into the water.

Under RCW 79.100, the owner of a derelict vessel is required to reimburse a public agency (which may include a port district, local government, or state agency with jurisdiction over the aquatic lands where the vessel is located) for the costs associated with removing and disposing of the vessel. If the owner is unknown or insolvent, such agencies are authorized to seek reimbursement of up to 90 percent of removal and disposal costs from the State. The public agency is responsible for the remaining 10 percent of the costs; this portion is called the agency's matching funds. If such a vessel is on state-owned aquatic lands, the primary responsibility for removal falls either to the public agency that is managing the land (e.g., through a lease or a Port Management Agreement) or (if the land has not been leased or if the lessee is not a public agency) to Washington DNR. In cases where it assumes responsibility, Washington DNR must provide matching funds to cover its contribution to the total removal cost.

In some situations, Washington DNR may assist other public agencies with the removal of vessels on lands not owned by the State (e.g., privately owned tidelands or county-owned aquatic lands). Washington DNR's decisions to assume responsibility in such situations depend in part on the availability of funds for the 10 percent contribution.

2.2.1.3 Interagency Collaboration to Enhance Conservation

Washington DNR manages state-owned aquatic lands in collaboration with other Federal, state, and local agencies and tribal governments that are responsible for managing aquatic resources. One specific example is Washington DNR's collaboration with Ecology in establishing a policy that defines thresholds of excessive and deleterious amounts of wood waste debris. Washington DNR identifies leases that meet these defined thresholds and establishes time limits for wood waste cleanup through the lease renewal process. Washington DNR systematically assesses and seeks cleanup options at currently authorized facilities on a site-by-site basis.

2.2.2 Alternative 1 (No-action)

Under the No-action Alternative, Washington DNR would manage requests for uses of state-owned aquatic lands on a site-by-site basis. Washington DNR would not develop an HCP, and the Services would not issue ITPs. Currently, many use authorization agreements issued by Washington DNR require the implementation of practices designed to protect environmental resources. Washington DNR also has various programs currently in place that help conserve habitat (Aquatic Reserves, Derelict Vessel Removal, Aquatic Restoration programs). However, it is assumed for the analysis in this EIS that the HCP Operating Conservation Program (Subsection 2.2.3, Elements Common to Both Action Alternatives) would not be implemented under the No-action Alternative. Washington DNR could implement measures to reduce the effects of authorized uses under this alternative, but the degree of habitat protection and the frequency and consistency of implementation would not be assured without an HCP and ITPs. Under the No-action Alternative, Washington DNR would not be committed to a fully funded agreement (i.e., the HCP and implementation agreement) that includes the following requirements:

- A commitment for continued funding of actions and programs to monitor, minimize, and mitigate for take of ESA-listed species over the next 50 years
- Establishment of procedures for implementing conservation strategies and for addressing changed circumstances
- Establishment of standards and commitment of staffing for individual site assessments
- A formal commitment to the management of recreational docks and wood waste
- Compliance monitoring, effectiveness monitoring, and adaptive management

Under the No-action Alternative, it is assumed for this EIS that Washington DNR would continue to issue use authorizations for aquaculture, overwater structures, and log booming and storage in a manner similar to the current management approach for state-owned aquatic lands. Washington DNR would, therefore, be expected to continue to perform the following tasks in issuing authorizations for the use of state-owned aquatic lands over the next 50 years:

- Determine whether the general public would be excluded from the area by physical encumbrances, use encumbrances, or changes in aquatic land management
- Determine who has preference rights to lease the land
- Determine whether the proposal is statutorily allowable, environmentally acceptable, and in the best interests of the State
- Determine whether all pertinent regulatory permits have been obtained
- Visit leaseholds to assess if lease conditions are being met. Such visits would not be conducted on a regular basis and Washington DNR would not conduct comprehensive compliance or effectiveness monitoring or adaptive management
- Continue to protect and restore locations that directly or indirectly support the persistence and recovery of fish and wildlife (including species that would be covered under the Aquatic Lands HCP) through the Aquatic Reserves Program, the Conservation Leasing Program, Commissioner's Orders, the Aquatic Lands Restoration Program, and the Derelict Vessel Removal Program, as well as applicable state and federal laws
- Continue to collaborate with other agencies to implement the aquatic leasing program in a manner consistent with other regulatory requirements

In addition to aspects of aquatic land management described in Elements Common to All Alternatives (Subsection 2.2.1) above, other relevant elements of the No-action Alternative include how recreational docks and wood waste are managed. These management elements are described below.

2.2.2.1 Private Recreational Dock Management

Recreational docks are owned privately with all or a portion of the structure on state-owned aquatic lands. They are used exclusively for private recreational purposes. In some locations, a proliferation of private recreational docks has led to substantial negative effects on proposed covered species from shading, loss of aquatic vegetation, and alterations in habitat structure and prey communities. An unknown number of private recreational docks (an estimated 9,000 to 19,000 docks) are entirely or partially located on state-owned aquatic lands.

Washington DNR currently has a limited relationship with residential dock owners. RCW 79.105.430 precludes Washington DNR from charging rent if the dock is owned by the landowner adjacent to Washington DNR land. Authorization for private recreational docks is given by statute. As a result, Washington DNR does not review applications or issue use authorizations for private recreational docks, and Washington DNR is not required to manage the potential environmental impacts of the docks. Under State law, however, Washington DNR may impose use conditions or revoke permission to install and maintain recreational docks if it finds that a dock is a hazard, obstructs navigation or fishing, or contributes to the degradation of aquatic habitat or the decertification of shellfish beds. To regulate dock construction and maintenance, Washington DNR has relied on Shoreline Master Programs administered by local governments, HPAs issued by WDFW, and regional general permits issued by the Corps.

2.2.2.2 Wood Waste Management

Many log booming and storage operations currently authorized by Washington DNR have been in place for 60 years or more. Some log booming and storage operations were originally authorized by the State before the establishment of Washington DNR. Historical practices for handling logs led in many cases to accumulations of bark and wood debris on the substrate.

Washington DNR rules require lessees to clean up wood debris regularly to prevent excessive accumulations within the leased area; Washington DNR has relied on qualitative standards because no numerical standards exist for defining acceptable or excessive accumulations of debris. Washington DNR's collaboration with Ecology to define thresholds of excessive and deleterious amounts of wood waste debris is mentioned above in Subsection 2.2.1, Elements Common to All Alternatives. These practices would continue under the No-action Alternative.

2.2.3 Elements Common to Both Action Alternatives

Under either action alternative, each of the Services would issue an ITP to Washington DNR authorizing the incidental take of the covered species by covered activities (Subsection 1.2.5, Covered Activities) through the implementation of an HCP. The species proposed for ITP coverage are listed in Table 1-1. The

ITPs would be valid for 50 years. The Operating Conservation Program for the Aquatic Lands HCP (HCP Chapter 5) would define how Washington DNR implements the mitigation sequence of avoidance, minimization, and compensation for unavoidable impacts of aquatic lands uses authorized by Washington DNR. The HCP Operating Conservation Program would include measures designed to avoid, minimize, and mitigate, to the maximum extent practicable, for incidental take associated with Washington DNR's management of state-owned aquatic lands. In addition, Washington DNR would implement an adaptive management program and would follow management practices that contribute to meeting the goals and objectives of the Aquatic Lands HCP. The HCP Operating Conservation Program would also incorporate additional commitments by Washington DNR, including programs to restore or protect aquatic habitat and implement management practices that contribute to meeting the goals and objectives of the Aquatic Lands HCP. These elements are summarized in Subsections 2.2.3.1 through 2.2.3.3 below and are described in greater detail in the Aquatic Lands HCP (Washington DNR 2013).

The ITPs would provide coverage to Washington DNR for incidental take resulting from the following three activities:

- **Authorization and management of shellfish aquaculture:** Shellfish aquaculture is described in Subsection 2.2.1.1, Uses of State-owned Aquatic Lands. The requirements of the ITPs would govern decisions regarding 1) the location of new or expanded aquaculture operations and related facilities, 2) the design of new or expanded structures and sites, 3) how aquaculture operations are conducted, 4) maintenance practices, and 5) the removal of abandoned structures. Harvest of wildstock shellfish is not proposed for coverage under the Aquatic Lands HCP but is covered under the Wild Geoduck Fishery HCP (Washington DNR 2008). Although geoduck aquaculture is proposed for coverage under the Aquatic Lands HCP, no authorizations for the planting of geoducks on state-owned aquatic lands had been signed as of December 2009.

- **Authorization and management of log booming and storage:** Log booming and storage are described in Subsection 2.2.1.1, Uses of State-owned Aquatic Lands. The requirements of the ITPs would govern decisions regarding 1) the location of new or expanded log booming and storage facilities, 2) how log booming and storage operations are conducted, and 3) the removal of wood debris.

- **Authorization and management of uses associated with overwater structures:** Overwater structures are identified in Subsection 2.2.1.1, Uses of State-owned Aquatic Lands. The requirements of the ITPs would govern decisions regarding 1) the location of new or expanded overwater structures; 2) the physical characteristics of individual new, expanded, or renovated structures; 3) operational elements of the structures; and 4) the removal of abandoned structures or facilities. With the exception of floating homes and nearshore buildings, overwater structures are water-dependent and are, therefore, considered preferred uses of state-owned aquatic lands.

In addition to the HCP measures specific to the covered activities, Washington DNR's existing habitat protection and restoration programs and actions would provide additional compensation for remaining impacts to covered species and their habitats, beyond that required in the HCP. These programs include Washington DNR's Aquatic Reserves Program, Conservation Leasing Program, and Commissioner's Orders, for the protection and restoration of habitats that directly or indirectly support the persistence and recovery of proposed covered species. Other existing programs that would provide additional compensation include the Aquatic Lands Restoration Program and the Derelict Vessel Removal Program. These programs are described above in Subsection 2.2.1, Elements Common to All Alternatives.

2.2.3.1 Requirements for Authorized Uses of State-owned Aquatic Land

Under either action alternative, Washington DNR would implement an HCP that would require all new and renewed authorization agreements[5] to include specific measures designed to address the potential effects associated with all uses authorized by Washington DNR, including non-covered programs. These conservation measures would focus on water quality, sediment quality, habitat-forming processes, habitat features, and biological communities. The measures would protect aquatic vegetation, forage fish spawning habitat, and important habitats and sensitive life phases for covered species. They would also include specific guidelines for artificial lighting, fill, flotation material, tires, treated wood, breakwaters, covered moorage and boathouses, derelict structures, and abandoned equipment, as well as undertakings such as bank armoring, pressure washing, and sediment removal. Because the measures would focus on the needs of covered species, Washington DNR's commitment to implementing these requirements would play a key role in meeting one of the Services' issuance criteria for ITPs. The details of these HCP conservation measures are listed in Table 2-1 and described further in HCP Chapter 5, The Operating Conservation Program.

Application of the conservation measures would be based on the specific conditions of each site. The measures and timelines for their implementation would be specified in all new and renewed authorization agreements for the use of state-owned aquatic lands. Washington DNR land managers would include applicable, site-specific measures in each authorization agreement. The HCP Operating Conservation Program also provides that Washington DNR may make exceptions to the application of conservation

[5] This does not include authorization agreements with ports managed under port management agreements; such authorization agreements would not be included in the Aquatic Lands HCP under either action alternative.

measures to accommodate exceptional circumstances, to meet safety or regulatory requirements, or to comply with existing legal designations such as harbor areas and waterways where conservation measures would thwart navigation and commerce. These exceptions would be documented in the authorization agreement. Where such considerations require exceptions to the conservation measures, other forms of compensation for impacts may be required, as provided in the HCP.

As existing authorizations are renewed, the associated uses would be brought into compliance with the terms and conditions specified in the Aquatic Lands HCP. The time frame for compliance would be defined in the authorization agreement and based on the life expectancy of the structure and the materials used for any structures associated with the use. In some cases, authorization agreements have clauses that allow additional, but short-term, renewals with the same terms and conditions as the existing agreement. In such cases, Washington DNR’s ability to impose new conditions may be delayed until the end of the optional renewal term.

In most cases, no new measures would be required for existing uses (including those that do not meet the standards established in the Aquatic Lands HCP) until the authorization agreement is renewed or the tenant requests a modification because Washington DNR generally does not have the authority to impose new measures on existing leases that are in compliance with contracts and permits. Modifications to existing authorizations may include expansions of existing structures, placement of new structures, or land uses other than those specifically permitted in the authorization agreement. Other circumstances under which new measures could be required for existing leases include default by a tenant on a lease agreement, ownership changes, or mutual agreement between Washington DNR and the tenant.

Once Washington DNR has authorized or reauthorized a use of state-owned aquatic lands under the Aquatic Lands HCP, land managers would periodically, but at least once per calendar year, visit the sites to ensure that conservation measures and other requirements identified in the authorization agreement are being implemented. For lease compliance, the terms of the authorization agreement must be met by the lessee. If lease compliance is not achieved, the lease would be subject to default. These management terms and actions would be integrated with the compliance and monitoring actions of the Aquatic Lands HCP.

The conservation measures required under the Aquatic Lands HCP would supplement rather than supersede any measures established by regulatory entities. Where regulatory standards are more protective of the covered species or their habitats, the more protective standards would apply, unless engineering or structural considerations, public safety, or Federal, state, or local laws or authorities require otherwise.

2.2.3.2 Adaptive Management and Monitoring

While an underlying premise of implementing the HCP Operating Conservation Program is improvement of habitat conditions for the proposed covered species, there may be a need to modify the conservation measures based on new information resulting from monitoring. While the best available science was used to develop the conservation measures, because of the long time frame for the HCP it is important to monitor implementation of the measures to ensure effectiveness. New information from monitoring would allow Washington DNR to modify and adjust conservation measures as needed. Monitoring will also help fill in some information gaps regarding 1) fine-scale distribution data for many species and habitat, 2) spatially accurate leasing data, and 3) data related to the cumulative effects on habitat and species from uses of state-owned aquatic lands.

In light of this uncertainty, successful achievement of the conservation goals and objectives of the Aquatic Lands HCP depends on the ability of Washington DNR and the Services to adjust HCP implementation practices in response to new information. To this end, a key element of the Aquatic Lands HCP would be the adaptive management program, which is described fully in HCP Subsection 5-4, Adaptive Management and Monitoring. The adaptive management program would provide an efficient and effective means of ensuring continued implementation of the Aquatic Lands HCP. Through the program, Washington DNR would also be able to expand knowledge of regional aquatic ecosystems, monitor threats associated with covered activities, and adapt to changes in habitat conditions over time. The program would define procedures for refining HCP objectives and adjusting management in response to information gathered through monitoring. A critical element of the adaptive management program would be baseline and effectiveness monitoring. The intent of this effort would be to assess the efficacy of the conservation measures in reducing impacts and providing the expected benefits to covered species and their habitat. Monitoring would focus on identifying and assessing changes in the quality and quantity of habitat for covered species on state-owned aquatic lands after implementation of the conservation measures. To address gaps in the knowledge of existing conditions for aquatic ecosystems and species, the program would include monitoring to establish the baseline conditions against which changes would be assessed by Washington DNR and the Services.

Effectiveness monitoring would occur at several scales. Washington DNR’s program-wide monitoring of all state-owned aquatic lands would address the need to understand the system-scale processes that provide the context in which the proposed covered activities occur. Project-level monitoring by the Washington DNR would be designed to evaluate the effectiveness of the conservation measures at specific sites. In addition to these two monitoring efforts, Washington DNR would conduct targeted studies designed to reduce the uncertainty associated with specific measures. Targeted studies would test specific hypotheses through the use of variable treatments, control sampling, and before- and after-treatment measurements.

Through the adaptive management process under either action alternative, Washington DNR would work with the Services to respond to information gathered through the monitoring programs. The adaptive management component of the Aquatic Lands HCP would commit Washington DNR to continually improve management policies and practices by learning from the outcomes of operational programs while still meeting the measureable goals and objectives of the Aquatic Lands HCP. Information gained through monitoring would be used to guide decision-making and to improve the management of state-owned aquatic lands. The Services, through their participation in an interagency technical team, would be actively involved in developing and refining decision criteria for effectiveness monitoring plans. The interagency technical team would include representatives from Washington DNR, the Services, and other Federal, state, and tribal agencies, along with a facilitated group of stakeholders representing commercial, environmental, and residential interests. The team would play a key role in program initiation and would meet regularly to review recommendations from Washington DNR's HCP implementation team. The technical team would also be responsible for making programmatic decisions, identifying alternative approaches, and developing monitoring plans.

Under either action alternative, in addition to the site-specific monitoring, Washington DNR would conduct comprehensive compliance monitoring to verify and document the proper implementation of the conservation measures specified in the Aquatic Lands HCP. Monitoring would occur through paper audits and field audits. Paper audits would assess whether conservation measures are being incorporated into agreements in a manner consistent with the Aquatic Lands HCP and implementing agreement. The paper audits would also assess Washington DNR's programmatic accomplishments (e.g., number of derelict structures removed) and progress toward specified goals. The field audits would assess whether activity-specific conservation measures are being implemented on the ground. Every year, Washington DNR staff would visit randomly selected sites to document the presence or absence of all applicable measures and determine whether quantifiable standards are being met. Results of compliance monitoring would be reported to the Services annually.

2.2.3.3 Additional Commitments by Washington DNR

Along with the conservation measures identified above and listed in Table 2-1, the Aquatic Lands HCP under either action alternative would include programs and programmatic strategies for the protection and restoration of state-owned aquatic lands, as provided in section 5 of the HCP. In addition, Washington DNR has established practices to fulfill its managerial obligations under the Aquatic Lands HCP. These commitments are summarized below and described in greater detail in HCP Chapter 5, The Operating

Conservation Program. Table 2-2 at the end of this section compares Washington DNR's commitments under the No-action Alternative and the action alternatives. Under either action alternative, Washington DNR would apply all appropriate elements of the HCP Operating Conservation Program to any newly acquired lands.

Protection of Aquatic Vegetation

Protection of native aquatic vegetation would be a focus of the Aquatic Lands HCP under either action alternative. Four groups of native aquatic vegetation would be included for protection: marine plants (seagrasses and salt marsh plants that have their roots inundated for the majority of an average day), kelps (algae in the order Laminariales), complex freshwater algae (stoneworts and brittleworts), and rooted freshwater plants (submerged, floating, and emergent). These plants were chosen for protection because they provide important habitat for species proposed for ITP coverage through the Aquatic Lands HCP. Examples of species that would be afforded protection under the Aquatic Lands HCP are provided in HCP Appendix D, Proposed List of Protected Vegetation.

Many of the conservation measures identified in Table 2-1 address the protection of aquatic vegetation. Under either action alternative, all new uses authorized by Washington DNR would be required to avoid existing native aquatic vegetation that is attached to or rooted in substrate. In addition, Washington DNR would require some uses to remain a certain distance from existing native aquatic vegetation. Such protective buffers would be required for new or modified authorizations for outfalls, finfish aquaculture net pens, shellfish aquaculture operations, docks, wharves, piers, marinas, rafts, shipyards, terminals, nearshore buildings, and log booming or storage facilities (Table 2-1). When applying for reauthorization of existing structures and uses that impact native aquatic vegetation, lessees would be required to move or modify the structures or uses to reduce impacts. Uses authorized by Washington DNR under the requirements of the Aquatic Lands HCP would not be required to move to avoid vegetation that expands into the area after the use has been authorized. The protection of aquatic vegetation would provide benefits to all ITP-covered species.

Protection of Forage Fish Spawning Habitat

Forage fish are an important link in the food web and are a direct food source for some of the proposed covered species. In turn, larger fish such as salmonids form the basis of the diet for a number of marine mammals, including the Southern Resident killer whale. Important forage fish species in Washington waters include Pacific herring, surf smelt, Pacific sand lance, and eulachon or Pacific smelt, all of which are proposed for coverage under the Aquatic Lands HCP. Under either action alternative, all new or reconfigured structures authorized by Washington DNR would be required to avoid impacts to documented habitat for forage fish. Washington DNR would require uses of those structures to be conducted in a manner that prevents alteration of spawning behavior (e.g., through implementation of work windows), substrate, or vegetation. Surveys would be required in areas where spawning has not been documented but where potentially suitable habitat is present. The intent of this commitment would be to protect food web dynamics for other proposed covered species by avoiding and minimizing effects on forage fish spawning habitat.

Habitat Protection and Restoration

As the manager of state-owned aquatic lands, Washington DNR has the legal authority to delineate areas appropriate for specific uses and to limit uses in other areas to ensure protection of both the aquatic land and the species that depend on it. Under either action alternative, Washington DNR would identify important areas to conserve and restore, using the Washington DNR Aquatics Division database to rank the conservation value of state-owned aquatic lands. Areas with little to no development and high to moderate importance to covered species would be assigned a high priority for possible conservation.

In areas that have been assigned a high priority for conservation, Washington DNR would not allow new activities that alter the value and function of natural habitats. Activities intended to rehabilitate, enhance, or restore habitat function may be authorized in these areas, pending review by Washington DNR. Some areas identified as priorities for conservation would be used to compensate for habitat degradation and loss associated with covered activities. All lands officially designated for compensation under the Aquatic Lands HCP would be protected from the loss of natural habitat value and function for the duration of the ITPs. Lands that are designated as aquatic reserves would be protected for the standard 90-year term of reserve status designation.

Priority conservation areas that are not designated for compensation would undergo additional scrutiny to ensure that use authorization decisions are made on an embayment, reach, or waterbody scale rather than on a case-by-case basis. To accomplish this objective, Washington DNR would develop landscape plans that assess appropriate uses and protections of state-owned aquatic lands in each of 17 regional planning areas. Before any new uses are authorized in areas designated as conservation priorities, the project proponents would be required to document 1) avoidance of new impacts, 2) elements to be monitored throughout the term of the agreement, and 3) contingency plans for minimizing and compensating for unanticipated impacts on habitat value and function from the use.

Conservation value rankings would also be used to identify areas that are candidates for habitat restoration (i.e., areas that have high to moderate importance to covered species and that are highly to moderately developed) or for re-creation of habitat for covered species (i.e., areas, regardless of development intensity, with low importance to covered species). The lands identified as restoration or habitat creation priorities would be used to guide internal and external conservation efforts on state-owned aquatic lands.

In addition to assigning priorities for conservation, Washington DNR would use conservation value rankings to identify parcels that are a high priority for acquisition or retention in state ownership. Washington DNR would discourage the transfer to others of state-owned aquatic lands identified as a conservation priority, unless the receiving entity commits to continued management in conformance with the Aquatic Lands HCP. When considering offers made for the purchase or exchange of lands, Washington DNR would emphasize the acquisition of lands most in need of protection, based on conservation value rankings. Washington DNR would apply the appropriate elements of the HCP Operating Conservation Program to all newly acquired lands.

An additional set of lands that would receive special protection under the Aquatic Lands HCP consists of lands identified as core remaining habitat for at-risk ITP-covered species. In addition to prohibiting use authorizations that negatively affect core remaining habitat value and function for these species on state-owned aquatic lands, Washington DNR would not authorize uses of state-owned aquatic lands that would negatively affect the habitat value and function of core remaining habitat identified on neighboring lands. Core remaining habitat for ITP-covered species would be defined as locations of known habitat meeting all three of the following criteria:

1. DNR management authority can be confirmed either on or immediately adjacent to the habitat.
2. The species in question is ESA-listed and/or state-listed as threatened or endangered and/or has a state rank of S1 or S2, as defined by the Washington Natural Heritage Program.
3. The species in question has a relatively small geographic range, or discrete documented habitat locations are known to fulfill critical life history requirements for the species.

Currently, Washington DNR has identified two species (Oregon spotted frog and Pacific pond turtle) that meet these criteria.

In addition to the habitat protection programs described above, Washington DNR’s commitment to habitat restoration would include the implementation of measures requiring the removal of unused structures, vessels, and equipment from state-owned aquatic lands. Washington DNR would be responsible for the removal of unused state-owned improvements; use authorization agreements would require the removal of lessee- or grantee-owned structures that are no longer used as part of the permitted use or upon termination of the use authorization. For existing abandoned structures for which no current lessee or grantee is responsible, Washington DNR would pursue all available legal remedies to assure removal of the structures, or would remove the structures and seek cost recovery from responsible parties.

Creation of Improved Mapping Tools

Under either action alternative, Washington DNR would create geographic information system (GIS) maps that identify the precise location of uses of state-owned aquatic lands. The system Washington DNR currently employs identifies the location of authorized uses only to the nearest square-mile section. Using locational information at this gross scale limits Washington DNR's ability to assess impacts and manage habitat. Ecosystems within a square-mile section can vary, which creates uncertainty regarding where and how a use may affect species and their habitats. During the first 2 years of HCP implementation, staff at Washington DNR would design the GIS database and identify the costs associated with database development. Upon completion of that effort, existing information about uses (e.g., mapped locations of mooring buoys and overwater structures, post-construction surveys of authorized uses) would be integrated with information about aquatic ownership and the current distribution of habitats and species. The resulting data would be linked internally to Washington DNR's financial management database and would be shared with the public for use in regional planning efforts.

Collaboration between Agencies

As discussed above in Subsection 2.2.1.3, Interagency Collaboration to Enhance Conservation, Washington DNR manages state-owned aquatic lands in collaboration with Federal, state, and local agencies and tribal governments that are responsible for managing aquatic resources. Under either action alternative, Washington DNR would commit to collaborating with Federal, state, and local agencies and tribal governments consistent with commitments in HCP Chapter 5.24, Management Practices.

Private Recreational Dock Management

Under the action alternatives, Washington DNR would take an active role in managing private recreational docks on state-owned aquatic lands. Washington DNR would be committed under the Aquatic Lands HCP to review HPA applications for private recreational docks on state-owned aquatic lands. In addition, Washington DNR would monitor the potential environmental impacts of private recreational docks and would require all new residential docks on state-owned aquatic lands to comply with the HCP conservation measures (Table 2-1).

Wood Waste Management

For Washington DNR to effectively manage active log booming and storage operations, site and authorize new operations, and manage wood debris from past operations, Washington DNR must identify the location and extent of wood debris accumulations on state-owned aquatic lands. Under the Aquatic Lands HCP, Washington DNR would identify and create a geographic database of historical operations. This would allow Washington DNR to determine management actions based on the conditions of the sites. To avoid impacts to new areas, Washington DNR would, as a component of the Aquatic Lands HCP, authorize log booming and storage in areas where the activity has historically occurred. Before any new log booming and storage facilities are authorized, proponents would be required to conduct underwater surveys to establish baseline benthic conditions, following standardized protocols developed for the site and approved by Washington DNR. A site that has been deemed deleterious or hazardous as a result of impact would not be suitable for a new facility and may be considered for habitat restoration.

Washington DNR would require lessees to complete wood debris surveys to determine rates of accumulation of wood debris and the extent of impacts on sediments and water quality. Surveys would be required at the beginning of a new, renewed, or amended authorization term, at predefined intervals during the term, and at the termination of the authorization agreement. Based on the rate of accumulation and environmental impacts, interim cleanup may be required before the authorization expires, if authorization terms specify these potential actions. Washington DNR would require the removal of all materials before the termination of the authorization. All surveys would include the leased area and areas outside the lease boundary that may have been impacted by the use. Surveys must be performed according to standardized protocols approved by Washington DNR.

2.2.4 Alternative 2 (Proposed Action)

Washington DNR's statewide Aquatic Lands HCP would apply to all state-owned aquatic lands and to the all species listed in Table 1-1. The elements of the Proposed Action are described in Subsection 2.2.1, Elements Common to All Alternatives, and Subsection 2.2.3, Elements Common to Both Action Alternatives, as well as in Table 2-1 and Table 2-2.

2.2.5 Alternative 3

Under Alternative 3, the Services would issue ITPs only for those proposed covered activities and species that occur in state-owned lands in marine areas. The Columbia spotted frog, Oregon spotted frog, northern leopard frog, western toad, western pond turtle, and black tern would not be covered under the ITPs because in Washington State, these species occur only in freshwater habitats. All other species identified in Table 1-1 would be covered.

Washington DNR would implement all of the elements of the HCP Operating Conservation Program outlined in Subsection 2.2.3, above, but in marine areas only. Washington DNR's ongoing habitat protection and restoration programs and actions would be applied toward compensation for remaining unavoidable impacts from authorized uses in marine and estuarine waters only. Washington DNR would manage state-owned aquatic lands in fresh water as described in Subsection 2.2.1, Elements Common to All Alternatives, and Subsection 2.2.2, Alternative 1, above. In other words, the action area for Alternative

3 would be same as for the other two alternatives; the difference would be that the HCP Operating Conservation Program would be applied only in a portion of the action area.

2.3 Alternatives Considered but Not Analyzed in Detail

In addition to the three alternatives analyzed in detail in this EIS and described in Subsection 2.2, Alternatives Analyzed in Detail, nine other potential alternatives were also considered. These potential alternatives were not analyzed in detail, however, because they did not satisfy the stated purpose and need for the Proposed Action or were speculative.

2.3.1 Limit ITPs to the Freshwater Environment

An HCP and ITPs under this alternative would cover species and activities occurring only in the freshwater ecosystem. Seeking coverage only for activities in the freshwater ecosystem was deemed impractical because most state-owned aquatic lands and associated uses occur in the marine and estuarine ecosystems. Limiting the ITPs to species and activities in freshwater habitats would not meet the purpose and need because this would not provide substantial conservation benefits for the species with the greatest potential to be affected by uses authorized by Washington DNR on state-owned aquatic lands.

2.3.2 Total Closure of All Aquatic Lands

This alternative would close all aquatic lands for 5 to 10 years to allow aquatic habitat conditions to improve and species populations to increase. Restricting access to aquatic lands would be unfeasible and would not meet the purpose and need because neither the Services nor Washington DNR have the authority to close all aquatic lands to public use and access. Washington DNR can, however, withdraw selected areas from leasing. The Legislature has directed Washington DNR to balance public benefits by encouraging direct public use and access, fostering water-dependent uses, ensuring environmental protection, using renewable resources, and generating revenue in a manner consistent with these priorities (RCW 79.105.030).

2.3.3 Smaller List of Covered Species

An HCP and ITPs under this alternative would cover only the fish species identified in Table 1-1. The Services concluded that limiting the list of species covered under the ITPs would fail to provide opportunities for collaborative management of current and future listed species that might be affected by uses authorized by Washington DNR on state-owned aquatic lands. In addition, excluding some eligible species from the ITPs would not minimize the State’s legal liability under the ESA. The alternative would, therefore, not meet the purpose and need for the action.

2.3.4 Larger List of Covered Activities

This alternative would extend the proposed list of covered activities to include those covered through ESA section 7 consultation, or other activities regulated through other channels. The effects of many such activities would be site-specific. It would be impractical and overly speculative at this time to collect the information needed to assess such effects or to design appropriate conservation measures. Examples that were discussed include removal of contaminated sediments (site-specific and too speculative to assess effects for a generalized analysis), Spartina removal (as above), and public access (difficult to regulate, and limiting access would be contrary to Washington DNR's mandate to provide access to state-owned aquatic lands).

2.3.5 Larger List of Covered Species

This alternative would expand the proposed list of covered species. Washington DNR, in collaboration with the Services, conducted extensive background research on the likely risks to various species due to uses authorized by Washington DNR on state-owned aquatic lands. The Services have determined that the list of species for which Washington DNR seeks coverage represents a reasonable judgment regarding how to provide ESA coverage for species potentially affected by management authorizations of State-owned lands. Species that were not proposed for coverage include 1) those not considered to be at risk of incidental take during the proposed ITP term, 2) those for which existing information is insufficient to support adequate conservation planning, or 3) those for which conservation measures to support an ITP application could not readily be defined. Based on these criteria, expanding the list of species proposed for coverage to include such species would not address likely risks to species other than those proposed for ESA coverage and, therefore, would not meet the purpose and need for the Proposed Action.

2.3.6 Different ITP Durations

This alternative would set different durations – either longer or shorter – than the 50-year ITP term proposed for the action alternatives. A 50-year term would afford the Services enough time to ascertain whether the HCP is benefitting covered species as anticipated through implementation, monitoring, and adaptive management, although results and adaptive management would be expected to incur incrementally throughout the 50 year term. The lease cycle for many existing use authorizations is 30 years; some existing authorizations may not require renewal until well into the implementation phase of the HCP. With an ITP term shorter than 50 years, Washington DNR would not have an adequate opportunity to implement and monitor the conservation measures for such authorizations before the ITP term expires. The biological benefits of the conservation measures would be less certain than with a 50-year term, and the purpose and need of the Proposed Action would not be met. A longer ITP duration is not expected to substantially change the analysis of environmental impacts or improve achievement of the purpose and need for the Proposed Action.

2.3.7 Pursue a Limited ITP

This alternative would establish ITPs for activities on state-owned aquatic lands only in the eastern or western portion of the state. (An alternative that addressed western Washington only would apply to the freshwater, marine, and estuarine environments.) Such an alternative would require Washington DNR to manage aquatic lands differently based on a geographic and political boundary rather than on ecological considerations. Washington DNR has a legal obligation to apply management consistently in all parts of the state, except as warranted by differences in ecological conditions. This possible alternative, therefore, would not meet the purpose and need. In addition, modifying the geographic area over which the HCP conservation measures apply would not substantially change the analysis of environmental impacts compared to the analysis under the action alternatives.

2.3.8 Limit ITPs to Nearshore Habitats

This alternative would limit coverage to nearshore habitats only within the proposed HCP planning area. It would be difficult to administer such an alternative and to achieve the proposal's purpose and need, primarily because the transition between nearshore and offshore areas is often difficult to delineate. Consequently, it would also be difficult to assess effects accurately.

2.3.9 Implement Measures and Practices without an HCP and ITP Agreements

Under this alternative, Washington DNR would implement the conservation measures and management practices developed for the Aquatic Lands HCP but without HCP implementation and ITP agreements. This scenario was not analyzed as a separate alternative because the uncertainty of implementation would result in similar or identical environmental effects as those analyzed under the No-action Alternative. Monitoring, enforcement, and adaptive management would be the same as under the No-action Alternative. Additionally, there would be no formal commitment to ensure the conservation measures would be implemented by the Washington DNR, which would not meet the Services' purpose and need for long-term conservation commitments.

2.4 Comparison of Components by Alternative

Table 2-1 and Table 2-2 summarize the components of the action alternatives, compared to the No-action Alternative. Table 2-1 summarizes the conditions (above and beyond the requirements of Federal, state, and local regulatory permits) that Washington DNR would be required to impost on authorized uses of state-owned aquatic lands under the action alternatives, compared to what Washington DNR would require under the No-action Alternative. Table 2-2 summarizes the management commitments Washington DNR would make under the action alternatives, compared to No Action. The two action alternatives differ only in the ecosystems within which they would apply; therefore, they are addressed together in these two tables. The HCP Operating Conservation Program would be the same under either action alternative, so both are addressed together in these tables. Detailed descriptions of the conservation measures are presented in Aquatic Lands HCP Chapter 5, The Operating Conservation Program. Table 2-3 summarizes the differences in the key management elements that define the alternatives, focusing on whether certain elements would be implemented under each alternative.

Note that the local, state, and Federal regulations and permitting programs that already have the potential to reduce impacts, would continue under the No-action Alternative and the two action alternatives, and would be further supplemented by the HCP Operating Conservation Program. Except as otherwise specified, tenants with uses authorized by Washington DNR would be responsible for implementing the conservation measures described in Table 2-1. Washington DNR would be responsible for managing state-owned aquatic lands, ensuring enforcement of the measures and compensating for impacts as described Table 2-2.

Under the No-action Alternative, Washington DNR would not be required to include any conservation measures in use authorizations for state-owned aquatic lands, beyond those identified through local, state, or Federal permitting processes. Washington DNR may include stipulations in the authorization agreements for some locations, but such requirements would not be consistently applied for all locations under the No-action Alternative.

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	No-action Alternative		Action Alternatives [2]	
	New Uses [3]	**Existing Uses [4]**	**New Uses [3]**	**Existing Uses [4]**
Conservation Measures for All Authorized Uses of State-owned Aquatic Lands				
Measures for the Protection of Specific Resources				
Aquatic Vegetation	No specific requirements beyond general prohibition on commercial harvesting of aquatic vegetation per RCW 79.135.410	No changes required	Avoid existing native aquatic vegetation attached to or rooted in substrate (see definition in Subsection 2.2.3.3, Additional Commitments by Washington DNR) Locate outfalls, finfish aquaculture net pens, docks, wharves, piers, marinas, rafts, shipyards, terminals, nearshore buildings, and log booming or storage facilities outside of protective buffers (see descriptions of buffers elsewhere in this table)	Buffer requirements apply to expanded facilities and structures At time of renovation or repair, move or reconfigure noncompliant docks, piers, and rafts to reduce shading
Documented Forage Fish Spawning Habitat	No requirements	No changes required	Site new or reconfigured structures and uses to avoid impacts; conduct activities so as to prevent alteration of spawning behavior (i.e., by implementing work windows), substrate, or vegetation New piers must have spans of 40 feet from the shoreline waterward to the first piling to avoid placing pilings in documented eulachon, surf smelt, or sand lance spawning beds	When reauthorizing uses in or adjacent to documented spawning areas, implement plans (including work windows) to minimize impacts, per schedule defined in authorization agreement

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	No-action Alternative: New Uses [3]	No-action Alternative: Existing Uses [4]	Action Alternatives [2]: New Uses [3]	Action Alternatives [2]: Existing Uses [4]
Documented Forage Fish Spawning Habitat – Timing Restrictions	No activity restrictions		During the spawning period in documented surf smelt or sand lance spawning areas, maintain adequate vertical or horizontal separation between the tidal elevation of the spawning habitat zone and all in-water activities with the potential to disturb spawning substrate or result in increased turbidity Work may proceed on a daily basis during generalized spawning period if no viable forage fish eggs are detected during protocol surveys No pesticides may be used when forage fish or eggs are present	
Potential Forage Fish Spawning Habitat	No requirements		When applying for new authorization or for a reauthorization, conduct surveys in areas where spawning has not been documented but where habitat characteristics would support spawning If surveys are not conducted, project must be designed and operated under the presumption that forage fish spawning occurs at the site New or renovated ramps and launches must span areas of substrate suitable for forage fish spawning	
Core Remaining Habitat for At-risk Species	No requirements	No restrictions on expansions	No new authorizations for uses that would negatively affect the value and function of core remaining habitat for at-risk species on state-owned aquatic lands or neighboring lands	Restrictions also apply to expansions of existing uses or structures
Species Work Windows	No requirements		Required for in-water construction, operation, or maintenance; work windows based on sensitive life history phases of ITP-covered species predicted or observed to occur at the use authorization site	

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	No-action Alternative		Action Alternatives [2]	
	New Uses [3]	**Existing Uses [4]**	**New Uses [3]**	**Existing Uses [4]**
Measures to Reduce Adverse Environmental Effects Associated with Specific Uses				
Artificial Lighting on Overwater Structures	No requirements to minimize incidental illumination	No requirements	Minimize effects by focusing light on the structure's surface and using shades that avoid illumination of the surrounding environment	Reconfigure systems to avoid illumination of surrounding environment, per timeline in authorization agreement
Bank Armoring	No restrictions on use	No requirements	Allowed only in extraordinary circumstances such as to protect existing infrastructure, or for habitat creation or restoration	Replace with softer shoreline protection systems or (if softer systems would be unduly onerous due to engineering or infrastructure protection issues) with equal- or smaller-sized bulkhead, per schedule defined in authorization agreement
Breakwaters	No restrictions on use or type	No replacement requirements	Floating breakwaters or wave boards may be authorized if critical for safety or protection of authorized use and not blocking the predominant longshore current or fish passage	Retrofit solid breakwaters to incorporate gaps that allow fish passage, water circulation, and longshore transport of sediments, per schedule defined in authorization agreement
Covered Moorage, Covered Watercraft Lifts, and Boathouses	No prohibition, although open moorage is generally preferred; WAC 332-30-139(c) limits the use of covered moorage to "highly developed areas and locations having a commercial environment"	No requirements for removal	Covered moorage and boat houses not allowed Locate lowest canopy edge of covered watercraft lifts at least 8 feet above ordinary high water elevation; orient north-south as much as possible	Remove or relocate (out of nearshore or littoral areas) structures that adversely affect predicted habitat for covered species when the authorization expires or as permitted under the terms of the existing use authorization at the time the structures are repaired or replaced; replace or renovate other structures to maximize light transmission, based on schedule defined in authorization agreement

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	No-action Alternative		Action Alternatives [2]	
	New Uses [3]	**Existing Uses [4]**	**New Uses [3]**	**Existing Uses [4]**
Derelict Structures	Per WAC 332-30-122(4), use authorizations typically require the lessee or grantee to maintain structures and improvements in good condition and repair, and to remove lessee- or grantee-owned improvements as appropriate		In addition to requirements of the No-action Alternative, remove lessee- or grantee-owned structures (e.g., treated wood pilings, vessels, and equipment) when they are no longer used as part of the permitted use or at the termination of the use authorization For existing abandoned structures for which no current lessee or grantee is responsible, Washington DNR would either remove the structure or seek legal remedies to assure removal	
Fill (New or Additional)	Generally prohibited under existing authorizations without express approval, but no specific restrictions on discretion to approve		Allowed only for authorized habitat creation or restoration projects, remediation of contaminated sediments, or shellfish aquaculture substrate amendment	
Finfish Aquaculture	No restrictions	No changes required	Locate net pens at least 492 feet from existing native aquatic vegetation	Locate expansions of existing net pens at least 492 feet from existing native aquatic vegetation
Foam Material	No restrictions on use	No replacement requirements until renovation	Encapsulate all foam material, whether used for flotation or for any other purpose, within a shell that prevents breakup or loss of foam material	Remove or replace unencapsulated foam material during maintenance, per schedule defined in authorization agreement

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

<table>
<tr><th rowspan="2">Component</th><th colspan="2">No-action Alternative</th><th colspan="2">Action Alternatives [2]</th></tr>
<tr><th>New Uses [3]</th><th>Existing Uses [4]</th><th>New Uses [3]</th><th>Existing Uses [4]</th></tr>
<tr><td>Outfalls</td><td>Use authorizations for the installation of underwater outfalls may be granted when proper provisions are included to ensure against substantial or irreversible damage to the environment, and when there is no practical upland alternative (WAC 332-30-122(2)(d))</td><td>No changes required</td><td>In addition to the general requirements in WAC 332-30-122(2)(d):
• Locate to avoid impacts to existing native aquatic vegetation
• Sewer and stormwater outfall pipes must be subsurface within nearshore area
• Locate diffuser or discharge point(s) so that acute and chronic mixing zones (as defined by WAC 173-201A-400 and established through discharge permits, general permits, or orders, as appropriate) do not overlap existing native aquatic vegetation
• For sewer and stormwater outfall leaseholds without a current NPDES permit, a qualified party must conduct a mixing zone analysis per Ecology protocols</td><td>These measures also apply to existing outfalls undergoing reconfiguration</td></tr>
<tr><td>Pesticide Application</td><td colspan="2">No specific restrictions on use</td><td colspan="2">Allowed only if
• EPA has conducted an ecological risk assessment and registered the pesticide
• USFWS and/or NMFS determine that use of the pesticide would have no effect on or would not jeopardize ITP-covered species or federally designated critical habitat, or the Services have issued an incidental take statement
• The use complies with Washington State law</td></tr>
<tr><td>Pressure Washing</td><td colspan="2">No restrictions on use</td><td colspan="2">Must be conducted in a manner that avoids scouring of substrate; no in-water or over-water washing of equipment that contains or is covered with petroleum-based products</td></tr>
</table>

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	No-action Alternative		Action Alternatives [2]	
	New Uses [3]	Existing Uses [4]	New Uses [3]	Existing Uses [4]
Dredging and Sediment Removal	Dredging and sediment removal is generally prohibited without express authorization (RCW 79.02.300); however, there are no mandatory restrictions on terms of sand and gravel authorization except the requirement of payment for removal of valuable materials (RCW 79.140) and the restrictions in WAC 332-30-163		In addition to the restrictions under the No-action Alternative, dredging, including sand and gravel mining, not permitted except for where required for navigation, trade and commerce, flood control, maintenance of water intakes, or other public health and safety purposes	
Tires	No restrictions on use	No replacement requirements	Prohibited as part of above- or below-water structures, or where tires may contact water	During maintenance or repairs, replace tires used for flotation replaced with inert or encapsulated materials
Treated Wood	No restrictions on use	No replacement requirements	Prohibited on all in-water structures, except as structural framing above water	Encase or replace with alternative materials during maintenance, per schedule defined in authorization agreement

Table 2-1. Comparison of alternative components related to Washington DNR’s requirements of authorized users of state-owned aquatic lands[1].

Component	**No-action Alternative**		**Action Alternatives [2]**	
	New Uses [3]	**Existing Uses [4]**	**New Uses [3]**	**Existing Uses [4]**
Conservation Measures for Shellfish Aquaculture				
Measures to Minimize Impacts to Water and Sediment Quality				
Gravel Use	No requirements for washing gravel		Gravel used as a substrate amendment must first be washed in an upland location where wash water is not discharged to surface waters	
Storage of Toxic Materials	No specific storage requirements		Store fuels and other toxic materials in a location where they do not pose a risk of contaminating intertidal or nearshore areas	
Prevention of Contamination from Equipment	No specific requirements		Reduce contamination from vehicles and equipment by • Screening pump intakes that use seawater (except for work boat motor intakes) • Treating all-terrain vehicle wash water before discharge • Storing, fueling, and maintaining vehicles in a staging area at least 150 feet from any stream, waterbody, or wetland, unless otherwise approved by Washington DNR • Inspecting all vehicles to be operated within 150 feet of any stream, waterbody, or wetland daily, and repairing any fluid leaks before leaving the staging area	

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	**No-action Alternative**		**Action Alternatives [2]**	
	New Uses [3]	**Existing Uses [4]**	**New Uses [3]**	**Existing Uses [4]**
Conservation Measures for Shellfish Aquaculture				
Measures to Minimize Impacts to Habitat-forming Processes, Habitat Features, and Biological Communities				
Buffers for Aquatic Vegetation	No requirements	No changes required	Locate systems that result in substantial shading or bottom disruption (other than suspended-but-attached-to-the-bottom culture of oysters) at least 25 feet from existing native aquatic vegetation; alternative protective measures may be evaluated through monitoring and adaptive management Space suspended-but-attached-to-the-bottom oyster culture systems so as to minimize shading to existing native aquatic vegetation (details in HCP)	Restrictions also apply to expansions of existing facilities and to renewing leases with new footprints
Floating Raft Culture	No restrictions	Not applicable	Floating shellfish rafts must not be sited above existing native eelgrass or kelp Conduct benthic surveys to ensure that bottom-dwelling organisms are not adversely affected in a way that causes harm to ITP-covered species When installing floating structures in phases over time, proceed with each phase only based on evidence that the increase in shellfish production is not damaging ecological health as it relates to ITP-covered species	Restrictions also apply to expansions of existing facilities
Predator Exclusion Devices	No restrictions on use		Install predator exclusion devices such as nets or PVC pipe securely so they do not break free and litter surrounding areas	

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	No-action Alternative		Action Alternatives [2]	
	New Uses [3]	**Existing Uses [4]**	**New Uses [3]**	**Existing Uses [4]**
Substrate Amendments	No restrictions on placement		Apply shell or washed gravel as a substrate amendment only where the site-specific authorization agreement defines the bathymetric, seasonal, and quantitative limits of the application Gravel or shell may not be placed on forage fish spawning habitat or native aquatic vegetation protected by the Aquatic Lands HCP	
Beach Access	No restrictions on routes		Establish and maintain beach access routes to leaseholds so as to minimize impacts to sensitive aquatic resources, such as forage fish spawning areas and existing native aquatic vegetation	
Water-based Access	No restrictions on methods		Minimize damage to sensitive aquatic resources, such as forage fish spawning areas and existing native aquatic vegetation, as practical; methods may include • Minimizing the grounding of work boats and barges in existing native aquatic vegetation • Preventing anchors, chains, and ropes from dragging on the bottom in existing native aquatic vegetation • Mooring and operating boats and barges in a manner that minimizes impacts from propeller scour or anchors	
Materials Storage	No restrictions on storing materials in intertidal areas		No long-term storage of materials such as bags, marker stakes, rebar, or nets in intertidal areas; place materials to be stored for longer than 7 days above the high-tide line and keep the site clean of litter	
Excess Materials and Trash	No specifications for removal		Remove all excess or unsecured materials and trash from state-owned aquatic land before the next incoming tide	

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	No-action Alternative		Action Alternatives [2]	
	New Uses [3]	Existing Uses [4]	New Uses [3]	Existing Uses [4]
Conservation Measures for Shellfish Aquaculture				
Measures to Minimize Disturbance and Displacement of, or Harm to, Covered Species				
Timing and Activity Restrictions – Forage Fish	No requirements		During the spawning period in documented surf smelt or sand lance spawning areas, conduct activities that disturb spawning substrate only in conjunction with monitoring for surf smelt or sand lance spawn; if evidence of spawning is detected, halt work until subsequent surveys show that no viable eggs are present If mechanical and hydraulic harvest, grading, cleaning, tilling, harrowing, or other bed preparation activities are proposed within a mapped tidal reference area and outside the specified work windows for Pacific herring, survey the work area for the presence of herring spawn and do not conduct these activities where spawning has occurred until the eggs have hatched and herring spawn is no longer present (Also see conservation measure timing restrictions in documented forage fish spawning habitat)	
Timing and Activity Restrictions – Salmonids	No requirements		Before conducting in-water activities with the potential to disturb or block migration or disrupt foraging by Chinook, chum, or pink salmon in the shallow nearshore environment, implement appropriate avoidance measures and timing restrictions, based on a site-specific assessment	

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	No-action Alternative		Action Alternatives [2]	
	New Uses [3]	Existing Uses [4]	New Uses [3]	Existing Uses [4]
Conservation Measures for Log Booming and Storage				
Measures to Minimize Impacts to Water and Sediment Quality				
Siting of New Facilities	Log storage facilities may not be located on bedlands if the abutting shorelands or tidelands, or their abutting uplands, are developed for residential or commercial purposes (RCW 79.130.010(2))	Not applicable	In addition to restrictions under No-action Alternative, log transfer sites and in-water storage facilities are not allowed in areas that do not currently meet state or Federal water and sediment quality standards	Not applicable
Wood and Bark Accumulation	WAC 332-30-145, which is incorporated by reference into log booming authorizations, prohibits • Excessive accumulation of any debris on the leased area • Grounding of logs or rafts • Free rolling of logs into leased area • Leaving log rafts in leased area for greater than 1 year		In addition to the requirements in WAC 332-30-145, where infrastructure exists, debark logs before placing them in the water If debarking infrastructure is not available, implement the following measures to reduce wood and bark accumulation: • Bundle logs before water transport and storage • Assemble bundles, sort individual logs, and break apart bundles in upland areas away from water • Use a crane to move logs from barges into the water • Maintain a containment boom to collect floating debris • Retain all loose bark and wood debris that accumulates on transport vessels • Dispose of collected wood debris at an appropriate upland location	
Wood Waste	WAC 332-30-145 requires only "upland disposal sufficient to prevent excessive accumulation of any debris on the leased area"		In addition to the requirements in WAC 332-30-145, control and properly dispose of wood waste; methods include • Limiting accumulations around transfer sites • Constructing bark trash boxes at log dump racks • Installing trash containment screens	

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	No-action Alternative		Action Alternatives [2]	
	New Uses [3]	Existing Uses [4]	New Uses [3]	Existing Uses [4]
Underwater Surveys	Not required		Conduct underwater surveys to establish baseline benthic conditions	Complete underwater surveys to determine rates of wood debris accumulation at the beginning of authorization term, at predefined intervals during the term, and at the termination of the agreement
Wood Debris Clean-up	WAC 332-30-145 requires only that lessee clean up "excessive accumulation" of wood debris on leased premises		In addition to the requirements in WAC 332-30-145, interim clean-up may be required based on weight of evidence from the required surveys, including total accumulation and percent coverage; weight of evidence also used to determine the extent to which material must be removed upon termination of use authorization	
Measures to Minimize Impacts to Habitat-forming Processes, Habitat Features, and Biological Communities				
Siting of New Facilities	No preference for location in areas of historical use	Not applicable	Locate only in areas where the activity has historically occurred	Not applicable
Siting in Priority Conservation Areas	No requirements to avoid nearshore and littoral areas	No requirements to move or reconfigure	Locate beyond nearshore and littoral areas	At the time of reauthorization, move or reconfigure as necessary to reduce impacts to nearshore and littoral areas Where navigational and harbor line designations allow, move beyond nearshore and littoral areas and out of important habitats for covered species
Buffers for Aquatic Vegetation	No requirements	No changes required	Locate at least 200 feet from existing native aquatic vegetation	Locate expansions at least 200 feet from existing native aquatic vegetation

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

<table>
<tr><th rowspan="2">Component</th><th colspan="2">No-action Alternative</th><th colspan="2">Action Alternatives [2]</th></tr>
<tr><th>New Uses [3]</th><th>Existing Uses [4]</th><th>New Uses [3]</th><th>Existing Uses [4]</th></tr>
<tr><td>Grounding</td><td colspan="2">No restrictions</td><td colspan="2">Ensure logs are not grounding; if grounding occurs, move facility to deeper water or reconfigure leasehold</td></tr>
<tr><td>Bottom Disturbance</td><td colspan="2">No restrictions</td><td colspan="2">Employ measures (e.g., embedded anchors, midline floats) to prevent chains and ropes on anchorage, mooring, and containment boom systems from dragging</td></tr>
<tr><td colspan="5">Conservation Measures for Overwater Structures</td></tr>
<tr><td colspan="5">Measures to Minimize Impacts to Water and Sediment Quality</td></tr>
<tr><td>Runoff</td><td colspan="2">No requirement to prevent runoff from entering aquatic habitat</td><td colspan="2">At the time of application or reauthorization, assess water drainage and runoff patterns from upland areas and develop and implement plans to minimize direct input of contaminants and nutrients into surface waters</td></tr>
<tr><td>Water Circulation</td><td>No requirements for flow maximization</td><td>No changes required</td><td>Maximize water flow within complex facilities (i.e., marinas, shipyards, or terminals) by means of
• Opening placement
• Dock orientation
• Avoidance of internal pocket creation in dredged basins</td><td>Standard also applies to reconfigurations of existing facilities
(Also see conservation measure for breakwaters)</td></tr>
<tr><td>Toxins</td><td colspan="2">No specific prohibitions for new authorizations beyond the general requirement in use authorizations that hazardous substances be used only in accordance will all applicable laws</td><td colspan="2">Implement protective measures to prevent discharge of toxins during work on overwater structures and associated vessels; measures include
• Limiting in-water repair and refinishing to decks and superstructures
• Prohibiting in-water hull scraping or underwater paint removal
• Prohibiting refinishing work from boats and temporary floats, unless permitted by an industrial NPDES permit
• Requiring dust, drip, and spill control measures</td></tr>
</table>

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	No-action Alternative		Action Alternatives [2]	
	New Uses [3]	**Existing Uses [4]**	**New Uses [3]**	**Existing Uses [4]**
Sewage Management	No standards or requirements for sewage management except as provided in WAC 332-30-171(4), which provides that leases allowing residential use require upland disposal of sewage in accordance with all applicable law		Docks and marinas with moorage for more than 10 boats must have a written sewage management plan Docks and marinas with moorage for 5 to 10 boats and without a sewage pumpout must clearly post the location of the nearest pumpout facility and upland restroom	
Best Management Practices (BMPs)	No specific requirements for the implementation of BMPs		Marinas, shipyards, and terminals must incorporate BMPs to prevent the release of chemical contaminants, wastewater, garbage, and other pollutants, according to the most current water quality standards or guidelines	
Measures to Minimize Impacts to Habitat-forming Processes, Habitat Features, and Biological Communities				
Bank Hardening	No specific prohibitions	No changes required	Design and locate structures and facilities to eliminate the need for new bulkheading or shoreline armoring	When reconfiguring multiple-element facilities such as marinas and terminals, remove hardened structures along the shoreline, or replace with a system that reduces impacts Otherwise, no changes required
Ramps and Launches	No specific restrictions	No changes required	Build new and renovated ramps and launches in nearshore marine areas level with the beach slope or high enough off the substrate to 1) minimize obstruction of currents, 2) minimize alteration of sediment transport, and 3) eliminate accumulation of drift logs and debris under ramps Structures must span any areas of substrate suitable for forage fish spawning	No changes required, except when renovating

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	No-action Alternative		Action Alternatives [2]	
	New Uses [3]	**Existing Uses [4]**	**New Uses [3]**	**Existing Uses [4]**
Watercraft Lifts	No specific restrictions on location	No changes required	Locate floating or suspended lifts at least 9 feet waterward from ordinary high water line; only one canopy per lift	No changes required until reauthorization
Buffers for Aquatic Vegetation	No buffers required	No requirements to move or reconfigure	Unless the aquatic vegetation present at a site can be accurately delineated from existing information, conduct a survey to determine the location of aquatic vegetation on a proposed leasehold Locate docks, wharves, piers, marinas, rafts, shipyards, terminals, and nearshore buildings outside specified buffer distance from existing native aquatic vegetation Structures not associated with watercraft must be at least 25 horizontal feet from vegetation, or the maximum distance that shade may be cast, whichever is greater The outside edge of any vessels associated with docks, wharves, piers, marinas, rafts, shipyards, or terminals must be at least 25 feet from vegetation, provided there is at least 7 feet of water above the vegetative canopy within the turning radius of the largest vessel to use the structure; if 7 feet of vertical clearance is not present, the buffer must expand to include the entire turning radius or the maximum distance shade will be cast by the structure, whichever is greater	Buffer requirements apply to expanded structures and buildings, as well as those undergoing reconfiguration

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	No-action Alternative		Action Alternatives [2]	
	New Uses [3]	**Existing Uses [4]**	**New Uses [3]**	**Existing Uses [4]**
Propeller Scour and Damage to Aquatic Vegetation	Prevention of propeller scour not required	No changes required	Locate boat mooring areas for docks, wharves, piers, marinas, shipyards, terminals, mooring buoys, rafts, and floats where the water is deeper than 7 feet during lowest low water conditions	No changes required
Bottom Disturbance	Prevention of bottom disturbance not required	No changes required	Locate boats and structures in water sufficiently deep to prevent grounding during lowest low water, or install stoppers, keeping the bottom of the structure at least 1.5 feet above the level of the substrate Use embedded anchors and midline floats to prevent anchors or lines from floats, rafts, and mooring buoys from dragging Deploy boat anchorage systems in a manner that prevents dragging of the vessel or line; employ technologies (e.g., midline floats) that prevent dragging and scouring by anchor lines Watercraft lifts may not be ground-based or allowed to ground	Watercraft lifts that ground must be removed or relocated by the end of the use authorization Measures that address grounding and line drag apply when scheduled maintenance occurs

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	No-action Alternative		Action Alternatives [2]	
	New Uses [3]	Existing Uses [4]	New Uses [3]	Existing Uses [4]
Grounding of Boats	No specific requirements to prevent grounding or the need for dredging	No changes required	Implement the following measures to avoid grounding of boats and the need for dredging: • Locate slips for deeper-draft boats at marinas, shipyards, and terminals in deeper water or moor deeper-draft boats offshore • Extend piers and docks into naturally deep water • Situate mooring buoys in water deep enough that vessels do not ground at the lowest low water • Orient new marinas, shipyards, and terminals so that the entrances align with natural channels	Orient expansions of complex facilities so that the entrances align with natural channels

Table 2-1. Comparison of alternative components related to Washington DNR's requirements of authorized users of state-owned aquatic lands[1].

Component	No-action Alternative		Action Alternatives [2]	
	New Uses [3]	**Existing Uses [4]**	**New Uses [3]**	**Existing Uses [4]**
Light Transmission	No restrictions	No changes required	Maintain buffers from existing native aquatic vegetation (see descriptions above) Floats wider than 5 feet must have unobstructed grating with at least 60 percent functional open space over at least 50 percent of the surface area; the area requirement may be reduced to 30 percent for floats less than 5 feet wide, if the lesser amount is specified by engineering design Gangways, piers, and elevated docks over nearshore or littoral areas must have 100 percent grating or other light transmission features Skirting is prohibited	Buffer requirements apply to expanded structures and buildings
Measures to Minimize Disturbance and Displacement of, or Harm to, Covered Species				
Wake Restrictions	No-wake advisories not required, but common at marinas		Post no-wake advisories	

[1] The regulatory requirements of other agencies (e.g., USFWS, NMFS, EPA, WDFW, Ecology) would apply equally under all alternatives; this table focuses on what Washington DNR would require of authorized users under the alternatives.
[2] The two action alternatives are summarized together because they differ only in the ecosystems within which the HCP Operating Conservation Program would apply.
[3] New uses include authorized uses that are not specified in an existing authorization agreement for a particular site now (under the No-action Alternative) or when the ITPs are signed (under the action alternatives).
[4] Existing uses include authorized uses currently specified in an authorization agreement. Under the Aquatic Lands HCP, conservation measures would be required for existing uses upon reauthorization or modification.

Table 2-2 Comparison of alternative components related to Washington DNR's management commitments.

Program Element	No-action Alternative	Action Alternatives [1]
Program Implementation		
Planning	Manage requests for uses of state-owned aquatic lands on a site-by-site basis without formal planning or programs to assess and reduce the magnitude of take of threatened and endangered species	Implement a specific conservation program to reduce take of threatened and endangered species and to maintain the health of their habitat and the species assemblages that occupy the same habitat
Take Minimization and Mitigation	No specific requirements	Commit to compliance with two permits (ITPs) that include the following requirements: • Continued funding of actions and programs to monitor, minimize, and mitigate for take of ESA-listed species over the next 50 years • Procedures for implementing conservation strategies and for addressing unforeseen circumstances • Establishment of standards and commitment of staffing for individual site assessments • Formal commitment to the management of recreational docks and wood waste • Compliance monitoring, effectiveness monitoring, and adaptive management
Mapping	No requirement for Washington DNR to map uses any more precisely than at the scale of the nearest square-mile section in accordance with historical practices	Create new tools for mapping the precise location of encumbrances on state lands
Interagency Collaboration	Manage state-owned aquatic lands in collaboration with other Federal, state, and local agencies and tribal governments that are responsible for managing aquatic resources	Improve collaboration with Federal, state, and local agencies and tribal governments; also, inform counties and other regulatory entities involved with construction or permitting of recreational docks that Washington DNR must be notified of any overwater construction or repair on state-owned aquatic lands
Private Recreational Docks	No requirement to manage the potential environmental impacts of private recreational docks on state-owned aquatic lands	Review HPA applications for private recreational docks on state-owned aquatic lands during the term of the ITPs and require all new residential docks on state-owned aquatic lands to comply with HCP conservation measures

Table 2-2 Comparison of alternative components related to Washington DNR's management commitments.

Program Element	No-action Alternative	Action Alternatives [1]
Wood Waste Management	No requirement to clean up wood waste beyond what is required by regulatory agencies Continue to rely on qualitative standards for defining acceptable or excessive accumulations of debris Continue to collaborate with Ecology to establish thresholds for wood waste debris	Identify historical operations and create a geographic database (sites deemed deleterious or hazardous as a result of impact would not be suitable for new facilities and may be considered for habitat restoration) Include site-specific best management practices in new and renewed authorizations, designed to reduce impacts Work with Ecology to define thresholds of excessive and deleterious amounts of wood waste debris (Also see conservation measures for Log Booming and Storage)
Monitoring and Adaptive Management	Visit individual leaseholds sporadically as staff time allows; inspection typically linked to lease renewal or to re-valuation of rental rates, approximately once every 4 years No commitment to conduct comprehensive compliance monitoring or to implement adaptive management	Implement compliance monitoring program to ensure lease conditions are being met; in the first year, conduct paper audits and field audits for almost all new and renewal applications; implement stratified random sampling design thereafter Conduct comprehensive effectiveness monitoring Use monitoring information to guide agency decision-making and improve the management of state-owned aquatic lands
Compensation for Impacts		
Derelict Vessel Removal	Continue to appropriate at least $100,000 on a biennial basis to provide matching funds for the Derelict Vessel Removal Program and to support one full-time position at Washington DNR Continue to exercise discretionary authority to remove derelict and abandoned vessels from state-owned aquatic lands and manage the Derelict Vessel Removal Account to reimburse removal costs of authorized public entities statewide	Continue action as under the No-action Alternative, using the Aquatics Division database to place additional emphasis on the removal of vessels based on potential environmental threats in areas that have been ranked as conservation or restoration priorities
Aquatic Reserves	As funding allows, continue to implement the Aquatic Reserves Program, establishing one to two new aquatic reserves every biennium	Dedicate funds to support the Aquatic Reserves Program using the Washington DNR Aquatics Division database to identify areas suitable for designation

Table 2-2 Comparison of alternative components related to Washington DNR's management commitments.

Program Element	**No-action Alternative**	**Action Alternatives** [1]
Conservation Leasing Program	Continue to enter into agreements, as initiated by lessees or licensees	Use the Washington DNR Aquatics Division database to prioritize conservation lease requests Examine options for rate schedule changes to provide incentives to potential conservation lessees
Commissioner's Orders	Continue to withdraw some lands from leasing, but not necessarily with consideration for conservation activities or based on established criteria	Use the Washington DNR Aquatics Division database to establish recommendations for areas to withdraw from leasing Withdrawal orders issued during the period of the ITP would have a term at least as long as the term of the ITP
Restoration Projects	As funding allows, implement existing programs such as taking part in various restoration projects	Use the Washington DNR Aquatics Division database to identify areas of importance for restoration Maintain dedicated restoration funding through the term of the Aquatic Lands HCP

[1] The two action alternatives are summarized together because they differ only in the ecosystems within which they would apply.

Table 2-3. Comparison of the existence of key management elements among alternatives.

	Alternative 1	Alternative 2	Alternative 3
Current Practices, Policies, Laws, and Rules	X	X	X
Compliance with Federal, State, and Local Permits	X	X	X
HCP Conservation Measures		X	X[1]
Shellfish Aquaculture		X	X[1]
Log Booming and Storage		X	X[1]
Overwater Structures		X	X[1]
All Other Uses		X	X[1]
Protection and Restoration Programs	X	X	X[2]
Aquatic Reserves Program	X	X	X[2]
Conservation Leasing Program	X	X	X[2]
Commissioner's Orders	X	X	X[2]
Derelict Vessel Removal Program	X	X	X[2]
Protection of Aquatic Vegetation		X	X[2]
Protection of Forage Fish Spawning Habitat		X	X[2]
Management Practices		X	X[1]
Creation of Improved Mapping Tools		X	X[1]
Interagency Collaboration	X	X	X[1]
Private Recreational Dock Management	X[3]	X	X[1]
Wood Waste Management	X[3]	X	X[1]
Adaptive Management		X	X

[1] Under Alternative 3, the HCP Operating Conservation Program would be implemented in marine and estuarine ecosystems only.

[2] Under Alternative 3, habitat protection and restoration programs and actions would be applied toward compensation for remaining unavoidable impacts from authorized uses in marine and estuarine waters only.

[3] Management of recreational docks and wood waste is limited under the No-action Alternative; an HCP under the action alternatives would include a formal commitment by Washington DNR to the management of recreational docks and wood waste.

3. AFFECTED ENVIRONMENT

3.1 Introduction

This section describes the affected environment to provide background for the assessment of the environmental effects of the alternatives in Section 4, Environmental Consequences, and Section 5, Cumulative Effects. The following subsections describe the resources and their current conditions against which the anticipated environmental effects of the alternatives described in Section 2, Alternatives, are evaluated, including the No-action Alternative. Existing statutes, regulations, rules, and policies that apply to uses of state-owned aquatic lands are described in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws. The first subsection describes land ownership and use within the state to provide context for the description of the other resources. The remaining subsections present the physical environment first, followed by the biological environment, then the social environment. The specific order of the subsections is as follows:

- Land Ownership and Use (Subsection 3.2)
- Substrates and Erosional Processes (Subsection 3.3)
- Water Resources (Subsection 3.4)
- Noise (Subsection 3.5)
- Vegetation (Subsection 3.6)
- Wetlands and Riparian Areas (Subsection 3.7)
- Fish, Aquatic Invertebrates, and Associated Habitats (Subsection 3.8)
- Wildlife and Wildlife Habitat (Subsection 3.9)
- Recreation (Subsection 3.10)
- Visual Resources (Subsection 3.11)
- Cultural Resources (Subsection 3.12)
- Social and Economic Environment (Subsection 3.13)
- Environmental Justice (Subsection 3.14)

The analysis area for an EIS encompasses the anticipated geographic extent of the potential effects of the alternatives. It is within this area that the affected environment, environmental effects, and cumulative effects are described. For this EIS, the analysis area for all resources consists of the lands and interior waters (fresh and marine) of Washington State, as well as all coastal waters to the seaward extent of State jurisdiction (3 nautical miles) (Figure 1-1). Although the Proposed Action and alternatives address only the management of state-owned aquatic lands in this area, Washington DNR's management actions could indirectly affect resources on other land ownerships throughout the state. The Proposed Action and alternatives would affect Washington DNR's management of state-owned aquatic lands statewide. In the complex and interconnected aquatic environment, the management of state-owned aquatic lands exerts substantial influence on conditions over a wide area, regardless of ownership. The statutory definition of these lands, which make up the covered lands for the Aquatic Lands HCP, is presented in Subsection 3.2, Land Ownership and Use.

The alternatives considered for this analysis represent modifications to the practices that Washington DNR applies to the issuance and management of authorizations for the use of state-owned aquatic lands. To varying extents, uses authorized by Washington DNR on state-owned aquatic lands are subject to permitting and regulatory oversight from numerous Federal, state, and local agencies, and would continue to undergo such regulatory review under any of the alternatives. As a result of these regulatory reviews, there may be conditions placed on permits, licenses, or authorizations imposed by other agencies. The conservation measures included in the HCP would be in addition to those already provided through these other agency review processes. Section 1 of this document, Purpose and Need, and Chapter 2 of the HCP, Planning Context, include descriptions of the regulatory framework within which Washington DNR provides proprietary land management of state-owned aquatic lands. Statutes, regulations, rules, and policies relevant to the resource areas under consideration in this EIS are identified in the discussion of the effects of the alternatives on each resource in Section 4, Environmental Consequences. For some resource areas, existing rules and regulations provide the basis for understanding how the affected environment is characterized. For these resource areas, such regulatory descriptions are presented in this section.

Discussions in this EIS are organized to reflect the topics, geographic areas, and environments that are meaningful to the analysis of the effects of alternative programs for Washington DNR's management of state-owned aquatic lands (Subsection 3.2, Land Ownership and Use). Much of the information in this EIS refers to or is drawn from the Aquatic Lands HCP. To organize data for screening and analyzing species, habitat, and their interactions with uses of state-owned aquatic lands, that document divides the analysis area into four ecosystems—two in marine areas and two in freshwater areas (Washington DNR 2013).

Marine areas include nearshore and offshore ecosystems; freshwater areas include the lacustrine ecosystem (lakes, ponds, and reservoirs) and the riverine ecosystem (rivers and streams). In addition, one of the alternatives under consideration for this analysis (Alternative 3) would implement the Aquatic Lands HCP in marine areas while retaining existing rules and practices in freshwater areas. For these reasons, many of the resource area descriptions in this section (particularly those that address the physical and biological resources that are the focus of the Aquatic Lands HCP) differentiate between marine and freshwater areas. The description of the social and economic environment, on the other hand, incorporates the geopolitical divisions (counties) that are used to organize the census and economic data that inform the analysis of effects on that resource.

The two subsections that follow define and describe the characteristics of the marine and freshwater ecosystems in the analysis area. These ecosystems are differentiated by physical parameters (e.g., terrain, morphology, and substrates) and processes (e.g., water movements, sediment transport mechanisms), as well as by biotic factors (e.g., light levels sufficient to support the long-term survival of attached submerged aquatic vegetation) (Washington DNR 2007c, 2011a). The proportion of the area owned by the State varies among ecosystems (Table 3-1).

> Analyses in this document address effects in two groups of ecosystems:
>
> - **Marine areas** are divided into the nearshore ecosystem (which extends from the extreme high water line out to a depth of 66 feet) and the offshore ecosystem (which includes all marine areas with water depths greater than 66 feet, offshore to the seaward extent of State jurisdiction).
> - **Freshwater areas** are divided into the lacustrine ecosystem (lakes, ponds, reservoirs, and associated shorelines) and the riverine ecosystem (rivers, streams, and associated shorelines and banks).
>
> Additional terms important for understanding the effects analyses are *nearshore* and *upland*.
>
> - *Nearshore* refers to areas near the shoreline of any body of water, marine or fresh. The phrase, *nearshore marine ecosystem*, has a specific meaning, given above. The phrase, *nearshore marine areas*, refers to areas within the nearshore marine ecosystem.
> - *Upland areas* include all areas upslope of the ordinary high water line of waterbodies, and exclude the marine and freshwater ecosystems described above.

The ownership patterns of aquatic lands in the ecosystems defined for this analysis are fairly consistent throughout the state. In eastern Washington, where there are no marine lands, state ownership of lacustrine and riverine aquatic lands is almost identical to statewide proportions (Table 3-2). The only substantial variation from the statewide average occurs in the Olympic Peninsula and Southwest Washington, where the State owns higher proportions of land in the lacustrine and nearshore marine ecosystems and a lower proportion of land in the riverine ecosystem, compared to statewide.

Table 3-1. Approximate distribution of state-owned aquatic lands among marine and freshwater ecosystems.

Aquatic Ecosystem	Total Acres Statewide	State-owned Acres	Percentage Owned by State (%)	Percentage of State Ownership, by Ecosystem (%)
Offshore Marine	1,845,252	1,844,618	100	71
Nearshore Marine[1]	674,184	454,938	67	17
Lacustrine (lakes, ponds, and reservoirs)[2]	595,553	260,043	44	10
Riverine (rivers and streams)	110,177	44,322	40	2
Total	**3,174,103**	**2,666,171**	**84**	**100**

Source: Washington DNR 2013
[1] The nearshore marine ecosystem includes estuaries and tidally influenced rivers.
[2] Acreage values for lakes include dam impoundments, many of which have substantial currents and rapid flushing and, therefore, function more like rivers than lakes.

Table 3-2. Geographic variability in the proportion of state-owned aquatic lands in each ecosystem.

Region	Percentage State-owned, by Ecosystem (%)				Percentage State-owned, All Ecosystems (%)
	Offshore	**Nearshore**	**Lacustrine**	**Riverine[1]**	
Eastern Washington	NA	NA	42	36	**42**
Western Cascades and Puget Trough	100	60	44	36	**86**
Olympic Peninsula and Southwest Washington	100	77	66	21	**89**
Total (Statewide)	**100**	**67**	**44**	**33**	**81**

Source: Washington DNR 2010a
NA = Not Applicable
[1] Differences between values shown in Table 3-1 and Table 3-2 for the state-owned proportion of the riverine ecosystem (40 percent and 33 percent, respectively) are attributable to differences in the geographic data sets that Washington DNR queried to produce these tables. Although the values differ, the overall patterns relevant to the analyses in this EIS—namely, that the riverine ecosystem accounts for a small proportion of state-owned aquatic lands and, compared to other ecosystems, and that relatively a small proportion of the riverine ecosystem is state-owned—are consistent between the two data sets.

3.1.1 Marine Areas

Washington's marine areas include aquatic resources up to 3 nautical miles off the Pacific Coast (from Cape Flattery to the Columbia River) and extend inland through the Strait of Juan de Fuca, Haro Strait, Boundary Pass, the Strait of Georgia, the San Juan Archipelago, Puget Sound, and Hood Canal. Due to the complexities associated with defining the geographic limits of estuaries—and to the fact that Puget Sound is frequently classified as an estuary—defining the geographic limits of tidal influence can be difficult. For this analysis, estuaries and tidally influenced rivers (including the Columbia River from its mouth to the Bonneville Dam) have been included as part of the nearshore marine ecosystem. Also included in marine areas are approximately 3,066 miles of shoreline along numerous islands, inlets, and sub-estuaries along the Pacific Coast and in Puget Sound (Washington DNR 2002), as well as intertidal and subtidal areas.

For this analysis, consistent with the analyses in the Aquatic Lands HCP, water depth is the basis for distinguishing between nearshore and offshore ecosystems (Washington DNR 2013). The nearshore ecosystem extends from the extreme high water line out to a depth of 66 feet (i.e., the depth at which light energy from the sun is insufficient to sustain photosynthesis by benthic vegetation; Washington DNR 2007a). Nearly all aquatic lands in the marine offshore ecosystem are state-owned, and the ecosystem makes up the largest proportion—more than 70 percent—of state-owned aquatic lands (Table 3-1). The offshore ecosystem generally begins at water depths greater than 66 feet. It is defined by light levels insufficient to support the long-term survival of attached submerged aquatic vegetation (Washington DNR 2007a). Approximately two-thirds of the aquatic lands in the nearshore marine ecosystem are state-owned, and the ecosystem makes up approximately 17 percent of state-owned aquatic lands (Table 3-1).

3.1.2 Freshwater Areas

Lakes are defined as non-flowing inland waters, lacking ocean-derived salt, that are impounded by either natural or anthropogenic (i.e., human-caused) processes (Washington DNR 2007a). The lacustrine ecosystem generally includes lakes, ponds, and reservoirs, as well as associated (lacustrine) wetlands.

Since most reservoirs inundate areas considerably wider than the original navigable channels, Washington DNR does not have authority to lease or manage aquatic lands over most of the inundated areas behind dams. Washington State has nearly 8,000 lakes and reservoirs with a total area exceeding 600,000 acres (Johnson and O'Neil 2001). Approximately 70 of these include state-owned aquatic lands (Washington DNR 2013). Slightly less than half (44 percent) of the aquatic lands in the lacustrine ecosystem are state-owned, and the ecosystem makes up approximately 10 percent of state-owned aquatic lands (Table 3-1).

The riverine ecosystem is defined by the flow of water from higher to lower elevations. The riverine ecosystem includes stream channels, associated floodplains, riverine wetlands, and riparian areas found within the meander zone. These systems typically terminate in lakes or tidally influenced environments. There are more than 97,000 miles of streams and rivers in the State of Washington (StreamNet 2011), approximately 4,350 miles of which are considered navigable rivers and are, therefore, in state ownership (Washington DNR 2007a). Because navigability is one of the criteria for establishing state ownership of aquatic lands, nearly all riverine habitat on state-owned aquatic lands consists of large, low-gradient rivers that can be navigated by boat traffic (Washington DNR 2013). Smaller streams in mountainous areas generally do not include state-owned aquatic land. Less than half (40 percent) of the aquatic lands in the riverine ecosystem are state-owned, and the ecosystem makes up the smallest proportion (approximately 2 percent) of state-owned aquatic lands (Table 3-1).

3.2 Land Ownership and Use

This subsection describes the current amount and distribution of aquatic lands owned by Washington State and the uses of them authorized by Washington DNR. Discussions in this subsection address the status of and factors that influence changes in the amount and distribution of ownership and use of state-owned aquatic lands in Washington.

3.2.1 Existing and Relevant Management Measures and Regulatory Framework

As explained in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws, the Aquatics Division exercises proprietary, not regulatory authority. Issuance of a use authorization from Washington DNR is only part of the process that determines the type, location, and implementation of uses of state-owned aquatic lands. Many Federal, state, and local authorities are involved in setting the conditions for the construction, operation, and siting of the uses authorized by Washington DNR. Federal, state, and local statutes, regulations, and policies pertinent to Washington DNR's authorization of uses of state-owned aquatic lands include the following:

- Treaty Rights
- Federal Coastal Zone Management Act
- Federal Rivers and Harbors Act
- Magnuson-Stevens Fishery Management and Conservation Act
- ESA, if Federal funding or permitting is involved
- NEPA, if Federal funding or permitting is involved
- SEPA
- RCW Title 79 – Public Lands
- WAC Chapter 332-30 – Aquatic Land Management
- State Growth Management Act (and local critical areas ordinances)
- State Shoreline Management Act (and local shoreline management plans)
- State Hydraulic Code

These are described in greater detail in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws.

3.2.2 Ownership of Aquatic Lands in Washington State

The State owns approximately 2.7 million acres of the 3.2 million acres of aquatic lands in Washington (Table 3-1). These lands are distributed in freshwater and marine waterbodies throughout the state (Figure 1-1). State-owned aquatic lands occur throughout the marine environment and in major lakes and rivers.

State ownership of aquatic lands has not changed appreciably in recent history. Washington DNR's authority to sell state-owned aquatic lands to private entities was discontinued in 1971, but sales to public entities are allowable (RCW 79.125.200). Sales and exchanges of state-owned aquatic lands are a comparatively rare occurrence. Washington DNR has engaged in three transfers of aquatic land ownership during the past 12 years, primarily aimed at correcting boundary lines or resolving legal disputes.

Washington DNR's authority to convey lands to other owners is described in Subsection 1.2.6, Washington DNR's Aquatics Division. As noted in that discussion, Washington DNR is required to consider the public interest and the public benefits established in RCW 79.105.030 when evaluating any proposed sale, acquisition, or exchange of aquatic lands. Conservation priorities are not formally factored into such considerations. Additionally, Washington DNR has entered into a number of legal agreements transferring management authority of state-owned aquatic lands to other entities (e.g., port management authorities, Washington State Parks, etc.).

3.2.3 Uses of Aquatic Lands in Washington State

State-owned aquatic lands are used for a variety of purposes. Many of those uses require authorization from Washington DNR (Subsection 1.2.6, Washington DNR's Aquatics Division). Some uses, such as boating, walking, picnicking, and birdwatching, do not require authorization. In some cases, state-owned aquatic lands are put to uses for which authorization is required but has not been secured. This subsection primarily describes authorized uses because the proposed HCP Operating Conservation Program under the action alternatives would apply only to authorized uses. Further, many unauthorized uses have not been identified, and would be difficult to catalogue as part of the affected environment and would, therefore, be difficult to analyze. See Subsection 2.2.1, Elements Common to All Alternatives, for a summary of the use authorization process and descriptions of the uses that are the focus of this analysis.

Derelict structures or derelict vessels are another type of use of aquatic lands that are not authorized by Washington DNR. Some components of the HCP also address the management of derelict structures and derelict vessels (Washington DNR 2013). In addition to authorizing uses, Washington DNR establishes some areas (called conservation areas in this EIS) where allowable uses are limited.

In fulfillment of its statutory duty to balance public benefits, Washington DNR issues three types of use authorizations: leases, easements (or rights-of-way), and licenses (e.g., rights of entry or waterway permits). These documents are referred to generically as “use authorizations.” Applicants other than government agencies are required to pay a $25 processing fee when applying for a use authorization.

3.2.3.1 Authorized Uses

Through the Aquatics Division, state-owned aquatic lands are authorized for many different and sometimes overlapping uses, ranging from aquaculture to utility easements to marine terminals. Washington DNR requires authorization for all commercial (including industrial) and most recreational uses of state-owned aquatic lands (e.g., aquaculture, log booming and storage, overwater structures, outfalls, erosion control structures, and recreational moorage), as well as for uses that are typically conducted by governmental agencies (e.g., road, bridge, and utility easements, waterfront parks, and compensatory mitigation for resource damage). Washington DNR currently has approximately 4,000 active authorizations for uses of state-owned aquatic lands (Washington DNR 2011). Uses of state-owned aquatic lands are defined and described in Subsection 2.2.1.1, Authorization of Uses of State-owned Aquatic Lands. Chapter 3 of the Aquatic Lands HCP (Washington DNR 2013) provides detailed descriptions of shellfish aquaculture, log booming and storage, and overwater structures, Washington DNR’s authorization and management of which would be HCP-covered activities under the action alternatives. The *Potential Covered Activities Technical Paper* prepared by Washington DNR (2007b) includes detailed descriptions of other uses of state-owned aquatic lands. Regulatory and technical definitions of terms related to these uses are included in the Glossary of this EIS.

In the process of developing the HCP, Washington DNR (2007b; 2013) analyzed the distribution of existing use authorizations among ecosystems, including commercial and recreational uses (Table 3-3). The geographic distribution of the ecosystems is discussed in Subsection 3.1, Introduction. Notably, most of these authorized uses occur in the nearshore marine ecosystem, followed by the lacustrine and then riverine ecosystems. Many uses occur in shallow waters in these ecosystems, primarily because such areas are close to shore. None of the authorized uses identified in Table 3-3 occur in marine offshore ecosystem areas. The predominance of uses in the nearshore marine ecosystem is likely a product of three factors: 1) lands in nearshore marine areas were historically developed to support navigation and commerce; 2) nearshore areas are directly adjacent to uplands, and are more readily accessible than offshore areas; and 3) some of the most densely populated portions of the state are adjacent to nearshore marine areas (e.g., Puget Sound). Shellfish aquaculture, in which intertidal and subtidal lands are used for the planting and harvesting of marine species such as oysters, clams, mussels, and geoducks, occurs only in nearshore marine areas.

Table 3-3. Distribution of use authorizations by ecosystem (percent of use type in each ecosystem).[1]

Use Type	**Nearshore Marine (%)**	**Offshore Marine (%)**	**Lacustrine (%)**	**Riverine (%)**
Shellfish Aquaculture[2]	100	0	0	0
Finfish Aquaculture[2]	68	0	23	9
Log Booming and Storage[2]	88	0	4	8
Overwater Structures[2]				
Docks and Wharves	67	0	27	6
Mooring Buoys	95	0	4	1
Floats and Rafts	25	0	70	5
Boat Ramps, Launches, Hoists	50	0	25	25
Nearshore Buildings	82	0	17	1
Floating Homes	11	0	60	29
Marinas	74	0	24	2
Shipyards and Terminals	81	0	17	2
Outfalls[3]	46		54	
Erosion Control Structures[3]	48		52	

[1] Uses listed in this table are those that would be addressed by the measures and practices of the HCP Operating Conservation Program under the action alternatives; these are the uses for which Washington DNR conducted the distributional analysis by ecosystem. Uses that would not be addressed by the HCP Operating Conservation Program (and which, therefore, were not included in the analysis of distribution by ecosystem) include road, bridge, and utility easements, waterfront parks, and areas established for conservation. Approximately one-half of Washington DNR's existing use authorizations are for uses that are not included in this table (Washington DNR 2011).
[2] **Source:** Washington DNR (Washington DNR 2013)
[3] **Source:** Washington DNR (Washington DNR 2007b); that analysis examined only the number of use authorizations in marine versus freshwater areas, and did not differentiate between the specific ecosystems in those areas. Therefore, it is possible to determine the proportion of outfalls and erosion control structures in freshwater areas, for example, but not how those are divided between lacustrine and riverine ecosystems.

The number and location of use authorizations varies as Washington DNR constantly receives applications for new authorizations and requests for re-authorizations. In 2011, Washington DNR received nearly 300 applications from persons or entities seeking to use state-owned aquatic lands (Washington DNR 2012c). Approximately one-half of the current use authorizations are due to expire in the next 5 years (see Subsection 3.13, Social and Economic Environment). In addition, Washington DNR is currently updating the use classification system within the database used to track use authorizations. As a result of refinements in the classification system, some authorizations that were previously classified as a right of entry, for example, have been assigned to a more descriptive classification, such as "mooring buoy." Despite the uncertainties regarding the actual number of current use authorizations, the values in Table 3-3 reflect the overall patterns in the relative amount and distribution of the various use authorizations on state-owned aquatic lands.

3.2.3.2 Uses not Authorized by Washington DNR

As noted above, not all uses of state-owned aquatic lands are authorized by Washington DNR. For example, as described in Subsection 2.2.2.1, Private Recreational Dock Management, Washington DNR does not review applications or issue use authorizations for private recreational docks. Instead, authorization for private recreational docks is given by statute. Washington DNR does, however, have the authority to revoke authorizations for reasons of public necessity, which can be based on environmental concerns.

The other uses that are not authorized by Washington DNR and that pertinent to this analysis are the abandonment of structures and vessels. Derelict structures would be addressed by the HCP Operating Conservation Program under the action alternatives, and Washington DNR would commit to continued funding of the Derelict Vessel Removal Program under the HCP. Other unauthorized uses are difficult to catalogue and to track within the large action area and would not, therefore, be addressed by the HCP.

Per WAC 332-30-122(4), contracts for uses of state-owned aquatic lands typically contain a clause requiring the removal of improvements. While Washington DNR is statutorily directed to address unauthorized structures, the process of identifying unauthorized users of state-owned aquatic lands and ensuring removal of derelict structures is time consuming and requires significant staff resources.

Washington DNR shares the responsibility for addressing problems related to derelict vessels; the Derelict Vessel Removal Program is described in Subsection 2.2.1, Elements Common to All Alternatives. Washington DNR received $1.7 million during the 2011-2013 biennium for derelict vessel removal. Washington DNR has assumed or shared primary responsibility for removing approximately one-third of the 385 derelict or abandoned vessels removed through the program since its inception in 2002 (Washington DNR 2012d). Derelict vessels that pose a threat to human health or safety are assigned the highest priority for removal, followed by vessels that pose a direct threat to elements of the natural environment (with emphasis on federally listed species and their habitat), then by vessels that pose a threat to navigation.

3.2.3.3 Washington DNR Programs for Protection and Restoration of Habitat

As the manager of state-owned aquatic lands, Washington DNR has the legal authority to delineate areas appropriate for specific uses and to limit uses to ensure the protection of both the land and the species that depend on it. Washington DNR has three established programs for protecting aquatic lands in freshwater and marine areas: the Aquatic Reserves Program, the Conservation Leasing Program, and Commissioner's Orders. Each of these methods can preclude the authorization of uses that conflict with resource protection (Subsection 2.2.1.1, Protection and Restoration of Aquatic Lands). To date, Washington DNR has established seven aquatic reserves, encompassing more than 90,000 acres of state-owned aquatic land in the marine areas of Puget Sound. As of 2010, Washington DNR had issued one conservation lease, protecting 10 acres of state-owned aquatic land in Woodard Bay near Olympia for 10 years (Washington DNR 2013). A limited amount of current information is available regarding areas designated through Commissioner's Orders. This information is available from the Washington DNR public records officer. Washington DNR intends to establish additional areas in the near future, through the existing aquatic reserve program.

3.2.4 Relationship between Uses of State-owned Aquatic Lands and Other Lands

Land uses adjacent to state-owned aquatic lands are often associated with use of state-owned aquatic lands. For example, upland waterfront developments, such as residential areas, park and recreation facilities, restaurants, and other businesses, often include access to the water through marinas, docks, piers, and boat ramps. These uses also locate on the shoreline to take advantage of waterfront views (Subsection 3.11, Visual Resources). In addition, other waterfront developments cannot exist without roads for access. These roads are often associated with aquatic land uses such as log storage, marinas, marine shipping terminals, bridges, docks, wharves, and floating homes.

3.3 Substrates and Erosional Processes

This subsection identifies the key processes of sediment transport and deposition in the analysis area, as well as the erosional processes of shorelines and streambanks. These processes influence shoreline conditions, substrate size and depth, and stream channel size and shape. In addition, water quality (Subsection 3.4, Water Resources) and habitat for fish and other aquatic species (Subsection 3.8, Fish, Aquatic Invertebrates, and Associated Habitats, and Subsection 3.9, Wildlife and Wildlife Habitat) are often related to substrate conditions, sediment erosion, and transport. Discussions in this subsection address processes that may be affected by uses of state-owned aquatic lands. These processes are also influenced by a combination of climate, surface rocks, soils, and terrain.

The key geologic processes potentially affected by uses authorized by Washington DNR on state-owned aquatic lands include erosion, scour, sediment transport, and deposition. Erosion refers to the movement of particles of rock and soil by wind, water currents, ice, or gravity. Scour is a type of erosion; it generally refers to removal of underwater sediments and formation of deep holes and channels. Scour is caused by strong tidal currents or flowing river waters, or it can be wind-generated. The terms "sediment transport" and "deposition" refer to the process by which sediments loosened by erosion are moved from one location and deposited elsewhere. Sediments are generally transported by moving water: in high-energy environments such as high-gradient streams, large rocks may be moved long distances downstream; in low-energy environments such as sheltered bays, tidal currents can loosen and move fine particles out of channels into lower-energy flats where the particles are deposited.

Subsection 2.2.1, Elements Common to All Alternatives, and Subsection 3.2, Land Ownership and Use, provide overviews of the types and locations of uses authorized by Washington DNR on state-owned lands. These uses have the potential to alter the processes of erosion and sediment transport by changing river flow, scour, and onshore wave patterns. They can also alter streamflow and tidal and wind-generated currents, resulting in localized increases or decreases in substrate scour and deposition. These changes in erosion and sediment transport mechanisms can result in a range of impacts, such as burying rocky habitats through the deposition of fine sediments or exposing coarse sediments due to scour of historically depositional areas. The ways in which uses of state-owned aquatic lands currently affect substrates and erosional processes are described in greater detail in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

3.3.1 Existing and Relevant Management Measures and Regulatory Framework

As noted in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws, the authority exercised by Washington DNR's Aquatics Division is proprietary, not regulatory. Issuance of a use authorization from Washington DNR is only part of the process that determines the type, location, and implementation of uses of state-owned aquatic lands. Many Federal, state, and local authorities are involved in setting the conditions for the construction, operation, and siting of the uses authorized by Washington DNR. Federal, state, and local statutes, regulations, and policies that influence the potential for Washington DNR-authorized uses of state-owned aquatic lands to affect substrates and erosional processes include the following:

- Federal Rivers and Harbors Act – Section 10
- Clean Water Act – Section 404
- Federal Coastal Zone Management Act

- Magnuson-Stevens Fishery Management and Conservation Act
- ESA, if Federal funding or permitting is involved
- NEPA, if Federal funding or permitting is involved
- SEPA
- State Growth Management Act (and local critical areas ordinances)
- State Shoreline Management Act (and local shoreline management plans)
- State Hydraulic Code

These are described in greater detail in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws. Additionally, when the Services are implementing their responsibilities under the relevant laws, they may provide additional measures beyond those in the HCP, when necessary to meet their other statutory responsibilities.

Many authorized uses with the potential to affect the environment are subject to review and/or permitting under one or more of these Federal, state, and local statutes or regulations. The potential for uses subject to regulatory review to result in adverse effects on substrates and erosional processes is influenced to a large degree by the implementation of conservation measures required through those regulatory review processes. For example, construction or reconfiguration of docks and piers entails Federal permitting under the Rivers and Harbors Act, which necessitates consultation with the Services under section 7 of the ESA. Measures implemented as a result of an ESA section 7 consultation process are designed to avoid, minimize, and/or mitigate adverse effects on habitat for ESA-listed species. Many listed species depend on natural processes of sediment transport and deposition; these processes are, therefore, likely to receive protection through the consultation process. Other uses of state-owned aquatic lands that are commonly subject to Federal regulatory review and permitting include dredging, dike and dam construction, outfall installation, and construction of bulkheads below the mean higher high-water line.

Similarly, construction activities that propose to change the bed of any waters of the state require an HPA from WDFW. Sediment transport and deposition are likely to be addressed by many of the conditions that are typically placed on activities through the HPA review process. Among the goals of the HPA review process is a provision for no net loss of the productive capacity of fish and shellfish habitat or functions (WAC 220-110). Protection of natural erosional processes is a common consideration for the achievement of this goal. For example, in a review of 260 HPA permits issued in western Washington, Quinn et al. (2007) found that 69 percent of the HPAs for bank protection projects in freshwater areas included provisions for the prevention of sedimentation. Similarly, most

HPAs for marine bank protection projects included measures that address factors that influence erosional processes, such as bulkhead location, the placement of waste material below the ordinary high water line, and the filling of depressions below the ordinary high water line (Quinn et al. 2007).

Notably, Quinn et al. (2007) found that, despite relatively high compliance rates with HPA permit requirements, the ability of the permit process to protect public resources, to meet the no net loss standard, and, to a lesser degree, to fully mitigate the impacts of HPA projects was relatively low. In other words, while the HPA program as a whole likely reduces negative impacts to public resources, HPA permits cannot entirely mitigate the negative effects of individual projects (Quinn et al. 2007). Lastly, in the absence of an adaptive management approach to the HPA program, the program's effectiveness in protecting public resources will remain largely unknown (Quinn et al. 2007).

In addition to Federal and state regulatory review, projects in areas managed under local shoreline master programs are commonly required to implement environmental protection measures. These protection measures vary to some degree between local jurisdictions. In marine areas, shoreline master programs are expected to protect existing regimes of sediment inflow and transport, and to restore degraded regimes (WAC 173-26-221). Similarly, standards for the management of freshwater shorelines give consideration to erosional processes, allowing the installation of erosion reduction measures only if the measures would not interfere with fluvial hydrological and geomorphological processes normally acting in natural conditions (WAC 173-26-221). As noted in Subsection 1.4.2, State Regulations, most parcels of state-owned aquatic land likely fall within areas managed under shoreline master programs.

Similar to the HPA review process, regulatory review under local shoreline master programs may not ensure full protection of public resources. In a review of regulatory protection programs in San Juan County, the San Juan Initiative (2008) found that county codes often do not specify measures to reduce the negative effects of overwater structures. For example, county codes lack requirements for orientation and maximum height, length, and width of floats or piers (San Juan Initiative 2008). In addition, due to the lack of monitoring requirements, the effectiveness of mitigation is largely unknown (San Juan Initiative 2008).

Not all Washington DNR-authorized uses of state-owned aquatic lands are subject to regulatory review by other agencies. For example, most existing uses (i.e., uses that have already undergone regulatory review and been authorized by Washington DNR) are not subject to regulatory review at the state or Federal level unless the structures associated with the use undergo substantial renovation or reconfiguration. In addition, review and permitting may not be required for some new uses in some cases. For example, log booming or storage at sites with existing pilings, dolphins, or buoys may not trigger regulatory review by the U.S. Army Corps of Engineers or WDFW. Local review under the Shoreline Management Act may be necessary in some of these cases, however. In some situations, measures required by other agencies may address some but not all potential effects of a particular use. For example, NPDES permits for log storage facilities typically address impacts on water quality but not necessarily effects related to sediment compaction.

3.3.2 Existing Conditions

The following two subsections identify the primary influences on the erosional, depositional, and transport processes in marine and freshwater areas. Emphasis in these discussions is on ecosystem characteristics or habitat types that could be affected by changes in the rules and policies that govern Washington DNR's authority to manage and grant authorizations for the use of state-owned aquatic lands (i.e., the alternatives analyzed in this EIS). The ways in which uses of state-owned aquatic lands currently contribute to adverse effects on substrates and erosional processes are further described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

3.3.2.1 Marine Areas

The basic geologic process affecting sediment transport and deposition in nearshore marine areas is drift. Longshore drift describes sediment transported in the nearshore waters along a coast. Beach drift describes the wave-induced motion of sediment in a longitudinal direction on the beachface. Wave action is the most important control on net longshore drift; waves and wave currents provide the primary mechanism for sediment erosion, entrainment, and transport (Johannessen and MacLennan 2007). In offshore marine areas, sediment transport is controlled by water circulation (which is strongly influenced by the contours of the underlying seafloor) and by wave and current energies.

Marine areas have two basic substrate types: consolidated bottom (rock greater than 10 inches diameter) and unconsolidated bottom (silt, mud, sand, gravel, and rock less than 10 inches diameter). The unconsolidated substrates include finer particles that are more susceptible to erosion, scour, and transport than larger rocky particles. Because unconsolidated substrates are more mobile, they can be altered by scour from boats, as well as by changes in tidal and wind currents from structures or boat activity.

Human alteration of marine areas generally results from changes in key controlling factors such as light, wave energy, and sediment availability (Nightingale and Simenstad 2001). Adding or removing sediment in submerged habitats can modify currents, change slope and depth profiles, and alter substrate composition (Washington DNR 2013). Structures placed in marine areas can change wave energy and currents, altering sediment transport mechanisms and associated habitat-forming processes. Hardening of the shoreline to prevent erosion can substantially change the functional capacity of the nearshore ecosystem by altering wave energy patterns and reducing the availability of beach-forming sediments. Bulkheads and other shore-parallel structures along coastal bluffs impound potential beach sediment and alter the beach and backshore, resulting in a decrease in the amount of drift sediment available for maintenance of down-drift beaches. In many places, unconsolidated substrates are stabilized by the roots of aquatic plants such as eelgrass (Mumford 2007). Where this is the case, uses that remove aquatic vegetation can contribute to increased rates of scour and erosion.

3.3.2.2 Freshwater Areas

In lakes, erosion or sediment deposition for any particular section of shoreline is determined by wave energy and the direction of littoral currents (Herdendorf et al. 1992). Wave energy is a function of wave height and velocity. Wave height and velocity, in turn, are determined by depth of water, the distance of open water over which the wind blows (fetch), and both the speed and duration of the wind. Littoral currents run parallel to the shore and are generally caused by waves striking the shore at an angle. Sediment that underlies shallow water (less than 6 feet deep) is more vulnerable to erosion from wind and waves than sediment that underlies deeper water. The composition of lake bed substrates is influenced primarily by energy regime: unconsolidated bottom types (characterized by mud, sand, or gravel substrates) typically are formed in low-energy environments, while high-energy environments typically have a greater proportion of larger rocks and boulders (Washington DNR 2007a).

Modifications to lake shorelines, such as placing fill or structures in aquatic areas, shading or disturbing aquatic vegetation, or disturbing the bank or bottom sediments, alter the structure and function of lake ecosystems. Changes occur through alteration of substrate composition and natural water movement processes (e.g., wave energy). Such modifications affect sediment transport and erosion processes.

Substrates and erosional processes in rivers are primarily controlled by hydrology (which is a product of climatic as well as geologic and vegetative conditions), as well as by topography and the characteristics of local rock formations (Montgomery and Buffington 1998; Montgomery et al. 1999). Hillslope processes (e.g., landslides, slumps, earthflows, debris avalanches, and debris torrents) are important mechanisms for delivering sediment to stream channels (Swanston 1991). Ultimately, the structure and variability of in-channel habitat are functions of channel slope, which is largely determined by topography (Montgomery et al. 1999).

Riverine systems can be modified by structures placed in channels, fill and dredging, damming, channel alteration, and changes in adjacent land use. Effects of altered flows can include encroachment of terrestrial vegetation into channels, removal or alteration of riparian vegetation, altered sediment transport, and sediment trapping. Channel alterations, such as removal of woody debris or straightened river channels, increase flood conveyance, resulting in reduced sediment and habitat complexity, as well as elimination of slower current areas during high flow. Bank hardening or armoring to prevent channel migration and bank erosion alters the dynamic equilibrium of riverine ecosystems and riparian succession. Among the effects of dams are sediment trapping and encroachment of terrestrial vegetation into channels. Elimination of riparian vegetation can result in increased erosion and sedimentation, faster runoff with higher flows, and increased likelihood of channel instability (Booth and Jackson 1997).

3.4 Water Resources

The marine and freshwater resources of Washington State support a number of complex aquatic ecosystems, including stocks of threatened and endangered Pacific salmon, rockfish, marine mammals, and other species. These resources are used for a variety of human enterprises, such as agriculture, power generation, recreation, and drinking water supplies. This subsection briefly describes the current condition of water and sediment quality in marine and freshwater areas on state-owned aquatic lands, and identifies the primary factors (e.g., climate, freshwater input in marine areas, input of nutrients and contaminants from upland areas, wastewater treatment plant discharges, agricultural practices, and shoreline habitat conditions) that influence those conditions in the analysis area. Existing conditions are described separately for marine and freshwater areas.

Discussions in this subsection do not address water quantity or groundwater because it is not possible to state with certainty whether Washington DNR's management of state-owned aquatic lands has any bearing on the primary factors that influence the condition of those resources in the analysis area. Water quantity refers to the timing and total amount of water within a watershed, typically measured by total yield and flow levels over a specified period of time. Water quantity is determined primarily by precipitation and other natural factors, as well as by human activities in upland areas, such as urban development and the associated conversion of natural landscapes to impervious surfaces. Impervious surfaces affect water quantity in lakes, rivers, and streams by inhibiting rainwater infiltration and groundwater recharge. Similar to water quantity, the primary influences on groundwater quality and quantity are associated with natural factors and land uses in upland areas rather than aquatic lands. The Washington DNR Aquatics Division manages only state-owned aquatic lands, which do not include upland areas. By definition, state-owned aquatic lands are all below the high water line. The potential exists, however, for Washington DNR's management of state-owned aquatic lands to have some bearing on the amount and location of urban or residential development (e.g., by influencing how attractive adjoining upland parcels may be for development). The extent to which this may occur is unknown and is strongly influenced by site-specific considerations, economic conditions, and numerous other factors outside of Washington DNR's control, however.

3.4.1 Existing and Relevant Management Measures and Regulatory Framework

As noted in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws, the authority exercised by Washington DNR's Aquatics Division is proprietary, not regulatory. Issuance of a use authorization from Washington DNR is only part of the process that determines the type and location of uses of state-owned aquatic lands, as well as the ways that uses would be implemented. Many Federal, state, and local authorities are involved in setting the conditions for the construction, operation, and siting of the uses authorized by Washington DNR. Federal, state, and local statutes, regulations, and policies that influence the potential for Washington DNR-authorized uses of state-owned aquatic lands to affect water resources include the following:

- Clean Water Act – Section 303(d) Total Maximum Daily Loads (TMDLs), Section 402 NPDES permits, Section 401 Water Quality Certifications, Section 404 permits
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- Federal Food, Drug, and Cosmetic Act
- Federal Insecticide, Fungicide, and Rodenticide Act
- Marine Mammal Protection Act
- Magnuson-Stevens Fishery Management and Conservation Act
- ESA, if Federal funding or permitting is involved
- NEPA, if Federal funding or permitting is involved
- SEPA
- State Water Quality Protection Act
- State Water Pollution Control Act
- State commercial shellfish licensing and closure zone establishment, per the National Shellfish Sanitation Program
- State Growth Management Act (and local critical areas ordinances)
- State Shoreline Management Act (and local shoreline management plans)

These are described in greater detail in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws.

Many authorized uses with the potential to affect the environment are subject to review and/or permitting under one or more of these Federal, state, and local statutes or regulations. The potential for uses subject to regulatory review to result in adverse effects on surface water and sediment quality is influenced to a large degree by the implementation of conservation measures required through those regulatory review processes.

As discussed in Subsection 3.3, Substrates and Erosional Processes, most projects that involve the construction or reconfiguration of in-water structures are subject to Federal permitting, which necessitates consultation with the Services under section 7 of the ESA. Measures implemented as a result of a section 7 consultation process are designed to avoid, minimize, and/or mitigate adverse effects on habitat for ESA-listed species. The suitability of habitat for many listed species depends to a large extent on surface water and/or sediment quality. Surface water and sediment quality are, therefore, likely to receive protection through the consultation process. In addition, for any projects that may result in any discharge into navigable waters, Ecology must assess whether the discharge being authorized will or will not violate state water quality standards, per section 401 of the Clean Water Act.

Similarly, construction activities that propose to change the bed of any waters of the state require an HPA from WDFW. HPAs typically include provisions for the protection of water quality (e.g., preventing silt-laden water, uncured concrete, petroleum products, or other hazardous substances from entering waterways, requiring project work to stop if leaks or spills occur). As noted in Subsection 3.3, Substrates and Erosional Processes, however, Quinn et al. (2007) found that HPA permits cannot entirely mitigate the negative effects of individual projects. Also, most existing uses are not subject to regulatory review or permitting at the state or Federal level unless the structures associated with the use undergo substantial renovation or reconfiguration.

In addition to Federal and state regulatory review, projects in areas managed under local shoreline master programs are commonly required to implement environmental protection measures. These protection measures vary to some degree between local jurisdictions. In marine areas, shoreline master programs are expected to implement policies and regulations to improve water quality (WAC 173-26-221(2)I(iii)(B)). In critical freshwater habitats, shoreline master programs are expected to include water quality provisions “to protect human health and safety and to protect and restore lake and river corridor ecological functions and ecosystem-wide processes” (WAC 173-26-221(2)(c)(iv)(B)). In addition, development and uses in shorelines of the state are required to avoid impacts to water quality and stormwater quantity that would result in a net loss of shoreline ecological function (WAC 173-26-221(6)(b)(ii)). As explained in Subsection 1.4.2, State Regulations, the Shoreline Management Act applies to all marine waters and submerged tidelands, and likely to all streams and lakes that are large enough to include state-owned aquatic lands.

3.4.2 Existing Conditions

The following two subsections describe issues related to surface water and sediment quality in marine and freshwater areas of Washington State, including known impacts to these resources. Notably, many of the major impacts to surface water and sediment quality in Washington State result from activities in upland areas (e.g., urban development and agriculture) and are, therefore, not attributable to Washington DNR's management of state-owned aquatic lands. Some impacts to surface water and sediment quality, however, do result from uses of state-owned aquatic lands as described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

3.4.2.1 Marine Areas

The nearshore marine ecosystem is considerably more sensitive to water quality impacts than is the offshore marine ecosystem, primarily because nearshore marine areas receive large amounts of freshwater runoff, are poorly mixed, and are subject to direct inputs of nutrients and sewage from human activities (Newton et al. 2002). Because fresh water is less dense than salt water, the presence of fresh water in nearshore marine areas leads to a condition called density stratification, which inhibits the mixing of the waters. Poorly mixed marine waters show more water quality impacts than well-mixed marine waters, largely due to resultant low levels of dissolved oxygen (Newton et al. 2002; Ruckelshaus and McClure 2007). In addition, fresh water from upland areas transports excess nutrients and fecal coliform bacteria from upland areas to marine waters, both of which directly impact marine water quality (Essington et al. 2011).

Climate also plays a large role in affecting water quality in the marine areas of Washington State. Various climatic conditions, such as air temperature, drought, wind, and cloud cover, affect water quality by influencing mixing and water properties such as temperature and salinity (Newton et al. 2002). In addition, increased levels of carbon dioxide generated by human activities have been absorbed by the ocean, contributing to acidification of marine waters (Feely et al. 2012). Further discussion of the effects of carbon dioxide emissions and the anticipated effects of changing climatic conditions on water quality can be found in Subsection 5.2, Future Actions and Conditions.

Results of long-term monitoring indicate that the primary water quality impacts in Washington State's marine waters are excess nutrients and fecal coliform bacteria, both of which enter marine waters in runoff from upland areas (Newton et al. 2002). In Puget Sound, low concentrations of dissolved oxygen due to elevated levels of nutrients—particularly nitrogen—have been identified as a major issue (Albertson et al. 2002a; Albertson et al. 2002b; Newton et al. 2002; Mohamedali et al. 2011). Excess nitrogen causes excess growth of algae. As algae die and decay, they consume dissolved oxygen, adversely affecting fish and other marine life (Mohamedali et al. 2011). Mohamedali et al. (2011) identified rivers[6] as the primary source of nitrogen in southern Puget Sound, followed by effluent from wastewater treatment plants. No clear trends in levels of dissolved oxygen in Puget Sound have been observed (Newton et al. 2002; Puget Sound Partnership 2012).

Copper and other metals or toxic chemicals have also been identified as major causes of water quality impacts in Puget Sound (Ecology and King County 2011). The most common pathway by which toxic chemicals reach Puget Sound is surface water runoff from upland areas. Most of the copper released to the Puget Sound basin comes from pesticides, fertilizers, motor vehicle brake pads, and roofing materials (Ecology and King County 2011). A small amount comes from some boat hull paints (Ecology and King County 2011).

Other key pollutants in Puget Sound include polycyclic aromatic hydrocarbons and petroleum-related compounds. Sources of polycyclic aromatic hydrocarbons include creosote-treated wood, wood smoke, and vehicle exhaust. Creosote-treated wood, such as pilings and bulkheads, railroad ties, and utility poles, accounts for approximately one-third of the total input of polycyclic aromatic hydrocarbons into waters of Washington State (Ecology and King County 2011). Sources of petroleum-related compounds include motor oil drips, leaks from vehicles, and minor spills of fuel and oil. The heaviest concentrations of toxic pollutants come from developed areas that support residential, commercial/industrial, and agricultural land uses throughout Washington State (Ecology and King County 2011). Based on reviews of monitoring data from 1999 through 2011, the Puget Sound Partnership (2012) found that the condition of marine water in Puget Sound has shown a declining trend.

In addition to surface water quality, sediment quality is a major concern in marine areas of Washington State. Sediment at many locations in Puget Sound have become contaminated, adversely affecting aquatic life (Puget Sound Partnership 2012). An indicator of the level of concern is the presence of

[6] Rivers and streams deliver nutrient loads from both natural and anthropogenic sources. Major contributing sources of nutrients in rivers include atmospheric deposition, natural watershed sources, septic systems, fertilizer applications, upstream wastewater treatment plants, stormwater, and other point and non-point sources (Mohamedali et al. 2011).

several Puget Sound sites on EPA's National Priorities List for cleanup of sediments contaminated with hazardous materials (Puget Sound Partnership 2011). Sources of these contaminants include industrial discharges, oil spills, contaminated runoff from urban streets and roads, and discharges from wastewater treatment plants (Puget Sound Partnership 2012). Monitoring data from sampling sites throughout Puget Sound indicate a pattern of deteriorating conditions in most regions, based on comparisons of data collected during two time periods (1997 to 2003 and 2004 to 2009) (Puget Sound Partnership 2012).

3.4.2.2 Freshwater Areas

Surface water and sediment quality in freshwater areas in Washington State vary from site to site but have been impacted by human activities in many areas. Ecology currently monitors water quality in rivers and streams throughout the state; there is currently no comparable monitoring program in lakes. In recent assessments, the most frequently identified water quality impacts in rivers and streams were elevated temperatures, elevated levels of fecal coliform bacteria, and low levels of dissolved oxygen (Ecology 2013). Additional sources of impacts included toxic substances (e.g., insecticides, metals), and excessively acidic or alkaline waters (Ecology 2013). Based on a review of monitoring data from 1995 through 2004, Hallock (2006) determined that water quality at most monitoring stations exhibited no statistically significant trends in condition, although data from more stations indicated improving conditions rather than declining conditions.

The primary sources of water quality impacts in freshwater areas are associated with human activities but not with those activities associated with uses of state-owned aquatic lands. The human activities that contribute most to elevated temperatures in rivers and streams include removal of riparian vegetation, discharges from industrial facilities, creation of impervious surfaces in upland areas, and construction of dams (EPA 2003). The primary sources of fecal coliform bacteria are wastewater treatment plant discharges, failing septic systems, and animal waste (Michaud 1994; King County 2011). Low levels of dissolved oxygen in streams are generally associated with low flows, high temperatures (colder water holds more oxygen), and/or high levels of organic matter (bacteria use up oxygen in the process of decomposing) (King County 2011). Stormwater runoff from urban and rural areas transports the large majority of toxic compounds, nutrients, and pathogens to waters throughout the Puget Sound basin (Puget Sound Partnership 2009).

Water quality in the lacustrine ecosystem is influenced primarily by management of adjacent lands. In a recent nationwide assessment of water quality in lakes, EPA (2009) found that the condition of upland areas immediately adjacent to lakes exerts substantial influence over water quality in lakes. Activities that degrade lakeshore habitat (e.g., tree removal, residential construction, grazing) can result in excess sedimentation, loss of native plant growth, alteration of native plant communities, loss of habitat structure, and modifications to substrate types. Runoff from poorly managed agricultural or residential development along lakeshores can deliver excess levels of nutrients, which can lead to weed growth, reduced water clarity, and other water quality impacts in lakes (EPA 2009). Based on research conducted by Bell-McKinnon (2010), the large majority of lakes in Washington State seem to be in fair to good condition with regard to nutrients and turbidity.

As with marine areas, sediment quality is an issue in freshwater areas in Washington State, because of potential human exposure to contaminants in sediments either through direct contact or by eating fish that have accumulated contaminants through the consumption of contaminated organisms (King County 2012). Due to the presence of contaminants in sediments and the water, the Washington Department of Health has issued advisories to limit consumption of fish caught in many rivers and lakes throughout Washington State (Department of Health 2013). The contaminants of greatest concern are those that persist in the environment, such as mercury, polychlorinated biphenyls, and chlorinated pesticides (Department of Health 2013). The primary sources of these contaminants are associated with human activities that do not occur on aquatic lands, such as industrial processes, use of internal combustion engines, use and disposal of various consumer products, and past applications of agricultural and residential pesticides (Gallagher 2000).

3.5 Noise

Noise is generally defined as unwanted sound (EPA 1971). There are no universally accepted noise standards. An acceptable noise level for a community or neighborhood may vary according to existing levels and expectations of the occupants or users. For example, residents in a rural or suburban single-family neighborhood may place a high value on lower noise levels and a sense of tranquility. An urban neighborhood with high-density multi-family housing and street-level commercial uses may place a high value on the vibrant character of the neighborhood and be tolerant of higher noise levels. Recreational users of a natural area may expect to hear no sounds other than those associated with natural processes. Noise analyses typically focus on sensitive noise receptors, which are locations where people could be adversely affected by the presence of unwanted sound.

3.5.1 Existing and Relevant Management Measures and Regulatory Framework

Authority for noise abatement and control typically resides with local governments. Rules, therefore, vary from locale to locale. Ecology has established rules that identify maximum allowable sound levels at various sites. Local governments can regulate noise levels by enforcing Ecology’s rules or by adopting and enforcing local noise ordinances. In general, allowable noise levels are based on the typical uses at the site where the sound originates (the generating property) and where it may be heard (the receiving property). Lands used for industrial purposes have higher allowable noise levels than residential or commercial properties.

Many authorized uses with the potential to generate high noise levels in underwater environments are subject to review and/or permitting under one or more of the Federal, state, and local policies and statutes described in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws. As discussed in Subsection 3.3, Substrates and Erosional Processes, most projects that involve the construction or reconfiguration of in-water structures are subject to Federal permitting, which necessitates consultation with the Services under section 7 of the ESA. Measures implemented as a result of a section 7 consultation process are designed to avoid, minimize, and/or mitigate adverse effects on ESA-listed species. Many such consultation processes result in the implementation of measures to reduce noise levels associated with underwater pile driving. Similar measures may be implemented for projects that require authorization for incidental take of marine mammals protected under the Marine Mammal Protection Act.

3.5.2 Existing Conditions

The following paragraphs describe sources of noise in the analysis area and characterize the typical noise levels at and near state-owned aquatic lands. Discussions are organized by the two primary media of noise transmission (water and air) and focus on sensitive noise receptors in the human environment. The sensitivity of wildlife to noise and other disturbance is addressed in the discussions of individual species (Subsection 3.9, Wildlife and Wildlife Habitat).

Noise levels in underwater environments, including marine areas, lakes, rivers, and streams, can be quite high. Examples of natural noise sources in these environments include wind, waves, precipitation, earthquakes, lightning strikes, and sounds produced by animals (e.g., whale songs, dolphin clicks, clicking of crustaceans) (Urick 1983; National Research Council 2003). Examples of noise sources associated with human activities include commercial shipping, geophysical surveys, oil drilling and production, dredging and construction, sonar systems, and oceanographic research (National Research Council 2003). One of the most prominent sources of high-intensity noise of concern in underwater environments is in-water pile driving, which can cause disturbance, injury, or even mortality in fish, seabirds, marine mammals, and other species (Yelverton and Richmond 1981; Richardson et al. 1991; Popper 2003; Hardyniec and Skeen 2005). Other sources of underwater noise associated with human activities include recreational boat use, offshore energy production facilities, and noise from nearby upland areas (e.g., pile driving near waterbodies).

Among the sources of underwater noise associated with human activity, surface shipping (which generates noise from ship engines, propellers, generators, and bearings) is widely considered to be the most widespread source of low-frequency underwater noise in the oceans (National Research Council 2003). Although there are no data describing long-term trends in ocean noise, increases in commercial shipping during the past 50 years imply a gradual increase in noise levels from shipping traffic. This relationship is complicated, however, by technology changes that have resulted in quieter ships during the same period (National Research Council 2003). Puget Sound experiences a concentration of commercial shipping into and out of ports, with the ports of Seattle and Tacoma together handling 9 percent of nationwide container traffic in 2010 (U.S. Army Corps of Engineers 2011). Recreational boating also generates noise in a variety of marine and freshwater environments, with most use likely occurring near heavily populated areas around Puget Sound.

Airborne noise levels near state-owned aquatic lands (both on shore and over water, including offshore and nearshore areas) vary widely. In urban areas, noise levels range from relatively quiet residential neighborhoods to high-intensity manufacturing areas where noise may approach the maximum levels allowed by state and local regulations. Transportation-related noise is also prevalent in urban areas, including noise from airplane overflights, vehicle engines, tires on roadways, sirens, and railways. In rural areas, agriculture and timber harvest activities can generate loud noise at isolated sites (usually far from concentrated residential areas) for short periods.

Compared to urban areas, rural areas generally have a lower intensity of development and less intense and less frequent human activity. This results in lower ambient noise levels over the area in general, but may include relatively high levels near localized centers of intense human activity. The major sources of noise in rural areas are likely to be transportation facilities, such as highways and railroads. Farther away from areas of concentrated human presence, noise levels are likely dominated by natural processes and low-intensity human activities.

Within urban areas, the most sensitive noise receptors include facilities and activities for which excessive noise may cause sleep interruption, annoyance, increased stress, loss of business, or other adverse effects. Examples of sensitive receptors include residential areas, hospitals, schools, performance spaces, and some businesses. Open space is also noise-sensitive if excessive noise would adversely affect potential recreational use of the space. Sensitive receptors in rural areas consist primarily of residences; sensitive receptors in other areas likely consist of recreational users. Any of these sensitive receptors may be present in upland areas near state-owned aquatic lands statewide.

3.6 Vegetation

Discussions in this subsection describe the primary factors affecting the distribution and condition of vegetation in the analysis area, emphasizing native aquatic vegetation that would be the subject of protective measures under the action alternatives. The types of native aquatic vegetation for which protective measures would be implemented under the action alternatives are seagrasses, kelps, salt marsh plants, complex freshwater algae, and rooted freshwater plants (Subsection 2.2.3, Elements Common to Both Action Alternatives). This subsection briefly describes the current condition of aquatic vegetation on state-owned aquatic lands in marine and freshwater areas, and identifies the primary factors (e.g., light availability, nutrients, substrate type, salinity, wave energy, hydrologic regime, and the presence of invasive species) that influence those conditions in the analysis area. Existing conditions are described separately for marine and freshwater areas. This subsection also identifies threatened and endangered plants associated with aquatic habitats in the analysis area.

Aquatic vegetation performs a wide variety of ecological functions in both marine and freshwater environments. Submerged, floating, and emergent plants provide three-dimensional structure in shallow-water benthic habitats; slow erosion and wave energy (Fonseca and Cahalan 1992); and convert carbon dioxide into oxygen and plant biomass (Hemminga and Duarte 2000). Aquatic vegetation biomass is a major source of food for amphibians, reptiles, birds, fish, and invertebrates, which consume plants directly or prey on species that use vegetation (Moore et al. 2004; Alvarez and Peckarsky 2005; Hilt 2006). Many species use vegetation for egg attachment, nursery/rearing areas, and/or for refuge from predation (Love et al. 1990; Webb 1991; Kendall and Mearns 1996; Munger et al. 1998; Shaffer 2004; Mumford 2007).

In addition, many of the functions provided by aquatic vegetation also constitute important ecosystem services that directly benefit people (MEA 2005). For example, aquatic vegetation sequesters carbon, stabilizes substrates, reduces shoreline erosion, dissipates wave and current energy, retains sediment and nutrients, and helps maintain water quality by moderating dissolved oxygen levels and water temperature. Vegetation in and near rivers and streams moderates flood flows by reducing velocities and providing short-term storage of high flow volumes.

At many locations in both marine and freshwater areas, invasive plant species compete with, prey upon, or introduce diseases to economically and ecologically valuable native species (Meacham 2001). Aquatic environments are particularly susceptible to introductions of exotic plants (Rejmánek et al.

2005). Factors that contribute to the introduction and establishment of invasive plant species include disturbance, nutrient enrichment, and fragmentation of existing native plant communities (Rejmánek et al. 2005).

3.6.1 Existing and Relevant Management Measures and Regulatory Framework

As noted in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws, the authority exercised by Washington DNR's Aquatics Division is proprietary, not regulatory. Issuance of a use authorization from Washington DNR is only part of the process that determines the type and location of uses of state-owned aquatic lands, as well as the ways that uses are implemented. Many Federal, state, and local authorities are involved in setting the conditions for the construction, operation, and siting of the uses authorized by Washington DNR. Federal, state, and local statutes, regulations, and policies that influence the potential for Washington DNR-authorized uses of state-owned aquatic lands to affect vegetation include the following:

- Clean Water Act – Section 401 permits, Section 404 permits
- Magnuson-Stevens Fishery Management and Conservation Act
- ESA, if Federal funding or permitting is involved
- NEPA, if Federal funding or permitting is involved
- SEPA
- State Growth Management Act (and local critical areas ordinances)
- State Shoreline Management Act (and local shoreline management plans)
- State Hydraulic Code

These are described in greater detail in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws.

Many authorized uses with the potential to affect the environment are subject to review and/or permitting under one or more of these Federal, state, and local statutes or regulations. The potential for uses subject to regulatory review to result in adverse effects on aquatic vegetation is influenced to a large degree by the implementation of conservation measures required through those regulatory review processes. As discussed in Subsection 3.3, Substrates and Erosional Processes, most projects that involve the construction or reconfiguration of in-water structures are subject to Federal permitting, which necessitates consultation with the Services under section 7 of the ESA. Measures implemented as a result of a section 7 consultation process are typically designed to avoid, minimize, and/or mitigate adverse effects on ESA-listed species. Vegetation is an important habitat component for many listed species. Aquatic vegetation is, therefore, likely to receive protection through the Federal permitting process. Similarly, construction activities that propose to change the bed of any waters of the state are required to seek an HPA from WDFW. Protection of aquatic vegetation is likely to be addressed by many of the conditions that are typically placed on activities through the HPA review process.

In addition to Federal and state regulatory review, projects in areas managed under local shoreline master programs are commonly required to implement environmental protection measures. These protection measures vary to some degree between local jurisdictions. In marine areas, all kelp beds and eelgrass beds have been identified as critical saltwater habitats, and are afforded an elevated level of protection under shoreline master programs (WAC 173-26-221(2)(c)(iii)(A)). Local governments are expected to implement standards that prohibit docks, piers, bulkheads, bridges, fill, floats, jetties, utility crossings, and other human-made structures from intruding into or over such areas. In cases of clearly demonstrated public need, where no feasible alternative is available, some such intrusion may be allowable, provided the project (including mitigation) would result in no net loss of ecological functions associated with the critical saltwater habitat (WAC 173-26-221(2)(c)(iii)(C)). Similar exceptions apply to private, noncommercial docks for individual residential or community use.

In freshwater shoreline management zones, local governments are expected to implement standards that "provide for the protection of ecological functions associated with critical freshwater habitat as necessary to assure no net loss of ecological functions" (WAC 173-26-221(2)(c)(I(C)). In practice, such standards typically encourage the protection of existing native aquatic vegetation. As explained in Subsection 1.4.2, State Regulations, the Shoreline Management Act applies to all marine waters and submerged tidelands, and likely to all streams and lakes that are large enough to include state-owned aquatic lands.

3.6.2 Existing Conditions

The following subsections describe issues related to the distribution and condition of aquatic vegetation in marine and freshwater areas of Washington State, including ways in which human-created modifications to the environment have affected aquatic vegetation. Also described are ESA-listed plants that associated with aquatic habitats in Washington. The ways in which uses of state-owned aquatic lands currently affect aquatic vegetation are described in greater detail in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

3.6.2.1 Marine Vegetation

Discussions in this subsection describe vegetation in the nearshore marine ecosystem, identifying the primary factors that influence the distribution and condition of native aquatic vegetation that may be affected by uses of state-owned aquatic lands and that would be the subject of protective measures under the action alternatives. As noted above, the groups of marine species pertinent to this analysis are seagrasses, kelps, and salt marsh plants. Vegetation in the offshore marine ecosystem is restricted to phytoplankton in the water column where light and nutrients are adequate for growth. Washington DNR's management of state-owned aquatic lands does not influence the availability of light and nutrients in the offshore marine ecosystem, so offshore marine vegetation is not addressed further in this analysis.

Submerged vegetation (e.g., seagrasses, kelp), salt marshes, and terrestrial vegetation generate organic compounds and detritus that support rich food webs in the nearshore marine ecosystem (Phillips 1984). Native seagrass species in Washington include eelgrass (*Zostera marina*), widgeongrass (*Ruppia maritima*), and several species of surfgrass (*Phyllospadix* spp.). Eelgrass grows in muddy to sandy substrates, generally in low- to moderately high-energy portions of intertidal and subtidal areas (Mumford 2007). Surfgrasses typically grow attached to rocks in environments with high levels of wave energy (Mumford 2007). Widgeongrass is uncommon in Washington State and inhabits high intertidal areas with brackish water (Green and Short 2003). Kelps are large brown seaweeds that attach to bedrock or cobbles in shallow waters, especially in areas with moderate to high waves or currents (Mumford 2007). Salt marshes are vegetated areas found between the limits of tidal elevation, in areas where sediment supply and accumulation are relatively high (Mitch and Gosselink 2000). Salt marsh vegetation typically occurs in a relatively narrow range of salinity and elevation within estuaries and other sheltered environments with tidal inundation.

The primary factors that influence the distribution of native aquatic vegetation in the nearshore marine ecosystem are light availability, tidal inundation, nutrient availability, substrate type, and wave or current energy. For example, the upper extent of eelgrass distribution is limited by drying stress in the upper intertidal zone during low tides, and the lower extent is limited by light penetration, which depends primarily on water clarity (Thom et al. 1998; Essington et al. 2011). Other controlling factors are substrate (sediment supply and type), wave or current energy, and nutrients (Thom et al. 1998). The distribution of kelp is largely determined by light levels, nutrient levels, the availability of suitable (hard) substrates, and by the presence of grazers, physical disturbances, and toxic contaminants (Mumford 2007; Essington et al. 2011). In salt marshes, the composition of vegetation depends on environmental factors such as salinity, elevation, and tidal flooding regime (Jefferson 1975; Burg et al. 1976; Disraeli and Fonda 1979), as well as soil conditions (Ewing 1983).

Human activities and shoreline modification can adversely affect native aquatic vegetation through direct removal or degradation and indirectly through alteration of the environmental conditions that support plants (EnviroVision et al. 2010). Major threats to aquatic vegetation include physical disturbance, loss of water clarity, and excessive nutrients or contaminants (Mumford 2007; Puget Sound Action Team 2007). Overwater structures, shoreline armoring, riparian vegetation alteration, boating, illegal harvesting, and shellfish aquaculture all have the potential to alter light and nutrient levels, alter substrate composition, increase concentrations of contaminants and suspended sediments, or cause physical disturbance of aquatic plants (EnviroVision et al. 2010). Surfgrasses, which generally grow on wave-swept, rocky areas where development is less likely to occur, are generally considered less likely than eelgrass or kelp to be affected by human activities (Carlisle et al. 2003).

In a study comparing the current and historical distribution of eelgrass in Puget Sound, Thom and Hallum (1990) reported mixed results, with apparent declines in eelgrass abundance in some areas and apparent increases in others since the late 1800s. More recent monitoring indicates a pattern of slight declines in eelgrass abundance at individual sites throughout Puget Sound since 2000, although the total area occupied by eelgrass in Puget Sound remained relatively stable (Gaeckle et al. 2009).

Recent monitoring in the marine waters of Washington State suggests that floating kelp is increasing in abundance along the outer coast and Strait of Juan de Fuca, although some localized declines have occurred at the eastern edge of the Strait of Juan de Fuca (Berry et al. 2005). Looking at distribution over a longer time frame, Thom and Hallum (1990) found evidence that the area occupied by floating kelp in Puget Sound has increased overall since the 1850s, despite losses in some areas. Monitoring efforts focus on floating kelp because no effective means of monitoring subtidal (i.e., non-floating) kelp populations over wide areas have been developed (Essington et al. 2011).

Salt marsh habitats and native vegetation have been almost entirely lost from Puget Sound over the past 100 years due to filling; elimination of tidal exchange through dikes, levees, and/or tide gates; conversion to agricultural, commercial, or industrial uses; and introduction of invasive species. In Puget Sound, estimates indicate that more than 90 percent of salt marsh habitats have been lost, with almost total loss of salt marsh habitat from some historical estuaries such as the Green/Duwamish and the Puyallup (Bortelson et al. 1980; Collins and Sheikh 2005).

3.6.2.2 Freshwater Vegetation

Discussions in this subsection describe vegetation in lakes, ponds, rivers, and streams and identify the primary factors that influence the distribution and condition of native aquatic vegetation that would be the subject of protective measures under the action alternatives. Among the freshwater algae, only the stoneworts (*Chara* spp.) and brittleworts (*Nitella* spp.) achieve the size and structural complexity sufficient to provide habitat for species proposed for ITP coverage through the Aquatic Lands HCP. As such, those are the only species of algae for which protective measures would be implemented under the action alternatives. Vascular plants differ from algae in having specialized tissues for conducting water and nutrients throughout the plant. Vascular plants for which protective measures would be implemented under the action alternatives are species that are attached to or rooted in state-owned aquatic lands, including submerged and emergent plants as well as those with leaves that float on the water's surface.

As in marine areas, aquatic vegetation plays an important role in freshwater areas by stabilizing sediment, removing excess nutrients from the water column (thereby contributing to improved water clarity) (van den Berg et al. 1998; Hietala et al. 2004), and generating oxygen (Findlay et al. 2006; Laskov et al. 2006). Primary factors influencing the distribution and type of vegetation in freshwater areas include hydrologic or inundation regime, sediment dynamics and substrate, light availability, nutrient inputs, and the presence of invasive species (Lacoul and Freedman 2006).

In contrast to marine areas, there are no statewide monitoring programs for aquatic vegetation in freshwater areas. Thus, comprehensive data are lacking on the current or historic status or trends in the distribution and condition of vegetation in lakes, ponds, rivers, and streams. No readily available information describes the current distribution or condition of freshwater aquatic plant species in Washington State. Human-caused impacts to freshwater vegetation have been identified and described, however, and are summarized below.

Aquatic vegetation in lakes and ponds throughout Washington State has been affected by many human activities, primarily in upland areas (e.g., development along lake shores, filling of wetlands, conversion of native vegetation to ornamental landscaping or turf, and increased inputs of nutrients and pollution from agricultural or stormwater runoff). As discussed in Subsection 3.4, Water Resources, Washington DNR's management of aquatic lands does not directly affect upland areas, and potential changes in the extent or location of upland development in response to changes in aquatic land management practices cannot be predicted. Some impacts to aquatic vegetation in lakes are attributable to actions associated with aquatic lands. Examples include water level manipulation, construction of bank armoring and overwater structures, and introductions of invasive species. Management of lakes and reservoirs for hydropower and irrigation has affected aquatic vegetation through changes in water levels. Shoreline armoring and overwater structures have affected substrates and erosional processes, altering the suitability of substrates for aquatic plants.

Most large rivers that include state-owned aquatic lands have been subjected to some combination of flow modification, flow diversion, bank armoring, channel straightening, channel confinement, removal of riparian vegetation, and/or filling of floodplains and adjacent wetlands (Gamon 2007). These changes have eliminated aquatic vegetation directly and have altered processes such as flow regimes and sediment dynamics that historically maintained characteristic native vegetation communities.

3.6.2.3 ESA-listed Plants

Three plant species that are ESA-listed as threatened or endangered are associated with aquatic habitats in Washington (USFWS 2012). Two of these are extremely unlikely to occur on state-owned aquatic lands. One—marsh sandwort (*Arenaria paludicola*), listed as endangered (58 Fed. Reg. 41378, August 3, 1993)—has not been observed in Washington since 1896 and is considered to be extirpated in the state (USFWS 2008). Primary habitat for the species is believed to consist of boggy areas in freshwater marshes and swamps (USFWS 2008); state-owned aquatic lands generally do not encompass such areas. The other—water howellia (*Howellia aquatilis*), listed as threatened (59 Fed. Reg. 35860, July 14, 1994)—is associated with seasonally inundated wetlands and vernal pools; such habitats do not meet the standard of navigability that defines state-owned aquatic lands (Washington DNR 2007d). These two species are not addressed further in this EIS.

One ESA-listed species—Ute ladies'-tresses orchid (*Spiranthes diluvialis*), listed as threatened (57 Fed. Reg. 2048, January 17, 1992)—has been found in areas that could meet the definition of state-owned aquatic lands. Of six known sites in Washington, five occur along Rocky Reach Reservoir on the Columbia River in Chelan County (the other one is in a periodically flooded alkaline flat in Okanogan County) (Washington Natural Heritage Program and U.S. Bureau of Land Management 2005; Chelan Public Utility District 2009).

Throughout its range, Ute ladies'-tresses occurs along riparian edges, gravel bars, old oxbows, high flow channels, and moist to wet meadows along perennial streams. This orchid species typically occurs in stable wetlands and seeps associated with old landscape features within historical floodplains of major rivers (Fertig et al. 2005). Such habitats are typically above the ordinary high water line that defines the upland extent of state-owned aquatic lands. Some uses of state-owned aquatic lands have the potential to alter habitat conditions for this species, however. For example, the construction of flood control structures (e.g., bank armoring) interferes with natural processes that create the flood-prone river habitat with which the species is associated (Fertig et al. 2005). The primary threats identified at the sites along Rocky Reach Reservoir are encroachment by noxious weeds and potential development of parcels that support known populations (Chelan Public Utility District 2009).

3.7 Wetlands and Riparian Areas

This subsection describes wetlands and riparian areas that may be affected by Washington DNR's management of state-owned aquatic lands under the proposed alternatives. Subsection 3.7.1, Existing and Relevant Management Measures and Regulatory Framework, identifies statutes, regulations, rules, and policies enacted by Federal, state, and local agencies that address the potential for uses of state-owned aquatic lands to affect wetlands and riparian areas. Subsection 3.7.2, Existing Conditions, provides baseline information for the evaluation of the effects of the alternatives in Section 4, Environmental Consequences, briefly describing the distribution, abundance, and condition of wetlands and riparian areas in the analysis area and identifying the key factors that influence those conditions.

3.7.1 Existing and Relevant Management Measures and Regulatory Framework

As noted in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws, the authority exercised by Washington DNR's Aquatics Division is proprietary, not regulatory. Issuance of a use authorization from Washington DNR is only part of the process that determines the type and location of uses of state-owned aquatic lands, as well as the ways that uses are implemented. Many Federal, state, and local authorities are involved in setting the conditions for the construction, operation, and siting of the uses authorized by Washington DNR. Federal, state, and local statutes, regulations, and policies that influence the potential for Washington DNR-authorized uses of state-owned aquatic lands to affect wetlands and riparian areas include the following:

- Clean Water Act – Section 401 permits, Section 404 permits
- Federal Rivers and Harbors Act – Section 10
- Magnuson-Stevens Fishery Management and Conservation Act
- ESA, if Federal funding or permitting is involved
- NEPA, if Federal funding or permitting is involved
- SEPA
- State Hydraulic Code
- State Water Quality Protection Act
- State Water Pollution Control Act
- State Forest Practices Act
- State Growth Management Act (and local critical areas ordinances)
- State Shoreline Management Act (and local shoreline management plans)

These are described in greater detail in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws.

Wetlands receive substantial protection through Federal, state, and local policies and statutes (Subsection 1.4, Relationship to Other Plans, Regulations, and Laws). Among these is the Clean Water Act, under which the Corps must review and issue permits for proposed projects that involve excavating, land clearing, or discharging dredged or fill material into waters of the United States, including wetlands. In addition, under the Rivers and Harbors Act, the construction of any structures in or over navigable waters of the United States (including wetlands) is subject to permitting review by the Corps. At the state level, projects that require Federal licenses or permits and that may involve the discharge of dredge or fill material into non-isolated wetlands are subject to a water quality certification by Ecology. All of these review and permitting processes typically result in the implementation of measures designed to avoid, minimize, and mitigate for adverse effects on wetlands.

In addition to Federal and state regulatory reviews, proposed uses of state-owned aquatic lands with the potential to affect both wetlands and riparian areas are subject to regulatory review and permitting at the local level. In areas managed under local shoreline master programs, wetlands are identified as critical areas. Such programs are required to provide a level of protection for wetlands that ensures "no net loss of shoreline ecological functions necessary to sustain shoreline natural resources" (WAC 173-26-221(2)(a)). In addition, shoreline master programs are required to establish regulatory provisions that address the conservation of shoreline vegetation (which includes riparian areas), meeting a similar "no net loss" standard (WAC 173-26-221(5)). As with all master program provisions, vegetation conservation provisions apply even to those shoreline uses and developments that are exempt from the requirement to obtain a shoreline substantial development permit. As explained in Subsection 1.4.2, State Regulations, the Shoreline Management Act applies to all marine waters and submerged tidelands, and likely to all streams and lakes that are large enough to include state-owned aquatic lands.

Lastly, many authorized uses of state-owned aquatic lands that could indirectly degrade wetlands and riparian areas by adversely affecting erosional processes, water quality, or vegetation are subject to review and/or permitting under one or more of the Federal, state, and local policies and statutes identified above (e.g., ESA), thereby limiting the potential for indirect effects on wetlands and riparian areas. These review processes are described in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework (Substrates and Erosional Processes), Subsection 3.4.1, Existing and Relevant Management Measures and Regulatory Framework (Water Resources), and Subsection 3.6.1, Existing and Relevant Management Measures and Regulatory Framework (Vegetation).

3.7.2 Existing Conditions

Wetlands and riparian areas occur on and near state-owned aquatic lands statewide. The discussions below describe the distribution, abundance, and condition of wetlands in the analysis area first, followed by riparian areas.

Wetlands are defined in terms of their physical, chemical, and biological characteristics. Analyses in this EIS address wetlands in marine areas (i.e., tidal wetlands) and in freshwater areas (specifically, lacustrine and riverine wetlands). The regulatory definition of wetlands, under the Clean Water Act, is "those areas that are inundated or saturated with surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (40 CFR 230.3(t)). Common functions performed by wetlands in Washington State include maintaining water quality, moderating water quantity (i.e., maintaining minimum stream base flows and absorbing peak flows), and providing habitat for fish, wildlife, and plants (Hruby et al. 1999).

Wetlands in marine areas are called tidal wetlands and include all areas with emergent vegetation (i.e., vegetation other than seagrasses or seaweeds) and that are periodically inundated by tidal waters. Tidal wetlands cover approximately 25 square miles in Washington State, with a small proportion (approximately 20 percent) occurring on state-owned aquatic lands (Washington DNR 2007a). Tidal wetlands occur predominantly in the Columbia River estuary, Willapa Bay, Grays Harbor, Skagit Bay, the Nooksack River delta, the Nisqually River delta, and several river deltas in Hood Canal.

Freshwater wetlands that may be affected by uses of state-owned aquatic lands include riverine and lacustrine wetlands. Other types of wetlands generally occur above the ordinary high water line or in transition areas between uplands and rivers and lakes and do not, therefore, occur on state-owned aquatic lands. Riverine wetlands are those that occur within river channels, although some islands in river channels may support other types of wetlands. Lacustrine wetlands occur along shorelines of dammed river channels or within topographic depressions larger than 20 acres and generally include areas of emergent and floating aquatic bed vegetation. Lane and Taylor (1997) identified approximately 1,500 square miles of freshwater wetlands in Washington State, a small proportion of which (15 percent or less) may occur on state-owned aquatic lands, based on their proximity to navigable waterways of the state (Washington DNR 2007a).

The distribution and abundance of wetlands in the analysis have been diminished from historical conditions. Through the 1980s, Washington State had lost an estimated 31 percent of its original wetlands, and continued losses have been documented (Sheldon et al. 2005). Factors contributing to the loss of wetlands include agricultural development, urbanization, timber harvest, road construction, and other land management activities. Development and filling have caused the loss of most (about 70 percent) of the tidal wetlands that existed in Puget Sound in the mid-1800s (Thom and Hallum 1990). Elsewhere, diking and filling have reduced the surface area of the Columbia River estuary by approximately 20 percent compared to historical levels, and approximately half (43 percent) of the tidal marshes and most (77 percent) of tidal swamps that existed in the estuary before 1870 have been lost (Fresh et al. 2005). The alteration of almost all river delta systems in Washington has resulted in substantial losses of tidal wetlands (Emmett et al. 2000).

In addition to affecting the distribution and abundance of wetlands, human activities such as diking, draining, and agriculture have directly affected the condition of (i.e., degraded) wetlands throughout the analysis area (Washington DNR 1998). The potential for uses of state-owned aquatic lands to directly affect the condition of wetlands is limited through the regulatory and permitting processes identified in Subsection 3.7.1, Existing and Relevant Management Measures and Regulatory Framework.

Some uses of state-owned aquatic lands can, however, indirectly affect wetlands by affecting erosional processes, water quality, and vegetation. Effects on erosional processes can indirectly affect wetlands by modifying patterns of bank erosion and replenishment, leading to erosion or sedimentation of wetlands. Uses of state-owned aquatic lands that contribute to such effects include overwater structures such as docks (including private recreational docks), piers, and derelict structures. Effects on water quality can indirectly affect wetlands by altering the growth of wetland vegetation. Uses of state-owned aquatic lands that contribute to such effects include any uses that result in increased levels of nutrients or contaminants (Subsection 3.6.2, Vegetation). Lastly, piers, gangways, or other structures that provide access between overwater structures (including derelict structures and private recreational docks) and shore can indirectly affect wetlands by casting shade that results in the loss or diminished growth of wetland vegetation (Washington DNR 2007a). The ways in which uses of state-owned aquatic lands currently contribute to adverse effects on erosional processes, water quality, and vegetation are described in greater detail in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. The amount of area over which effects on erosional processes, water quality, and vegetation contribute to indirect effects on wetlands is unknown.

Riparian areas are defined as areas adjacent to aquatic systems; they occur adjacent to marine or freshwater areas throughout Washington State. Riparian areas typically occur above the high-water line that defines the upland extent of state ownership. Riparian areas have distinct resource values and characteristics that make them important zones of interaction between terrestrial and aquatic ecosystems (Knutson and Naef 1997; Brennan and Culverwell 2004). Functions of marine and freshwater riparian areas in the Pacific Northwest include 1) providing nearshore shade and organic nutrients, 2) providing structural habitat elements such as large woody debris, 3) moderating the rate of water and sediment supply from uplands to nearshore areas, 4) stabilizing shorelines, 5) enhancing the retention and breakdown of pollutants and excess nutrients, and 6) providing habitat for diverse communities of plants and animals (Beschta et al. 1987; Spence et al. 1996; Levings and Jamieson 2001).

Since the 19th century, between 50 and 90 percent of Washington's riparian areas have been modified or degraded (Canning and Stevens 1989; Knutson and Naef 1997). Along the Columbia River, nearly all (more than 90 percent) of the original riparian area has been affected through inundation behind dams or conversion to agricultural lands (USFWS 1979 *in* Knutson and Naef 1997). Current riparian conditions are strongly influenced by urban and residential development and/or past forest management practices within riparian areas. Although riparian areas typically occur above the high-water line that defines the upland extent of state ownership, some uses of state-owned aquatic lands include actions that have the potential to affect the condition of riparian areas. As with wetlands, riparian areas can be indirectly degraded by uses of state-owned aquatic lands that adversely affect erosional processes, water quality, and vegetation, as described above. The ways in which uses of state-owned aquatic lands currently contribute adverse effects on erosional processes, water quality, and vegetation are described in greater detail in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

3.8 Fish, Aquatic Invertebrates, and Associated Habitats

This subsection describes fish, aquatic invertebrates, and associated habitats that may be affected by Washington DNR's management of state-owned aquatic lands under the proposed alternatives, emphasizing species proposed for ITP coverage through the Aquatic Lands HCP. Subsection 3.8.1, Existing and Relevant Management Measures and Regulatory Framework, identifies statutes, regulations, rules, and policies enacted by Federal, state, and local agencies that address the potential for uses of state-owned aquatic lands to affect fish, aquatic invertebrates, and associated habitats. Subsection 3.8.2, Existing Conditions, provides baseline information for the evaluation of the effects of the alternatives in Section 4, Environmental Consequences, briefly describing the status, distribution, key habitat components, abundance, and threats, as well as the condition of habitat for species of fish and aquatic invertebrates that are known or likely to occur in the analysis area.

3.8.1 Existing and Relevant Management Measures and Regulatory Framework

As noted in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws, the authority exercised by Washington DNR's Aquatics Division is proprietary, not regulatory. Issuance of a use authorization from Washington DNR is only part of the process that determines the type and location of uses of state-owned aquatic lands, as well as the ways that uses are implemented. Many Federal, state, and local authorities are involved in setting the conditions for the construction, operation, and siting of the uses authorized by Washington DNR. Federal, state, and local statutes, regulations, and policies that influence the potential for Washington DNR-authorized uses of state-owned aquatic lands to affect fish, aquatic invertebrates, and their habitats include the following:

- Clean Water Act – NPDES permits, Section 401 permits, Section 404 permits
- Federal Rivers and Harbors Act – Section 10
- Comprehensive Environmental Response, Compensation, and Liability Act
- Magnuson-Stevens Fishery Management and Conservation Act
- Federal Coastal Zone Management Act
- ESA, if Federal funding or permitting is involved
- NEPA, if Federal funding or permitting is involved
- SEPA
- State Hydraulic Code
- State Water Quality Protection Act
- State Water Pollution Control Act
- State Growth Management Act (and local critical areas ordinances)
- State Shoreline Management Act (and local shoreline management plans)

These Federal, state, and local statutes and regulations are described in greater detail in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws.

Many authorized uses with the potential to affect the environment are subject to review and/or permitting under one or more of these Federal, state, and local statutes or regulations. The potential for uses subject to regulatory review to result in adverse effects on fish, aquatic invertebrates, and associated habitat is influenced to a large degree by the implementation of conservation measures required through those regulatory review processes. As discussed in Subsection 3.3, Substrates and Erosional Processes, most projects that involve the construction or reconfiguration of in-water structures are subject to Federal permitting, which necessitates consultation with the Services under section 7 of the ESA. Measures implemented as a result of a section 7 consultation process are typically designed to avoid, minimize, and/or mitigate adverse effects on ESA-listed species (e.g., measures to reduce disturbance or injury due to noise and human activity) and on the habitats that support these species. Measures designed to protect these species and habitats typically address components of the environment (e.g., the condition of substrates, water and sediment quality, aquatic vegetation, light, noise, disturbance, and food/prey availability) that provide habitat for numerous organisms in aquatic areas, not just those listed as threatened or endangered under the ESA. Many species of fish and aquatic invertebrates, therefore, receive protection through the various Federal permitting processes.

At the state level, HPAs issued under the Hydraulic Code (required for all construction activities that propose to change the bed of any waters of the state) include provisions to minimize project-specific and cumulative impacts to fish, based on the best available science and practices related to protection of fish life (WAC 220-110). Conditions placed on activities through the HPA review process commonly require the protection of substrates, water and sediment quality, and aquatic vegetation.

At the local level, management standards for the protection of sediment transport processes, water and sediment quality, aquatic vegetation, and shoreline vegetation in areas managed under local shoreline master programs generally minimize the potential for new uses of state-owned aquatic lands to result in adverse effects on fish and aquatic invertebrates. As explained in Subsection 1.4.2, State Regulations, shoreline master programs developed under the Shoreline Management Act likely apply to all state-owned aquatic lands because the Shoreline Management Act applies to all marine waters and submerged tidelands and likely to all streams and lakes that are large enough to include state-owned aquatic lands.

The likelihood for uses subject to regulatory review to result in adverse effects on fish, aquatic invertebrates, and associated habitats is influenced to a large degree by the implementation of conservation measures required through Federal, state, and local regulatory review processes. The fact that a particular project is subject to regulatory review and/or permitting does not, however, ensure that the project would not result in adverse effects on aquatic species and habitats. As described in the discussions of existing and relevant management measures and regulatory frameworks in Subsection 3.3, Substrates and Erosional Processes, and Subsection 3.4, Water Resources, some permitting processes, including the HPA process, may have a limited ability to protect public resources, ensure no net loss of the productive capacity of fish and shellfish habitat or functions, and fully mitigate the impacts of permitted projects (Quinn et al. 2007).

3.8.2 Existing Conditions

The marine and fresh waters of Washington State support hundreds of species of fish and thousands of aquatic invertebrates. Fish and aquatic invertebrates are an important natural resource with biological, cultural, recreational, and economic significance in the analysis area. Fish and aquatic invertebrates support commercial, recreational, and tribal fisheries in marine and freshwaters throughout Washington State. Many species of fish and aquatic invertebrates play substantial roles in marine food webs that support fishes, seabirds, and mammals.

The distribution and abundance of fish and aquatic invertebrates in the analysis area depend on the distribution, abundance, and condition of their associated habitat. Habitat is a product of erosional processes, water quality, physical habitat features (e.g., substrate composition, access to habitat), and biological communities (e.g., native aquatic vegetation, prey resources). Key habitat components of the aquatic environment that influence the distribution and abundance of fish and aquatic invertebrates and that are pertinent to this analysis include substrates, water and sediment quality, aquatic vegetation, light conditions, noise, disturbance, and food/prey availability. These habitat components are considered pertinent to this analysis because they may be affected differently by differences in Washington DNR's management of state-owned aquatic lands under the alternatives. The following two subsections (Subsection 3.8.2.1, Key Habitat Components in Marine Areas and Subsection 3.8.2.2, Key Habitat Components in Freshwater Areas) describe the relationships between fish and aquatic invertebrates and these key habitat components in marine and freshwater areas of the analysis area. Descriptions of existing conditions for substrates, water and sediment quality, and aquatic vegetation, are based largely on information provided in Subsection 3.3, Substrates and Erosional Processes, Subsection 3.4, Water Resources, and Subsection 3.6, Vegetation, respectively. The ways in which uses of state-owned aquatic lands currently contribute adverse effects on all key habitat components are further described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

Among the hundreds of species of fish and aquatic invertebrates in the analysis area, 18 are considered to be of particular concern for this analysis due to the current status of each species' population, threats to their populations with respect to uses of state-owned aquatic lands, and the inclusion of the species in Washington DNR's application for ITP coverage (Table 1-1). Subsection 3.8.2.3, Proposed Covered Species, describes the status, distribution, habitat use, and abundance of these species, along with identified threats to each species' populations.

3.8.2.1 Key Habitat Components in Marine Areas

As mentioned above, key habitat components that influence the distribution and abundance of fish and aquatic invertebrates in the analysis area include substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability. The following paragraphs describe the relationships between these key habitat components and fish and aquatic invertebrates in marine areas and identify how the condition of these components has been affected by human activities in the analysis area.

Substrates in marine areas provide habitat for many different species of fish and aquatic invertebrates. Consolidated (i.e., rocky; see Subsection 3.3.2.1, Marine Areas—Substrates and Erosional Processes) substrates provide shelter and attachment sites for many marine invertebrates, and rockfish are strongly associated with consolidated substrates such as rock outcrops and other features. Unconsolidated (i.e., silty, sandy, muddy) substrates support recreationally and commercially important stocks of clams, crabs, and fishes, including flatfishes and sturgeon. Some species (e.g., surf smelt, Pacific sand lance) use substrates in intertidal areas as spawning habitat.

The distribution of consolidated and unconsolidated substrates in marine areas has been heavily influenced by human activities (Subsection 3.3.2.1, Marine Areas—Substrates and Erosional Processes). Structures placed in the water (e.g., pilings on overwater structures, including derelict structures) or along shorelines (e.g., bank armoring) degrade habitat for fish and aquatic invertebrates through scour and compaction and by interrupting sediment supply, changing the distribution of consolidated and unconsolidated substrates in the analysis area.

The quality of water and sediment also influences the distribution and abundance of fish and aquatic invertebrates in the analysis area. Substances that impair water and sediment quality (e.g., chemicals, turbidity, waste products, pathogens, excess nutrients) can kill organisms directly, or they can build up in the ecosystem over time and cause chronic health problems (King County 2003). Also, fish and aquatic invertebrates that avoid areas with low levels of dissolved oxygen can be affected by reduced feeding rates or increased vulnerability to predation (Essington et al. 2011). Copper and other metals are toxic to many species of fish and aquatic invertebrates, even in low concentrations (Ecology and King County 2011). Other pollutants, such as polycyclic aromatic hydrocarbons, can contribute to developmental defects in fish (Incardona et al. 2005; Carls et al. 2008). The quality of marine waters in the analysis area has been impaired by elevated levels of nutrients (and resultant decreases in dissolved oxygen) and other pollutants (e.g., copper, polycyclic aromatic hydrocarbons), primarily due to runoff from upland areas (Subsection 3.4.1, Marine Areas—Water Resources). The Creosote Removal

Program currently implemented in marine areas by Washington DNR has a goal of reducing sources of contamination (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands).

Vegetation in marine areas (i.e., seagrasses, kelp, and salt marsh plants; see Subsection 3.6.2.1, Marine Vegetation) provides food and shelter for many aquatic species in the analysis area. For example, marine vegetation provides nurseries and migratory pathways for rockfish (Palsson et al. 2009) and shelter for young salmonids as they grow and adjust to the marine environment (Stillaguamish Tribe 2005). In some areas, extensive patches of eelgrass support some of the richest aquatic animal assemblages in the state (Phillips 1984). Such eelgrass meadows provide important feeding and refuge habitat for salmonids (Thom et al. 1989) and crabs (McMillan et al. 1995; Holsman et al. 2003), and provide spawning habitat for herring (Penttila 2007). Human actions such as the construction of overwater structures (including private recreational docks) can impact aquatic vegetation and diminish the capacity for aquatic vegetation in marine areas to provide these functions in the analysis area. Compared to historical conditions, the areal extent of eelgrass, kelp, and saltmarsh vegetation has decreased substantially the analysis area (Subsection 3.6.2.1, Marine Vegetation).

In addition to the habitat components identified above, the distribution and abundance of fish and aquatic invertebrates in marine area are influenced by specific, local light conditions, noise and disturbance levels, and the availability of prey in the analysis area. Juvenile salmonids avoid dark, shaded areas under overwater structures, resulting in loss of potential habitat, interruption of movement, and potentially increased exposure to predators (e.g., by causing small fish to move into deeper waters inhabited by larger, predatory species) (Haas et al. 2002; Toft et al. 2004). Artificial lighting can also affect fish and aquatic invertebrates by disrupting reproductive, migratory, or foraging behavior, or by increasing exposure to predators (e.g., by reducing the availability of dark areas that provide hiding cover) (Washington DNR 2013). Elevated levels of noise and disturbance due to human activity also can interfere with access to habitat or disrupt habitat use during sensitive life history phases (e.g., reproduction, migration) by causing fish and aquatic invertebrates to avoid areas that could potentially provide food and shelter in the analysis area (Washington DNR 2013).

Another key habitat element for fish and aquatic invertebrates in marine areas in the analysis area is the availability of prey, particularly forage fish. Forage fish are small, schooling species that form a critical link between plankton and larger species of fish and aquatic invertebrates (Essington et al. 2011). Common forage fish species in the analysis area include Pacific herring, surf smelt, Pacific sand lance, and eulachon. The status of forage fish populations in the analysis area varies by species: eulachon populations have declined dramatically in the last decade while Pacific herring populations are not considered to be at risk of extinction, and the abundance of surf smelt and Pacific sand land lance in the analysis area is currently unknown (Subsection 3.8.2.3, Proposed Covered Species).

3.8.2.2 Key Habitat Components in Freshwater Areas

As in marine areas, key habitat components that influence the distribution and abundance of fish and aquatic invertebrates in freshwater areas of the analysis area include substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability. The following paragraphs describe the relationships between these key habitat components and fish and aquatic invertebrates in freshwater areas and identify how the condition of these components has been affected by human activities in the analysis area.

Various substrates in freshwater areas support different species of fish and aquatic invertebrates in many different ways in the analysis area. For example, salmonids spawn in gravel in lakes and streams (Washington DNR 2013), while larval lamprey grow and develop within silty substrates of slow-moving streams (Kostow 2002). Freshwater substrates in the analysis area have been altered through modifications to lake shorelines, dam construction, and bank armoring (Subsection 3.3.2.2, Freshwater Areas—Substrates and Erosional Processes). Such modifications to lake shorelines can impact habitat conditions for fish and aquatic invertebrates by altering the substrate composition and natural water movement processes in lakes (Subsection 3.3.2.2, Freshwater Areas—Substrates and Erosional Processes). In rivers, structures (e.g., dams, bank armoring) that interfere with the movement of substrates can alter habitat conditions by replacing shallow unconsolidated habitats with deep, steep consolidated substrates.

Water and sediment quality in freshwater areas plays a key role in determining successful spawning, incubation, and rearing of many species of fish and aquatic invertebrates in the analysis area. Elevated temperatures, low levels of dissolved oxygen, and elevated levels toxic compounds and pathogens have detrimental effects on many species (Olivieri et al. 1977; Cubbage 1995; Kerwin 2001; Ahn et al. 2005). As noted in Subsection 3.4.2.2, Freshwater Areas—Water Resources, the primary sources of water and sediment quality impacts in freshwater areas are not associated with uses of state-owned aquatic lands.

As in marine areas, vegetation in freshwater areas (i.e., complex freshwater algae, and rooted freshwater plants; see Subsection 3.6.2.2, Freshwater Vegetation) supports many species, providing shelter and egg attachment sites and helping maintain water and sediment quality in lakes, ponds, rivers, and streams (Zedler and Kercher 2005). As discussed in Subsection 3.6.2.2, Freshwater Vegetation, aquatic vegetation in lakes, ponds, rivers, and streams throughout Washington State has been affected by human activity, degrading habitat quality for fish and aquatic invertebrates in the analysis area. Construction of bank armoring and overwater structures in lakes has contributed to shading and substrate alterations and the introduction of invasive species, adversely affecting aquatic vegetation in those waterbodies. In rivers, bank armoring has altered sediment dynamics that historically maintained characteristic native vegetation communities.

As in marine areas, the distribution and abundance of fish and aquatic invertebrates in freshwater areas can be impacted by alterations in light conditions, noise levels, and disturbance levels associated with human activity in the analysis area (Washington DNR 2013). In addition to the impacts described above for marine areas, overwater structures can create shaded areas that provide hiding cover for some non-native species of fish, such as smallmouth bass, that prey on native fish (Carrasquero 2001; Bonar et al. 2005).

3.8.2.3 Proposed Covered Species

Eleven species of fish that use habitats on state-owned aquatic lands in the analysis area are listed as threatened or endangered under the ESA. All of these are proposed for coverage under the ITPs that are the subject of this NEPA analysis, along with seven non-listed species (Table 1-1). Together, these 18 species constitute the proposed covered species for this EIS analysis. The species proposed for ITP coverage that currently have no listing status either have similar life histories and habitat requirements to listed species, or were determined to have a high likelihood of being listed during the proposed 50-year ITP (Washington DNR 2007d). No aquatic invertebrates are ESA-listed in Washington State, and none are proposed for ITP coverage.

Species proposed for ITP coverage are given particular consideration in this analysis because they have been determined to have a high potential of risk and/or interaction with Washington DNR-authorized uses of state-owned aquatic lands and because sufficient information was available about each of these species to assess impacts and to develop conservation measures (Washington DNR 2013). The following subsections provide information about the distribution and habitat use of these species, along with identified threats to each species' survival. Much of the information in the following discussions was drawn from the Aquatic Lands HCP (Washington DNR 2013). Readers are directed to that document for more detailed discussions and additional literature citations.

Pacific Lamprey

The Pacific lamprey is a Federal Species of Concern[7]. At the state level, the species has not been identified as needing specific protection or management to ensure the survival of free-ranging populations, but WDFW does monitor the status and distribution of the species. Pacific lampreys are anadromous, found in coastal streams from southern California to the Gulf of Alaska and around the Pacific Rim to Korea and Japan. Within Washington State, the species is found in most large rivers and streams along the coast, Strait of Juan de Fuca, and Puget Sound; Pacific lampreys are also found far inland, in the Columbia, Snake, and Yakima Rivers (Wydoski and Whitney 2003; Moser and Close 2003). The adult form is parasitic, using its suckerlike mouthparts to feed on body fluids from host organisms (primarily fish and marine mammals).

Pacific lampreys are closely associated with habitats state-owned aquatic lands during the larval stage, when they live in substrates in freshwater areas. Newly hatched larvae burrow into silty substrates within slow-moving stream reaches, subsisting on algae and organic matter for at least 5 years (Moser and Close 2003). After transformation, Pacific lampreys migrate downstream in spring and start a parasitic life soon thereafter. The length of time spent in the ocean is not known, with estimates ranging from 6 to 40 months (Kostow 2002). Adult Pacific lampreys are typically found in water depths of 200 to 800 feet (Wydoski and Whitney 2003). After migrating upstream, adults spawn in moderate- to high-flow streams at depths less than 3 feet (Moser and Close 2003).

Lamprey populations in the upper Columbia and Snake River basins have declined dramatically, likely as a result of elevated water temperatures, sedimentation of spawning gravels, and barriers to migration (Close et al. 1995). Identified threats to Pacific lamprey populations include loss and modification of habitat due to flow regulation (Wallace and Ball 1978; Beamish and Northcote 1989); channelization (Igoe et al. 2004); poor water quality (Myllynen et al. 1997); chemical treatments (Schuldt and Goold 1980); dams, culverts, tidegates, weirs, and water-diversion structures (Kostow 2002); and dredging of and toxins in sediments (Kostow 2002).

Green Sturgeon

The southern distinct population segment of the North American green sturgeon is ESA-listed as threatened (71 Fed. Reg. 17757, April 7, 2006). Designated critical habitat for southern green sturgeon includes coastal and inland marine waters from central California to the Strait of Juan de Fuca (74 Fed.

[7] Species of Concern are those species about which NMFS or USFWS has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA. This status does not confer any procedural or substantive protections under the ESA.

Reg. 52300, October 9, 2009). NMFS has determined that the northern distinct population segment does not warrant listing under the ESA (70 Fed. Reg. 17386, April 6, 2005). The species has no state listing status.

Green sturgeons from the southern distinct population segment occur in Washington only as subadults and adults; reproduction occurs only in the Sacramento River in California (74 Fed. Reg. 52300, October 9, 2009). Green sturgeons use state-owned aquatic lands in marine areas of the lower Columbia River (residing for prolonged periods below river mile 60 near Longview, but not reproducing) and the Washington coast (where they have regularly been found in Willapa Bay and Grays Harbor). Recent telemetry data suggest that both the northern and southern distinct population segments migrate up and down the Pacific coast.

Identified threats to green sturgeon populations include loss or destruction of critical spawning habitat (Adams et al. 2002); loss or alteration of foraging habitat; commercial fisheries bycatch (Adams et al. 2002); and bioaccumulation and concentration of contaminants (e.g., due to degraded water or sediment quality) (Emmett et al. 1991; Adams et al. 2002).

White Sturgeon

The white sturgeon has no listing status at the Federal or state level in Washington State. White sturgeons occur in Washington primarily in the Columbia River. They seem to have historically moved throughout the Columbia-Snake River system, ranging freely from the estuary to the headwaters and migrating into coastal marine waters. They have been observed in areas such as Willapa Bay, Grays Harbor, Puget Sound, and Lake Washington.

All life stages of white sturgeon may use habitats on state-owned aquatic lands, some in marine areas and some in freshwater areas. Adults spawn in freshwater areas, in large river channels with swift currents; embryos develop on cobble and boulder substrates in those areas. Juveniles less than 1 year old are found only in freshwater habitats, where they feed on algae and small invertebrates (Emmett et al. 1991). In the Columbia River, young-of-the-year white sturgeons were collected over unconsolidated sediments in water 40 to 90 feet deep (Wydoski and Whitney 2003). In marine systems, adult and subadult white sturgeons use a variety of unconsolidated estuarine and nearshore marine habitats; they may move onto intertidal flats to feed at high tide (Emmett et al. 1991).

Dams and associated reservoirs on major rivers have adversely modified migratory corridors and spawning and rearing habitat for the white sturgeon, resulting in population declines (Brannon and Setter 1992). Identified threats to white sturgeon populations include loss of spawning habitat, alteration of seasonal flow regimes, and population isolation associated with channel modifications (e.g., dams) (Beamesderfer and Farr 1997; Wydoski and Whitney 2003); bioaccumulation and concentration of contaminants (Emmett et al. 1991); decreases in dissolved oxygen due to anthropogenic eutrophication (Klyashtorin 1976; Secor and Gunderson 1998); and overharvest by commercial and recreational fisheries (Dumont 1995; Echols 1995; Rosenthal et al. 1999).

Coastal Cutthroat Trout

The southwestern Washington/Lower Columbia River distinct population segment of the coastal cutthroat trout is a Federal Species of Concern. The species has no state listing status. Cutthroat trout are ubiquitous in Pacific Northwest drainages.

All life stages of coastal cutthroat trout may use habitats on state-owned aquatic lands, some in marine areas and some in freshwater areas. Coastal cutthroat trout spawn in the smallest headwater streams and tributaries used by any salmonid species, using gravel and cobble substrates in the cooler waters of the streams. The young usually remain in their natal streams about a year before moving downstream into larger streams. Juveniles live in side channels and margins of these larger streams for another 2 to 5 years (usually 3) before migrating to the Pacific Ocean (Wydoski and Whitney 2003). Coastal cutthroat trout are a popular gamefish in both freshwater and marine environments (WDFW 2009). Although recreational fishing can lead to the overharvest of cutthroat trout, angling restrictions have resulted in increased population size (WDFW 2000). The accidental bycatch of cutthroat trout most likely occurs when recreational anglers, commercial fishers, and tribal fishers are targeting other salmonid species.

Since cutthroat trout spawn in small headwater streams, they are more susceptible than other salmonid species to land management practices that directly or indirectly alter water temperature, decrease dissolved oxygen, increase fine sediment loads, alter the amount of woody debris, or remove riparian vegetation. Dams and water diversions can impose migration barriers and degrade downstream habitats as well. Eutrophication caused by high nutrient levels in fertilizers from agriculture, fish farm waste, lumber mill runoff, and urban areas may also negatively affect this species by decreasing the concentration of dissolved oxygen in the water.

Pink Salmon

Populations of pink salmon in Washington State have no listing status at the Federal or state level. All life stages of pink salmon may use habitats on state-owned aquatic lands, some in marine areas and some in freshwater areas. Spawning typically occurs in silt with small to medium-sized gravel (Hard et al. 1996; Wydoski and Whitney 2003). Some spawners remain in local bays for up to a month before migrating upriver (Heard 1991). Although intertidal spawning is known to occur, it is not common in

Washington (Hard et al. 1996). The incubation period for this species is approximately 5 months (Hard et al. 1996). Newly hatched fish may remain in the interstitial spaces of the gravel for several months (Heard 1991). Fry emerge from the gravel when they are about 1 inch long, migrating to saltwater soon afterward (Quinn 2005). Adults are found mostly in the open ocean and nearshore marine habitats. Pink salmon account for over 50 percent of the commercial salmon harvest on the west coast (Wydoski and Whitney 2003). While there is some indication that escapement has declined in British Columbia, overfishing has not been identified as a threat to Washington populations (Hard et al. 1996).

Because pink salmon spawn and incubate in rivers and streams, they are particularly susceptible to habitat degradation and changes in water quality. Spawning habitat is particularly susceptible to the adverse effects from land-use activities such as logging, agriculture, grazing practices, and urban development. Common problems include modification of flow regimes, non-point source pollution, and physical destruction of habitat. Additional impacts to pink salmon populations may result from the creation of physical barriers to migration (e.g., blocked culverts, dams, water-diversion structures); high temperatures and low flows; and natural events, such as landslides or flood-induced channel changes (Washington DNR 2007d). Net pen aquaculture of Atlantic salmon has been identified as a potential source of sea louse (*Lepeophtheirus salmonis*) infestation in pink salmon (Morton et al. 2004), which can lead to skin infections and the inability to maintain viable concentrations of salts and water in body tissues (Wootten et al. 1982).

Chum Salmon

The Hood Canal summer-run and Columbia River evolutionarily significant units of chum salmon are ESA-listed as threatened (64 Fed. Reg. 14507, March 25, 1999). Critical habitat has been designated in marine areas of Hood Canal, the eastern end of the Strait of Juan de Fuca, and the lower Columbia River, as well as freshwater tributaries to those waterbodies (70 Fed. Reg. 52630, September 2, 2005). Both populations are candidates for listing at the state level. Chum salmon are targeted for recreational and commercial fisheries, and have historically been subject to overfishing (WDFW 2009). According to a recent survey of commercial salmon catch in Washington State in 2006, chum salmon made up 75 percent of the total catch (TCW Economics 2008). Because oceanic harvest cannot differentiate between summer runs and fall runs, commercial fisheries may continue to pose a risk to summer-run populations.

All life stages of chum salmon may use habitats on state-owned aquatic lands, some in marine areas and some in freshwater areas. In Washington, chum salmon rear in the ocean for most of their adult lives (3 to 5 years) (Salo 1991; Wydoski and Whitney 2003). Spawning occurs in gravel substrates of rivers and streams, generally less than 50 miles from marine areas. Chum salmon spend little time rearing in fresh water, with fry beginning their downstream migration shortly after emergence from the gravel to rear in estuarine environments. Since marine survival greatly depends on size, and chum salmon fry arrive in estuaries earlier than most salmon, juvenile chum salmon reside in estuaries longer than most other anadromous species (Healey 1982; Wydoski and Whitney 2003; Quinn 2005).

Habitat loss and degradation are thought to be the primary reasons for declining populations of chum salmon. Although the existing fishery is highly regulated, recreational and commercial fisheries continue to present a threat to the continued existence of chum salmon (Washington DNR 2007d). Similar to pink salmon, chum salmon are susceptible to infestations of sea lice from Atlantic salmon net pens.

Coho Salmon

The Lower Columbia River evolutionarily significant unit of coho salmon is ESA-listed as threatened (70 Fed. Reg. 57564, October 3, 2005), and the Puget Sound/Strait of Georgia evolutionarily significant unit is a Federal Species of Concern. NMFS has proposed designating critical habitat for Lower Columbia River coho salmon (78 Federal Register 2726, January 14, 2013). The species has no listing status at the state level. Coho salmon are a preferred species for anglers in Washington due to their relative abundance and unpredictable fighting style (WDFW 2009). Catch records have fluctuated cyclically in the past 30 years, but reached record low levels during the early 1990s (Johnson et al. 1997). Commercial and recreational fishing have been identified as a contributing factor in the decline of coho salmon populations (Stouder et al. 1997), and WDFW stocks millions annually to supplement wild coho salmon runs (Pacific States Marine Fisheries Commission 2013).

All life stages of coho salmon may use habitats on state-owned aquatic lands, some in marine areas and some in freshwater areas. Coho salmon spawn in gravel substrates in streams and rivers throughout Washington State. Most juvenile coho salmon remain at least 1 year in fresh water and recent studies have shown that juveniles of some populations also rear in estuaries before moving to marine habitats (McMahon and Holtby 1992). Coho salmon use estuaries primarily for interim food while they adjust physiologically to salt water and then move offshore to deeper waters (Smith 1999). They typically spend 2 years at sea and return to fresh water as 3-year-old adults.

Habitat degradation and loss in freshwater, estuarine, and marine systems are thought to be major contributing factors to coho salmon population declines in Washington and throughout the Pacific Northwest region (Weitkamp et al. 1995). Habitat degradation and loss have been linked to timber harvest activities, agriculture, grazing, and urbanization (Stouder et al. 1997). Commercial and recreational fishing have been identified as contributing factors in the decline of coho salmon populations (Stouder et al. 1997). Hydroelectric dams and irrigation withdrawals have also been linked to the decline of coho salmon populations, especially those in the Lower Columbia River (Johnson et al. 1991).

Steelhead Trout

The upper Columbia River, middle Columbia River, lower Columbia River, Snake River basin, and Puget Sound distinct population segements of steelhead are ESA-listed as threatened (72 Fed. Reg. 26722, May 11, 2007) and are candidates for listing at the state level. Critical habitat has been designated for the upper Columbia River, middle Columbia River, lower Columbia River, and Snake River basin evolutionarily significant units (70 Fed. Reg. 52630, September 2, 2005) and critical habitat has been proposed for the Puget Sound evolutionarily significant unit (78 Fed. Reg. 2725, January 14, 2013).

All life stages of steelhead may use habitats on state-owned aquatic lands, some in marine areas and some in freshwater areas. Steelhead trout juveniles typically spend 1 to 2 years (up to 4 years) in fresh water (Busby et al. 1996; Wydoski and Whitney 2003). Steelhead trout migrate to sea in the spring, spending up to 4 years in the open ocean (Wydoski and Whitney 2003). Unlike Pacific salmon, steelhead trout may return to sea after spawning and migrate again to fresh water to spawn again another year. However, in larger rivers, where steelhead trout travel long distances to their natal spawning grounds, the proportion of returning adults who spawn more than once is considerably lower (Meehan 1991).

Habitat degradation and loss in freshwater, estuarine, and marine systems are thought to be major contributing factors in steelhead population declines in Washington and throughout the Pacific Northwest region (Busby et al. 1996). Habitat degradation and loss have been linked to timber harvest activities, agriculture, grazing, and urbanization (Stouder et al. 1997). Commercial and recreational fishing have been identified as contributing factors in the decline of steelhead populations (Stouder et al. 1997). Hydroelectric dams and irrigation withdrawals have also been linked to steelhead population declines (Stouder et al. 1997).

Sockeye Salmon/Kokanee

The Snake River evolutionarily significant unit of sockeye salmon is ESA-listed as endangered (56 Fed. Reg. 58619, November 20, 1991) and the Ozette Lake evolutionarily significant unit is listed as threatened (64 Fed. Reg. 14528, March 25, 1999). Critical habitat has been designated for both evolutionarily significant units (58 Fed. Reg. 68543, December 28, 1993 [Snake River], and 70 Fed.

Reg. 52630, September 2, 2005 [Ozette Lake]). Both populations are candidates for listing at the state level.

All life stages of sockeye salmon may use habitats on state-owned aquatic lands, some in marine areas and some in freshwater areas. Sockeye salmon have complex life history variations because of their variable freshwater residency (1 to 3 years), and because the species has three different life history strategies. One variation (lacustrine adfluvial) spawns in rivers but rears in lakes for 1 to 3 years before out-migrating to the ocean, one variation (lacustrine) spawns along lake shores and rears in lakes for 1 to 3 years before out-migrating to the ocean, and a less common variation (fluvial) spawns and rears in rivers and streams before out-migrating to the ocean (Burgner 1991). In Washington and British Columbia, lake residence normally lasts 1 to 2 years (Burgner 1991). Sockeye salmon juveniles remain in estuarine and nearshore areas throughout the summer, and then grow and develop for 2 to 4 years in the ocean before returning to their natal stream to spawn (Wydoski and Whitney 2003).

Kokanee salmon is the resident form of sockeye salmon, found only in freshwater areas. The kokanee population in Lake Sammamish is a Federal Species of Concern. Kokanee spawn in tributaries to nursery lakes, along beaches, and the mainstems of rivers (Wydoski and Whitney 2003).

Habitat degradation and loss in freshwater, estuarine, and marine systems are thought to be major contributing factors to sockeye salmon population declines throughout the Pacific Northwest region. Of particular concern are lakeshore development and other human activities that degrade lake ecosystems (Gustafson et al. 1997). Habitat degradation and loss have been linked to timber harvest activities, agriculture, grazing, and urbanization (Stouder et al. 1997). Dams and irrigation withdrawals have also been linked to the decline of salmon populations in general, especially those in the Columbia River Basin (Stouder et al. 1997). Channelization and bank armoring reduce the amount, quality, and diversity of sockeye salmon spawning areas by narrowing and deepening the stream channel. Fishing pressure (commercial and recreational) has been identified as a contributing factor in the decline of sockeye salmon populations (Gustafson et al. 1997).

Chinook Salmon

The Upper Columbia River spring-run evolutionarily significant unit of Chinook salmon is ESA-listed as endangered (64 Fed. Reg. 41835, August 2, 1999). Evolutionarily significant units in Puget Sound and the Lower Columbia River are listed as threatened (64 Fed. Reg. 41835, August 2, 1999), as is the evolutionarily significant unit in the Snake River (57 Fed. Reg. 14653, April 22, 1992). Critical habitat has been designated for all of these evolutionarily significant units (58 Fed. Reg. 68543, December 28, 1993; 65 Fed. Reg. 7754, February 16, 2000). These populations are all candidates for listing at the state level.

All life stages of Chinook salmon may use habitats on state-owned aquatic lands, some in marine areas and some in freshwater areas. Chinook salmon are generally divided into three categories based on when they return to fresh water: spring run (March to May), summer run (June and July), and fall run (August and September) (Wydoski and Whitney 2003). All Chinook salmon spawn in the fall, with the spring runs spawning first in headwater streams (as far as 1,200 miles upstream), followed by summer-run Chinook salmon in tributary mouths, and fall types in mainstem tributaries (Wydoski and Whitney 2003). After hatching, developing Chinook salmon typically remain in the gravel for several months before emergence (Healey 1991). Most summer- and fall-run Chinook salmon out-migrate within their first year of life, but spring Chinook salmon stocks typically rear for at least 1 year in fresh water (Marshall et al. 1995). All Chinook salmon rear within estuarine and nearshore environments prior to entering the ocean.

Chinook salmon stocks in Washington have been listed as threatened or endangered primarily because of degradation or loss of habitat, overharvest, and pressure from hatchery stocks (Washington DNR 2007d). Habitat degradation and loss have been linked to timber harvest activities, agriculture and grazing, and urbanization (Stouder et al. 1997). Hydroelectric dams and irrigation withdrawals have also been linked to the decline of Chinook salmon populations, especially those in the Lower Columbia River (Stouder et al. 1997). Increases in siltation can lead to increased embryo mortality as a result of smothering and may also lead to decreased juvenile survival by shifting food webs to less favorable prey (Meehan 1991). Fishing pressure from commercial and recreational sources has been identified as a contributing factor in the decline of Chinook salmon populations (Stouder et al. 1997).

Bull Trout

All populations of bull trout within the coterminous United States are ESA-listed as threatened (64 Fed. Reg. 58910, November 1, 1999). Critical habitat has been designated for bull trout in Washington, Oregon, Idaho, Montana, and Nevada, including approximately 750 miles of marine shoreline, 3,800 miles of streams, and 100 square miles of lakes and reservoirs in Washington State (75 Fed. Reg. 63898, October 18, 2010). The bull trout is also a candidate for listing at the state level.

All life stages of bull trout may use habitats on state-owned aquatic lands, some in marine areas and some in freshwater areas. Bull trout exhibit four life history strategies based on migratory behavior. These are the anadromous, adfluvial, fluvial, and resident strategies. Adfluvial stocks rear in lake systems, but migrate to tributary streams for spawning. Fluvial stocks rear entirely in larger streams or rivers, but have lengthy migrations between headwater spawning and rearing areas. Other stocks are considered resident where they spend their life without any extensive migration. The resident form typically subsists entirely on insects, while more migratory bull trout typically subsist on a variety of organisms including other fish. The life history strategies exhibited are very flexible, and individual fish may adopt more than one strategy during the course of a lifetime. Spawning habitat consists of very clean gravel, often in areas of groundwater upwelling or cold spring inflow (Goetz 1994). Habitat components that particularly influence their distribution and abundance include water temperature, cover, channel form and stability, spawning and rearing substrate conditions, and migratory corridors (Fraley and Shepard 1989; Goetz 1989; Watson and Hillman 1997). Bull trout have a freshwater residency typically spanning 2 to 4 years. Individuals have been observed to migrate hundreds of miles through the nearshore marine ecosystem, to forage in different river basins (Goetz et al. 2004).

USFWS (2004) identified the following threats as reasons for the decline of bull trout populations in the species' range: elevated water temperatures due to loss of riparian vegetation; dams and water diversions that create migration barriers; decreased concentrations of dissolved oxygen due to elevated input of nutrients; and overharvest (accidental bycatch) through recreational fishing.

Bocaccio

The Puget Sound/Georgia Basin distinct population segment of bocaccio is ESA-listed as endangered (75 Fed. Reg. 22276, April 28, 2010) and is a candidate for listing at the state level. Bocaccio are rockfish that use state-owned aquatic lands in marine areas. Bocaccio have been found on rocky outcroppings both off the Pacific coast and in the inland waters of Puget Sound and the Strait of Juan de Fuca. Adults commonly inhabit steep slopes with sand and rocky substrates at depths between about 150 and 800 feet. Larvae live in the water column in offshore areas for several months before settling into shallow, nearshore waters in rocky or cobble substrates as juveniles (Love et al. 1991; Love et al. 2002). Juveniles occupy areas with high substrate relief and have also been associated with structures such as off-shore oil platforms.

The primary factors responsible for the decline of bocaccio are overutilization for commercial and recreational purposes, habitat degradation, and water quality problems (including low dissolved oxygen concentrations and elevated contaminant levels) (75 Fed. Reg. 22276, April 28, 2010). Degradation of offshore rocky habitat and loss of nearshore eelgrass and kelp were identified as specific threats to rockfish habitat in the Georgia Basin. Rocky habitat has been impacted by derelict fishing gear; construction of bridges, sewer lines, and other structures; deployment of cables and pipelines; and burying from dredge spoils and natural subtidal slope movement (Palsson et al. 2009). Rockfish are long-lived and mature slowly, with only sporadic episodes of successful reproduction, making them especially vulnerable to overfishing, either directly or through accidental bycatch (75 Fed. Reg. 22276, April 28, 2010).

Canary Rockfish

The Puget Sound/Georgia Basin distinct population segment of canary rockfish is ESA-listed as threatened (75 Fed. Reg. 22276, April 28, 2010) and is a candidate for listing at the state level. Canary rockfish use state-owned aquatic lands in offshore marine areas along the Washington outer coast; they were once common in the inland waters of Puget Sound and the Strait of Juan de Fuca but are now rare. Adult canary rockfish live in loose schools in the water column over cobble, mud, and sand habitats interspersed in rocky structures from about 200 to 700 feet deep. Canary rockfish larvae are thought to drift with currents for up to 4 months before becoming juveniles and settling onto benthic habitats associated with kelp beds or other low-relief areas close to shore. The primary factors responsible for the decline of canary rockfish populations are the same as those identified for bocaccio, above (75 Fed. Reg. 22276, April 28, 2010).

Yelloweye Rockfish

The Puget Sound/Georgia Basin distinct population segment of yelloweye rockfish is ESA-listed as threatened (75 Fed. Reg. 22276, April 28, 2010) and is a candidate for listing at the state level. Yelloweye rockfish use habitats associated with state-owned aquatic lands primarily offshore along the outer coast; they are rarely found in the inland waters of Puget Sound and the Strait of Juan de Fuca. Adults occupy complex rock and wall habitats and are often associated with boulder fields, broken rock, overhangs, and crevices at depths between about 130 and 1,800 feet. Yelloweye rockfish are sedentary and are generally found on or just above rocky substrates. Similar to bocaccio, yelloweye rockfish larvae live in the water column in offshore areas for several months before developing into juveniles. Unlike bocaccio and canary rockfish, juvenile yelloweye rockfish do not typically occupy shallow, nearshore waters but are most frequently observed in waters deeper than 98 feet (Yamanaka et al. 2006). The primary factors responsible for the decline of yelloweye rockfish populations are the same as those identified for bocaccio, above (75 Fed. Reg. 22276, April 28, 2010).

Pacific Herring

The Pacific herring has no listing status at the Federal level but is a candidate for listing at the state level. Pacific herring occur throughout the inland waters of Puget Sound and the Strait of Juan de Fuca, as well as in Willapa Bay and Grays Harbor. Pacific herring are forage fish that consume phytoplankton and zooplankton and that are in turn consumed by a wide variety of fish species, marine mammals, and marine birds.

Pacific herring are closely associated with habitats state-owned aquatic lands in marine areas for spawning, egg development, and juvenile rearing. They are a pelagic species that reside in coastal marine and estuarine waters and migrate to estuarine shoreline beaches for spawning. Spawning habitat for Pacific herring is primarily eelgrass and seaweed at intertidal and shallow shoreline elevations. After incubating for 2 to 3 weeks, the larvae hatch and rear in shoreline areas near spawning sites. Juvenile herring rear in shoreline areas and gradually disperse as they move along the shorelines, gradually migrating offshore to take up a pelagic lifestyle.

Threats to Pacific herring populations include loss, modification and disruption of spawning habitat due to bank armoring; shading of vegetation due to overwater structures; altered sediment transport due to pilings; or degradation of open water habitat by pollution (EVS 1999; Stout et al. 2001; Landis et al. 2004). Noise has also been identified as a potential stressor on Pacific herring (EVS 1999; Schwartz and Greer 1984). NMFS conducted a status review of Pacific herring in response to a petition to list this species under the ESA. The review team concluded that the distinct population segment represented by stocks in the Georgia Basin and Puget Sound was not at risk of extinction, nor likely to become so (Stout et al. 2011).

Pacific Sand Lance

The Pacific sand lance has no listing status at the Federal or state level in Washington State. Pacific sand lance are forage fish that provide a prey resource for numerous fish, marine mammals, and marine birds.

All life stages of Pacific sand lance may use habitats on state-owned aquatic lands in marine areas. Pacific sand lance burrow in sandy substrates in shallow shoreline areas and spawn at intertidal elevations of sandy beaches. The embryos incubate for about 4 weeks, during which time they are dispersed by wave action across the intertidal zone. The larvae are carried by tidal currents and schools of juveniles are a commonly observed near shorelines. Little information is available to support any estimates of Pacific sand lance abundance.

Pacific sand lance populations are generally not considered threatened or endangered, although the abundance of Pacific sand land lance populations in the analysis area is currently unknown (Penttila 2007; Puget Sound Action Team 2007). Potential threats include loss and modification of spawning habitat due to physical disruption of spawning grounds and construction of overwater and nearshore structures such as bulkheads that affect sediment movement (Penttila 2007). Because they seem to show fidelity to specific locations, Pacific sand lance are susceptible to degradation of sandy shoreline areas.

Surf Smelt

The surf smelt has no listing status at the Federal or state level in Washington State. Surf smelt are a forage fish common in many nearshore areas of Washington. Surf smelt use habitats on state-owned aquatic lands in marine areas for spawning and juvenile development. Surf smelt spawn throughout the inland waters of Puget Sound and the Strait of Juan de Fuca, and at some locations along the Pacific coast. Spawning occurs in the upper intertidal zones of mixed sand and gravel beaches, generally within a few feet of the high tide line. Juvenile surf smelt linger and feed in shallow waters. Little is known about the life history of surf smelt away from their spawning grounds.

Surf smelt populations are generally not considered threatened or endangered, although the abundance of surf smelt populations in the analysis area is currently unknown (Penttila 2007; Puget Sound Action Team 2007). Surf smelt have been adversely affected by modifications of the upper intertidal spawning habitat they require. Shoreline armoring and shoreline development in Puget Sound and elsewhere have buried spawning sites and have interfered with the erosional processes that deposit suitable spawning substrates in upper intertidal areas (Penttila 2007).

Eulachon

The southern distinct population segment of Pacific eulachon is ESA-listed as threatened and it includes populations spawning from the Skeena River in British Columbia (inclusive) south to the Mad River in Northern California (inclusive), wherever found (75 Fed. Reg. 13012, March 18, 2010). Critical habitat has been designated within streams and associated rivers in Washington, Oregon, and California (76 Fed. Reg. 65323, October 20, 2011). The species is a candidate for listing at the state level. Spawning runs of eulachon have been identified as critical feeding opportunities for marine mammals as well as several species of fish and birds, because of the high caloric content of the fish (Wydoski and Whitney 2003; Sigler et al. 2004). Eulachon are also harvested commercially and recreationally by using gillnets, dip nets, and trawls, and are noted as a substantial bycatch in the shrimp fishery.

Eulachon are closely associated with habitats state-owned aquatic lands in freshwater areas (and in the lower reaches of the Columbia River, which are considered marine areas for this analysis) for spawning and egg development, and in marine areas (estuaries) for larval rearing. Adult eulachon spend most of their lives in marine areas (in the Pacific Ocean at depths between 250 and 650 feet), migrating only a short distance upstream to spawn (Wydoski and Whitney 2003). In Washington, eulachon spawn in the lower reaches of the Columbia and Cowlitz Rivers, along with a few other rivers. Eulachon are broadcast spawners, generally spawning in low-gradient reaches with coarse sediments (McLean et al. 1999). They are thought to die after spawning, generally washing out to the ocean or being consumed locally by birds, mammals, and fish (Wydoski and Whitney 2003). Eggs hatch within 2 to 3 weeks (McLean et al. 1999). Shortly after hatching, the larvae are carried downstream and are dispersed by estuarine, tidal, and ocean currents. It is not known how long larval eulachon remain in estuarine areas before entering the ocean. Post-larval eulachon stay near the surface of the water.

Eulachon populations have declined dramatically in the last decade for unknown causes. NMFS (2011) identified and ranked specific threats for the Klamath River and lower Columbia River Basin portions of the southern distinct population segment of eulachon. The most prominent threats include the following: 1) effects of climate change on ocean conditions; 2) bycatch in commercial fisheries; 3) effects of climate change on freshwater habitat; 4) dams and water diversions; 5) water quality degradation; 6) dredging; and 7) predation.

3.9 Wildlife and Wildlife Habitat

This subsection describes wildlife (including amphibians, turtles, birds, and marine mammals) and wildlife habitat that may be affected by Washington DNR's management of state-owned aquatic lands under the proposed alternatives, emphasizing species proposed for coverage under the Aquatic Lands HCP. Subsection 3.9.1, Existing and Relevant Management Measures and Regulatory Framework, identifies statutes, regulations, rules, and policies enacted by Federal, state, and local agencies that address the potential for uses of state-owned aquatic lands to affect wildlife and wildlife habitat. Subsection 3.9.2, Existing Conditions, provides baseline information for the evaluation of the effects of the alternatives in Section 4, Environmental Consequences, briefly describing the status, distribution, key habitat components, abundance, and threats, as well as the condition of habitat for species of wildlife that are known or likely to occur in the analysis area.

3.9.1 Existing and Relevant Management Measures and Regulatory Framework

As noted in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws, the authority exercised by Washington DNR's Aquatics Division is proprietary, not regulatory. Issuance of a use authorization from Washington DNR is only part of the process that determines the type and location of uses of state-owned aquatic lands, as well as the ways that uses are implemented. Many Federal, state, and local authorities are involved in setting the conditions for the construction, operation, and siting of the uses authorized by Washington DNR. Federal, state, and local statutes, regulations, and policies that influence the potential for Washington DNR-authorized uses of state-owned aquatic lands to affect wildlife and wildlife habitat include the following:

- Clean Water Act – NPDES permits, Section 401 permits, Section 404 permits
- Federal Rivers and Harbors Act – Section 10
- Comprehensive Environmental Response, Compensation, and Liability Act
- Marine Mammal Protection Act
- Migratory Bird Treaty Act
- Bald and Golden Eagle Protection Act
- Magnuson-Stevens Fishery Management and Conservation Act
- Federal Coastal Zone Management Act
- ESA, if Federal funding or permitting is involved
- NEPA, if Federal funding or permitting is involved
- SEPA
- State Hydraulic Code
- State Water Quality Protection Act
- State Water Pollution Control Act
- State Growth Management Act (and local critical areas ordinances)
- State Shoreline Management Act (and local shoreline management plans)

These Federal, state, and local statutes and regulations are described in greater detail in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws.

Many authorized uses with the potential to affect the environment are subject to review and/or permitting under one or more of these Federal, state, and local statutes or regulations. The potential for uses subject to regulatory review to result in adverse effects on wildlife and wildlife habitat is influenced to a large degree by the implementation of conservation measures required through those regulatory review processes. As discussed in Subsection 3.3, Substrates and Erosional Processes, most projects that involve the construction or reconfiguration of in-water structures are subject to Federal permitting, which necessitates consultation with the Services under section 7 of the ESA. Measures implemented as a result of a section 7 consultation process are typically designed to avoid, minimize, and/or mitigate adverse effects on ESA-listed species (e.g., measures to reduce disturbance or injury due to noise and human activity) and on the habitats that support these species. Measures designed to protect these species and habitats typically address components of the environment (e.g., the condition of substrates, water and sediment quality, aquatic vegetation, light, noise, disturbance, and food/prey availability) that provide habitat for numerous organisms in aquatic areas, not just those listed as threatened or endangered under the ESA. Many species of wildlife, therefore, receive protection through the various Federal permitting processes.

At the state level, HPAs issued under the Hydraulic Code (required for all construction activities that propose to change the bed of any waters of the state) include provisions to minimize project-specific and cumulative impacts to fish, based on the best available science and practices related to protection of fish and other aquatic life forms (WAC 220-110). Conditions placed on activities through the HPA review process commonly require the protection of substrates, water and sediment quality, and aquatic vegetation. In addition to providing direct protection for wildlife species that use aquatic habitats (e.g., amphibians, turtles, birds, marine mammals), such provisions would reduce the potential for diminished availability of prey for many wildlife species in aquatic areas.

At the local level, management standards for the protection of sediment transport processes, water and sediment quality, aquatic vegetation, and shoreline vegetation in areas managed under local shoreline master programs generally minimize the potential for new uses of state-owned aquatic lands to result in adverse effects on wildlife and wildlife habitat. As explained in Subsection 1.4.2, State Regulations, shoreline master programs developed under the Shoreline Management Act likely apply to all state-owned aquatic lands because the Shoreline Management Act applies to all marine waters and submerged tidelands and likely to all streams and lakes that are large enough to include state-owned aquatic lands.

The likelihood for uses subject to regulatory review to result in adverse effects on wildlife and wildlife habitat is influenced to a large degree by the implementation of conservation measures required through Federal, state, and local regulatory review processes. The fact that a particular project is subject to regulatory review and/or permitting does not, however, ensure that the project would not result in adverse effects on wildlife species and habitats. As described in the discussions of existing and relevant management measures and regulatory frameworks in Subsection 3.3, Substrates and Erosional Processes, and Subsection 3.4, Water Resources, some permitting processes, including the HPA process, may have a limited ability to protect public resources, ensure no net loss of the productive capacity of habitat or functions, and fully mitigate the impacts of permitted projects (Quinn et al. 2007).

3.9.2 Existing Conditions

Almost 200 species of amphibians, turtles, birds, and marine mammals use habitats in the marine and fresh waters of Washington State (Johnson and O'Neil 2001). The distribution and abundance of wildlife in the analysis area depend on the distribution, abundance, and condition of their associated habitat. Habitat is a product of erosional processes, water quality, physical habitat features (e.g., substrate composition, access to habitat), and biological communities (e.g., native aquatic vegetation, prey resources). Key habitat components of the aquatic environment that influence the distribution and abundance of wildlife and that are pertinent to this analysis include substrates, water and sediment quality, aquatic vegetation, light conditions, noise, disturbance, and food/prey availability. These habitat components are considered pertinent to this analysis because they may be affected differently by differences in Washington DNR's management of state-owned aquatic lands under the alternatives.

The following two subsections (Subsection 3.9.2.1, Key Habitat Components in Marine Areas and Subsection 3.9.2.2, Key Habitat Components in Freshwater Areas) describe the relationships between wildlife and these key habitat components in marine and freshwater areas of the analysis area. Descriptions of existing conditions for substrates, water and sediment quality, and aquatic vegetation, are based largely on information provided in Subsection 3.3, Substrates and Erosional Processes, Subsection 3.4, Water Resources, and Subsection 3.6, Vegetation, respectively. The ways in which uses of state-owned aquatic lands currently contribute adverse effects on all key habitat components are further described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

Among the hundreds of species of fish and aquatic invertebrates in the analysis area, 11 are considered to be of particular concern for this analysis due to the current status of each species' population, threats to their populations with respect to uses of state-owned aquatic lands, and the inclusion of the species in Washington DNR's application for ITP coverage (Table 1-1). Subsection 3.9.2.3, Proposed Covered Species, describes the status, distribution, habitat use, and abundance of these species, along with identified threats to populations of each species.

3.9.2.1 Key Habitat Components in Marine Areas

As mentioned above, key habitat components that influence the distribution and abundance of wildlife in the analysis area include substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability. The following paragraphs describe the relationships between these key habitat components and wildlife species in marine areas and identify how the condition of these components has been affected by human activities in the analysis area.

Substrates in marine areas support plants and animals that provide foraging opportunities for many species of wildlife. For example, worms and other invertebrates that live in the unconsolidated substrates of tidal flats are a major food source for shorebirds, marine mammals, and terrestrial mammals (Washington DNR 2013). Different types of substrates support different types of vegetation, providing habitat for a diverse range of wildlife species. As discussed in Subsection 3.6.2.1, Marine Vegetation, kelp grows primarily on hard (i.e., consolidated; see Subsection 3.3.2.1, Marine Areas—Substrates and Erosional Processes) substrates while eelgrass grows primarily on unconsolidated substrates. The distribution of these different substrate types affects the distribution of associated vegetation types, which in turn influences the distribution of wildlife species in the analysis area.

The distribution of consolidated and unconsolidated substrates in marine areas has been heavily influenced by human activities (Subsection 3.3.2.1, Marine Areas—Substrates and Erosional Processes). Structures placed in the water (e.g., pilings on overwater structures, including derelict structures) or along shorelines (e.g., bank armoring) degrade habitat for wildlife through scour and compaction and by interrupting sediment supply, changing the distribution of consolidated and unconsolidated substrates in the analysis area.

The quality of water and sediment also influences the distribution and abundance of wildlife in the analysis area. Many species are sensitive to the toxic effects of environmental contaminants (e.g., chemicals, turbidity, waste products, pathogens, excess nutrients), which may be contacted through direct exposure to contaminated water or sediment, or through ingestion of contaminated prey (Wiles 2004; Washington DNR 2013). The quality of marine waters in the analysis area has been impaired by elevated levels of nutrients (and resultant decreases in dissolved oxygen) and other pollutants (e.g., copper, polycyclic aromatic hydrocarbons), primarily due to runoff from upland areas (Subsection 3.4.2.1, Marine Areas—Water Resources). The Creosote Removal Program currently implemented in marine areas by Washington DNR has a goal of reducing sources of contamination (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands).

Vegetation in marine areas (i.e., eelgrasses, kelp, and salt marsh plants; see Subsection 3.6.2.1, Marine Vegetation) provides food and shelter for many wildlife species in the analysis area. For example, eelgrass meadows provide feeding and refuge habitat for birds (Baldwin and Lovvorn 1994; Wilson and Atkinson 1995; McIntyre and Barr 1997) and spawning habitat for fish species that are prey for birds and marine mammals (Phillips 1984). Kelp beds provide foraging areas for marine mammals

(Mumford 2007). Human actions such as the construction of overwater structures (including private recreational docks) can impact aquatic vegetation and diminish the capacity for aquatic vegetation in marine areas to provide these functions in the analysis area. Compared to historical conditions, the areal extent of eelgrass, kelp, and salt marsh vegetation has decreased substantially the analysis area (Subsection 3.6.2.1, Marine Vegetation).

In addition to the habitat components identified above, the distribution and abundance of wildlife in marine area are influenced by specific, local light conditions, noise and disturbance levels, and the availability of food/prey in the analysis area. All species require access to suitable habitats, unimpeded by structures or by noise and human activity that cause disturbance. Modifications to light conditions, noise levels, or disturbance levels can cause wildlife species to avoid areas that provide breeding habitat, cover, or foraging opportunities. Such modifications can also influence the availability of prey species, such as forage fish (Subsection 3.8.2.1, Key Habitat Components in Marine Areas—Fish).

3.9.2.2 Key Habitat Components in Freshwater Areas

As in marine areas, key habitat components that influence the distribution and abundance of wildlife in freshwater areas of the analysis area include substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability. The following paragraphs describe the relationships between these key habitat components and wildlife species in freshwater areas and identify how the condition of these components has been affected by human activities in the analysis area.

Similar to marine areas, substrates in freshwater areas support plants and animals that provide foraging opportunities for many species of wildlife. Many species feed on invertebrates that live on aquatic substrates (e.g., crayfish, shrimp, insects) or that burrow in unconsolidated substrates (e.g., worms) (Washington DNR 2013). Frogs and turtles hibernate in unconsolidated substrates in lakes and rivers. Some amphibian species (e.g., western toad) lay eggs directly on substrates in freshwater areas. Freshwater substrates in the analysis area have been altered through modifications to lake shorelines, dam construction, and bank armoring (Subsection 3.3.2.2, Freshwater Areas—Substrates and Erosional Processes). Such modifications to lake shorelines can impact habitat conditions for wildlife by altering the substrate composition and natural water movement processes in lakes (Subsection 3.3.2.2, Freshwater Areas—Substrates and Erosional Processes). In rivers, structures (e.g., dams, bank armoring) that interfere with the movement of sediment can alter habitat conditions by replacing shallow unconsolidated habitats with deep, steep consolidated substrates.

Water and sediment quality in freshwater areas is vital to many wildlife species in the analysis area, particularly amphibians. A growing body of evidence indicates that chemical contaminants are contributing to amphibian declines in Washington State and elsewhere (Sparling et al. 2001; Blaustein et al. 2003). Amphibians are particularly vulnerable to contaminants because of their highly permeable skin and unshelled eggs cycle (Linder et al. 2010). Of particular concern are herbicides, fungicides, heavy metals, nitrogen, and acidification (Hallock 2013). As noted in Subsection 3.4.2.2, Freshwater Areas—Water Resources, the primary sources of water and sediment quality impacts in freshwater areas are not associated with uses of state-owned aquatic lands.

As in marine areas, vegetation in freshwater areas (i.e., complex freshwater algae, and rooted freshwater plants; see Subsection 3.6.2.2, Freshwater Vegetation) supports many species, providing shelter and egg attachment sites and helping maintain water and sediment quality in lakes, ponds, rivers, and streams (Zedler and Kercher 2005). Freshwater aquatic vegetation is a major source of food for amphibians, turtles, and birds, which may consume the vegetation itself, prey on other species that consume or find shelter in vegetation, or consume organisms that benefit from vegetation as a source of detritus and dissolved organic matter (Moore et al. 2004; Alvarez and Peckarsky 2005; Hilt 2006). Wildlife species may also use aquatic, emergent, or riparian vegetation for egg attachment, as nesting or rearing areas, and/or for refuge from predation (Webb 1991; Kendall and Mearns 1996; Munger et al. 1998; Shaffer 2004). As discussed in Subsection 3.6.2.2, Freshwater Vegetation, aquatic vegetation in lakes, ponds, rivers, and streams throughout Washington State has been degraded by human activity, adversely affecting habitat quality for wildlife in the analysis area. Construction of bank armoring and overwater structures in lakes has contributed to shading and substrate alterations and the introduction of invasive species, adversely affecting aquatic vegetation in those waterbodies. In rivers, bank armoring has altered sediment dynamics that historically maintained characteristic native vegetation communities.

As in marine areas, the distribution and abundance of wildlife in freshwater areas (including distribution during key wildlife life stages) can be impacted by alterations in light conditions, noise levels, and disturbance levels associated with human activity in the analysis area (Washington DNR 2013). For example, amphibians generally mate at night when the risk of predation is reduced; the presence of artificial light may decrease reproductive success by discouraging mate selection by females (Rand et al. 1997) or by reducing chorus activity by males (Buchanan 2006). In addition, tadpoles use decreasing light as a cue to move to warmer and deeper water; night lighting may discourage such movements, leading to thermoregulatory impacts (Buchanan 2006). For all wildlife species, modifications to noise levels or disturbance levels can cause animals to avoid areas that provide breeding habitat, cover, or foraging opportunities, resulting not only in decreased feeding efficiency and increased energy expenditures, but also potentially lowering migratory or reproductive success as a result of decreased fat reserves (Washington DNR 2013).

3.9.2.3 Proposed Covered Species

Two species of birds (marbled murrelet and western snowy plover) that use habitats on state-owned aquatic lands in the analysis area are listed as threatened under the ESA. In addition, one marine mammal (the Southern Resident killer whale) is listed as endangered. All three of these species are proposed for coverage under the ITPs that are the subject of this NEPA analysis, along with eight non-listed species (four amphibians, one reptile, and three additional birds) (Table 1-1). Together, these 11 species constitute the proposed covered wildlife species for this EIS analysis. The species proposed for ITP coverage that currently have no listing status either have similar life histories and habitat requirements to listed species, or were determined to have a high likelihood of being listed during the proposed 50-year ITP term (Washington DNR 2007d).

Species proposed for ITP coverage are given particular consideration in this analysis because they have been determined to have a high potential of risk and/or interaction with Washington DNR-authorized uses of state-owned aquatic lands and because sufficient information was available about each of these species to assess impacts and to develop conservation measures (Washington DNR 2013). The following subsections provide information about the distribution and habitat use of these species, along with identified threats to each species' survival. Much of the information in the following discussions was drawn from the Aquatic Lands HCP (Washington DNR 2013). Readers are directed to that document for more detailed discussions and additional literature citations.

Several ESA-listed species of marine mammals may occur in the waters of Washington State, but they were judged to have little or no overlap either with state-owned aquatic lands or with the land uses that could be affected by HCP implementation under the action alternatives (Washington DNR 2013). These species (blue whale, bowhead whale, humpback whale, North Pacific right whale, and Steller sea lion), therefore, will not be addressed further in this document. Similarly, four ESA-listed species of marine turtles (leatherback, green, olive ridley, and loggerhead sea turtles) occasionally appear off Washington State's Pacific coast. Based on the abundance of primary prey species (jellyfish) in the area, coastal waters south of Cape Flattery have been designated as critical habitat for leatherback sea turtles (77 Fed. Reg. 4170, January 26, 2012). All of these species are associated with open-water habitats in Washington waters and are unlikely to be affected by uses of state-owned aquatic lands.

Differences in Washington DNR's management under the alternatives, therefore, would not be expected to result in any differences in the potential for uses of state-owned aquatic lands to affect any of these species. For this reason, sea turtles will not be addressed further in this document.

Columbia Spotted Frog

The Columbia spotted frog is a Federal Species of Concern and is a candidate for listing at the Washington State level. Because the Columbia spotted frog is not listed or proposed for listing under the ESA, no critical habitat has been designated for this species. The historic range of the Columbia spotted frog includes southern Alaska through British Columbia and western Alberta to Washington, Oregon, Nevada, and Utah (Stebbins 1966). In Washington, this species is found in freshwater habitats on the eastern slopes of the Cascade Mountains, in the Okanogan Highlands, and in the Columbia River basin (Hallock and McAllister 2005a). USFWS considers Columbia spotted frogs in the main portion of their range (western Alberta, British Columbia, eastern Washington and Oregon, northern and central Idaho, and western Montana and Wyoming) to be common and abundant (58 Fed. Reg. 27262, May 7, 1993). However, populations of Columbia spotted frogs appear to be declining rapidly in lakes and rivers in shrub-steppe habitats of eastern Washington (L. Hallock, pers. comm., WDFW, August 13, 2009).

All life stages of Columbia spotted frog may use habitats in freshwater areas on state-owned aquatic lands. Adults and tadpoles occur primarily in the marshy edges of ponds, lakes, stream pools, and wetlands (Nussbaum et al. 1983; O'Neil et al. 2001; Pilliod et al. 2002). Spawning and incubation occur in permanent shallow waters of most aquatic habitats, including slow-moving reaches of rivers (Nussbaum et al. 1983; Johnson and O'Neil 2001; Lannoo 2005). Columbia spotted frogs hibernate during the winter after burrowing into mud at the bottom of ponds and lakes (Johnson and O'Neil 2001; Pilliod et al. 2002).

Factors contributing to the degradation and fragmentation of suitable habitat for Columbia spotted frogs include water development, improper grazing practices, mining, and introductions of non-native species. In some portions of the species' range, fungal diseases, virus outbreaks, and the spread of parasites may be contributing to population declines (77 Fed. Reg. 70019, November 21, 2012). Beaver removal within the range of the Columbia spotted frog may be detrimental because beavers contribute to the creation and maintenance of wetland conditions important for this species (Hallock and McAllister 2005a).

Oregon Spotted Frog

The Oregon spotted frog has been proposed for listing as a threatened species under the ESA (78 Fed. Reg. 53581, August 29, 2013) and is a Washington State endangered species. Critical habitat is also proposed for this species, and could be located within state-owned aquatic lands (78 Fed. Reg. 59334, September 26, 2013). The historic range of this species extends from British Columbia southward through the Puget Sound lowlands and the Willamette Valley, as well as along the Cascades to northern California (Green et al. 1997; Hallock and McAllister 2005c). In Washington, the Oregon spotted frog has experienced a dramatic decline in numbers (McAllister et al. 1993). Currently, populations are known to occur in Washington State at freshwater wetland habitats in western Washington (Sumas River, South Fork Nooksack River, Samish River, and Black River watersheds) and in the southeastern Cascades (White Salmon River and Middle Klickitat River watersheds) (78 Fed. Reg. 53581, August 29, 2013). State-owned aquatic lands are present at some of these sites.

All life stages of Oregon spotted frog may use habitats in freshwater areas on state-owned aquatic lands. The Oregon spotted frog is highly aquatic. In Washington, the species occurs in large, shallow wetland systems associated with streams and beaver ponds (Hallock and McAllister 2005c). Adults prefer deeper waters and are rarely found in upland areas farther than 6 feet from surface water (Lannoo 2005). Breeding occurs in seasonally flooded margins of wetlands (Nussbaum et al. 1983; Johnson and O'Neil 2001; Hallock and McAllister 2005c). Oregon spotted frogs overwinter in waters generally free of ice, burying themselves in the sediment at the base of plants during the coldest periods (Watson et al. 2000; Hallock and McAllister 2005c; Lannoo 2005).

The major threats to Oregon spotted frogs in Washington include loss of wetland habitat (which is the primary reason for the absence of the species from approximately 90 percent of its former range); changes in hydrology due to construction of dams and human-related alterations to seasonal flooding; loss of beavers; introduction of nonnative plant and animal species; vegetation succession and encroachment; poor water quality; livestock grazing (in some circumstances); and residential and commercial development (78 Fed. Reg. 53581, August 29, 2013). In some areas, stream bank, channel, and wetland modifications (e.g., bank armoring) have contributed to the loss of natural wetland and riverine disturbance processes that created early successional wetlands favorable to Oregon spotted frogs (78 Fed. Reg. 53581, August 29, 2013).

Northern Leopard Frog

The northern leopard frog is a Federal Species of Concern and a Washington State endangered species. Because the northern leopard frog is not listed or proposed for listing under the ESA, no critical habitat has been designated for this species. The northern leopard frog is widely distributed across North America. Its historic range extended from Hudson Bay and the Great Slave Lake in Canada, south to Virginia, Nebraska, New Mexico, and Arizona (Stebbins 1985; Zeiner et al. 1988). In Washington, northern leopard frogs historically occurred in freshwater habitats east of the Cascade Mountains, on the Columbia Plateau and in the northeastern and southeastern portions of the state. Leopard frogs are now known to occur at only two sites in the Crab Creek drainage in Grant County (McAllister et al. 1999; Germaine and Hays 2007).

All life stages of northern leopard frog may use habitats in freshwater areas on state-owned aquatic lands, although waterbodies that provide breeding habitat are unlikely to meet the navigability criteria that define state-owned aquatic lands (see discussion in Subsection 1.4.2.2, State Shoreline Management Act). Breeding ponds for northern leopard frogs are generally greater than 5 feet deep, with open waters that warm quickly and dry up periodically, thereby eliminating fish predators (McAllister et al. 1999). Young frogs may emigrate from their natal ponds to more permanent waters such as lakes or streams (McAllister et al. 1999). Northern leopard frogs overwinter among stones, sunken logs, or leaf litter along the bottom of ponds, lakes, and streams (McAllister et al. 1999; Hallock and McAllister 2005b).

Northern leopard frogs are vulnerable to habitat modification and local extirpations, as the only extant populations in Washington occur in relatively small areas in a single region (McAllister et al. 1999; Germaine and Hays 2007). The causes of the population declines that led to the contraction of the leopard frog’s range in Washington are not known with certainty; habitat loss, pesticide use, and nonnative predators are likely factors (Hays and Jennings 1986; Andelman and McAllister 1994; Leonard and McAllister 1996). In addition to being vulnerable to predation by exotic species such as bullfrogs and carp (Hallock and McAllister 2005b), leopard frogs may also be negatively affected by competition with bullfrogs for food and other resources (Witmer and Lewis 2001). Fertilizers and pesticides associated with agricultural areas are a threat to northern leopard frogs in Washington (Hallock and McAllister 2005b), as are pesticides used for mosquito control (Kaufman et al. 2001). Rotenone, a fish toxicant commonly used in the Columbia Basin, has been found to be toxic to leopard frog tadpoles at concentrations normally used in fish control (McAllister et al. 1999).

<u>Western Toad</u>

The western toad is a Federal Species of Concern and a candidate for listing at the Washington state level. Because the western toad is not listed or proposed for listing under the ESA, no critical habitat has been designated for this species. The historic range of this species extends from southern Alaska into Baja California, generally west of the Rocky Mountains (Stebbins 1985; O'Neil et al. 2001). Western toads historically occurred in freshwater habitats throughout most of Washington State; population declines have been documented in the Puget Sound lowlands and the lower Columbia River, and in portions of the Columbia River plateau (Stebbins 1966; Nussbaum et al. 1983; Hallock and McAllister 2005d; Leonard et al. 1993).

All life stages of western toad may use habitats in freshwater areas on state-owned aquatic lands, although primarily as eggs and tadpoles. In Washington, western toads spawn in almost any standing water (Zeiner et al. 1988). Strings of eggs are attached to submerged and emergent vegetation (Johnson and O'Neil 2001) or laid directly on the substrate (Hallock and McAllister 2005d) in shallow ponds, lakes, slow-moving reaches of streams, springs, reservoirs, stock ponds, canals, and roadside ditches (Stebbins 1966; Nussbaum et al. 1983; Zeiner et al. 1988). When not breeding, western toads are found primarily in terrestrial habitats including grasslands, scrublands, woodlands, forests, or mountain meadows (Stebbins 1966; Nussbaum et al. 1983; Vander Haegen et al. 2001). Western toads can also occur in low-density urban habitats with irrigated landscaping (Ferguson et al. 2001). Little is known about migratory behavior, but females have been observed more than 1.5 miles from breeding sites (Johnson and O'Neil 2001).

A major threat to the western toad is the conversion of habitat to agricultural, industrial, or high-density urban use in low-elevation areas. Such conversions have substantially reduced the species' range in Washington (Martin 2001). In addition, habitat fragmentation resulting from urban and suburban development has isolated wetlands and riparian habitats from terrestrial habitat used by western toads, further impacting the species (Ferguson et al. 2001). Ravens preying on breeding adult western toads may have contributed to the decline of western toad populations at certain locations in Oregon (NatureServe 2012).

Pacific Pond Turtle

The Pacific pond turtle is a Federal species of concern and a Washington State endangered species. Because the Pacific pond turtle is not listed or proposed for listing under the ESA, no critical habitat has been designated for this species. Historically, this species' range extended from Puget Sound south along the Pacific Coast to Baja California (Hays et al. 1999). In Washington, the Pacific pond turtle historically occurred in freshwater habitats in the Puget Sound lowlands and in the Columbia River Gorge from sea level to elevations near 1,000 feet (Hays et al. 1999; Hallock and McAllister 2005e). Of four known Washington populations, two occur naturally in ponds, lakes, and small tributaries to the Columbia River in Skamania and Klickitat Counties (Hays et al. 1999); the other two populations are captive-reared stocks released by the Washington Department of Fish and Wildlife in the Columbia Gorge and in man-made ponds in Pierce County (Hays et al. 1999; Hallock and McAllister 2005e). Existing populations of Pacific pond turtles are declining in Washington and are at risk of extirpation due to their limited distribution, low numbers, and isolated populations. This species is vulnerable to extirpation in Washington by both natural and human-caused events (WDW 1993).

All life stages of Pacific pond turtle may use habitats in freshwater areas on state-owned aquatic lands. Pond turtles are strongly associated with aquatic habitats, occurring in permanent and intermittent waters of streams and rivers, ponds, lakes, wetlands, and reservoirs (Nussbaum et al. 1983; Stebbins 1966). When pond turtles occupy large rivers, they are usually found near banks or in nearby backwater habitats where the current is relatively slow and emergent basking sites are abundant (Stebbins 1966; Hays et al. 1999). Pacific pond turtles typically excavate nests in sandy banks, usually within 300 feet of water but sometimes up to 1,300 feet from water (Nussbaum et al. 1983; Hays et al. 1999). Adult pond turtles, and possibly juveniles, overwinter in the muddy bottoms of lakes or ponds, or in upland habitats adjacent to water bodies (Nussbaum et al. 1983; Hays et al. 1999).

Alteration and degradation of critical features of aquatic or terrestrial habitats, as well as loss of nests to human activities and removal of pond turtles from the wild, are major threats to the Pacific pond turtle (Hallock and McAllister 2005e). No other anthropogenic factors have been identified as major threats to this species. Additional threats include depredation of hatchlings by introduced bullfrogs and loss of nests to other predators (Hallock and McAllister 2005e). While information concerning the threat of disease is lacking, an unknown disease in 1990 killed approximately one-third of the population in Klickitat County (Hays et al. 1999).

Black Tern

The black tern has no Federal or Washington State listing status, but WDFW monitors the status and distribution of this species in Washington State. Because the black tern is not listed or proposed for listing under the ESA, no critical habitat has been designated for this species. The breeding range for black terns in North America extends from the northern United States through central Canada (Dunn and Agro 1995), with breeding populations concentrated in productive wetlands in the prairies of Alberta, Saskatchewan, Manitoba, the Dakotas and Minnesota (Dunn and Agro 1995). Within Washington State, black terns breed in freshwater habitats primarily on the east slopes of the Cascade Mountains and in the northeastern and southeastern portions of the state (Smith et al. 1997). Black terns winter in marine and marine coastal areas of Central America and northern South America (Dunn and Agro 1995).

Breeding adult black terns may use habitats in freshwater areas on state-owned aquatic lands. Black terns generally nest in emergent vegetation (e.g., cattails, bulrushes) along prairie sloughs, rivers, lakes and impoundments, wet meadows and marshes, and occasionally on mats of floating vegetation or wood (NatureServe 20012). Most nests are on semi-permanent ponds (Dunn and Agro 1995; Smith et al. 1997). Nests are generally built in shallow water areas, usually within 3 to 6 feet of open water (NatureServe 2012). Nesting adults forage on insects and small freshwater fish (Dunn and Agro 1995).

Threats to black terns include loss or degradation of wetlands used for breeding and migration as a result of drainage for agriculture and urban/suburban development. The invasive species purple loosestrife (*Lythrum salicaria*) chokes out native emergent vegetation and can form stands too dense for black tern nesting. Water quality impacts from pesticides used for agriculture, horticulture, or control of invasive species impact prey species that are important food sources during nesting and migration. Nest predation may limit reproductive success. Other natural or manmade factors affecting the continued existence of black terns may include declines of the pelagic forage fish base in wintering areas; and collisions with power lines, towers, and wind turbines during migration. In addition, breeding populations may be adversely affected by disturbance from recreational activities such as swimming, fishing, birding, or boating.

Common Loon

The common loon has no Federal listing status, but is a Washington State sensitive species. Because the common loon is not listed or proposed for listing under the ESA, no critical habitat has been designated for this species. The breeding range for the common loon extends from Alaska south into Washington and eastward throughout Canada (McIntyre and Barr 1997). Within Washington, common loons nest on lakes and reservoirs in the northern and central portions of the state and in the Puget Sound lowlands (Richardson et al. 2000). During winter, common loons are found on coastal and inland marine waters in western Washington (Richardson et al. 2000). Estimates of the number of common loons wintering in Washington range between 1,600 and 4,200 birds, mostly in Puget Sound and the Strait of Juan de Fuca (Richardson et al. 2000).

All life stages of common loon may use habitats on state-owned aquatic lands, some in marine areas and some in freshwater areas. Common loons generally nest on large lakes with clear water, complex rocky shorelines, numerous bays, deep inlets, numerous islands, floating bogs, and fish (McIntyre and Barr 1997). In Washington, common loons have been recorded nesting on lakes and reservoirs ranging from 10 to 300 feet deep. Common loons forage primarily on small fish, other aquatic vertebrates, some invertebrates, and occasionally vegetation (McIntyre and Barr 1997). During periods of migration between breeding areas and wintering areas, common loons gather on low-gradient rivers and on larger lakes and reservoirs. Common loons winter primarily along coastal and inland marine waters, over shoals, and in sheltered bays, inlets and channels, with some individuals wintering on freshwater lakes, reservoirs, and low-gradient rivers.

Known threats to common loons include the following: 1) loss or degradation of lake or reservoir shoreline habitats used for breeding; 2) loss or degradation of coastal marine areas used for wintering; 3) degradation of nesting habitat due to lake and reservoir water level fluctuations; 4) reduction or elimination of forage fish and invertebrates due to chemicals used in invasive species management; and 5) habitat degradation from oil and fuel spills in breeding or wintering habitats. Nest sites are subject to human disturbance from recreational activities. Common loons are at risk from entanglement and drowning in fish gill nets, and from ingestion of toxicants, including lead from fishing gear, mercury, and organochlorines.

Harlequin Duck

The harlequin duck has no listing status at the Federal or state level in Washington State. Because the harlequin duck is not listed or proposed for listing under the ESA, no critical habitat has been designated for this species. Harlequin ducks breed throughout much of the northern portion of North America. An estimated 400 harlequin duck pairs nest in Washington (Robertson and Goudie 1999). Nesting birds are found along streams throughout the Olympic and Cascade ranges, the northwestern Pacific coast, and in northeastern Washington. An estimated 3,000 harlequin ducks winter in northern Puget Sound, northern Hood Canal, the Strait of Juan de Fuca, San Juan Islands and along the outer coast (Robertson and Goudie 1999; Lewis and Kraege 2004).

All life stages of harlequin duck may use habitats on state-owned aquatic lands, some in marine areas and some in freshwater areas. Harlequin ducks generally nest on the ground along fast-flowing streams in riparian, sub-alpine, or coastal habitats (Robertson and Goudie 1999; Lewis and Kraege 2004). Preferred nesting habitat includes streams with low acidity, high invertebrate density, steep banks, vegetation cover along stream banks, braided channels, and small islands or gravel and sand bars (Robertson and Goudie 1999). Within several weeks after hatch, hens with broods move to low-gradient streams with adequate supplies of aquatic insect larvae (Robertson and Goudie 1999; Lewis and Kraege 2004). Harlequin ducks are attracted to areas with high prey densities, such as lake outlets, as well as streams where trout, salmon, and suckers lay eggs (Robertson and Goudie 1999). In Washington, wintering harlequin ducks are found in shallow water (3 feet or less), usually over eelgrass and kelp communities, and occasionally over sandy beaches or mudflats. Winter distributions are variable but are related to the abundance of available intertidal and subtidal invertebrate forage species (Gaines and Fitzner 1987; Vermeer 1983). Before spring migration to nesting areas, many harlequin ducks gather at Pacific herring spawning sites (Vermeer et al. 1997).

Threats to harlequin ducks include the following: 1) loss or degradation of stream habitats used for breeding and coastal areas used for molting and wintering; 2) degradation of nesting habitat due to logging and mining activities; 3) reduction of invertebrate abundance in nesting habitats due to habitat degradation from altered stream flows and silt deposition; 4) reduction of invertebrate abundance in nesting habitats due to chemicals used for invasive species management; 5) disturbance in nesting and brood-rearing habitats from fishing, boating, and rafting; 6) degradation of molting and wintering habitat from shoreline development, aquaculture, algae harvest, and oil and fuel spills; and 7) disturbance in molting and wintering habitats due to boat traffic. Other factors include ingestion of plastics; bioaccumulation of heavy metals and polycyclic aromatic hydrocarbons from creosote piers and/or diesel soot; contaminated food supplies leading to reduced survival and reproduction; and losses due to entanglement and drowning in fish gill nets.

Marbled Murrelet

The marbled murrelet is ESA-listed as a threatened species and is a Washington state threatened species (57 Fed. Reg. 45328, October 1, 1992). Marbled murrelet critical habitat has been designated in Washington State; critical habitat is restricted to forested land that provides nesting habitat and does not include marine waters of Puget Sound (76 Fed. Reg. 61599, October 5, 2011). Marbled murrelets are distributed from the Aleutian Islands in Alaska to central California (Nelson 1997). In Washington, marbled murrelets occur mainly in northern Puget Sound and along the northern Pacific coast (Speich and Wahl 1995). Based on at-sea monitoring efforts, the 2012 estimated marbled murrelet population in Puget Sound was approximately 8,400 birds and the estimated population along the Washington coast was approximately 1,200 birds (Falxa et al. 2013). In contrast with previous population reviews, analyses conducted by Falxa et al. (2013) found no statistically significant population trends in Puget Sound or at the overall population scale between 2001 and 2012; previous analyses have found declining trends in numbers at both scales (Pearson et al. 2011). Falxa et al. (2013) did, however, detect a statistically significant decline of 7.6 percent per year between 2001 and 2012 for the Washington coast population.

Adult and subadult marbled murrelets commonly use habitats in marine areas on state-owned aquatic lands, and they may use some freshwater habitats in lakes. Nesting habitat is found in forested areas that are not affected by Washington DNR’s management of the Aquatics Division. Marbled murrelets generally forage in protected coastal and nearshore waters including bays, inlets, fjords, lagoons, and coves, with most birds remaining between 1 and 3 miles from shore (Thompson 1997). During the breeding season, murrelets consume small, schooling fish such as Pacific sand lance, northern anchovy, Pacific herring, surf smelt, and shiner perch (Nelson 1997). They also feed on juvenile rockfish and marine invertebrates such as squid and shrimp (McShane et al. 2004). Dominant winter prey includes invertebrates, smelt, and herring (Nelson 1997). Marbled murrelets sometimes are found on lakes during winter or summer, where they feed on salmonids (Nelson 1997). Murrelets may aggregate where Pacific herring are spawning (Speich and Wahl 1989).

The *Report on the Marbled Murrelet Recovery Implementation Team Meeting and Stakeholder Workshop* identified the primary mechanisms contributing to declines of marbled murrelet populations as 1) loss of terrestrial nesting habitat, 2) increased nest predation, 3) changes in marine forage abundance, distribution, and quality, 4) increased post-fledging mortality (e.g., from oil spills, entanglement in nets and derelict gear, avian predation, and collisions), and 5) cumulative and interactive effects (e.g., increased energetic costs and vulnerability to predation due to increased distance between nesting and foraging habitats) (Marbled Murrelet Recovery Implementation Team 2012). While depletion of forage fish populations may be contributing to declines in Washington State, the extent of depletion is unknown (Marbled Murrelet Recovery Implementation Team 2012). Based on demographic modeling, observed juvenile ratios, and adult survivorship rates, McShane et al. (2004) suggested that the numbers of murrelets in Washington, Oregon, and California may be too low to sustain a murrelet population. Population declines are expected to continue until murrelet fecundity is substantially improved and the anthropogenic stressors affecting fitness, survivorship, and nest success are eliminated or sufficiently reduced (USFWS 2010).

<u>Western Snowy Plover</u>

The western snowy plover is ESA-listed as threatened (58 Fed. Reg. 12864, March 5, 1993) and is a Washington state endangered species. USFWS has designated approximately 25,000 acres of critical habitat for western snowy plovers in Washington, Oregon, and California, including approximately 6,000 acres beach habitat at six locations along the central and southern Washington coast (77 Fed. Reg. 36728, June 19, 2012). Western snowy plovers occur in several western states from Washington to Texas, but only members of the Pacific Coast population (California, Oregon, Washington) are listed as threatened under the ESA. The Pacific Coast distinct population segment of the western snowy plover breeds from Washington State to Baja California, Mexico, with most occurring south of San Francisco Bay (Page et al. 1991; Palacios et al. 1994; 66 Fed. Reg. 42676, August 14, 2001). Western snowy plovers are found in nearshore marine habitats in Washington during all parts of the year (Page et al. 1995; Richardson 1995). Historically, snowy plovers bred in at least five areas in western Washington. Currently, only three active breeding areas are known in Grays Harbor County and Pacific County (Richardson 1995; 64 Fed. Reg. 68508, December 7, 1999).

Adult and subadult western snowy plovers may use habitats in marine areas on state-owned aquatic lands. Nesting habitat for western snowy plovers consists primarily of areas above the high tide line on coastal beaches. Birds nest on barren to sparsely vegetated sandy areas, dry salt flats in lagoons, dredge spoils deposited on beach or dune habitat, and river bars (USFWS 2012). Western snowy plovers forage for invertebrates in muddy and sandy substrate exposed during low tide. Aggregations of western snowy plover winter along the Pacific coast, foraging in the tidal zone. The northernmost wintering area known on the Pacific coast is near Cape Shoalwater in Pacific County, Washington (Pearson et al. 2006).

The final recovery plan for the western snowy plover identified threats to include commercial and residential development and construction of jetties, parks, and marinas, which have resulted in the loss of suitable nesting habitat (Palacios et al. 1994; Richardson 1995; U.S. Fish and Wildlife Service 2007). Snowy plovers are also sensitive to disturbance; decreases in breeding success and winter habitat use have been documented in areas where development of beach areas has resulted in increased levels of human activity (Warriner et al. 1986; Lafferty 2001; Ruhlen et al. 2003; U.S. Fish and Wildlife Service 2007). The introduction of non-native beach grasses has been shown to decrease the rate of nesting in previously used areas, reduce prey abundance, and increase the abundance of mammalian nest predators (Slobodchikoff and Doyen 1977; Powell et al. 2002; Neuman et al. 2004; U.S. Fish and Wildlife Service 2007). Predation also contributes to nest failure (Warriner et al. 1986; Powell et al. 2002; U.S. Fish and Wildlife Service 2007).

Southern Resident Killer Whale

The Southern Resident distinct population segment of killer whales is federally and state-listed as endangered in Washington (70 Fed. Reg. 699903, November 18, 2005). In November 2006, NMFS designated approximately 2,500 square miles of Puget Sound, as well as the entire Strait of Juan de Fuca (excluding areas with water less than 20 feet deep in both regions), as critical habitat for Southern Resident killer whales (71 Fed. Reg. 69054, November 29, 2006). The Southern Resident population contains three pods (J, K, and L) comprising approximately 90 animals. Killer whales from the Southern Resident population can occur throughout Washington’s marine waters, spending most of their time in the inland waterways of the Strait of Georgia, Strait of Juan de Fuca, and Puget Sound, and occasionally using the coastal waters off Oregon, Washington, and Vancouver Island (Wiles 2004; NMFS 2008). The movements of Southern Resident killer whales relate to those of their preferred salmon prey. Pods commonly seek out and forage in areas where salmon occur, especially areas associated with migrating salmon (Heimlich-Boran 1986; Heimlich-Boran 1988; Nichol and Shackleton 1996).

All life stages of Southern Resident killer whale may use habitats in marine areas on state-owned aquatic lands. Southern Resident killer whales, like other resident forms, feed mainly on Chinook salmon and, to a lesser extent, chum salmon, and have been known to eat other fish species and squid (Ford et al. 1998, 2000; Saulitis et al. 2000; Ford and Ellis 2006; Hanson et al. 2010a). On average, Chinook salmon make up 88 percent of the diet of Southern Resident killer whales in inland waters from May to September (Hanson et al. 2010b). The proportion of chum salmon in the whales' diet increases during fall and winter (Ford et al. 2010), making up approximately 70 percent of the diet of Southern Resident killer whales in inland waters from October to January (Hanson et al. 2010a). Killer whales are highly social animals, depending heavily on underwater sound for orientation, feeding, and communication.

The final recovery plan for Southern Resident killer whales identified several factors that may be limiting recovery. These are quantity and quality of prey, toxic chemicals that accumulate in top predators, oil spills, and disturbance from sound and vessels (NMFS 2008). Although it is not clear which threat or threats are most significant to the survival and recovery of Southern Resident killer whales, all of the threats identified are potential limiting factors in their population dynamics (NMFS 2008). The killer whale's position as a top-level predator makes the species vulnerable to changes in prey abundance.

3.10 Recreation

This subsection identifies the recreational activities that may be affected by Washington DNR's management of state-owned aquatic lands under the proposed alternatives. Subsection 3.10.1, Existing and Relevant Management Measures and Regulatory Framework, identifies statutes, regulations, rules, and policies enacted by Federal, state, and local agencies that address recreational activities associated with state-owned aquatic lands. Subsection 3.10.2, Existing Conditions, provides baseline information for the evaluation of the effects of the alternatives in Section 4, Environmental Consequences.

3.10.1 Existing and Relevant Management Measures and Regulatory Framework

Per RCW 79.105.030, Washington DNR is required to encourage direct public use of and access to state-owned aquatic lands. WAC 332-30-131 goes further, stating that Washington DNR's responsibilities include actively promoting and protecting recreational use of state-owned aquatic lands. Elsewhere, WAC 332-52-155 limits the amount of time that vessels may be moored or anchored on state-owned aquatic lands.

Construction and reconfiguration of overwater structures that support many recreational activities are subject to Federal permitting under the Rivers and Harbors Act, which commonly necessitates consultation with the Services under section 7 of the ESA. Measures implemented as a result of an ESA section 7 consultation process would be designed to avoid, minimize, and/or mitigate adverse effects on habitat for ESA-listed species. Such measures may include requirements to avoid aquatic vegetation or other habitat features that occur close to shore. As a result, many new or reconfigured overwater structures that support recreational activities may be placed in locations that are not close to shore. Except in cases of proposed reconfiguration, existing structures are typically not subject to such regulatory review.

3.10.2 Existing Conditions

Many recreational activities depend on the use of and access to aquatic lands. Recreational activities associated with aquatic lands include those involving the direct use of aquatic lands as well as activities that use overwater structures situated on aquatic lands. Recreational activities involving the direct use of state-owned aquatic lands include walking, swimming, recreational harvest of shellfish and edible seaweeds, sightseeing, beachcombing, birdwatching, waterfowl hunting, photography, and beach fishing. Chief among the recreational activities that depend on overwater structures are motorized boating and sailing, which depend on overwater structures (e.g., docks, piers, marinas, rafts, floats, mooring buoys) for boat moorage and other overwater structures (e.g., boat ramps, launches, hoists) for boat launch facilities. Overwater structures that are attached to shore (e.g., docks, piers, marinas, boat ramps, launches, hoists) are readily accessible from land. For structures that are not attached to shore (e.g., rafts, floats, mooring buoys), access between moored vessels and shore can take the form of small, motorized vessels or human-powered means (e.g., swimming, rowboats, kayaks). For persons who use human-powered means to travel to and from vessels moored to structures that are not attached to shore, structures close to shore can generally be accessed with less effort than those farther away from shore. Generally, all of the recreational activities associated with aquatic lands in the analysis area occur in marine and freshwater areas throughout the state; exceptions are the recreational harvest of shellfish and edible seaweeds, which are largely restricted to marine areas.

Boating is a popular activity in Washington State, as indicated by the 263,000 boats registered statewide in 2011 (Washington Department of Licensing 2012). Many boaters rely on boat moorage and launch facilities on state-owned aquatic lands. Currently, Washington DNR has approximately 107 authorizations for boat launch facilities (i.e., boat ramps, launches, and hoists) and more than 1,800 authorizations for boat moorage facilities (i.e., docks, piers, marinas, rafts, floats, mooring buoys) on state-owned aquatic lands (Washington DNR 2013). Nearly all (approximately 93 percent) existing use authorizations for overwater structures associated with recreational activities are in marine areas (Washington DNR 2011).

3.11 Visual Resources

This subsection describes the visual resources that may be affected by Washington DNR's management of state-owned aquatic lands under the proposed alternatives. Subsection 3.11.1, Existing and Relevant Management Measures and Regulatory Framework, identifies statutes, regulations, rules, and policies enacted by Federal, state, and local agencies that address visual impacts associated with uses of state-owned aquatic lands. Subsection 3.11.2, Existing Conditions, provides baseline information for the evaluation of the effects of the alternatives in Section 4, Environmental Consequences.

3.11.1 Existing and Relevant Management Measures and Regulatory Framework

WAC 332-30-118(8) states that structures used for aquaculture on the beds of navigable waters must be located in a way that "strive(s) to reduce adverse visual impacts." Per WAC 332-30-139, moorage facilities developed on state-owned aquatic lands must be designed to be compatible with the local environment and to minimize adverse aesthetic impacts. Scenic qualities are given some consideration in some areas managed under shoreline master programs. Per WAC 173-26-221(5), one of the goals of vegetation conservation in shoreline areas is to improve the visual and aesthetic qualities of the shoreline.

In addition to the WAC requirements that directly address visual and aesthetic impacts, several of the special conditions that have been incorporated into the Corps' nationwide permit for commercial shellfish aquaculture in Washington State have the potential to minimize the visual impacts of materials associated with shellfish aquaculture. For example, operators of shellfish aquaculture facilities are prohibited from storing aquaculture gear (e.g., supporting infrastructure or tubes and nets used to protect geoducks and other shellfish from predators) below the line of mean higher high water for more than 7 consecutive days. Depending on the configuration of the beaches and shoreline vegetation at and near individual facilities, this requirement may result in the placement of these materials out of the line of sight of persons at nearby properties. In addition, predator exclusion nets must be installed securely to prevent them from breaking free and littering surrounding areas, and crews are required to patrol nearby beaches at least once every 3 months to retrieve escaped aquaculture debris (e.g., anti-predator nets, tubes, tube caps, stakes). While these requirements can reduce the visual impacts associated with escaped gear, the impacts of such gear that remains at shellfish aquaculture facilities remain unchanged.

3.11.2 Existing Conditions

Visual resources are the natural and cultural features of the landscape that can be seen and that contribute to the public's appreciation of the environment. The components of the visual resource affected environment include 1) the visual and aesthetic quality of an area and 2) the visual and aesthetic experiences of viewers such as residents and users of parks and other public spaces. High-quality scenery, especially scenery with natural-appearing landscapes, is generally regarded as an important visual resource that enhances the aesthetic quality of life, influences the quality of recreational experiences, and, in some cases, affects nearby property values. Aquatic lands include many important visual resources and are often associated with scenic areas. The state's aquatic lands are considered a valued resource by many Washington residents and visitors and are viewed as an integral part of the Washington experience.

The visual and aesthetic quality of state-owned aquatic lands in Washington varies widely, ranging from urban areas dominated by structures to high-quality scenery in natural-appearing landscapes where evidence of human modifications to visual resources is largely absent.

Human modifications to visual resources in marine and freshwater areas typically include structures (e.g., roads, bridges, breakwaters, log handling facilities, and overwater structures, including derelict structures) and other materials (e.g., trash, supporting infrastructure for shellfish aquaculture). In general, structures, activities, and trash close to shore are more visible to a greater number of viewers than are those farther offshore.

Shellfish aquaculture, which occurs in marine areas only, can have substantial visual impacts. In many areas, particular concern has been expressed regarding the increase of shellfish aquaculture and its effect on the scenic characteristics of beaches (Stickney 2009). The visual impact of tubes and nets used to protect geoducks and other shellfish from predators is frequently identified as an issue. If unsecured aquaculture gear (e.g., tubes and nets) is left below the line of mean higher high water, it can be picked up by an incoming tide and deposited on other beaches nearby. As long as such gear remains below that line, it is both visible and susceptible to being picked up by incoming tides.

3.12 Cultural Resources

This subsection describes cultural resources that may be affected by Washington DNR's management of state-owned aquatic lands under the proposed alternatives. Subsection 3.12.1, Existing and Relevant Management Measures and Regulatory Framework, identifies statutes, regulations, rules, and policies enacted by Federal, state, and local agencies that address the potential for uses of state-owned aquatic lands to affect cultural resources. Subsection 3.12.2, Existing Conditions, provides baseline information for the evaluation of the effects of the alternatives in Section 4, Environmental Consequences, briefly describing cultural resources in the analysis area and identifying the key factors that influence the potential to adversely affect cultural resources.

3.12.1 Existing and Relevant Management Measures and Regulatory Framework

As noted in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws, the authority exercised by Washington DNR's Aquatics Division is proprietary, not regulatory. Issuance of a use authorization from Washington DNR is only part of the process that determines the type, location, and implementation of uses of state-owned aquatic lands. Many Federal, state, and local authorities are involved in setting the conditions for the construction, operation, and siting of the uses authorized by Washington DNR. Federal and state statutes, regulations, and policies that influence the potential for Washington DNR-authorized uses of state-owned aquatic lands to affect cultural resources include the following:

- National Historic Preservation Act (16 USC 470 *et seq*.)
- NEPA (42 USC 4321-4347)
- Antiquities Act of 1906 (16 USC 431 *et seq*.)
- Native American Graves Protection and Repatriation Act (25 USC 3001)
- Archaeological Resources Protection Act of 1979 (25 CFR 262.3)
- The American Indian Religious Freedom Act of 1978 (42 USC 1996)
- Executive Order 13007, Indian Sacred Sites
- SEPA
- Washington Governor's Executive Order 05-05, Archaeological and Cultural Resources
- RCW Chapter 27.44 Indian Graves and Records Act
- RCW Chapter 27.53 Archaeological Sites and Resources Act
- State Shoreline Management Act (and local shoreline management plans)

These Federal and state statutes, regulations, and policies are described in greater detail in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws.

Analyses in this document address two categories of cultural resources: recorded and unrecorded. Recorded resources are those that have been reported to the Washington State Department of Archaeology and Historic Preservation and recorded in the state inventory of cultural resources. The State Department of Archaeology and Historic Preservation is mandated by federal and state law (e.g., the National Historic Preservation Act and Governor's Executive Order 05-05; see Subsection 1.4, Relationship to Other Plans, Regulations, and Laws) to house and maintain these records. Resources are added to the inventory when they are discovered through surveys conducted for academic purposes or to meet regulatory requirements, or when the resources are found and reported by the public. Projects that may trigger surveys that can lead to the addition of resources to the state inventory of cultural resources include those Federal projects subject to review under section 106 of the National Historic Preservation Act or Governor's Executive Order 05-05, as described below.

Unrecorded resources are those that have not been recorded in the state inventory of cultural resources. Many cultural resources are buried and are not found until ground-disturbing activities occur. Some of these resources remain unrecorded because they occur at locations where surveys have not been conducted (because no proposed projects have triggered such surveys, for example). In other cases depending on the extent and coverage of surveys, some cultural resources may remain unrecorded even in areas where surveys are conducted beforehand. These and other unrecorded cultural resources are at an elevated risk of degradation, damage, or destruction by ground-disturbing activities, compared to cultural resources that have been found and recorded.

Under section 106 of the National Historic Preservation Act, Federal agencies are required to consider the effects of their undertakings (including funding, licensing, or permitting the undertakings of other entities) on cultural resources that are listed or eligible for listing on the National Register of Historic Places. Through the section 106 review process, Federal agencies are required, in consultation with state and tribal historic preservation offices, to seek ways to avoid, minimize, or mitigate any potential adverse effects on these cultural resources (Subsection 1.4.1.8, National Historic Preservation Act). Cultural resources discovered through consultations and surveys conducted for section 106 reviews are added to the state inventory of cultural resources. The issuance of ITPs under the ESA is considered a Federal undertaking, subject to review under section 106 of the National Historic Preservation Act.

At the state level, Governor's Executive Order 05-05 agencies conducting state capital projects not subject to Federal section 106 review are required to determine potential impacts on cultural resources and protect the public interest in historic and cultural sites (Subsection 1.4.2.9, State Historic Preservation Office). Capital projects are those that entail the expenditure of state funds for constructing new facilities or making substantial improvements to existing facilities. If recorded cultural resources occur in the area affected by a capital project, or if the Washington State Department of Archaeology and Historic Preservation determines that cultural resources are likely to occur in the area, the agency responsible for the capital project is required to consult with affected tribes and develop survey and mitigation strategies and take reasonable action to avoid, minimize, or mitigate adverse effects on the resource.

Individual city and county governments also provide protections for cultural resources. If the parcel where a particular use is proposed lies within a city's or a county's jurisdiction, additional requirements to identify, minimize, and mitigate for adverse effects may be required. Typically, the local agency will defer to the lead state and/or Federal agency, whereby effects on cultural resources are assessed under SEPA, section 106 of the National Historic Preservation Act, or Washington State Governor's Executive Order 05-05, in addition to the local regulation. If a project does not involve a Federal undertaking, does not require state capital funding, or is not located in an area covered under a shoreline master program, there may be no required effects review or protection for affected cultural resources. In addition, some of the statutes listed above (e.g., Shoreline Management Act) afford protections to some cultural resources (e.g., sites, buildings, objects, structures, districts) but not to others (e.g., Indian trust resources, traditional cultural properties).

In addition to the Federal, state, and local reviews identified above, cultural resources staff from the Washington DNR Aquatics Division review all Joint Aquatic Resources Project Applications, collect field information and conduct preliminary cultural resources evaluations on a site-by-site basis for all aquatic use authorizations. Through this review process, many (but not necessarily all) cultural resources on state-owned aquatic lands that have not already been recorded by the State Department of Archaeology and Historic Preservation are found and recorded, and effects are mitigated on a site-by-site basis. As noted above, some buried cultural resources may not be found or recorded during field reviews conducted by Washington DNR staff.

Most proposed projects with the potential to affect cultural resources involve ground-disturbing activities and are, therefore, subject to regulatory review and permitting at the Federal, state, and local levels (e.g., the Rivers and Harbors Act, Clean Water Act, and/or the State Hydraulic Code) as discussed in Subsection 3.3-1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes. Therefore, the potential for projects on state-owned aquatic lands and in the overall analysis area to adversely affect cultural resources is likely low, for two reasons. First, recorded cultural resources are protected under Federal, state, and local review and permitting processes. Second, many unrecorded cultural resources are protected through the implementation of measures aimed at protecting other resources that are found along shorelines and in shallow waters, where cultural resources are relatively likely to occur. Examples of review and permitting processes that may provide indirect protection of unrecorded cultural resources include ESA section 7 consultations, HPA reviews, and project reviews under local shoreline master programs, all of which can result in the implementation of measures that avoid or minimize ground-disturbing activities to protect resources such as habitat for ESA-listed species and other fish and wildlife, as well as the ecological functions of shoreline areas (Subsection 4.3.1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes).

Furthermore, the cultural resources that receive the most protection under these Federal, state, and local statutes, regulations, and policies are those that have been reported to and recorded by the State Department of Archaeology and Historic Preservation (Subsection 1.4, Relationship to Other Plans, Regulations, and Laws).

3.12.2 Existing Conditions

Cultural resources are aspects of a cultural system that are valued by or significantly representative of a culture or that contain significant information about a culture (National Park Service 1998). Cultural resources may include sites, features (natural or built), or areas, as well as patterns of behavior associated with a particular way of life (National Park Service 1998). They play an active part in the current and traditional cultural practices of ethnic groups in Washington State. Cultural resources can occur in the form of sites, buildings, objects, structures (including derelict structures), or districts. Cultural resources also include traditional materials and other resources used by native peoples to sustain their cultures. Such materials and resources, collectively referred to here as Indian trust resources, include plants, animals, and materials traditionally and currently used in medicines, foods, tools, textiles, building materials, carvings, and sacred objects, as well as the usual and accustomed grounds and stations for subsistence, ceremonial, cultural, and commercial benefits (Washington DNR 2010c). Lastly, cultural resources include traditional cultural properties, which are resources associated with the cultural practices or beliefs of a living community that are 1) are rooted in that community's history and 2) important in maintaining the continuing cultural identity of the community (U.S. Department of Interior 1998).

Access to and the use of water played a major role in the lives of prehistoric peoples and early Euro-American immigrants, and they continue to do so for many groups and individuals (Salzman 2006). Consequently, locations along shorelines and in shallow water in both marine and freshwater areas have a higher likelihood of cultural resources occurring on them than locations than other areas. Some cultural resources are more prevalent in marine areas than in freshwater areas. For example, shell middens are more commonly found in marine areas where shellfish are abundant (M. Major, pers. comm., Washington DNR, Archaeologist, March 26, 2013). Appendix A, Additional Information to Support the Analyses of Cultural Resources and Environmental Justice, provides additional detail regarding pre-history, Euro-American history, American Indian tribes, and the cultural resources found within Washington State.

The potential for proposed projects, including those involving uses of state-owned aquatic lands, to directly affect cultural resources that have been recorded by the State Department of Archaeology and Historic Preservation is limited through the regulatory and permitting processes identified in Subsection 3.12.1, Existing and Relevant Management Measures and Regulatory Framework. As noted above, however, not all cultural resources on state-owned aquatic lands have likely been recorded. These unrecorded cultural resources may not be found until they are uncovered (and possibly damaged) by ground-disturbing activities; in some cases, unrecorded cultural resources may be degraded, damaged, or destroyed without anyone's knowledge. For this reason, the number and distribution of unrecorded cultural resources that have been damaged, destroyed, or degraded are unknown. As discussed in Subsection 3.2, Land Ownership and Use, many uses of state-owned aquatic lands occur in areas that are close to shore—i.e., along shorelines and in shallow waters, which is where many cultural resources are likely to occur.

Examples of potential effects on unrecorded cultural resources include 1) damage or destruction of sites or the modification of features that are important to the historical or cultural context; 2) changes to the setting through the introduction of noise or the construction of new elements that are out of character with the existing setting; 3) disturbance of the shoreline or submerged resources during construction, demolition, and maintenance activities (including removal of derelict structures, many of which occur along shorelines and in shallow water); and 4) degradation or reduced availability of and access to culturally important plant and animal resources that can affect Indian trust resources. The ways in which uses of state-owned aquatic lands potentially contribute to the risk of adverse effects on cultural resources are described in greater detail in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

3.13 Social and Economic Environment

This subsection identifies the aspects of the social and economic environment that may be affected by Washington DNR's management of state-owned aquatic lands under the proposed alternatives. Subsection 3.13.1 describes the statutes, regulations, rules, and policies that influence the costs associated with uses of state-owned aquatic lands, as well as those that influence the potential for uses of state-owned aquatic lands to affect the social and economic value of ecosystem services (e.g., maintenance of water quality, support of human well-being) provided by those lands. Subsection 3.13.2 provides baseline information for the evaluation of the effects of the alternatives, describing costs associated with using state-owned aquatic lands; revenue, jobs, and income within industries supported by uses of state-owned aquatic lands; and the social and economic value of ecosystem services provided by state-owned aquatic lands.

3.13.1 Existing and Relevant Management Measures and Regulatory Framework

As noted in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws, the authority exercised by Washington DNR's Aquatics Division is proprietary, not regulatory. Issuance of a use authorization from Washington DNR is only part of the process that determines the type and location of uses of state-owned aquatic lands, as well as the ways that uses are implemented. Many Federal, state, and local authorities are involved in setting the conditions for the construction, operation, and siting of the uses authorized by Washington DNR. Federal, state, and local statutes, regulations, and policies pertinent to Washington DNR's authorization of uses of state-owned aquatic lands include the following:

- Treaty Rights
- Federal Coastal Zone Management Act
- Federal Rivers and Harbors Act
- NEPA, if Federal funding or permitting is involved
- ESA, if Federal funding or permitting is involved
- SEPA
- RCW Title 79 – Public Lands
- WAC Chapter 332-30 – Aquatic Land Management
- State Growth Management Act (and local critical areas ordinances)
- State Shoreline Management Act (and local shoreline management plans)
- State Hydraulic Code

These are described in greater detail in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws. Notably, state law (RCW 79.105.030) directs Washington DNR to provide a balance of public benefits for all citizens of the state. Among these benefits are commerce and revenue generation (WAC 332-30-106). State law requires Washington DNR to weigh the relative benefits of current use and enjoyment of the resource, while protecting it for future generations.

Project reviews under various Federal, state, and local statutes, regulations, rules, and policies (e.g., Rivers and Harbors Act, Clean Water Act, State Hydraulic Code, local shoreline master programs) commonly result in the implementation of measures that restrict the location and conduct of many uses to protect environmental resources. These review processes and examples of such measures are described in the discussions of physical and biological resources elsewhere in this document, specifically, Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework (Substrates and Erosional Processes), Subsection 3.4.1, Existing and Relevant Management Measures and Regulatory Framework (Water Resources), and Subsection 3.6.1, Existing and Relevant Management Measures and Regulatory Framework (Vegetation). As a result, applicants for many new or reconfigured structures and uses are required to implement measures that may result in increased operational or materials and installation costs. Except in cases of proposed reconfiguration, existing structures are typically not subject to such regulatory review.

In addition to the measures identified above, several of the special conditions that have been incorporated into the U.S. Army Corps of Engineers' nationwide permit for commercial shellfish aquaculture in Washington State have the potential to affect operational costs at shellfish aquaculture facilities. These include requirements to avoid certain activities in areas documented as spawning habitat for forage fish species and to conduct surveys for evidence of forage fish spawning. The nationwide permit also prohibits certain aquaculture activities that may disturb the eggs of Pacific herring (a species of forage fish). At sites where herring spawn is present on aquaculture materials (e.g., oyster bags, long lines, or netting), compliance with these requirements may necessitate a cessation of aquaculture activities during periods of active herring spawning. Lastly, the nationwide permit for commercial shellfish aquaculture prohibits the placement of new or expanded shellfish aquaculture systems within 10 horizontal feet of eelgrass or kelp.

No Federal, state, or local regulatory review or permitting processes directly address the provision of ecosystem services. However, many authorized uses of state-owned aquatic lands that could adversely affect ecosystem services by degrading ecosystem function are subject to review and/or permitting under one or more of the Federal, state, and local policies and statutes identified above, thereby limiting the potential for indirect effects on ecosystem services.

3.13.2 Existing Conditions

The current condition of the social and economic environment in the analysis area is described in the following terms:

- The costs associated with using state-owned aquatic lands
- The amount, distribution, and types of revenue, jobs, and income associated with industries supported by uses of state-owned aquatic lands
- The amount, distribution, and social and economic value of ecosystem services provided by state-owned aquatic lands

In this subsection, information on the amount and distribution of uses of state-owned aquatic lands is organized by county as is typical for describing similar information at a statewide scale. This level of information also supports the analyses of environmental justice, which identify potentially affected low-income and minority populations at the county level (Subsection 3.14, Environmental Justice).

The number of use authorizations is constantly changing as Washington DNR processes applications for new authorizations and requests for reauthorization of existing uses. In the discussions below, information about the number and spatial distribution of existing authorizations is based on data drawn from Washington DNR's accounting system while the HCP was under development (Washington DNR 2011). As such, the information presented below is a snapshot of conditions when the accounting system was queried. The number of use authorizations in the snapshot of data helps frame an understanding of: 1) the number of use authorizations associated with each industry and 2) the geographic distribution of the use authorizations throughout the counties in the state. However, the snapshot of data does not necessarily represent the actual number of use authorizations that may be affected under any of the alternatives.

3.13.2.1 Costs Associated with Uses of State-owned Aquatic Lands

As described in Subsection 3.13.1, Existing and Relevant Management Measures and Regulatory Framework, project reviews under various Federal, state, and local statutes, regulations, rules, and policies commonly result in the implementation of measures that restrict the location and conduct of many uses of state-owned aquatic lands, potentially leading to increased operational or materials and installation costs. The costs of implementing such measures vary widely, depending on operational practices and the physical features at individual use authorization sites. In general, large firms and organizations are more likely to have the capital available to absorb such costs, compared to smaller firms or individual operators. Examples of measures that can lead to increased costs include the following:

- Restrictions on operations within protective buffers (e.g., for aquatic vegetation) can reduce operational efficiency by reducing the amount of area available for engaging in activities at use authorization sites.
- Measures directed at reducing substrate damage due to boats and other floating objects (e.g., logs) striking the bottom of a waterbody during low-water conditions can result in requirements to modify facilities to avoid such damage, leading to increased construction costs. Similar measures required to prevent substrate damage from dragging anchors or lines at mooring buoys can also result in costs associated with the use of embedded anchors or midline floats. Measures aimed at reducing substrate damage can also result in requirements to locate facilities where damage will not occur, potentially reducing operational efficiency.
- Measures directed at reducing the accumulation of wood and bark at log handling facilities can result in increased operational costs associated with bark removal and disposal. Typically, bark is left on logs that are transported in water because the bark extends the time the logs can remain in the water without damage. As a result, and because of economies of scale, bark removal and disposal are most cost-effective if they occur at a central location, after the logs have been delivered to their destination and removed from the water (Groves 2011). When operators of log handling facilities are required to remove bark before logs are placed in the water and delivered to a central location, the efficiency of centralized bark removal is reduced, leading to increased costs due to the use of smaller, decentralized bark removal devices, as well as increased transportation costs for bark disposal.
- Labor effort to comply with other measures directed at reducing the accumulation of wood and bark at log handling facilities (e.g., maintaining containment booms, using cranes instead of rolling logs off of barges, disposing of loose bark and wood debris at upland locations) can also result in increased operational costs.

In addition to the measures identified above, requirements to avoid the use of certain materials (e.g., treated wood for replacement decking[8]) can result in increased upfront costs, if other materials and installation are more expensive. The following paragraphs provide estimates of upfront costs associated with using materials that comply with Federal, state, and local statutes, regulations, rules,

[8] Note that treated wood has also been used for pilings. However, most new pilings (and replacements of treated wood pilings that have reached the end of their service life) are made of galvanized steel, a material commonly allowed under regulatory and permitting reviews. Therefore, current and prospective users of state-owned aquatic lands are not likely to incur increased materials costs associated with the use of galvanized steel instead of treated wood for pilings.

and policies regarding the protection of environmental resources. The available data address differences in costs of materials used in marine areas; it is likely that the relative differences of costs in freshwater areas are similar.

The use of treated wood products in aquatic environments is a widespread practice, developed to protect the wood from degradation by aquatic organisms capable of consuming wood (NMFS 2008). Shade from decks and other surfaces made of treated wood can harm sensitive resources that are protected through Federal, state, and local regulatory review and permitting processes (e.g., by impeding the growth of vegetation or presenting a migration barrier to fish; Subsection 4.1.4.4, Shading). As a result, these review and permitting processes commonly result in requirements to use materials that allow light transmission. Materials that meet light transmission requirements currently include aluminum, fiberglass, polypropylene, and steel. The material and installation costs of these alternative materials are typically greater than those of treated wood (Table 3-4). If the service life of the material is taken into account, however, the resulting annualized material and installation costs of two alternative materials—molded fiberglass and galvanized steel grating—are equal to or less than the annualized cost of treated wood (Table 3-4). The annualized costs of other surface materials may be up to six times the annualized cost of pressure-treated wood.

Table 3-4. Material and installation costs of deck surface materials.

Material	**Material and Installation Costs ($ per square foot)**	**Estimated Service Life (years)**	**Annualized Cost ($ per year)**	***Difference from Annualized Cost of Treated Wood (Percent)***
Predominant material currently in use				
Treated Wood	$4.00	13	$0.32	*0*
Alternative materials that meet requirements to minimize shading of sensitive habitats				
Pre-stressed Concrete Decking	$77.50	35	$2.21	+ *591*
Recycled Plastic Lumber	$67.50	35	$1.93	+ *503*
Aluminum Grating	$45.00	40	$1.13	+ *253*
Stainless Steel	$36.00	50	$0.72	+ *125*
Pultruded[9] Fiberglass	$19.00	33	$0.58	+ *81*
Molded Fiberglass	$10.50	33	$0.32	*0*

[9] Pultrusion is a molding process in which heated resin cures as it is pulled through a die. Pultrusion is a variation of the extrusion process, in which resin is pushed through a die.

Galvanized Steel Grating	$11.00	40	$0.28	- *13*

Sources: Fabricators and Manufactures Association 2011; Guy 2011; Kaczmarek 2011; Keidle 2011; Stroud 2011

Notably, for operators of shellfish aquaculture facilities, the potential costs of implementing measures to protect sensitive resources may be offset through funding from the Natural Resources Conservation Service. In 2005, the Natural Resources Conservation Service implemented a program in Massachusetts to help offset the costs of implementing best management practices established for the shellfish aquaculture industry in southeastern Massachusetts (Smith et al. 2006). The funding was made available under the Environmental Quality Incentives Program to encourage accelerated local adoption of best management practices. By 2006, contracts had been developed with 34 shellfish producers for approximately $550,000 in Environmental Quality Incentives Program funds. The Natural Resources Conservation Service is considering a pilot study for implementing a similar program in Washington State (Kendig 2012).

3.13.2.2 Revenue, Jobs, and Income

Discussions in this subsection present information about revenue, jobs, and income in the aquaculture, forestry, recreation, and commerce industries. Discussions focus on these industries because they are supported by uses of state-owned aquatic lands that are strongly associated with proposed changes in Washington DNR's management under the alternatives. These uses include shellfish aquaculture, log booming and storage, and uses that depend on overwater structures. Based on data from Washington DNR (2011), approximately one-half of the active use authorizations in 2011 were for uses that are strongly associated with proposed changes in the operation of Washington DNR's Aquatics Division. The great majority of the remaining use authorizations were easements for roads and utilities or land encumbrances for administrative purposes, with smaller numbers being for other uses such as outfalls, floating homes, and areas used for fill and for contaminated sediment mitigation (Washington DNR 2011).

For each industry, the amount and distribution of revenue, jobs, and income associated with uses of state-owned aquatic lands are indicated by the amount and distribution of existing authorizations for uses that support that industry. Discussions in this subsection focus on existing use authorizations because the amount or distribution of any applications for new use authorizations, or for reconfigurations of existing authorized uses, cannot reliably be predicted.

Table 3-5 presents a geographic breakdown of the 1,890 use authorizations with the strongest association with changes proposed through the HCP Operating Conservation Program under the action alternatives. Almost all (approximately 96 percent) of these authorizations are in counties in western

Washington, primarily those that include marine areas along Puget Sound and Hood Canal. San Juan County has the greatest number of use authorizations, most of which are for recreational buoys (Washington DNR 2011). Only 30 of Washington's 39 counties are represented in Table 3-5. The other nine counties either have no authorizations for uses of state-owned aquatic lands, or the existing authorizations in these counties are for uses that are not associated with proposed changes in Washington DNR's management under the alternatives.

Table 3-5. Use authorizations for state-owned aquatic lands, by county and industry.

County	**Aquaculture**	**Forestry**	**Recreation**	**Commerce**	**Total**
Asotin	-	-	3	-	3
Benton	-	-	2	1	3
Chelan	2	-	21	3	26
Clallam	8	1	17	11	37
Clark	-	2	10	11	23
Cowlitz	1	3	21	6	31
Douglas	-	-	11	-	11
Franklin	-	-	2	1	3
Grant	-	-	3	-	3
Grays Harbor	15	3	5	9	32
Island	6	-	37	6	49
Jefferson	12	-	92	5	109
King	1	2	121	69	193
Kitsap	4	1	226	13	244
Kittitas	-	-	1	1	2
Lewis	-	-	5	1	6
Mason	16	4	33	8	61
Okanogan	-	-	9	-	9
Pacific	57	-	7	7	71
Pend Oreille	-	-	7	-	7
Pierce	3	2	118	26	149
San Juan	4	2	568	22	596
Skagit	2	1	69	15	87
Skamania	-	-	3	-	3
Snohomish	-	3	20	3	26
Spokane	-	-	4	-	4
Thurston	5	2	45	2	54
Wahkiakum	1	1	6	5	13
Whatcom	1	-	24	7	32
Yakima	-	-	2	1	3
Total	**138**	**27**	**1,492**	**233**	**1,890**

Source: Washington DNR 2011

Also pertinent to this analysis are the schedules for expiration of existing use authorizations; these schedules help identify the time frame over which the effects of the alternatives might be expected to occur. Figure 3-1 shows the cumulative percent of use authorizations due for re-authorization each year, as a percent of the total number of use authorizations in that industry. The expiration dates for existing authorizations represent the earliest point at which habitat conservation measures can be incorporated, unless the tenant proposes changes to the use, operations, or improvements. Other circumstances under which new measures could be required for existing use authorizations include default by a tenant on a use authorization agreement, ownership changes, assignment, or a mutual agreement between Washington DNR and the tenant. Although the industries differ somewhat in the pace at which existing authorizations will expire, the overall pattern is fairly similar. Of the 1,890 use authorizations that were active in 2011 and that strongly associated with proposed changes in the operation of Washington DNR's Aquatics Division, approximately 50 percent will expire by 2019, with use authorizations in the aquaculture and forestry industries reaching that point a few years earlier and those for floating homes arriving later. By 2035, 90 percent of the authorizations in most industries will expire, although the aquaculture industry will have reached that point by 2021 (Figure 3-1).

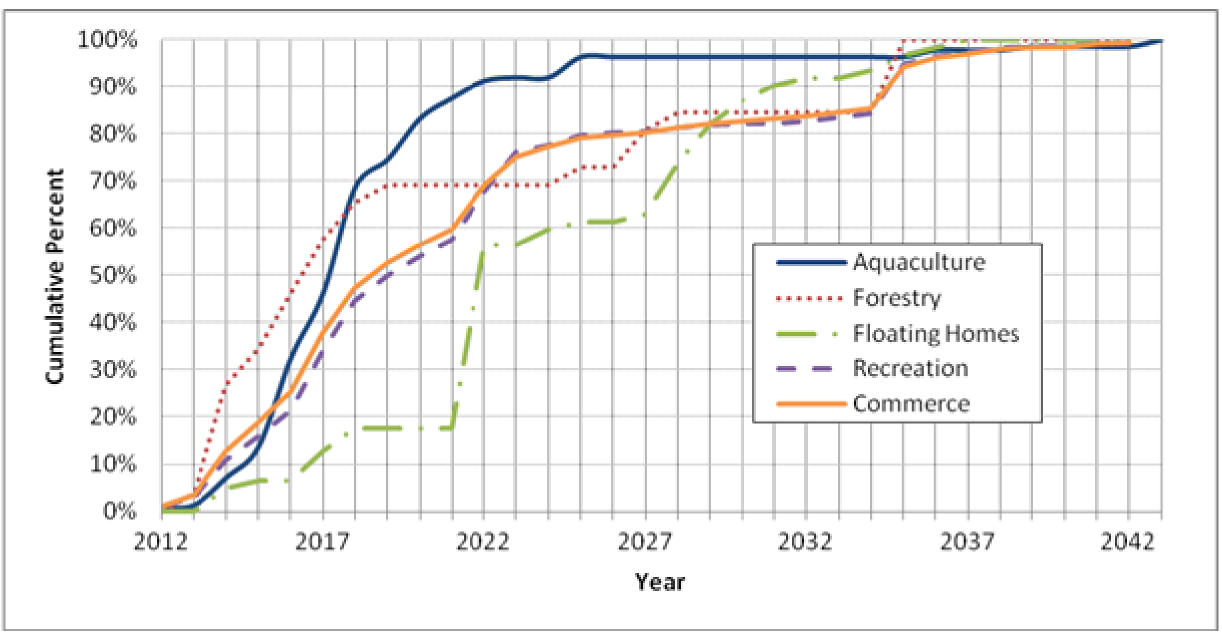

Figure 3-1. Cumulative percent of use authorizations expiring by year, within each industry.

The following subsections identify the number and location of use authorizations in each of the industries identified for this analysis, focusing on the 1,890 existing use authorizations that are most strongly associated with proposed changes in Washington DNR's management under the alternatives. Information about revenue, jobs, and income in each industry, where available and pertinent, is also presented. Where possible, the discussions include information about the amount of economic activity associated with uses of state-owned aquatic lands.

Aquaculture

The aquaculture industry involves the production of aquatic organisms for commercial or other purposes. Uses of state-owned lands that support revenue, jobs, and income in the aquaculture industry include shellfish aquaculture (oysters, clams, mussels, and shrimp) and finfish aquaculture (primarily herring and salmon). The holders of use authorizations range from individuals operating in relatively small areas to large aquaculture companies. Most shellfish operations in the state are relatively small. Eighty percent of the members of the Pacific Coast Shellfish Growers Association gross less than $25,000 on the raw product that they produce annually (M. Barrette, pers. comm., Pacific Coast Shellfish Growers Association, February 15, 2012).

The extent to which the use of state-owned aquatic lands for shellfish aquaculture and finfish aquaculture contributes to the generation of revenue, jobs, and income in the aquaculture industry in Washington State is unknown. Information about the economic activity associated with aquaculture can be drawn from the census of agriculture conducted periodically by the U.S. Department of Agriculture. Between 1998 and 2005, the total revenue from the sales of aquaculture products (shellfish and finfish) in Washington State increased 65 percent, from $56.6 million to $93.2 million (U.S. Department of Agriculture 2006). Most of that increase was associated with shellfish aquaculture; the number of shellfish aquaculture facilities in the state increased from 64 in 1998 to 174 in 2005 (U.S. Department of Agriculture 2006). Based on the existence of use authorizations, the use of state-owned aquatic lands for aquaculture contributes to revenue, jobs, and income in Washington State, but the amounts are unknown. The proportion of the state's aquaculture industry that is supported on state-owned aquatic lands is not known (D. Palazzi, pers. comm., Washington DNR, September 12, 2013).

Existing authorizations for uses of state-owned aquatic lands for aquaculture occur exclusively in counties that border or include marine areas. Of the 138 use authorizations in the aquaculture industry, 88 (64 percent) are in Pacific County, Grays Harbor County, or Mason County (Table 3-5). Approximately 5 percent of the tidelands in shellfish production in Grays Harbor are state-owned aquatic lands (Washington DNR 2012b). Willapa Bay, in Pacific County, has more area encumbered by shellfish aquaculture than any other location in the state. No corresponding information is available concerning the amount of area in shellfish aquaculture production in Mason County, nor the proportion of that area consisting of state-owned aquatic lands. Most of the rest of the aquaculture authorizations are in counties that border Hood Canal (Kitsap, Jefferson) or Puget Sound (Island, San Juan, Thurston) (Table 3-5).

In contrast to other industries, the rents and fees paid for use of state-owned aquatic lands for aquaculture are established through competitive bidding or negotiation for individual leases (RCW 79.135.100). In addition, rents and fees are based on the wholesale value of the product, rather than the value of the land and improvements (J. Schreck, pers. comm., Washington DNR, November 19, 2009). Between 1998 and 2009, average annual revenue from state-owned aquatic lands in aquaculture production was approximately $400,000 (D. Palazzi, pers. comm., Washington DNR, December 28, 2009), amounting to approximately 2 to 5 percent of total revenue from use authorizations for state-owned aquatic lands each year (Washington DNR 2012f).[10]

Forestry

The forestry industry involves the production and transport of wood products, including logs, lumber, furniture, and paper. Uses of state-owned lands that support revenue, jobs, and income in the forestry industry include log storage and log booming. The holders of use authorizations include large, multinational firms as well as relatively small firms in the tug, barge, and towing business.

The extent to which the use of state-owned aquatic lands for log storage and log booming contributes to the generation of revenue, jobs, and income in the forestry industry in Washington State is unknown. In 2010, direct employment in Washington's forest product industry (including forestry and logging; wood product manufacturing; paper manufacturing; forestry support activities; and wood furniture and related product manufacturing) was approximately 47,900 jobs (Washington State Employment Security Department 2011). Approximately 60 percent of the jobs were in manufacturing. The number of jobs that were directly related to log booming or storage on state-owned aquatic lands is unknown. Based on the large number of jobs in other portions of the industry, however (e.g., manufacturing, logging, silviculture), it is likely that log booming and storage supported a small proportion of the jobs in the forest products industry. Forestry and logging encompass numerous interconnected processes, including but not limited to felling, bucking, hauling, storing, transporting, drying, and planing.

[10] Note that these amounts do not include revenue from auctions selling the rights to harvest geoducks on state-owned aquatic lands because geoduck harvest is not addressed by any of the alternatives.

Although state-owned aquatic lands are used for just one of those processes (storing), changes in the operation of that process have the potential to influence the flow of raw materials through the entire system, which may also influence revenue, jobs, and/or income.

The 27 use authorizations in the forestry industry are fairly evenly distributed among 13 counties in western Washington, with no county having more than 4 authorizations (Table 3-5). The greatest proportion (12 of 27) of use authorizations is in counties that border Puget Sound; the others are in counties along Hood Canal, the lower Columbia River, and Grays Harbor.

Recreation

For this analysis, the recreation industry includes businesses that provide goods and services for persons engaging in water-related recreation (e.g., boating). Uses of state-owned lands that support revenue, jobs, and income in the recreation industry include private docks and buoys as well as public and private marinas and yacht clubs. Uses supporting the recreation industry also include non-water-dependent structures, such as nearshore buildings (e.g., restaurants, retail outlets, office buildings). The extent to which these uses of state-owned aquatic lands contribute to the generation of revenue, jobs, and income in the recreation industry in Washington State is unknown. However, some general information about the industry is available. A recent study estimated that recreational boating contributes approximately $343 million per year to Washington's economy, supporting more than 1,900 jobs (Hebert Research 2011). The U.S. Census Bureau (2007) estimated the receipts associated with 115 marinas in Washington State to be $75.3 million in 2002, with a supporting payroll of $17.0 million for 534 paid employees (U.S. Census Bureau 2007). The number of these marinas that were on state-owned aquatic lands is not known. Taken together, however, these findings indicate a substantial amount of economic activity associated with the recreational use of aquatic lands, including state-owned aquatic lands.

Use authorizations in the recreation industry are found statewide, including all of the counties listed in Table 3-5. Nearly 90 percent of the authorizations are in counties that border or include marine areas in Puget Sound, Hood Canal, or the Pacific Ocean. More than 60 percent of the use authorizations in the recreation industry category are for mooring buoys associated with private residences or recreational sites (Washington DNR 2011).

Commerce

For this analysis, the commerce industry includes businesses that provide goods and services associated with the use of aquatic lands for transport and commerce. Uses of state-owned lands that support revenue, jobs, and income in the commerce industry include those for navigational buoys, commercial mooring buoys, and commercial marinas. Use authorizations with ports are included in this category, with the exception of those managed under Port Management Agreements because state-owned aquatic lands in areas managed under Port Management Agreements would not be included in the Aquatic Lands HCP under either action alternative. Examples of the types of economic activities supported by authorizations to use state-owned aquatic lands for transport and commerce include those associated with terminal and transfer facilities, ferry terminals, boat repair facilities, fish processing plants, irrigation pumping plants, navigational aids, sand and gravel processing facilities, and petroleum refining facilities.

The amount of economic activity associated with the use of aquatic lands for transport and commerce, while substantial, is not known. In 2010, for example, the United States Customs District of Seattle (which includes nearly all ports in the State of Washington, except for those in Kalama, Longview, and Vancouver) handled more than $77 billion worth of international trade (Maritime Administration 2012). A comparable amount of domestic trade likely occurred during the same period. A considerable proportion of that activity was associated with ports in major cities, most of which are either located on private property or operated under Port Management Agreements with Washington DNR. The amount of economic activity associated with Washington DNR-managed lands, while unknown, is likely much smaller than the statewide figures cited above. Another indicator of the economic activity potentially associated with aquatic lands is the number of jobs in the seafood canning and processing industries. In 2010, seafood canning and seafood processing supported 6,665 jobs in Washington State (Washington State Employment Security Department 2011). Some of these jobs may have been in facilities on overwater structures on state-owned aquatic lands. It is not known however, whether these jobs represent a small or large proportion of the total number of jobs within those two classifications.

3.13.2.3 Ecosystem Services

Ecosystem services are the benefits that people receive from ecosystems (Millennium Ecosystem Assessment 2005), including resources and processes as well as support of human well-being. Examples of ecosystem services provided by state-owned aquatic lands include water quality maintenance, nutrient cycling, habitat formation, climate regulation, and biodiversity. Examples of human well-being benefits include material well-being, relationships with family and friends, and emotional and physical health (Plummer and Schneidler 2011).

Several recent publications (e.g., Leschine and Peterson 2007; Batker et al. 2008) have described the economic benefits of fully functioning ecosystems, with an emphasis on Puget Sound. These publications have employed economic principles—for example, estimating the least-cost engineered solution to water quality improvements as a proxy for the water filtration services provided by healthy ecosystems. Although such calculations are beyond the scope of this analysis, it is worth noting that natural ecosystem functions have values that can be described in economic terms, as well as other values that cannot be described. Based on the information provided in the descriptions of the physical and biological resources elsewhere in this document (e.g., Subsection 3.3, Substrates and Erosional Processes; Subsection 3.4, Water Resources; Subsection 3.5, Noise; Subsection 3.6, Vegetation; Subsection 3.7, Wetlands and Riparian Areas; Subsection 3.8, Fish, Aquatic Invertebrates, and Associated Habitats; Subsection 3.9, Wildlife and Wildlife Habitat), the current condition of aquatic lands in the analysis area is substantially degraded from historical conditions, diminishing the ability of those lands to provide ecosystem services.

The ongoing work of the Puget Sound Partnership's Puget Sound Science Update also supports the assertion that protection and restoration of natural resources have social and economic value that can be measured in terms of human well-being. The Puget Sound Science Update is reviewing data that can be used as indicators for the social and economic state of the region (Puget Sound Partnership 2011). Additionally, work is underway to determine "how human well-being can be … used (in principle) as an over-arching metric by which to evaluate the effectiveness and impacts of management actions" (Plummer and Schneidler 2011).

3.14 Environmental Justice

This subsection identifies low-income and minority populations that may be subject to disproportionately high and adverse human health or environmental effects by Washington DNR's management of state-owned aquatic lands under the proposed alternatives. Subsection 3.14.1 describes the statutes, regulations, rules, and policies that address the potential for uses of state-owned aquatic lands to result in disproportionately high and adverse effects on low-income and minority populations. Subsection 3.14.2 provides baseline information for the evaluation of the effects of the alternatives, briefly identifying low-income and minority populations in the analysis area, as well as the ways in which these populations may be affected by Washington DNR's management of state-owned aquatic lands.

3.14.1 Existing and Relevant Management Measures and Regulatory Framework

As noted in Subsection 1.4, Relationship to Other Plans, Regulations, and Laws, the authority exercised by Washington DNR's Aquatics Division is proprietary, not regulatory. Issuance of a use authorization from Washington DNR is only part of the process that determines the type and location of uses of state-owned aquatic lands, as well as the ways that uses would be implemented. Many Federal, state, and local authorities are involved in setting the conditions for the construction, operation, and siting of the uses authorized by Washington DNR.

Any uses of state-owned aquatic land that include Federal involvement (e.g., funding, approval, and/or permitting) are subject to Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The Order directs agencies to identify and address, as appropriate, any disproportionately high and adverse effects of their actions, programs, or policies on low-income and minority populations. The Order further stipulates that the agencies must conduct their programs and activities in a manner that does not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination because of their race, color, or national origin.

Many uses of state-owned aquatic lands receive funding or require approval or permitting by Federal agencies. As such, the Federal agencies responsible for funding, approving, and/or permitting these uses are required to consider the environmental justice implications of these decisions. In addition, project reviews under various Federal, state, and local statutes, regulations, rules, and policies (e.g., Rivers and Harbors Act, Clean Water Act, State Hydraulic Code) commonly result in the implementation of measures that restrict the location and conduct of many uses. As a result, applicants for many new or reconfigured structures and uses are required to implement measures that may result in increased operational or materials and installation (e.g., decking, pilings) costs, with potential adverse economic effects on low-income and minority populations (see Subsection 3.14.2, Existing Conditions). Except in cases of proposed reconfiguration, existing structures are typically not subject to such regulatory review.

State and local permits that may be required for development of a use authorized by Washington DNR typically rely on SEPA to evaluate potential effects. SEPA does not require, nor does it preclude, an evaluation of environmental justice. A state or local agency may choose to include such an evaluation on its own or in response to public input on a project. Washington DNR does not have any specific requirements concerning the potential for uses of state-owned aquatic lands to result in disproportionately high and adverse effects on low-income and minority populations.

3.14.2 Existing Conditions

As noted above, environmental justice analyses address effects on low-income and minority populations. For the reasons provided below, low-income and minority populations with the potential to be affected by the alternatives are identified in this analysis at the county level, based on various demographic and economic measures. Counties identified as being at an elevated risk of disproportionate effects on low-income or minority populations are those meeting any of the following criteria (EPA 1998):

- A poverty rate that is greater than 50 percent or that is at least 120 percent of the statewide rate
- A 3-year average unemployment rate that is greater than 50 percent or that is at least 120 percent of the statewide rate
- A low socioeconomic resiliency rating[11]
- More than 50 percent of the population consisting of a minority group
- A minority group making up a proportion of the county population that exceeds the corresponding statewide proportion by at least 20 percentage points (for example, if 5 percent of the statewide population consists of a specific minority group, and that group makes up at least 25 percent of a particular county's population, then that county is identified as being at an elevated risk of disproportionate effects on minority populations)

For this analysis, such counties are called counties with elevated environmental justice concerns (Table 3-6). For example, for this analysis, Grant County is considered to be a county with elevated environmental justice concerns for both low-income and minority populations, based on a poverty rate that is more than 120 percent of the statewide rate and a Hispanic population that is more than 20 percentage points above the statewide average. The process by which counties were identified for this analysis is described in Appendix A, Additional Information to Support the Analyses of Cultural Resources and Environmental Justice.

As noted above, low-income and minority populations with the potential to be affected by the alternatives are identified in this analysis at the county level. This is because no information is available for the number or distribution of use authorizations that have been issued to members of low-income or minority populations; no demographic or economic information is available about the persons who have authorizations to use state-owned aquatic lands, or about the owners, operators, and employees of businesses that rely on those lands. For this reason, a direct analysis of low-income and minority populations with the potential to be affected by Washington DNR's management of state-owned aquatic lands under the proposed alternatives is not possible. Instead, the environmental justice analysis in this EIS identifies counties with elevated environmental justice concerns. Also, as discussed

[11] Socioeconomic resiliency refers to the ability of an area's population and economy (e.g., community, county, or region) to adapt to economic changes or shocks (Daniels 2004). Counties with a low rating are considered to have an elevated risk of negative effects in response to downturns in individual firms or economic industries. See Appendix A for additional discussion.

Table 3-6 Counties in the analysis area with elevated environmental justice concerns.

County[1]	Elevated Poverty Rate[2]	Elevated Unemployment Rate[3]	Low Resiliency Rating[4]	Elevated Minority Population[5]	
				Hispanic or Latino Origin	**Other Race[6]**
Adams	X		X	X	X
Clark		X			
Columbia	X	X	X		
Cowlitz	X	X			
Ferry	X	X	X		
Franklin	X			X	X
Garfield	X		X		
Grant	X			X	
Grays Harbor	X	X			
Kittitas	X				
Klickitat	X	X	X		
Lewis		X			
Lincoln			X		
Mason	X	X			
Okanogan	X		X		
Pacific	X	X	X		
Pend Oreille	X	X	X		
Skamania		X	X		
Stevens	X	X	X		
Wahkiakum		X	X		
Walla Walla	X				
Whatcom	X				
Whitman	X				
Yakima	X			X	

[1] Names in *italics* indicate counties where there are no existing authorizations for uses that are considered likely to be affected by the action alternatives.
[2] "X" indicates poverty rate equal to or greater than 120 percent of the statewide rate. No counties in Washington have poverty rates exceeding 50 percent (U.S. Census Bureau American Community Survey 20b).
[3] "X" indicates 3-year average unemployment rate equal to or greater than 120 percent of the statewide rate. No counties in Washington have unemployment rates exceeding 50 percent (Washington State Employment Security Department 2012).
[4] "X" indicates counties identified as having a low socioeconomic resiliency rating (Daniels 2004).
[5] "X" indicates minority groups with county-level populations that exceed the statewide proportion by 20 or more percentage points. Minority groups do not make up more than 50 percent of the population in any Washington counties (U.S. Census Bureau 2012a).
[6] "Other Race" indicates census respondents who did not identify as white, African American, Asian, or Native American.

in Subsection 3.13, Social and Economic Environment, analyses of potential effects on low-income and minority populations are based on the locations of existing use authorizations that have been identified as having a high likelihood of being affected by implementation of the Aquatic Lands HCP under the action alternatives (Table 3-5).

Of the 24 counties with elevated environmental justice concerns in the analysis area (Table 3-6), 9 (Adams, Columbia, Ferry, Garfield, Klickitat, Lincoln, Stevens, Walla Walla, and Whitman) do not have any authorizations for uses with a high likelihood of being affected by implementation of the Aquatic Lands HCP under the action alternatives (Table 3-5). In the other 15 counties, Washington DNR's management of the Aquatics Division has a greater potential for influencing the operational or materials and installation (e.g., decking, pilings) costs when existing uses are considered for reauthorization. Of these 15 counties, 9 (Clark, Cowlitz, Grays Harbor, Lewis, Mason, Pacific, Skamania, Wahkiakum, and Whatcom) border or include marine areas in Puget Sound, the Pacific Ocean, or the lower Columbia River.

Management of aquatic lands, including Washington DNR's management of uses of state-owned aquatic lands, has the potential for adverse effects on people, including individuals in low-income and minority populations. For example, implementation of measures that place restrictions on the location and/or operation of certain uses may result in increased operational or materials and installation (e.g., decking, pilings) costs for some uses of state-owned aquatic lands (e.g., shellfish aquaculture facilities, log handling facilities, mooring buoys).

4. ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

This section provides an analysis of potential direct and indirect environmental effects associated with the alternatives on the physical, biological, and social environments. Cumulative effects associated with the alternatives are described in Section 5, Cumulative Effects. The analysis presented in this section is based on potential changes to the existing conditions described in Section 3, Affected Environment. Consequently, each main subsection below describes potential effects on a specific resource topic, which is described in a corresponding main subsection in Section 3, Affected Environment. The specific order of the resource effects analyzed in this section is as follows:

- Land Ownership and Use (Subsection 4.2)
- Substrates and Erosional Processes (Subsection 4.3)
- Water Resources (Subsection 4.4)
- Noise (Subsection 4.5)
- Vegetation (Subsection 4.6)
- Wetlands and Riparian Areas (Subsection 4.7)
- Fish, Aquatic Invertebrates, and Associated Habitats (Subsection 4.8)
- Wildlife and Wildlife Habitat (Subsection 4.9)
- Recreation (Subsection 4.10)
- Visual Resources (Subsection 4.11)
- Cultural Resources (Subsection 4.12)
- Social and Economic Environment (Subsection 4.13)
- Environmental Justice (Subsection 4.14)

Table 4-1 at the end of this section provides a summary of the effects of the alternatives on each resource area. The remainder of this subsection provides general information relevant to the evaluation of the alternatives. Topics discussed include the analysis area, available information used, the general approach to the analysis of the effects of the alternatives, and an overview of the potential physical and biological effects of the uses that would be addressed by the HCP Operating Conservation Program under the action alternatives. The interactions between the proposed project and climate change are discussed in Section 5, Cumulative Effects.

4.1.1 Analysis Area

As described in Subsection 3.1, Introduction, the analysis area for all resources addressed in this EIS includes lands and waters throughout the State of Washington (Figure 1-1). The action area is a subset of the analysis area, consisting of state-owned aquatic lands managed by Washington DNR. This is the area that would be directly affected by Washington DNR's management under the Proposed Action and alternatives. While the HCP Operating Conservation Program would apply only to state-owned aquatic lands under the action alternatives, implementation of these measures could indirectly affect resources on other land ownerships throughout the state.

Note that the discussions for many resource areas differentiate between potential effects in marine areas (i.e., nearshore and offshore ecosystems) and freshwater areas (i.e., lacustrine and riverine ecosystems). These are defined and described in Subsection 3.1.1, Marine Areas, and Subsection 3.1.2, Freshwater Areas. In Section 3, Affected Environment, many descriptions of conditions in freshwater areas differentiate between the lacustrine ecosystem (e.g., lakes, ponds, reservoirs) and the riverine ecosystem (e.g., rivers and streams). In this section, however, most effects analyses address the two freshwater ecosystems together. This is because the requirements of the HCP Operating Conservation Program under Alternative 2 would apply equally in both lacustrine and riverine ecosystems (under Alternative 3, the Aquatic Lands HCP would be implemented in marine areas only), meaning the potential effects of HCP implementation would be similar in both ecosystems. Where lacustrine and riverine ecosystems differ in the pathways through which they may be affected by uses

Analyses in this document address effects in two groups of ecosystems:

- **Marine areas** are divided into the nearshore ecosystem (which extends from the extreme high water line out to a depth of 66 feet) and the offshore ecosystem (which includes all marine areas with water depths greater than 66 feet, offshore to the seaward extent of State jurisdiction).
- **Freshwater areas** are divided into the lacustrine ecosystem (lakes, ponds, reservoirs, and associated shorelines) and the riverine ecosystem (rivers, streams, and associated shorelines and banks).

Additional terms important for understanding the effects analyses are *nearshore* and *upland*.

- *Nearshore* refers to areas near the shoreline of any body of water, marine or fresh. The phrase, *nearshore marine ecosystem*, has a specific meaning, given above. The phrase, *nearshore marine areas*, refers to areas within the nearshore marine ecosystem.
- *Upland areas* include all areas upslope of the ordinary high water line of waterbodies, and exclude the marine and freshwater ecosystems described above.

of state-owned aquatic lands (e.g., major sources of water quality degradation), those differences are noted in the discussions of effects in freshwater areas.

4.1.2 Available Information

Knowledge about many of the resource conditions and their relationships with human uses of state-owned aquatic lands is limited. Physical and ecological relationships associated with marine and freshwater areas represent a complex and evolving science. Discussions of the effects of the alternatives are based on best available data and knowledge about the relationships between resources and human uses of aquatic lands. The data and level of analysis used were commensurate with the degree of possible effects. The analyses of effects on species proposed for ITP coverage is consistent with information presented in the draft Aquatic Lands HCP.

Information used to support development of the Aquatic Lands HCP was used for development of this EIS. For example, discussions below of the ways in which uses of state-owned aquatic lands can affect various physical and biological resources (Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis, below) are drawn from the Aquatic Lands HCP. Those discussions provide support for this document's analysis of effects on those resources. The HCP Operating Conservation Program was designed to address the effects identified in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis; implementation of that program under the action alternatives, therefore, would be expected to reduce the potential for adverse effects on those resources.

The data collected to support development of the Aquatic Lands HCP does not provide any information to support analyses of effects on resource areas that are concerned primarily with human interactions with the environment (e.g., recreation, visual resources, economics). When analysis team members encountered an information gap, they generally collected the information or developed assumptions for analysis. In some cases, however, the effort required to obtain the information was prohibitively expensive or required too long a period of time, relative to the value of the information to be obtained. Such information may have added precision to estimates or better specified a relationship; however, the analysis team concluded that the basic data and essential relationships were sufficiently well established in the respective sciences that the potential additional information would be very unlikely to change conclusions. Under these circumstances, the missing information was not considered necessary for the decision-makers to make a reasoned choice among the alternatives.

4.1.3 Analysis Approach

This EIS evaluates alternative programs for the management of state-owned aquatic lands statewide, rather than a specific action at a particular site. The scope of the analysis is defined by the management changes proposed in the Aquatic Lands HCP. In essence, the alternatives under consideration for analysis represent different sets of restrictions and conditions on uses of state-owned aquatic lands. While most of the HCP Operating Conservation Program would represent restrictions on where, when, or how uses may be conducted on state-owned aquatic lands, some specify new requirements, such as surveys for forage fish or wood waste. Consequently, the analysis for each resource area compares the effects of the rules and regulations under alternative management regimes.

The effects of the two action alternatives (Alternative 2 and Alternative 3) are compared to those of Alternative 1, No-action. Comparisons of short-term and long-term effects address changes (adverse or beneficial) in conditions and trends that were identified in Section 3, Affected Environment, as well as any identifiable modifications to the current rate of change in the condition of a given resource area (e.g., faster or slower rate of habitat degradation for fish).

For the action alternatives, the effects analysis for each resource area considers the effects of implementing the full suite of measures and practices included in the HCP Operating Conservation Program, rather than examining the effects of each measure individually. This is because the effects of individual uses overlap and interact in the environment and cannot be viewed in isolation. For similar reasons, the effects of any given management measure would interact with those of other measures or regulations. In addition, some—but not necessarily all—measures would apply to any use authorized by Washington DNR under the action alternatives. It is not possible, therefore, to make definitive statements about the extent to which any individual measure would address the risk of adverse effects on a particular physical or biological resource.

Further, it is not possible to predict when prospective users will apply for authorizations to use state-owned aquatic lands, or where the uses will occur, or what the uses will be. In other words, the number and locations of use authorizations where the HCP Operating Conservation Program would be implemented under the action alternatives cannot be predicted reliably, nor can the suite of measures that would be implemented at any given site. The evaluations of the effects of the alternatives, therefore, are presented primarily as comparisons of the requirements for and restrictions on uses authorized by Washington DNR on state-owned aquatic lands.

For the action alternatives, these discussions focus on the ways in which implementation of the HCP Operating Conservation Program (including the adaptive management program) would, in combination with existing rules and regulations, influence the conditions and trends described for each resource area in Section 3, Existing Conditions, as compared to the conditions and trends anticipated under Alternative 1 (No-action). As appropriate and where supporting data are available, these discussions address any spatial or temporal variability in the potential effects on the resource, and differentiate between ongoing effects of existing uses (based on their current distribution in different ecosystems statewide, as presented in Section 3, Affected Environment) and potential effects of future uses (based on where new uses may be authorized).

The HCP Operating Conservation Program would be designed to avoid, minimize, and mitigate for adverse effects on fish and wildlife species and habitat, to the maximum extent practicable. The adverse effects addressed by the Aquatic Lands HCP would be those associated with uses of state-owned aquatic lands (Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis). The HCP Operating Conservation Program would address adverse effects on species proposed for ITP coverage by imposing conditions and restrictions on uses that adversely affect the physical and biological resources that are essential components of habitat for those species. Adverse effects on essential habitat components would create risk to covered species. Implementation of the Aquatic Lands HCP would, therefore, provide opportunities for risk reduction that would not be realized under Alternative 1, No-action. For this reason, the effects analyses for physical and biological resources in this EIS (Subsection 4.3, Substrates and Erosional Processes, through Subsection 4.9, Wildlife and Wildlife Habitat) assess the potential for risk reduction that would result from implementing the HCP Operating Conservation Program statewide (Alternative 2, Proposed HCP) or in marine areas only (Alternative 3, HCP for Marine Areas Only), compared to not at all (Alternative 1, No-action).

The major conclusions discussed under each resource analysis of this EIS are, by necessity, expressed in terms of risk. Because the physical and biological relationships of aquatic systems are imprecisely defined, and because quantitative measures do not exist for many aspects of the alternatives, the risk statements are given in qualitative terms. Conclusions are based on the best reasonably available data and are generally based on qualitative analyses, supported as appropriate by best readily available quantitative data. The following paragraphs provide more information about the timeframe and supporting assumptions for the analyses.

4.1.3.1 Analysis Assumptions

The collective effects of any of the alternatives would become evident gradually over the 50-year period that defines the term of the Aquatic Lands HCP and is the temporal basis for the analysis of long-term effects in the analyses. Because Washington DNR-owned aquatic lands constitute a small portion of total aquatic lands statewide, beneficial short-term effects from HCP implementation would be difficult to distinguish from other activities that also affect aquatic lands. Under the action alternatives, most of the elements of the HCP Operating Conservation Program would be implemented incrementally, as individual applications for new uses are processed and as existing uses are modified or come up for reauthorization. For physical and biological resources, the effects of the action alternatives would take the form of a gradual reduction in the extent and intensity of adverse effects associated with uses of state-owned aquatic lands. Because differences in the risk of adverse effects would become evident only gradually, it is not possible to distinguish short-term effects from long-term effects on physical and biological resources. For users of state-owned aquatic lands, the short-term effects of the action alternatives could take the form of reduced options for siting new uses or increased costs for operations, construction, or maintenance.

The potential exists under the action alternatives that current or prospective users of state-owned aquatic lands could seek to use privately owned or other lands (e.g., upland areas) rather than operate under the use restrictions necessary for compliance with the requirements of the HCP Operating Conservation Program. The opportunities to do so would be limited by the availability of suitable lands (e.g., upland areas or aquatic lands held by private landowners, municipalities, counties, ports, the Federal government, or other interests), and by the willingness of landowners to sell or lease their land. A shift in uses from state-owned aquatic lands to other lands could reduce the State’s income associated with rental fees. Additionally, if such a shift were to result in an increase in the proportion of uses on private rather than state-owned aquatic lands, the relative number of proposed uses subject to the requirements of the HCP Operating Conservation Program would be reduced, thereby diminishing the effectiveness of the program. However, the activity on private land may still be subject to federal and state reviews and permits. Any such decisions by prospective users would be highly dependent on individual economic and logistical considerations, however, and cannot accurately be predicted. For this reason, analyses in this section do not address the potential for a shift in uses from state-owned aquatic lands to other lands.

As noted in Section 2, Alternatives, analyses in this EIS incorporate the assumption that, under the No-action Alternative (Alternative 1), Washington DNR would not implement the HCP Operating Conservation Program. This does not mean that the conservation measures included in the program would never be implemented under Alternative 1. Many use authorization agreements issued by Washington DNR currently require the implementation of practices designed to protect environmental resources. Such requirements, however, are not applied to all authorization agreements in all areas, and the implementation of these practices is not assured in all cases. To address the full potential risk to the resources, therefore, the analyses for Alternative 1 consider the potential effects associated with

Washington DNR authorizing uses of state-owned aquatic lands without requiring the implementation of any conservation measures other than those required by other agencies with regulatory authority.

Under all alternatives, including Alternative 1, No-action, uses authorized by Washington DNR on state-owned aquatic lands would be subject to permitting and regulatory oversight from numerous Federal, state, and local agencies. To varying degrees, potential adverse effects would be avoided or reduced through the implementation of measures required by other agencies with permitting authority. For this analysis, it is assumed that the measures required by other agencies would not differ among the alternatives.

4.1.3.2 Treatment of Uncertainty

A major factor in determining the effects of the alternatives is the distribution of uses on aquatic lands, both state-owned and otherwise. For example, if a use occurs primarily on state-owned aquatic lands, measures implemented under the action alternatives would have a greater potential to modify the effects of that use, compared to the effects of a use that occurs largely on lands held by private landowners, municipalities, counties, ports, the Federal government, or other interests. No readily available data document the numbers or locations of uses on aquatic lands outside of state ownership, so it is not possible to calculate the proportional distribution of uses on state-owned *versus* other aquatic lands.

An example of the extent to which leasing decisions by Washington DNR have the capacity to influence conditions in specific areas can be seen in data gathered in support of an NPDES permit for oyster growers in Willapa Bay and Grays Harbor. In March 2006, 20 percent of the 45,000 acres of intertidal area in Willapa Bay, and 3 percent of the 34,460 acres of intertidal area in Grays Harbor, were being used for growing oysters or clams (Ecology 2006). In Willapa Bay, 23 percent of the land under production for oysters or clams is state-owned aquatic land leased from Washington DNR. In Grays Harbor, 5 percent of the land under production for oysters or clams is state-owned aquatic land leased from Washington DNR (Washington DNR 2012b). Based on those values, shellfish aquaculture leases on state-owned aquatic lands accounts for approximately 5 percent of the intertidal area of Willapa Bay (i.e., 23 percent of 20 percent); the remaining 95 percent of the bay’s intertidal area is either not in state ownership or is not used for shellfish aquaculture. Based on a similar calculation, the proportion of the intertidal area of Grays Harbor occupied by shellfish aquaculture leases on state-owned aquatic lands is approximately one-tenth of 1 percent. Notably, the physical and biological effects of activities associated with shellfish aquaculture can extend beyond the area where the use occurs. In addition, these values do not account for the area affected by other uses of state-owned aquatic lands, such as overwater structures.

Despite uncertainty and variability regarding the distribution of uses by ownership, it is possible to estimate the potential for management decisions on state-owned aquatic lands to influence the condition of various resources in the ecosystems defined for the analyses (i.e., nearshore marine, offshore marine, lacustrine, and riverine; Subsection 3.1, Introduction). Such an estimate can be based on the proportion of each ecosystem that is state-owned. In ecosystems where state-owned aquatic lands make up a higher proportion of the total area, the implementation of the HCP Operating Conservation Program on state-owned lands would be expected to make a greater contribution toward addressing the effects of the uses.

Such an assessment must also consider the distribution of aquatic land uses by ecosystem. For example, Washington DNR manages nearly all lands in the offshore marine ecosystem (i.e., waters greater than 66 feet deep), but only a small proportion of uses currently are authorized there. Based on the current distribution of use authorizations (Table 3-3), therefore, none of the alternatives would be expected to have a substantial influence on the condition of resources in the offshore marine ecosystem. It should be noted, however, that under the action alternatives the number of use authorizations in the offshore marine ecosystem could increase due to the implementation of measures intended to reduce adverse effects in nearshore areas.

An indication of the current distribution of uses by ecosystem can be derived from information that was gathered to support development of the Aquatic Lands HCP. Table 3.4, Table 3.12, and Table 3.16 in the Aquatic Lands HCP identify the ecosystems in which more than 2,000 authorizations have been granted for uses of state-owned aquatic lands. Of these, more than 80 percent occur in the nearshore marine ecosystem (including estuaries), 15 percent occur in the lacustrine ecosystem, and 5 percent occur in the riverine ecosystem. The values in the HCP tables pertain only to certain uses (i.e., shellfish aquaculture, log booming and storage, and overwater structures, Washington DNR's authorization and management of which would be HCP-covered activities under the action alternatives). Uses likely to be affected by implementation of the HCP Operating Conservation Program (of which aquaculture, log booming and storage, and overwater structures are a subset) account for approximately 45 percent of the currently authorized uses of state-owned aquatic lands (Table 3-5). Nevertheless, these values likely indicate the areas where the implementation of the HCP Operating Conservation Program under the action alternatives could make a substantial difference in resource conditions.

Based on these considerations, uses and resources in the nearshore marine ecosystem have the greatest potential to be affected by decisions that affect the management of state-owned aquatic lands. First, the proportion of state ownership is relatively high in the nearshore marine ecosystem: state-owned aquatic lands make up approximately 67 percent of that ecosystem, compared to 40 to 44 percent in the two freshwater ecosystems (Table 3-1). Second, as noted above, most state-authorized uses that would be the subject of the HCP Operating Conservation Program under the action alternatives occur in the nearshore marine ecosystem.

4.1.3.3 Regional Differences in Effects

The extent to which any of the alternatives may affect the environment could differ in different parts of the state. In areas where the State owns a relatively high proportion of aquatic lands, the management of those lands would exert greater influence over the condition of the surrounding environment, compared to areas with relatively low levels of state ownership. On the whole, state ownership of aquatic lands in the four ecosystems varies only slightly from region to region. For example, statewide, 44 percent of the aquatic lands in the lacustrine ecosystem are state-owned (Table 3-2). At the regional scale, the proportional amounts of state ownership of lacustrine aquatic lands in eastern Washington (42 percent) and the western Cascades and Puget Trough (44 percent) are similar to the statewide proportion. The ownership pattern in the Olympic Peninsula and Southwest Washington differs somewhat, with the State owning 66 percent of lacustrine aquatic lands in that region (Table 3-2). Based on the regional variations in the proportion of state-owned aquatic lands by ecosystem, the potential for the alternatives to affect uses and resources in lacustrine and nearshore marine areas would likely be greater in the Olympic Peninsula and Southwest Washington than in other parts of the state. Similarly, the potential for substantial changes in uses of or the condition of riverine habitat would be lower in those regions, compared to other parts of the state.

4.1.4 Pathways of Potential Effects of Uses Relevant to This Analysis

This subsection presents an overview of how uses authorized by Washington DNR on state-owned aquatic lands can affect the environment, along with potential ways of reducing adverse effects (i.e., risk-reduction practices, including measures commonly required by agencies with regulatory oversight, as well as conservation measures that would be part of the Aquatic Lands HCP under the action alternatives). Discussions in this subsection focus on uses that would be affected by the implementation of the HCP Operating Conservation Program under the action alternatives. The potential effects identified here also have contributed to the baseline conditions described in Section 3, Affected Environment.

Information in this subsection supports the analyses of the effects of the alternatives, based on the extent to which each alternative would address the adverse effects of uses of state-owned aquatic lands. As stated in Subsection 4.1.3, Analysis Approach, the basic premise of the analyses is that implementation of the HCP Operating Conservation Program would reduce the risk of adverse effects on physical and biological resources. By summarizing the connection between the HCP Operating Conservation Program and the effects they are intended to address, the following discussions provide the supporting rationale for that premise. Discussions focus on physical and biological effects because the HCP Operating Conservation Program implemented under either action alternative would be designed to avoid, minimize, and mitigate for adverse effects on fish and wildlife species and habitat.

HCP Chapter 4, Factors Affecting Species, provides a more thorough account of the potential adverse effects of authorized uses of state-owned aquatic lands on fish and wildlife species proposed for ITP coverage, and on their habitat (which includes many of the resource areas that are the subject of analysis in this EIS). The sensitivity of individual resources to the various pathways of potential effects below is described in the relevant resource area discussions in Section 3, Affected Environment, of this EIS. HCP Chapter 5, The Operating Conservation Program, identifies the conservation measures that Washington DNR proposes to implement to address these effects. These conservation measures are summarized in Table 2-1 of this EIS.

Uses of state-owned aquatic lands can affect the environment in many ways. The pathways of potential effects relevant to this analysis can be summarized as follows:

- Disrupting the alongshore movement of water and sediment
- Damaging substrates and associated organisms when floating structures strike or drag across the bottom
- Degrading water quality through the release of contaminants
- Blocking sunlight that aquatic vegetation needs for growth
- Creating visual or auditory disturbance that causes fish and wildlife to avoid key areas
- Generating sound levels intense enough to cause injury
- Disrupting access to habitat and diminishing habitat quality or quantity

The following subsections provide more information about these pathways of potential effects from uses of aquatic lands. Each discussion is followed by examples of conservation measures designed to address those effects. Under any of the alternatives, many of these conservation measures would be implemented in compliance with the regulations and permitting requirements of numerous local, state, and Federal agencies. Under the action alternatives, Washington DNR would require authorized users of state-owned aquatic lands to implement these and other measures to avoid or minimize the effects of such uses on covered species.

4.1.4.1 Interference with Water Currents and Sediment Transport

Shoreline and in-water structures alter water currents and wave energy, as well as interrupt the recruitment of sediment from upland areas. These effects can interfere with the process of sediment transport by preventing the input of sediment from the shore or by blocking the movement of sediment along the shoreline (i.e., longshore drift, beach drift).

Effects of Structures

In marine areas, particularly in nearshore marine areas, shoreline armoring may deprive beaches of sediment recruitment from uplands, preventing replenishment of substrates and thus exacerbating scour (Macdonald et al. 1994). In addition, structures may prevent tidal or storm inundation, hindering the transport of sediment stored high on beaches (Macdonald et al. 1994). As fine, unconsolidated sediments are carried away and not replenished by new sediment from upland areas, the composition of sediment near the shore changes, becoming dominated by substrate particles too large to be mobilized by wave action (Macdonald et al. 1994). The slope or topography of the shoreline or of nearshore marine areas may also change, as shallow, unconsolidated habitats are replaced with deeper, steeper, consolidated substrates (Toft et al. 2004). Derelict vessels can have similar effects when they settle to the bottom and interrupt currents, causing scour.

The effects of placing structures in freshwater areas (such as lakes and rivers) can be similar to those in marine areas. In lakes, for example, bank armoring and breakwaters interrupt natural processes of sediment transport (Reid and Holland 1997). In rivers, erosion control structures can contribute to channel incision, coarsening of bed substrates, and shifting of bank erosion to unarmored sections of the channel (Biedenharn et al. 1997). Examples of structures that may contribute to these effects include pilings, breakwaters, log rafts, suspended shellfish culture facilities, outfall pipes, and bulkheads. The potential effects of human alterations are not limited to in-water structures. Elimination of riparian vegetation can result in increased erosion and sedimentation, faster runoff with higher flows, and increased likelihood of channel instability (Booth and Jackson 1997).

Effects of Substrate Modification

In addition, many uses of aquatic lands can alter substrates directly. Filling of aquatic areas alters important habitat features (such as slope and depth profile), modifies current and wave patterns and energies, and eliminates habitat (Washington DNR 2013). Similarly, removing sediment from submerged habitats changes slope and depth profiles and alters substrate composition, resulting in direct mortality of aquatic vegetation and loss of habitat for many species. Sediment removal also changes the supply and distribution of sediment, possibly altering habitat structure in other locations (Washington DNR 2013). In addition, boat wakes can create unnaturally large or frequent waves, leading to increased erosion of sediments in shallow areas, weakening or killing native plant communities (Washington DNR 2007b). Boat wakes can also damage the nests and eggs of birds and amphibians that breed in shoreline habitats (Vermeer 1973; Washington DNR 2013).

Effects of Shellfish Aquaculture

Shellfish aquaculture can affect sediment transport by modifying sediment composition. Suspended shellfish culture methods (e.g., longlines, rafts) may result in the deposition of shells, feces, and other materials such as excess food (Callier et al. 2006; Giles et al. 2006; Hargrave et al. 2008). Aquaculture may also alter substrate composition through the deposition of growing media such as shell fragments and coarse gravel. In addition, seeding and mechanical harvest disturbs the substrate, resuspending fine sediments (Wisehart et al. 2007). If water currents carry away a substantial quantity of the resuspended sediments, the composition of the substrate at the disturbed site may shift towards coarser size classes (Wisehart et al. 2007). Shellfish aquaculture may also contribute to localized changes in substrate composition by interfering with water circulation. For example, in-water structures associated with shellfish aquaculture (e.g., bags, racks, longlines) can interrupt the action of waves and currents, resulting in deposition of fine sediments in the immediate vicinity of the structure (Washington DNR 2013).

Effects on Biological Communities

Any of these effects can harm plant and animal communities in marine and freshwater areas by disrupting the movement of water and sediment that provides nourishment, spawning habitat, substrate for root establishment, and shelter for prey species (Washington DNR 2013). Disruptions of water current patterns also can create areas of scour that physically disturb and/or uproot aquatic vegetation, such as eelgrass. Uses that disturb spawning substrate or sediment sources that support spawning can adversely affect the reproductive capacity of many fish species (Thom et al. 1994; Williams and Thom 2001), including those proposed for coverage under the Aquatic Lands HCP. In freshwater areas, changes in littoral slope profiles can eliminate shallow water habitat in which amphibians lay eggs (Washington DNR 2013).

Effects on Cultural Resources

Changes in sedimentation patterns can affect cultural resources through both the increase and the decrease of sediments on or adjacent to the property. The integrity of archaeological and historical sites can be damaged through too much weight from increased sedimentation. Increases in sedimentation can also negatively affect traditional resources by blocking sunlight and nutrients necessary for growth and development of plants and animals, including shellfish. Decreases in sediment accumulation may lead to the collapse of structures that support or archaeological or historical sites (or that are archaeological or historical sites themselves). Changes in sediment accumulation patterns also may divert necessary nutrients from traditional resources such as shellfish.

Risk-reduction Practices

Examples of practices that can avoid or mitigate for adverse effects associated with the disruption of water circulation and sediment movement include the following:

- Design and locate structures and facilities to minimize the obstruction of currents and the alteration of sediment transport.
- Design new overwater structures and facilities so that shoreline armoring is not needed.
- Replace existing hard armoring with a system that reduces impacts.
- Require breakwaters to incorporate gaps that allow fish passage, water circulation, and alongshore transport of sediments.
- Require boat ramps and launches to be level with the beach slope or high enough off the substrate to 1) minimize obstruction of currents, 2) minimize alteration of sediment transport, and 3) eliminate accumulation of drift logs and debris under ramps.
- Remove derelict structures, including vessels, pilings, and equipment.
- Locate structures and uses away from native aquatic vegetation or other sensitive areas.
- Locate new facilities in deeper water, farther from shore.
- Restrict the placement of fill on aquatic lands.
- Allow sediment removal only where required for navigation, flood control, contaminant removal, or maintenance of water intakes.
- Post ‘no wake’ signs, directing boaters to reduce wave heights along the shore.

4.1.4.2 Damage to Substrates and Aquatic Vegetation

During periods of low water—whether in rivers, lakes, or marine waters—some floating structures near shorelines can crush the vegetation and animals that live beneath them (Washington DNR 2013). This can occur in shallow marine waters, for example, when floats, rafts, mooring buoys, or derelict vessels (or the chains or ropes used to secure these structures) strike the bottom as they are lifted and lowered by the tide (Washington DNR 2013). At sites used for log booming or storage, bark that sloughs off of logs may contribute to habitat loss by covering substrate; also, the weight of dropped or sunken logs or debris causes sediment compaction (Sedell and Duval 1985; Picard et al. 2003). Vehicles driven in shallow water or tidelands also can destroy plant and animal communities near the shores of marine or freshwater areas. Areas with severely compacted sediments may not be able to support aquatic vegetation and may become inhospitable to all but a few species (Sedell et al. 1991). In the riverine ecosystem, the larvae of Pacific lamprey are particularly vulnerable to injury from sediment compaction or removal, as they live in the substrates of slow-moving streams for several years (Kostow 2002; Moser and Close 2003). In the nearshore marine ecosystem, forage fish eggs and adults may be crushed by equipment or foot traffic in intertidal areas (Subsection 3.8, Fish, Aquatic Invertebrates, and Aquatic Habitat).

Shellfish aquaculture can modify unconsolidated habitats in the nearshore marine ecosystem in a number of ways, including the following:

- Emplacing artificial objects (e.g., stakes, protective tubes or nets, anchors, dikes).
- Digging, tilling, raking, or using hydraulic harvest methods to remove target species or to modify the substrate.
- Adding coarser sediments (e.g., gravel, shell fragments).
- Depositing shells, feces, and sediments from mussel rafts (Callier et al. 2006; Giles et al. 2006; Hargrave et al. 2008).

In a study of oyster aquaculture in Willapa Bay, Tallis et al. (2009) found that eelgrass density declined with increasing oyster cover, likely as a result of direct competition of space. In areas where oysters were cultivated in dredged or hand-picked beds, eelgrass growth rates were higher but density, plant size, and production were lower (Tallis et al. 2009). Other ways in which shellfish culture can affect the distribution of submerged aquatic vegetation include decreasing the area available for colonization and removing plants and rhizomes during mechanical harvest or site preparation (Simenstad and Fresh 1995; Carvalho et al. 2006; Tallis et al. 2009). The effects of physical disturbance vary with culture type and may not necessarily be adverse (Dumbauld et al. 2009; Tallis et al. 2009). Dealteris et al. (2004) concluded that shellfish aquaculture gear can provide habitat value similar to that of submerged aquatic vegetation. While local and short-term effects from aquaculture have been documented in many areas, shellfish aquaculture has not been implicated in shifts to alternate states or reduced adaptive capacity of the larger ecological system (Dumbauld et al. 2009).

Many uses of aquatic lands can affect aquatic vegetation in ways other than shading (Subsection 4.1.4.4, Shading). Water and effluent flowing from outfalls can scour substrates and aquatic vegetation. Outfall pipes may indirectly affect vegetation through alteration of wave energy and currents, further increasing erosion (Diener et al. 1997; King County 2003). Boat traffic in shallow areas can damage aquatic vegetation by shearing plants or scouring sediment from around the plants' roots (Burdick and Short 1999; Eriksson et al. 2004). Sediment churned up by propeller wash or boat wakes can smother plants or impact water quality by increasing turbidity or by dispersing contaminants (EVS 2003). At shellfish aquaculture facilities, vegetation may become entwined in the ropes used for longline culture and be damaged or pulled out when longlines are removed or replaced.

Cultural resources can also be affected directly or indirectly by modifications to substrates and vegetation. Such modifications may include the mixing of archaeological deposits, breaking of artifacts, and destruction of structures, traditional resources, and sites.

Examples of practices that can avoid or mitigate for adverse effects associated with damage to substrates and native aquatic vegetation include the following:

- Place structures and activities in deeper water beyond where aquatic vegetation can grow.
- Design structures and facilities so they cannot ground out (i.e., strike the bottom of the waterbody).
- Locate boat landings in areas where boats and barges do not run aground, and propellers do not disturb the sediments or native aquatic vegetation.
- Use embedded anchors and midline floats to minimize the dragging of chains and ropes.
- Post 'no wake' signs, directing boaters to reduce wave heights along the shore.
- Establish boat and barge landing locations for access to shellfish aquaculture facilities so as to 1) minimize grounding in native aquatic vegetation, 2) prevent anchors, chains, and ropes from dragging in native aquatic vegetation, and 3) minimize impacts due to propeller scour.
- Space ground-based shellfish culture systems to minimize disturbance of native aquatic vegetation.
- At shellfish aquaculture facilities, establish and maintain access routes from upland areas for vehicles, equipment, or personnel so as to minimize impacts to sensitive aquatic resources, such as forage fish spawning areas and existing native aquatic vegetation.

4.1.4.3 Contamination

Operations conducted over or near water pose the risk of releasing contaminants into the water and the underlying substrates. Chemicals, turbidity, waste products, pathogens, or excess nutrients can kill organisms directly, or they can build up in the ecosystem over time and cause chronic health problems (King County 2003). Species that use aquatic habitats can be exposed to contaminants in the water column. Contaminated sediments can be ingested by fish, amphibians, reptiles, birds, and mammals that consume aquatic vegetation or prey in unconsolidated substrates. As noted in Subsection 3.6.1, Marine Vegetation, excessive nutrients or contaminants pose a major threat to seagrasses, kelps, and other aquatic vegetation in marine areas. For example, toxic substances such as petroleum products affect bull kelp and other aquatic vegetation by damaging or killing tissue and by lowering photosynthesis and respiration (Mumford 2007). Similarly, increased inputs of nutrients and pollutants have affected aquatic vegetation in freshwater areas (Subsection 3.6.2, Freshwater Vegetation).

Derelict vessels or structures may contain large quantities of oil or other toxic substances that pose a contamination risk to aquatic lands, nearby shorelines, and water quality (Washington DNR 2013). Also, contaminants from activities in upland environments may be picked up by rainwater and deposited into nearby waters, where they can pollute the aquatic environment (Olivieri et al. 1977; Cubbage 1995; Kerwin 2001; Ackerman and Weisberg 2003; King County 2004; Ahn et al. 2005).

Some materials used in the construction of overwater and nearshore structures can also be sources of contaminants (Carrasquero 2001). Tires, which may come in contact with water when they are used for flotation or as fenders, can leach hydrocarbons and metals, degrading water and sediment quality. Leached hydrocarbons may interfere with the larval development of many species, including those proposed for ITP coverage or that provide prey for proposed covered species (Collins et al. 2002; Smolders and Degryse 2002; Camponelli et al. 2009; Wik and Dave 2009). Treated wood also leaches harmful chemicals that may cause biological dysfunction if absorbed or ingested by organisms in the water (Carrasquero 2001). Through food web dynamics, these chemicals can bioaccumulate in higher trophic levels, adversely affecting health and reproduction for many species (EVS 2003). Because Pacific lamprey larvae spend several years in sediments, they are particularly susceptible to toxicological effects from contaminants and chemical treatments (Close et al. 2002).

In a review of the effects of treated wood in marine and freshwater areas, Poston (2001) found the extent of measurable influence for treatment chemicals to be limited to a small area around structures. Levels of creosote and metals in sediments reached background concentrations within 10 feet from structures (Poston 2001). Based on that review and an assessment of the potential for salmonids to encounter contaminated water or sediments, Poston (2001) concluded, "Once juvenile salmon enter larger rivers or engage in an open-water marine lifestage, the potential to be adversely impacted by treated wood contaminants is very low."

The accumulation of organic matter, such as wood waste, can increase the amount of oxygen consumed by bacteria that decompose the matter, reducing the amount of oxygen available for other organisms. Byproducts of anaerobic decomposition (e.g., of wood waste or of debris from aquaculture facilities) can slow the growth of aquatic vegetation (Elliott et al. 2006).

Aquaculture of filter-feeding bivalves, such as oysters, clams, or mussels, can reduce the availability of nutrients needed by marine vegetation and non-cultured species (Gibbs 2004). Conversely, biofiltration by cultured shellfish may reduce local phytoplankton abundance, thereby reducing turbidity and increasing light penetration for submerged vegetation (Newell 2004; Grant et al. 2007). The net effect of these competing influences is unclear. In Totten Inlet, which has high levels of nutrient input from anthropogenic sources as well as the highest density of shellfish culture of any embayment in Puget Sound, Dumbauld et al. (2009) reported high rates of bivalve growth and only local phytoplankton depletion around raft structures.

Contamination has the potential to affect cultural resources by altering the chemical and physical properties of the resources themselves, as well as the environment that provides context. Contamination can affect archaeological resources by changing the acidity of anthropogenic soils, altering materials used for radiometric dating, and degrading artifacts. Toxins can also be taken up by traditional use resources, including shellfish, fish, seaweeds, and other plants, rendering them unusable and inedible.

Examples of practices that can avoid or mitigate for adverse effects associated with the release or accumulation of waste, garbage, contaminants, or nutrients include the following:

- Design and locate facilities to allow for the free flow of water, thereby preventing stagnation and the buildup of wastes and sediment.
- Locate sources of contaminants (e.g., outfalls, log booms, log storage facilities, finfish net pens) away from native aquatic vegetation.
- Store, refuel, and maintain vehicles away from streams, wetlands, and other waterbodies.
- Prohibit pesticide use, except as authorized by regulatory agencies.
- Limit in-water repair activities and conduct all boat refinishing work out of the water or on decks or superstructures.

- Prohibit refinishing work from boats and temporary floats unless permitted by a NPDES permit.
- Prohibit in-water hull scraping and any processes that remove paint from boat hulls underwater.
- Use tarps to prevent dust, drips, and spills from entering the water.
- Prohibit the use of tires as part of above- or below-water structures, or where tires contact water.
- Prohibit the use of chemically treated wood on in-water structures.
- Remove derelict structures, including vessels, pilings, and equipment.
- Encapsulate foam material (e.g., where used for flotation) within a shell that prevents breakup or loss of the material.
- Provide sewage disposal facilities at marinas.
- Prevent contaminated runoff from entering the water.
- Properly dispose of waste and contaminants, including wood waste.
- Wash gravel to be used for aquaculture beds in an upland location where the wash water cannot enter the waterbody.
- For log booming and storage activities, implement practices that reduce the deposition or accumulation of wood and bark in the water.

4.1.4.4 Shading

Shading from structures (e.g., docks, piers, marinas, vessels) inhibits the growth of aquatic vegetation. Log rafts and some methods of shellfish culture (e.g., longlines, rafts) can also contribute to shading of benthic habitats and aquatic vegetation. Shading that reduces light levels below the minimum requirement may result in the complete loss of vegetation throughout the footprint of a structure (Simenstad et al. 1999; Nightingale and Simenstad 2001). Structures that float directly upon the water have the greatest potential to interfere with light transmission (Burdick and Short 1999).

Aquatic vegetation provides food and shelter for fish and wildlife, as well as food, medicine, and other culturally important materials for many people, including members of American Indian tribes. Vegetation that is rooted in underwater substrates reduces the susceptibility of those substrates to erosion. Loss of vegetation can reduce prey production and feeding efficiency, increase the risk of predation, and can contribute to the loss of substrates that are used for spawning or other key functions. In addition, shade can be a migration barrier for fish. Juvenile salmonids avoid dark, shaded areas under structures, resulting in loss of access to habitat, blockage of movement, and potentially increased exposure to predators (Haas et al. 2002; Toft et al. 2004). Lastly, shade from overwater structures provides hiding cover for some non-native species, such as smallmouth bass, that prey on native fish (Carrasquero 2001; Bonar et al. 2005).

Examples of practices that can avoid or mitigate for adverse effects associated with shade include the following:

- Avoid impacts by restricting activities in or near areas with native aquatic vegetation.
- Locate new structures away from native aquatic vegetation.
- Place structures in deeper water where they will not shade native aquatic vegetation.
- Design overwater structures to maximize light transmission.
- Space ground-based shellfish culture systems to reduce shading of native aquatic vegetation.
- Remove unnecessary structures from areas near shorelines.

4.1.4.5 Noise and Visual Disruption

The noise and visual disruption caused by human activities and equipment operation can disturb fish, birds, amphibians, and marine mammals, causing them to leave a particular area or abandon key habitats (e.g., spawning areas, nest sites, foraging areas) during sensitive life history phases (e.g., reproduction, rearing, migration) (Washington DNR 2013). Movement away from areas of disturbance may lead to reduced viability if food resources available elsewhere are not sufficient to compensate for the extra energy expended to avoid the disturbance (Puttick 1979; Burger 1998; Nudds and Bryant 2000).

Artificial lighting can also affect many species by disrupting reproductive, migratory, or foraging behavior, by increasing exposure to predators, or by adversely affecting their prey (Tabor et al. 2004; Buchanan 2006). In addition to causing disturbance, high-intensity noise can physically injure or even kill fish, marine mammals, birds, and other organisms in the water (Washington DNR 2013). Uses of state-owned aquatic lands can also affect the visual quality of the landscape, as perceived by humans. Shellfish aquaculture, in particular, has been identified as a concern (Subsection 3.12, Visual Resources).

Examples of practices that can avoid or mitigate for adverse effects associated with noise and visual disturbance include the following:

- Locate new facilities in deeper water away from shorelines.
- Move existing facilities into deeper water away from shorelines.

- Observe work windows to minimize disturbance of native species in key habitats during sensitive life history phases.
- Minimize noise during native species' breeding or migration times.
- Minimize the amount of artificial nighttime lighting that illuminates aquatic habitats and the surrounding environment.
- Limit vehicular or foot traffic in shallow water and intertidal areas to that needed for operations, and use designated routes to minimize the area subject to noise and human activity.

4.1.4.6 Decreased Habitat Complexity and Integrity

Uses and structures that reduce habitat complexity (e.g., by simplifying stream channels, armoring shorelines, or reducing the input of large woody debris) and alter habitat integrity (e.g., by impeding access or altering species composition) can reduce the ability of marine or freshwater areas to support diverse communities of fish, wildlife, and invertebrates (Washington DNR 2013). The placement of structures in shallow environments in marine and freshwater areas may cause some species, including fish, amphibians, and birds, to avoid those areas (Washington DNR 2013). Flood control structures such as levees can disconnect secondary channels from the mainstem of a stream, reducing or eliminating access to wetlands and other areas that provide fish refuge from high flows (Reid and Holland 1997).

Shoreline modifications may alter the structure and function of in-water habitats in areas near shorelines, changing the composition of the communities of species that use those areas. In freshwater areas, for example, shade from overwater structures can provide cover and preferred habitat for ambush predators such as smallmouth bass (Carrasquero 2001; Bonar et al. 2004). Shoreline modifications that remove logs, rootwads, boulders, or undercut banks reduce the availability and diversity of habitat niches, as well as food and cover (Scrivener and Andersen 1982).

Other modifications, such as the placement of structures in shoreline areas, can influence important behavioral cues and disrupt habitat connectivity. Stormwater runoff from impervious surfaces associated with overwater structures can contribute to increased water temperatures (Washington DNR 2013). The influence of changes in water temperature on spawning behavior of fish is a widely documented phenomenon; spawning may be disrupted if temperature regimes are modified by the addition or removal of shade in a water body (Herdendorf et al. 1992). Similarly, elevated water temperatures may result in premature metamorphosis of amphibians, and depressed temperatures (due to shading) may delay metamorphosis, potentially reducing overwinter survival of juveniles (Washington DNR 2013).

Uses of aquatic lands can also lead to changes in local biotic communities. In areas used for log booming or storage, severe sediment compaction may prevent clams and other filter feeders from burrowing into the substrate. As a result, the composition of the benthic community may shift, becoming dominated by detritus feeders (Sedell et al. 1991). Similarly, Otero et al. (2005) found that the benthic invertebrate community underneath mussel aquaculture rafts changed from predominantly filter feeders to predominantly detritus feeders. In addition, enrichment by nutrients from aquaculture facilities can change the composition, diversity, and structure of benthic communities, increasing the abundance of pollution-tolerant species and locally altering food web dynamics (Bendell-Young 2006; Carvalho et al. 2006). Although the pre-existing community structure and nutrient balance typically recover once shellfish cultivation stops, the process may take several years (Heffernan 1999; Stenton-Dozey et al. 2001). Excess nutrients from any source (including in-water activities or runoff from upland areas) can interfere with the growth and productivity of native aquatic vegetation. For example, elevated nutrient levels can promote the growth of algae, reducing the amount of light available for eelgrass and kelp (Mumford 2007).

Examples of practices that can avoid or mitigate for adverse effects associated with decreases in habitat complexity include the following:

- Locate new facilities where the associated uses have historically occurred, to avoid adverse effects in new areas.
- Locate structures (e.g., floating rafts for shellfish aquaculture) so as to avoid impacts that result in changes in the extent and composition of benthic communities.
- Design new overwater structures and facilities so that shoreline armoring is not needed.
- Replace existing hard armoring with systems that reduce impacts.
- Minimize impacts from shading by maximizing light transmission in overwater structures.
- Place structures in deeper water, away from migratory routes of juvenile salmonids.
- Remove unnecessary structures from nearshore areas.

4.2 Land Ownership and Use

This subsection describes the direct and indirect effects of the proposed alternatives on the ownership and use of state-owned aquatic lands, comparing the effects of the action alternatives (Alternative 2 and Alternative 3) to those of Alternative 1, No-action, over the 50-year analysis period for this EIS. The three alternatives vary in the degree to which Washington DNR would place restrictions on or impose requirements for authorized uses of state-owned aquatic lands, and in the areas in which such restrictions would apply. Analyses in this subsection compare how Washington DNR's management under the proposed alternatives would, in combination with the requirements identified in Subsection 3.2.1, Existing and Relevant Management Measures and Regulatory Framework, be expected to influence land ownership and the uses of state-owned aquatic lands as described in Subsection 3.2, Land Ownership and Use. The potential effects of Alternative 2 and Alternative 3 are discussed relative to the current management program represented by Alternative 1, No-action.

The primary way in which the Washington DNR's management can affect aquatic land use is through encumbrance. An encumbrance is a right, other than an ownership interest, to a property, restricting the ability of others to use the property. Leases and other use authorizations issued by Washington DNR represent encumbrances on state-owned aquatic lands. Many derelict vessels and derelict structures constitute unauthorized encumbrances on state-owned aquatic lands. The uses that would be the subject of the HCP Operating Conservation Program under the action alternatives require the issuance of authorizations from Washington DNR and, therefore, encumber state-owned aquatic lands. Differences in the effects of the alternatives would depend on differences in the extent to which the alternatives may influence the number and location of parcels that are encumbered by land uses, authorized or otherwise.

Some uses that do not occur on state-owned aquatic lands could be affected by changes in the management of the Aquatics Division. Changes in the availability of land for log storage, marinas, docks, wharves, or floating homes could influence the amount or location of waterfront development associated with those uses. Decisions concerning the development of waterfront areas for uses such as residential areas, park and recreation facilities, restaurants, and other businesses may also change in response to modifications to visual resources. As noted in Subsection 4.1.3, Analysis Approach, it is possible that increased restrictions/requirements on certain activities on state-owned aquatic lands could lead to increases in these practices elsewhere. For example, restrictions on the storage and maintenance of boats could lead to increases in these practices at boat storage and maintenance lots in upland areas. The potential for such a shift in uses from state-owned aquatic lands to other lands under any of the alternatives cannot be assessed with certainty, however, and is not addressed in this analysis.

4.2.1 Effects Common to All Alternatives

Under any of the alternatives, uses would be limited in conservation areas established through the Aquatic Reserves Program, the Conservation Leasing Program, and Commissioner's Orders (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands). The status of land designated as an aquatic reserve can affect leasing decisions on adjacent, state-owned parcels. The duration of aquatic reserve designation would be 90 years under any of the alternatives, and allowable uses would continue to be defined in each aquatic reserve management plan. Potential differences in the duration of conservation leases and Commissioner's Orders under the alternatives are discussed in the alternative analyses below.

It is assumed for this analysis that Washington DNR would not modify the process for authorizing uses of state-owned aquatic lands under any of the alternatives in any way that would affect the ability of persons or entities to secure authorization to use state-owned aquatic lands. Washington DNR would continue to require authorization for most commercial and recreational uses of state-owned aquatic lands (e.g., aquaculture, log booming and storage, overwater structures, outfalls, erosion control structures), as well as for uses that are typically conducted by governmental agencies (e.g., road, bridge, and utility easements, waterfront parks, and compensatory mitigation for resource damage). Washington DNR would not be required to implement new measures to reduce the number of unauthorized uses of state-owned aquatic lands, and such uses would be expected to continue.

As noted in Subsection 3.2.3.1, Authorized Uses, the number and location of use authorizations would continue to change; at any time, the total number of active use authorizations may be greater than or less than the current value of approximately 4,000. Based on the considerations specified above, the number of use authorizations would not be expected to differ substantially under one alternative compared to the others. The potential for prospective users to use other lands (either non-state-owned aquatic lands or non-aquatic lands) under any of the alternatives is discussed in Subsection 4.1.3, Analysis Approach. Ongoing refinements to the classification system for use authorizations would continue under all three alternatives. Through this process, Washington DNR's understanding of the number and location of the different use types would continue to improve. Refinements to the classification system would not be expected to influence the number or location of any individual use types.

4.2.2 Alternative 1, No-action

Under Alternative 1, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives, and Subsection 2.2.2, Alternative 1, No-action. Washington DNR would continue to manage state-owned aquatic lands by acquiring, selling, and exchanging lands (Subsection 3.2.2, Ownership of Aquatic Lands in Washington State), managing uses (Subsection 3.2.3, Use of Aquatic Lands in Washington State), and protecting key areas (Subsection 3.2.3.3, Washington DNR Programs for Protection and Restoration of Habitat). There would be no certainty that measures included under the Proposed Action, which are designed to minimize potential adverse effects on physical and biological resources and processes, would be incorporated into use authorization agreements statewide (Subsection 2.2.2, Alternative 1, No-action; Subsection 2.2.4, Alternative 2, Proposed Action). In contrast, under the No-action Alternative, requirements for any such measures would result from the permitting and review processes of agencies with regulatory oversight. The following subsections describe the potential effects of Washington DNR's management under Alternative 1 on land ownership and use.

4.2.2.1 Ownership of Aquatic Lands in Washington State

The amount and distribution of state-owned aquatic lands would not be expected to change substantially under Alternative 1, and Washington DNR's authority to convey lands to other owners would not change. As directed by law, Washington DNR would continue to consider the public interest when evaluating proposed sales, acquisitions, or exchanges of aquatic lands. Any such transfers would likely continue to be a rare occurrence, as has been the historic trend (Subsection 3.2.2, Ownership of Aquatic Lands in Washington State). Washington DNR would not be required to consider conservation priorities when identifying lands for acquisition or retention. For example, the status of a site as habitat for vulnerable species would not be required to be considered when identifying lands considered for conveyance under Alternative 1.

4.2.2.2 Uses of Aquatic Lands in Washington State

Under Alternative 1, Washington DNR's ability to issue leases, easements, and licenses authorizing uses of state-owned aquatic lands would not change. The requirement to obtain authorizations for certain uses (i.e., most commercial and recreational uses, as well as those typically conducted by governmental agencies) would not change, nor would the types of uses for which authorizations are not required (e.g., walking, picnicking, and birdwatching). Washington DNR would continue to assess fees for processing applications for use authorizations. Washington DNR would not be required to impose restrictions on uses in shallow and nearshore waters, or near aquatic vegetation, beyond the restrictions implemented through the permitting and review processes of agencies with regulatory oversight.

While the number and location of uses would continue to change, the overall distribution of use authorizations by ecosystem would likely exhibit the general patterns evident in Table 3-3: the bulk of use authorizations would likely continue to be in nearshore marine areas. Washington DNR would not be required to include timing restrictions or other constraints in its use authorizations for state-owned aquatic lands (see Subsection 4.1.3, Analysis Approach, for a discussion of the assumptions concerning the implementation of practices designed to protect environmental resources).

Uses not authorized by Washington DNR, including the abandonment of vessels and structures, would continue to result in the encumbrance of state-owned aquatic lands. To address derelict vessels, Washington DNR would be expected to continue to appropriate at least $100,000 on a biennial basis to provide matching funds for the Derelict Vessel Removal Program and to support one full-time position at Washington DNR, as has been the pattern for the past 8 years (Subsection 3.2.3.2, Uses Not Authorized by Washington DNR). Washington DNR would also continue to apply the prioritization scheme described in that subsection. Derelict vessels would continue to be removed from aquatic lands in Washington State, but the number and location of such removals is unknown. Abandonment of existing structures would likely continue to be rare occurrence because a high percentage of structures would be subject to a contract-based requirements for removal, per WAC 332-30-122(4) (Subsection 3.2.3.2, Uses Not Authorized by Washington DNR). Some structures would also be removed through the Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands). The continued removal of derelict vessels and derelict structures through the Derelict Vessel Removal Program and the Creosote Removal Program would not, however, be assured with a 50-year commitment.

4.2.2.3 Washington DNR Programs for Protection and Restoration of Habitat

Washington DNR's programs for identifying and establishing key areas for conservation would continue to operate as described in Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands. It is unlikely that any specific sites would be established solely to protect individual species. Priorities for protection through these programs include high-quality native aquatic ecosystems (for aquatic reserves); areas where aquatic habitat can be restored, enhanced, created, or preserved (through conversation leasing); and areas with significant (per RCW 79.105.210(3)) natural value (for protection through Commissioner's Orders). To date, all areas that have been established as aquatic reserves or through conservation leasing are in Puget Sound, primarily in nearshore areas. Areas of the marine ecosystem in Puget Sound would likely continue to receive priority for protection through these programs. To date, no such areas have been established in freshwater areas (Subsection 3.2.3.3, Washington DNR Programs for Protection and Restoration of Habitat). If any are, however, littoral areas (where high-quality native aquatic ecosystems and other areas with high natural value typically occur) would likely receive priority for protection. Additional areas would likely continue to be established through these programs; the location and timing of the establishment of such conservation areas cannot reliably be predicted.

As described in Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands, areas established as aquatic reserves would be expected to remain in aquatic reserve status for 90 years from the date of reserve establishment. Allowable uses would continue to be defined in each aquatic reserve management plan. The duration of establishment of other types of conservation areas could be considerably shorter than the duration for aquatic reserves. Currently, the only conservation lease for state-owned aquatic lands has a term of 10 years. Current policy does not establish the duration of Commissioner's Orders that withdraw certain freshwater or marine areas from the option of leasing or that prohibit or limit specific types of uses; such withdrawals or restrictions could be revoked at any time (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands).

4.2.2.4 Relationship between Uses of State-owned Aquatic Lands and Other Lands

Uses of waterfront areas adjacent to use authorizations (e.g., log handling facilities, marinas, docks, wharves) on state-owned aquatic lands would be expected to continue to be associated with and influenced by uses of state-owned aquatic lands. Sites near aquatic lands would continue to be desirable locations for businesses and residential developments, and existing developments would likely remain in place. The visual quality of aquatic lands would likely continue to influence uses of waterfront areas, either positively or negatively (Subsection 4.11, Visual Resources). Changes in the amount and location of waterfront developments would depend on numerous factors that are outside the scope of Washington DNR's proprietary authority (e.g., economic conditions, regulatory restrictions, availability of land) and cannot be anticipated.

4.2.3 Alternative 2, Proposed HCP

Under Alternative 2, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives. Washington DNR would continue to manage state-owned aquatic lands by acquiring, selling, and exchanging lands, managing uses, and protecting key areas. In addition, and in contrast to Alternative 1, Washington DNR would require authorized users of state-owned aquatic lands to implement measures in the HCP Operating Conservation Program that minimize to the maximum extent practicable the potential for adverse effects on covered species and their habitat (Table 2-1). These measures would be required for all new and renewed authorizations statewide, and for existing use authorizations when the tenant requests a modification. The following subsections describe the potential effects of these measures on land ownership and use.

4.2.3.1 Ownership of Aquatic Lands in Washington State

As under Alternative 1, Washington DNR's authority to convey lands to other owners would not change under Alternative 2. Transfers of ownership would likely continue to be a rare occurrence, and the amount and distribution of state-owned aquatic lands would not be expected to change substantially. Washington DNR would continue to consider the public interest when evaluating proposed sales, acquisitions, or exchanges of aquatic lands.

Under Alternative 2, Washington DNR would discourage the transfer to others of state-owned aquatic lands identified as a conservation priority, unless the receiving entity commits to continued management in conformance with the Aquatic Lands HCP. No such restrictions would apply under Alternative 1, under which Washington DNR would not be required to base land transfer decisions on conservation value rankings (Subsection 2.2.3.3, Additional Commitments by Washington DNR). When considering offers made for the purchase or exchange of lands, Washington DNR would emphasize the retention and acquisition of lands most in need of protection, based on conservation value rankings. Compared to Alternative 1, this may lead to greater retention and acquisition of lands in nearshore and littoral areas that provide habitat for species proposed for ITP coverage through the Aquatic Lands HCP. Such areas would not be assured of priority retention or acquisition under Alternative 1, under which Washington DNR would not be required to consider the status of a site as habitat for vulnerable species (as indicated by ESA listing status or other factors) when identifying lands to be considered for conveyance.

4.2.3.2 Uses of Aquatic Lands in Washington State

As under Alternative 1, Washington DNR would continue to issue leases, easements, and licenses authorizing uses of state-owned aquatic lands under Alternative 2. The primary difference from Alternative 1 would be the implementation of the HCP Operating Conservation Program, some components of which would affect the location of areas encumbered by new or renewed use authorizations. The HCP Operating Conservation Program would not impose new user fees or access restrictions compared to fees or restrictions under Alternative 1. Based on data provided by Washington DNR (2011), approximately 45 percent of existing use authorizations are for uses that would be subject to the requirements of the HCP Operating Conservation Program (Table 3-5). In most cases, an existing use would be required to meet the terms and conditions specified in the Aquatic Lands HCP only when the use authorization expires and Washington DNR receives an application for renewal of the authorization (Subsection 2.2.1.1, Authorization of Uses of State-owned Aquatic Lands).

Implementing the HCP Operating Conservation Program could reduce the amount of area available for some types of use authorizations in shallow waters in marine and freshwater areas, thereby altering the overall distribution of uses by ecosystem when compared to Alternative 1. For example, in response to measures intended to reduce adverse effects in nearshore areas, new log handling facilities and new or reconfigured outfalls would be located in offshore areas (i.e., waters greater than 66 feet deep), and some existing facilities would be moved from their current locations when their authorization is renewed[12]. In addition, the requirement that new or renovated boat ramps and launches must constructed to avoid or minimize effects on substrate suitable for forage fish spawning. The HCP Operating Conservation Program could also reduce the number of those structures in the nearshore marine ecosystem where substrate suitable for forage fish spawning occurs. Lastly, in response to measures intended to reduce propeller scour, boat mooring areas for new or expanded docks, marinas, shipyards, terminals, wharves, piers, mooring buoys, and rafts would be prohibited in water less than 7 feet deep.

Requirements to avoid existing native aquatic vegetation would further reduce the amount of area available for certain use types in shallow waters, because aquatic vegetation is limited to nearshore areas. Protective buffers for aquatic vegetation would be required for new or modified authorizations for outfalls, finfish aquaculture net pens, certain shellfish aquaculture operations, docks, wharves, piers, marinas, rafts, shipyards, terminals, nearshore buildings, and log booming or storage facilities. Affected shellfish aquaculture operations would include new or expanded on-bottom culture of species other than oysters, new or expanded oyster culture systems that result in substantial shading or bottom disruption, new or expanded floating rafts, and new geoduck operations.

Existing boathouses, covered moorage facilities, and covered watercraft lifts that impact or occur within predicted habitat for covered species and their prey would have to be moved out of nearshore areas when their authorizations expire or as permitted under the terms of the existing use authorization at the time the structures are repaired or replaced. Similarly, existing mooring buoys where vessels strike the bottom would have to be moved when scheduled maintenance occurs. Some existing docks, piers, and rafts that are not a sufficient distance from existing native aquatic vegetation could also be moved if their owners determine that moving would be more practicable than renovating the structures to increase light penetration.

[12] Existing log handling facilities would be moved out of nearshore areas only where navigational and harbor line designations allow.

As a result of implementing the restrictions identified above, the composition of use types close to shore would change compared to Alternative 1. While the amount of area encumbered by overwater structures, log handling facilities, outfalls, and aquaculture operations would decrease, other uses would continue to be allowed without restrictions. Uses to which the HCP Operating Conservation Program would not apply include road, bridge, and utility easements, waterfront parks, and compensatory mitigation for resource damage. In general, these uses are conducted by governmental agencies. Most commercial and recreational uses of state-owned aquatic lands would be subject to the limitations identified above.

The rate at which existing facilities may be relocated out of shallow waters would depend on the timing of lease expirations and on the circumstances of individual lessees. To ensure compliance with the State's statutory obligation to foster water-dependent uses, utilize renewable resources, and encourage direct public access to state-owned aquatic lands, Washington DNR would implement the requirements for existing facilities in a manner that avoids an inordinate burden on the lessees who own the structures and improvements. The time frame for compliance would be established in each authorization agreement. In some cases, replacement of a facility may not be reasonable within the lease term. In such cases, Washington DNR would establish a reasonable time frame for replacement and would provide notice to the lessee that replacement will be expected in a future term, if there is one.

Some restrictions would apply only during certain periods. For example, shellfish aquaculture activities that disturb the substrate during the spawning period would be allowed in areas where surf smelt or sand lance spawning has been observed only after eggs have hatched and no viable eggs or spawn are present. Such limited restrictions would not be expected to result in any long-term changes in the types of uses that occur on any given parcel of state-owned aquatic lands.

As under Alternative 1, uses not authorized by Washington DNR would continue to encumber state-owned aquatic lands. To address derelict vessels, Washington DNR would commit to appropriating at least $100,000 on a biennial basis to provide matching funds for the Derelict Vessel Removal Program and to support one full-time position. The result of this commitment would be the continued funding of the program, as would be expected under Alternative 1. In contrast to Alternative 1, however, the continued removal of derelict vessels would be assured with a 50-year commitment. In addition, Washington DNR would modify the scheme for prioritizing vessels for removal, placing additional emphasis on the removal of vessels in areas that have been ranked as conservation or restoration priorities through the Aquatics Division database (Subsection 2.2.3.3, Additional Commitments by

Washington DNR). This would not be expected to affect the total number of vessels that are removed, compared to Alternative 1, but it could mean that more vessels would be removed from some types of locations (e.g., those that provide substantial key habitat for species proposed for ITP coverage through the Aquatic Lands HCP). Any such change would not likely be substantial, however.

The amount of area encumbered by derelict structures would likely decrease more rapidly under Alternative 2, compared to Alternative 1. Under the Aquatic Lands HCP, all authorizations for uses of state-owned aquatic lands would require the removal of lessee- or grantee-owned structures when the authorization expires or the structures are no longer used as part of the authorized use (with the schedule for removal defined in each authorization agreement). If a structure has no viable lessee or grantee, Washington DNR would either remove the structure or seek legal remedies to assure removal. In contrast to Alternative 1, the continued removal of derelict structures would be assured with a 50-year commitment.

4.2.3.3 Washington DNR Programs for Protection and Restoration of Habitat

As under Alternative 1, Washington DNR would continue to establish aquatic reserves, enter into conservation leasing agreements, and issue Commissioner's Orders to protect areas with significant (per RCW 79.105.210(3)) natural value. The Aquatic Lands HCP would not include any explicit commitments for the amount or specific locations of areas that would be established through these programs and processes, but it would incorporate the use of the Washington DNR Aquatics Division database to rank the conservation priorities of state-owned aquatic lands (Subsection 2.2.3.3, Additional Commitments by Washington DNR). Based on the priorities established through this process, it is likely that most areas established through Washington DNR's programs for protecting and restoring habitat on aquatic lands would be in nearshore and littoral areas, which provide substantial key habitat for species proposed for ITP coverage through the Aquatic Lands HCP. This is similar to the pattern evident in areas that have been established under existing policies and programs, and that would be established under Alternative 1. It is possible, however, that more conservation areas would be established in freshwater areas under Alternative 2 than under Alternative 1, because any sites that provide habitat for ITP-covered species would be identified as conservation priorities, whether they are in freshwater or marine areas. The fact that all existing aquatic reserves and conservation leases are in the marine areas of Puget Sound suggests that habitats in freshwater areas may not receive a high priority for conservation under existing policies and programs, and that they would not under Alternative 1.

The period for which some conservation areas are established could be longer under Alternative 2 than under Alternative 1. Areas established as conservation areas would be expected to remain in place concurrent with the term of the HCP (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands). Additional areas would likely continue to be established through Commissioner's Orders and conservation leases; the location and timing of establishment of such conservation areas cannot reliably be predicted. In contrast to Alternative 1, the duration of any Commissioner's Orders issued under Alternative 2 during the period of the ITPs would be consistent with the remaining term of the ITPs at the time the Order is issued. Current policy does not establish the duration of Commissioner's Orders that prohibit or limit specific types of uses; such withdrawals or restrictions could be revoked at any time (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands). Although it is not possible to predict whether any such orders would be revoked under Alternative 1, Washington DNR's commitment under the Aquatic Lands HCP would provide greater certainty that areas would continue to be managed as specified under Commissioner's Orders for a known period under Alternative 2 when compared to Alternative 1, under which Commissioner's Order could be revoked.

Under Alternative 2, an additional form of *de facto* conservation areas would be created through Washington DNR's commitment to protect natural habitat value and function in areas that have been identified as habitat for at-risk species. Currently, Washington DNR has identified two species (Oregon spotted frog and Pacific pond turtle) that meet the criteria for protection (Subsection 2.2.3.3, Additional Commitments by Washington DNR—Habitat Protection and Restoration). Sites at which leasing would be curtailed consist of state-owned aquatic lands along the Black River and portions of Black Lake in Thurston and Lewis Counties, along with shorelands adjacent to Beacon Rock and the surrounding wetland complex along the Columbia River in Skamania County (see HCP Appendix J, Protecting Core Remaining Habitat for At-risk Species on State-owned Aquatic Lands). Additional locations could be identified in the future if new information on species status and/or land ownership becomes available. No such commitment would be made under Alternative 1.

4.2.3.4 Relationship between Uses of State-owned Aquatic Lands and Other Lands

As under Alternative 1, sites near aquatic lands would continue to be desirable locations for businesses and residential developments under Alternative 2, and existing developments would remain in place. Likewise, uses of waterfront areas adjacent to use authorizations (e.g., log handling facilities, marinas, docks, wharves) on state-owned aquatic lands would be expected to continue to be associated with and influenced by uses of state-owned aquatic lands. Some types of waterfront development could be affected by the implementation of the Aquatic Lands HCP under Alternative 2. By reducing the amount of nearshore and littoral habitat available for log handling facilities, marinas, docks, wharves, and floating homes (see Uses of State-owned Aquatic Lands, above), the HCP Operating Conservation Program could contribute to reductions in the amount of waterfront development associated with any of those uses (e.g., sawmills near log handling facilities, retail stores to support demand from residents of floating homes). Conversely, the implementation of measures that reduce the visual impacts of some aquatic land uses (Subsection 4.11, Visual Resources) may render some waterfront properties more desirable for development as residential areas, park and recreation facilities, restaurants, or other businesses, possibly leading to an increase in such uses, compared to Alternative 1.

4.2.4 Alternative 3, HCP for Marine Areas Only

Under Alternative 3, Washington DNR would implement the same HCP Operating Conservation Program as under Alternative 2, but in marine areas only. Freshwater areas would be managed as under Alternative 1. Washington DNR would continue to manage state-owned aquatic lands by acquiring, selling, and exchanging lands, managing uses, and protecting key areas. Alternative 3 would result in the implementation of measures and management practices that would impose new restrictions on uses, compared to Alternative 1. The magnitude and the geographic extent of potential effects on land use would be less, however, than under Alternative 2.

4.2.4.1 Ownership of Aquatic Lands in Washington State

As under Alternative 1, Washington DNR's authority to convey lands to other owners would not change under Alternative 3. Transfers of ownership would likely continue to be a rare occurrence, and the amount and distribution of state-owned aquatic lands would not be expected to change substantially. Washington DNR would continue to consider the public interest when evaluating proposed sales, acquisitions, or exchanges of aquatic lands. Under Alternative 3, the Aquatics Division database would be used to rank HCP conservation priorities (which would not be implemented under Alternative 1) in marine areas only (Subsection 2.2.3.3, Additional Commitments by Washington DNR). As under Alternative 2, this may lead to greater retention and acquisition of lands in nearshore marine areas than under Alternative 1. Because the conservation value rankings would be applied in marine areas only, the levels of retention and acquisition in freshwater areas under Alternative 3 would likely be similar to those under Alternative 1.

4.2.4.2 Uses of Aquatic Lands in Washington State

Compared to Alternative 1, and as under Alternative 2, Alternative 3 would be expected to reduce the amount of area available in shallow and/or nearshore waters for many commercial and recreational use authorizations. The magnitude of the reduction would be less than under Alternative 2, however, and would be limited to marine areas. Uses that occur primarily in freshwater areas—for example, floating homes, floating docks, and boat ramps (Table 3-3)—would likely not be affected as much as uses that occur primarily in marine areas.

As under Alternative 1, uses not authorized by Washington DNR would continue to encumber state-owned aquatic lands. As under Alternative 2, Washington DNR would commit to addressing derelict vessels by appropriating at least $100,000 on a biennial basis to provide matching funds for the Derelict Vessel Removal Program and to support one full-time position at Washington DNR. The result of this commitment would be the continued funding of the program, as would be expected under Alternative 1. As under Alternative 2, and in contrast to Alternative 1, the continued removal of derelict vessels would be assured with a 50-year commitment. As under Alternative 2, modifications to the scheme for prioritizing vessels for removal would not be expected to result in substantial changes in the number or location of vessels that are removed.

Under Alternative 3, Aquatic Lands HCP provisions that address derelict structures would be applied in marine areas only. The amount of area encumbered by derelict structures would likely decrease more rapidly than under Alternative 1 but less rapidly than under Alternative 2 because measures requiring the removal of derelict structures would be applied over a smaller area (i.e., marine areas only). In addition, as under Alternative 2, the continued removal of derelict structures would be assured with a 50-year commitment.

4.2.4.3 Washington DNR Programs for Protection and Restoration of Habitat

As under Alternative 1, Washington DNR would continue to establish aquatic reserves, enter into conservation leasing agreements, and issue Commissioner’s Orders to protect areas with significant natural value (per RCW 79.105.210(3)). Under Alternative 3, the Aquatics Division database would be used to rank HCP conservation priorities (which would not be implemented under Alternative 1) in marine areas only (Subsection 2.2.3.3, Additional Commitments by Washington DNR). As under Alternative 2, it is likely that most areas would be in nearshore areas. This is similar to the pattern evident in areas that have been established under existing policies and programs, and that would be established under Alternative 1. Because the conservation value rankings would be applied in marine areas only, however, the amount of conservation areas established in freshwater areas under Alternative 3 would likely be similar to those under Alternative 1. The location and timing of the establishment cannot reliably be predicted, however.

As under Alternative 1, areas established as aquatic reserves or through conservation leases would be expected to remain unavailable for other uses for at least 50 years. Additional areas would likely continue to be established through Commissioner's Orders; the location and timing of establishment of such conservation areas cannot reliably be predicted. Similar to Alternative 2, Alternative 3 would provide greater certainty that areas established under Commissioner's Orders would remain withdrawn or restricted for a known period than under Alternative 1. This would apply only in marine areas, however. In freshwater areas, areas protected through Commissioner's Orders could have the protection revoked at any time, as under Alternative 1.

Lastly, no areas would be established to protect habitat for at-risk species, since no such habitat has been identified on state-owned aquatic lands in marine areas. Such locations could be identified in the future, however, if additional information is collected on the status of species in marine environments and/or if land ownership changes.

4.2.4.4 Relationship between Uses of State-owned Aquatic Lands and Other Lands

As under Alternative 1, sites near aquatic lands would continue to be desirable locations for businesses and residential developments under Alternative 3, and existing developments would likely remain in place. Likewise, uses of waterfront areas adjacent to use authorizations (e.g., log handling facilities, marinas, docks, wharves) on state-owned aquatic lands would be expected to continue to be associated with and influenced by uses of state-owned aquatic lands. Compared to Alternative 1, Alternative 3 could reduce the amount of waterfront development associated with log handling facilities, marinas, docks, or wharves. Any such reductions would be more limited than under Alternative 2, however, because they would occur only adjacent to marine waterbodies.

The potential for decreased visual impacts from uses of state-owned aquatic lands to result in an increase in waterfront development in some areas would likely be similar to that under Alternative 2. As discussed in Subsection 4.11, Visual Resources, implementation of the HCP Operating Conservation Program could reduce the visual impacts of several uses of aquatic lands (e.g., shellfish aquaculture operations, log handling facilities, boat mooring areas, docks, wharves, piers, marinas, rafts, shipyards, terminals, and derelict structures), compared to Alternative 1. Most of these uses occur primarily in marine areas (Table 3-3).

4.3 Substrates and Erosional Processes

This subsection describes the direct and indirect effects of the proposed alternatives on substrates and processes of sediment erosion, transport, and deposition, comparing the effects of the action alternatives (Alternative 2 and Alternative 3) to those of Alternative 1, No-action, over the 50-year analysis period for this EIS. Analyses in this subsection compare how Washington DNR's management of state-owned aquatic lands under the proposed alternatives would, in combination with the requirements identified in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework, be expected to affect the condition of surface water and sediment quality as described in Subsection 3.3.2, Existing Conditions. The potential effects of Alternative 2 and Alternative 3 are discussed relative to the current management program represented by Alternative 1, No-action.

The features of the proposed alternatives that may influence the potential for uses of state-owned aquatic lands to affect substrates and erosional processes include 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of uses that are not authorized by Washington DNR, and 3) the opportunities for monitoring and adaptive management in response to information gathered from field audits (as described in Subsection 2.2.2, Alternative 1 (No-action), and Subsection 2.2.3, Elements Common to Both Action Alternatives). The effects analysis for each alternative below considers each of these features in turn.

4.3.1 Effects Common to All Alternatives

Under all alternatives, uses of state-owned aquatic lands would continue to occur in marine and freshwater areas and would have the potential to affect substrates and erosional processes as described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. These effects would continue under any of the alternatives, but to varying degrees, depending on the implementation of practices and programs designed to avoid or minimize adverse effects on erosional processes, as well as the implementation of monitoring and adaptive management. Examples of avoidance and minimization measures are provided in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. The differences among the alternatives are analyzed in the following subsections.

Under any of the proposed alternatives, proposed projects in marine and freshwater areas would continue to undergo review through the existing network of local, state, and Federal regulatory and permitting processes (Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework). In many cases, such review processes would result in substantial protection of substrates and erosional processes. As noted in Subsection 4.1.3.1, Analysis Assumptions, any potential changes in the regulatory environment cannot be predicted. For this reason, it is assumed for the analyses in this EIS that the effects of existing rules and regulations that are not part of the proposed alternatives would remain the same under all alternatives. As such, the regulatory requirements identified in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework, would apply equally under all alternatives. Under all three alternatives, Washington DNR's Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands) would be expected to operate in marine areas only, and would not contribute to reducing the effects of derelict structures in freshwater areas.

None of the alternatives would be expected to influence water depth, wind movement, hydrology, channel slope, topography or any other natural factors that are the primary controlling factors for erosional processes in marine and freshwater areas, including lakes. In addition, Washington DNR's management of channel alteration and dam construction projects (both of which can have substantial effects on erosional processes, albeit in riverine systems only) would not differ under the alternatives. Similarly, none of the alternatives would be expected to affect land uses adjacent to lakes or rivers (including residential, commercial/industrial, and agricultural land uses) to an extent that would influence substrates or erosional processes.

Approximately 2,600 acres of state-owned aquatic land are currently affected by log booming and storage (Washington DNR 2013). Under any of the alternatives, even if all current log handling facilities on state-owned aquatic lands were required to move into offshore habitats (i.e., waters greater than 66 feet deep—an unlikely scenario, considering the navigational and harbor line designations that limit the opportunities to move such facilities away from nearshore sites in many areas), the total area affected would be less than 0.2 percent of the total area of the offshore ecosystem in the analysis area.

4.3.2 Alternative 1, No-action

Under Alternative 1, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives, and Subsection 2.2.2, Alternative 1. When making decisions concerning the issuance of aquatic land use authorizations, Washington DNR would continue to consider the natural values of state-owned aquatic lands (Subsection 1.2.6, Washington DNR's Aquatics Division), but avoiding and minimizing adverse effects on surface water and sediment quality would not be a central goal of the Aquatics Division.

Washington DNR would not be required to implement programs aimed at avoiding and minimizing the potential for uses of state-owned aquatic lands to damage substrates or interfere with erosional processes under Alternative 1 (Subsection 4.1.3.1, Analysis Assumptions). Also, Washington DNR would not be required to include measures to avoid and minimize adverse effects on substrates and erosional processes in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight.

Washington DNR would not be required to place restrictions on new uses based on the habitat value and/or the level of development at the proposed use site. In addition, Washington DNR would not be required to implement new programs to address the effects of uses that are not authorized by Washington DNR, nor would it implement an adaptive management and monitoring program. As a result, the potential benefits of implementing such practices and programs would not be realized under Alternative 1, and uses of state-owned aquatic lands would continue to affect substrates and erosional processes in the analysis area as described in Subsection 3.3.2, Existing Conditions, and Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

Overall, the effects on substrates and erosional processes in the analysis area would not change from existing conditions in the short term or the long term. This is because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and 3) many of the factors that influence the condition of substrates and erosional processes in the analysis area are outside of Washington DNR's control (Subsection 4.3.1, Effects Common to All Alternatives).

4.3.2.1 Marine Areas

Under Alternative 1, Washington DNR would not be required to implement risk-reduction practices and programs directed at reducing the potential for uses of state-owned aquatic lands to adversely affect substrates and erosional processes (e.g., waves, wave currents, drift) in marine areas. Washington DNR would not be required to include measures to reduce the risk of interference with waves and wave currents that contribute to sediment erosion, entrainment, and transport in its use authorizations for state-owned aquatic lands, beyond the restrictions implemented through the permitting and review processes of agencies with regulatory oversight. Because most current use authorizations are in the nearshore marine ecosystem, and because the distribution of new authorizations would be expected to continue to follow that pattern (Subsection 4.1.3, Analysis Approach), nearshore marine areas would face the greatest risk of adverse effects, compared to areas in the offshore marine ecosystem or in freshwater areas. Areas with unconsolidated substrates would have the greatest potential to be affected by uses of state-owned aquatic lands because unconsolidated substrates are more susceptible than consolidated substrates to sediment movement.

<u>Implementation of Risk-reduction Practices</u>

Under Alternative 1, many of the potential adverse effects of authorized uses on substrates and erosional processes would be avoided, minimized, or mitigated to some extent through the application of rules and programs carried out by agencies with regulatory authority. As noted in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework, such regulatory review does not, however, always result in the application of effective conservation measures. In addition, some uses of state-owned aquatic lands would not be subject to Federal, state (other than Washington DNR), or local regulatory review.

Under Alternative 1, Washington DNR would not be required to include measures to protect substrates and erosional processes in its use authorizations for state-owned aquatic lands, beyond the restrictions implemented through the permitting and review processes of agencies with regulatory oversight. As a result, many uses of state-owned aquatic lands would likely continue to damage aquatic substrates and interfere with processes of sediment transport (e.g., longshore drift, beach drift). Existing uses of state-owned aquatic lands would be more likely than proposed new uses to adversely affect substrates and erosional processes because permitting and regulatory review typically apply only to proposed new uses. For example, existing overwater structures and shoreline armoring would remain in place, and Washington DNR would not require the replacement or reconfiguration of elements that damage substrates or interfere with erosional processes. The likelihood that measures would be implemented to reduce the adverse effects of human alterations, therefore, would be low. The potential effects of these and other uses are described in Subsection 4.1.4.1, Interference with Water Circulation and Sediment Transport, and Subsection 4.1.4.2, Damage to Substrates and Aquatic Vegetation.

Programs to Address Effects of Uses Not Authorized by Washington DNR

In addition to the uses authorized by Washington DNR, uses of state-owned aquatic lands not authorized by Washington DNR would continue to affect substrates and erosional processes under Alternative 1. Pertinent to this analysis are derelict structures and private recreational docks; the effects of these overwater and in-water structures are described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis (for example, derelict structures and private recreational docks can interfere with wave energy and currents). The abandonment of structures and subsequent adverse effects of derelict structures on substrates and erosional processes would likely continue to be a comparatively rare occurrence because a high percentage of structures would be subject to a contract-based requirements for removal, per WAC 332-30-122(4) (Subsection 3.2.3.2, Uses Not Authorized by Washington DNR). Washington DNR would be expected to continue to remove derelict pilings and overwater structures through the Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands). Although the primary goal of the program is the removal of toxic compounds from beaches, waters, and sediments, removal of these structures would also reduce adverse effects on substrates and erosional processes. The continued removal of derelict structures through the Creosote Removal Program would not, however, be assured with a 50-year commitment.

Under Alternative 1, private recreational docks would continue to be sited by statutory authority on state-owned aquatic lands abutting upland residential properties (Subsection 2.2.2.1, Private Recreational Dock Management). Washington DNR would not be required to implement programmatic measures for managing private recreational docks, nor would Washington DNR be required to impose use conditions for new docks on state-owned aquatic lands, specifying measures to avoid or minimize the degradation of aquatic habitat. The potential for recreational docks and their associated uses to damage substrates or interfere with erosional processes would remain unchanged from current levels, although the area over which these effects occur would remain unknown. To regulate dock construction and maintenance, Washington DNR would continue to rely on shoreline master programs administered by local governments, HPAs issued by WDFW, and regional general permits issued by the Corps.

Monitoring and Adaptive Management

Under Alternative 1, Washington DNR would not conduct comprehensive compliance or effectiveness monitoring or engage in adaptive management. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspections. Most such visits would be linked to lease renewal (approximately once every 12 to 30 years) or to periodic re-valuations of rental rates (approximately once every 4 years) (Table 2-1) (Washington DNR 2013). The purpose of such visits would be to verify the general condition of any structures associated with the use. Staff conducting the inspections would not be directed to identify and assess changes in the quantity and quality of habitat (including the condition of substrates) for fish or wildlife.

As noted in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework, monitoring and adaptive management are not consistently incorporated into regulatory review and/or permitting processes (Quinn et al. 2007; San Juan Initiative 2008). As a result, the likelihood of Washington DNR taking measures to reduce adverse effects on substrates or erosional processes by modifying management practices or identifying and correcting problems based on information gained from reviews of existing use authorizations would be low.

4.3.2.2 Freshwater Areas

The anthropogenic factors with the greatest effects on the condition of substrates and erosional processes in freshwater areas (e.g., lakes and rivers, including shorelines)—placement of fill, removal of sediment, construction of in-water structures, shoreline armoring—are essentially identical to those in marine areas (Subsection 3.3.2.2, Existing Conditions—Freshwater Areas). For this reason, the potential for implementation of Alternative 1 to result in continued adverse effects on substrates and erosional processes in lakes and rivers would be similar to the potential in marine areas. Human alterations, including uses of state-owned and other aquatic lands, would be expected to continue to affect substrates and erosional processes in lakes, rivers, and streams, as described in Subsection 4.1.4.1, Interference with Water Circulation and Sediment Transport, and Subsection 4.1.4.2, Damage to Substrates and Aquatic Vegetation. As in marine areas, areas with unconsolidated substrates would have the greatest potential to be affected because unconsolidated substrates are more susceptible than consolidated substrates to sediment movement.

On the whole, the programs and regulatory processes that influence the potential for adverse effects on substrates and erosional processes in marine areas would have the same influence in freshwater areas. The potential for adverse effects would, therefore, be as described above. The one exception to this expectation concerns Washington DNR's Creosote Removal Program, which operates only in the marine and estuarine waters of Puget Sound. As such, the Creosote Removal Program would reduce the effects of derelict structures in freshwater environments under Alternative 1.

4.3.3 Alternative 2, Proposed HCP

Under Alternative 2, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives. In addition, and in contrast to Alternative 1, Washington DNR would require users of state-owned aquatic lands to implement measures in the HCP Operating Conservation Program that reduce the potential for alteration of wave and current energy, disruption or modification of substrate composition, and alteration of depth and slope profiles. These measures would be required for all new and renewed authorizations statewide. The measures are described in Table 2-1 and the potential effects addressed by the measures are identified in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. In contrast to Washington DNR's management under Alternative 1, the central goals of the Aquatic Lands HCP Operating Conservation Program would include avoiding and minimizing alterations to natural, habitat-forming processes, such as wave and current energy and sediment transport (Washington DNR 2013).

When engaging in any of the HCP-covered activities (i.e., authorization and management of shellfish aquaculture, log booming and storage, and overwater structures), Washington DNR would consider the potential direct and indirect effects of the use on ITP-covered species and their habitats. Through this review process, some uses may not be allowed in some locations or the footprints of some existing use authorizations may be modified to accommodate ITP-covered species or important habitat features. Such reviews and modifications would not take place under Alternative 1.

Also in contrast to Alternative 1, new and existing uses would be required to implement conservation measures under the terms and conditions of the lease or grant issued. Washington DNR would not allow new uses that alter the value and function of natural habitats, including substrates and erosional processes, in areas with little to no development and with high to moderate importance to proposed covered species (Subsection 2.2.3.3, Additional Commitments by Washington DNR—Habitat Protection and Restoration). No such restrictions would be imposed under Alternative 1. In addition, and in contrast to Alternative 1, Washington DNR would implement new programs to address the effects of uses that are not authorized by Washington DNR, and would implement an adaptive management and monitoring program.

The overall effect of implementing the HCP Operating Conservation Program, including the measures discussed above, on all state-owned aquatic lands under Alternative 2 would be a reduced risk, compared to Alternative 1, of adverse effects on natural processes of sediment transport and in the analysis area over the short term and the long term. This is because the amount of area subject to scour, compaction, changes in sediment composition, and other effects identified in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis, would be expected to decrease over time, or at least to increase at a rate slower than under Alternative 1. In addition, the amount of area over which uses of state-owned aquatic lands continue to interfere with processes of sediment transport (e.g., longshore drift, beach drift) would be expected to decrease, compared to Alternative 1. As a result of these changes, the condition of substrates and erosional processes in the analysis area may improve compared to Alternative 1. This change would occur gradually over the course of 30 to 50 years, because ongoing effects associated with existing use authorizations would continue until those authorizations need to be renewed, or authorized structures undergo renovation or repair. In addition, as discussed in Subsection 2.2.3.1, Requirements for Authorized Uses of State-owned Aquatic Land, the schedule for ensuring individual use authorizations are in compliance with the terms and conditions specified in the Aquatic Lands HCP would be based on the life expectancy of the materials used for any structures associated with the use, allowing further delays in the implementation of measures that reduce the potential for adverse effects.

Although implementation of the HCP Operating Conservation Program would cease after 50 years, the potential benefits associated with HCP implementation would be expected to persist beyond the 50-year analysis period for this EIS, and such benefits are expected to be greater than those under

Alternative 1. This is because facilities authorized or reauthorized during the term of the Aquatic Lands HCP would be sited and constructed in a manner aimed at avoiding or minimizing adverse effects. In addition, operational constraints already incorporated into existing use authorizations at the time of ITP expiration would remain in place until subsequent renewals.

Despite site-specific improvements, the effects on substrates and erosional processes in the analysis area would likely be similar to those anticipated under Alternative 1. This is because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, state-owned aquatic lands make up a small proportion of the total aquatic land area that it manages, and 3) many of the factors that influence the condition of substrates and erosional processes in the analysis area are outside of Washington DNR's control (Subsection 4.3.1, Effects Common to All Alternatives).

The following subsections provide additional analysis of the potential effects of Alternative 2 on substrates and erosional processes in marine areas and freshwater areas, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of uses that are not authorized by Washington DNR, and 3) the opportunities for monitoring and adaptive management in response to information gathered from field audits.

4.3.3.1 Marine Areas

The risk-reduction practices and programs of the HCP Operating Conservation Program under Alternative 2 would be directed at reducing the potential for uses of state-owned aquatic lands to adversely affect substrates and erosional processes (e.g., waves, wave currents, drift). In contrast to Alternative 1, the implementation of measures under Alternative 2 that reduce the potential for uses of state-owned aquatic lands to interfere with waves and wave currents (which contribute to sediment erosion, entrainment, and transport) may result in improvements in the condition of substrates and erosional process in the analysis area. These improvements would result from the implementation of the measures, programs, and adaptive management and monitoring elements of the HCP Operating Conservation Program, as described in the subsections below. Any improvements in conditions (e.g., movement toward conditions resembling those expected in an undisturbed state) would be most noticeable in areas with unconsolidated substrates, which are more susceptible than consolidated substrates to sediment movement. Compared to Alternative 1, the amount of area affected by uses of state-owned aquatic lands in the offshore marine ecosystem could increase in response to measures intended to reduce adverse effects in nearshore areas (Subsection 4.2.3, Alternative 2, Proposed HCP—

Land Ownership and Use). For example, under Alternative 2 some new log handling facilities would be located in offshore areas, and some existing facilities would be moved from their current locations. Based on a comparison of the amount of area potentially affected by such uses relative to the overall size of the offshore ecosystem (more than 1.8 million acres; Table 3-1), however, the potential effects of any such increase would be minimal.

Implementation of Risk-reduction Practices

As under Alternative 1, many of the potential adverse effects of authorized uses on substrates and erosional processes would be avoided, minimized, or mitigated to some extent under Alternative 2 through the application of rules and programs carried out by agencies with regulatory authority. As noted in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes, however, such regulatory review does not always result in the application of effective conservation measures. Under Alternative 2, these rules and programs would be supplemented by conservation measures and management practices implemented as part of the HCP Operating Conservation Program. For example, measures that prohibit new bank armoring and require the replacement of existing bulkheads would likely lead to an increase in the amount of drift sediment available for maintenance of down-drift beaches. By focusing on uses for which the primary means of reducing potential adverse effects falls within Washington DNR's proprietary authority, the Aquatic Lands HCP would address effects that may not be addressed through other regulatory channels. This contrasts with Alternative 1, under which Washington DNR would not be required to include measures to protect substrates and erosional processes in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight.

Although it would likely represent an improvement over Alternative 1, implementation of the HCP Operating Conservation Program would not be expected to eliminate the potential for adverse effects on erosional processes entirely. For example, restrictions would be placed on in-water shellfish aquaculture activities that disturb substrate only in certain areas (i.e., documented spawning areas for surf smelt and sand lance) and at certain times of year (i.e., work windows). Outside of those areas, temporary disturbance of substrate every few years by shellfish aquaculture would continue. The potential for long-term adverse effects on natural processes of sediment transport and deposition would be minimized, however, through the adaptive management program that would be part of the Aquatic Lands HCP (see Monitoring and Adaptive Management, below).

Programs to Address Effects of Uses Not Authorized by Washington DNR

As under Alternative 1, uses that have not been authorized by Washington DNR—specifically, derelict structures and private recreational docks—would continue to affect substrates and erosional processes under Alternative 2 as described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. In contrast to Alternative 1, however, all authorizations for uses of state-owned aquatic lands would require the removal of lessee- or grantee-owned structures when the authorization expires or the structures are no longer used as part of the authorized use. This requirement would remain in effect through the 50-year duration of the ITPs. As a result, the amount of area over which derelict structures damage substrates or interfere with sediment transport would likely be less than under Alternative 1. This reduction would occur in combination with the reductions that would be expected to continue through the operation of the Creosote Removal Program.

Additional benefits would be expected to result from Washington DNR's commitment to implementing programmatic measures for the management of private recreational docks, combined with Washington DNR's commitment to requiring all new private recreational docks on state-owned aquatic lands to comply with the conservation measures of the Aquatic Lands HCP. Under this HCP, owners of new private recreational docks would be required to implement protective measures to avoid or minimize the degradation of aquatic habitat. Such measures would reduce the risk of altering wave and current energy, disrupting or modifying substrate composition, and altering depth and slope profiles. This requirement would reduce the potential for uses of private recreational docks to damage substrates or interfere with erosional processes, compared to Alternative 1.

Monitoring and Adaptive Management

Compared to Alternative 1, implementation of effectiveness and compliance monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring program would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner. There is no assurance that these programs would be implemented under Alternative 1 or through most review and/or permitting processes of Federal, state, and local agencies with regulatory authority.

Through the adaptive management and monitoring program, staff from Washington DNR would conduct field audits to assess whether the HCP Operating Conservation Program is being implemented as intended. Rather than being linked to lease renewal or rental rate re-valuation (as under Alternative 1), field audits would occur at a randomly selected sample of all use authorizations every year. In addition, and in contrast to Alternative 1, Washington DNR staff conducting effectiveness monitoring would identify and assess changes in the quantity and quality of habitat for ITP-covered fish and wildlife species. For example, staff would look for evidence of scour or other changes in slope profiles or sediment grain size distribution. In addition, information collected through effectiveness monitoring would be used to improve the efficacy of measures intended to avoid or minimize the adverse effects of authorized uses on substrates and erosional processes. Compared to Alternative 1, therefore, Washington DNR would have a greater likelihood of modifying management practices or readily identifying and correcting problems based on information gained from reviews of existing use authorizations, further reducing the risk of adverse effects.

4.3.3.2 Freshwater Areas

As under Alternative 1, the potential for Washington DNR's management under Alternative 2 to result in adverse effects on substrates and erosional processes in lakes, rivers, and their shorelines would be similar to the potential in marine areas. Implementation of the HCP Operating Conservation Program under Alternative 2 would reduce the risk that uses of state-owned aquatic lands would interfere with natural water movement processes that support sediment erosion and transport processes in lakes, compared to Alternative 1. The measures would also address effects associated with structures placed in river channels by requiring such structures to be designed and located to minimize the obstruction of currents and the alteration of sediment transport. As in marine areas, areas with unconsolidated substrates would have the greatest potential to be affected because unconsolidated substrates are more susceptible than consolidated substrates to sediment movement.

On the whole, the programs and regulatory processes that influence the potential for adverse effects on substrates and erosional processes in marine areas would have a similar influence in freshwater areas. Because the HCP Operating Conservation Program would apply equally to uses of state-owned aquatic lands in freshwater areas and in marine areas under Alternative 2, the potential for adverse effects would be as described in the discussion of Marine Areas, above. As under Alternative 1, the exception to this expectation concerns Washington DNR's Creosote Removal Program, which operates only in the marine and estuarine waters of Puget Sound. As such, and as under Alternative 1, the Creosote Removal Program would not reduce the effects of derelict structures in freshwater areas under Alternative 2.

4.3.4 Alternative 3, HCP for Marine Areas Only

Under Alternative 3, Washington DNR would implement the same HCP Operating Conservation Program as under Alternative 2, but in marine areas only. Freshwater areas would be managed as under Alternative 1. As a result, the risk of adverse effects on substrates and natural processes of sediment transport and deposition would be less under Alternative 3 than under Alternative 1 in marine areas, but the same in freshwater areas. In both the short term and the long term, the potential benefits of HCP implementation anticipated under Alternative 3 would, therefore, occur over a greater area than under Alternative 1 but less than under Alternative 2.

Based on decreases in adverse effects associated with uses of state-owned aquatic lands, the condition of substrates and erosional processes in the analysis area would be expected to show improvements, compared to Alternative 1, but in marine areas only. As under Alternative 2, the effects on substrates and erosional processes in the analysis area would likely be similar to those anticipated under Alternative 1. This is because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and 3) many of the factors that influence the condition of substrates and erosional processes in the analysis area are outside of Washington DNR's control (Subsection 4.3.1, Effects Common to All Alternatives). Washington DNR's management under Alternative 3, as under Alternative 1, would not be expected to contribute to improvements in the condition of substrates and erosional processes in freshwater areas.

4.4 Water Resources

This subsection describes the direct and indirect effects of the proposed alternatives on surface water and sediment quality, comparing the effects of the action alternatives (Alternative 2 and Alternative 3) to those of Alternative 1, No-action, over the 50-year analysis period for this EIS. Analyses in this subsection compare how Washington DNR's management of state-owned aquatic lands under the proposed alternatives would, in combination with the requirements identified in Subsection 3.4.1, Existing and Relevant Management Measures and Regulatory Framework, be expected to affect the condition of surface water and sediment quality as described in Subsection 3.4.2, Existing Conditions. The potential effects of Alternative 2 and Alternative 3 are discussed relative to the current management program represented by Alternative 1, No-action.

Per discussions in Subsection 3.4, Water Resources, the effects on surface water quantity, groundwater quality, or groundwater quantity would not be expected to differ among alternatives. As noted in that subsection, the potential exists for Washington DNR's management of state-owned aquatic lands to affect surface water quantity, groundwater quality, or groundwater quantity by influencing the amount of impervious surface associated with urban or residential development (e.g., by influencing how attractive adjoining upland parcels may be for development). The extent to which this may occur under any of the alternatives would, however, be influenced by personal choices, site-specific considerations, economic conditions, and numerous other factors outside of Washington DNR's control. As such, potential effects on impervious surfaces in upland areas under any of the alternatives cannot accurately be predicted. For the purposes of this EIS, therefore, effects of the proposed alternatives on water resources are analyzed by comparing effects on surface water and sediment quality among alternatives.

The features of the proposed alternatives that may influence the potential for uses of state-owned aquatic lands to affect surface water and sediment quality include 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of uses that are not authorized by Washington DNR, and 3) the opportunities for monitoring and adaptive management in response to information gathered from field audits (as described in Subsection 2.2.2, Alternative 1 (No-action), and Subsection 2.2.3, Elements Common to Both Action Alternatives). The effects analysis for each alternative below considers each of these features in turn.

4.4.1 Effects Common to All Alternatives

Under all alternatives, uses of state-owned aquatic lands would continue to occur in marine and freshwater areas and would have the potential to affect surface water and sediment quality as described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. These effects would continue under any of the alternatives, but to varying degrees, depending on the implementation of practices and programs designed to avoid or minimize adverse effects on water quality, as well as the implementation of monitoring and adaptive management. Examples of avoidance and minimization measures are provided in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. The differences among the alternatives are analyzed in the following subsections.

Under any of the proposed alternatives, proposed projects in marine and freshwater areas would continue to undergo review through the existing network of local, state, and Federal regulatory and permitting processes (Subsection 3.4.1, Existing and Relevant Management Measures and Regulatory Framework). In many cases, such review processes would result in substantial protection of surface water and sediment quality. As noted in Subsection 4.1.3.1, Analysis Assumptions, any potential changes in the regulatory environment cannot be predicted. For this reason, it is assumed for the analyses in this EIS that the effects of existing rules and regulations that are not part of the proposed alternatives would remain the same under all alternatives. As such, the regulatory requirements identified in Subsection 3.4.1, Existing and Relevant Management Measures and Regulatory Framework, would apply equally under all alternatives. Under all three alternatives, Washington DNR's Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands) would be expected to operate in marine areas only, and would not contribute to reducing the effects of derelict structures in freshwater areas.

As discussed in Subsection 3.4, Water Resources, Washington DNR's management of aquatic lands does not directly affect upland areas, and potential changes in the extent or location of upland development in response to changes in aquatic land management practices cannot be predicted. The effects of the proposed alternatives would, therefore, not be expected to differ with respect to factors that are primarily associated with actions in upland areas. These factors are identified in the paragraphs below and would continue to be the primary causes of surface water and sediment quality impacts in marine and freshwater areas under any of the alternatives.

As discussed in Subsection 3.4.2.1, Existing Conditions—Marine Areas, the primary water quality impacts in Washington State's marine areas are excess nutrients and fecal coliform bacteria, both of which enter marine waters mostly via runoff from upland areas or discharges from wastewater treatment plants. These impacts are most severe in nearshore marine areas, due in part to the density stratification caused by the addition of fresh water from upland areas. The most common pathway by which toxic chemicals (e.g., copper, polycyclic aromatic hydrocarbons) reach marine waterbodies such as Puget Sound is surface runoff from upland areas. The primary sources of contaminants in marine sediments are industrial discharges, oil spills, contaminated runoff from upland areas, and discharges from wastewater treatment plants.

As discussed in Subsection 3.4.2.2, Existing Conditions—Freshwater Areas, the primary water quality impacts in Washington State's freshwater areas are elevated temperatures, elevated levels of fecal coliform bacteria, and low levels of dissolved oxygen (in rivers and streams), along with excess nutrients (in lakes). The major causes of these impacts are removal of riparian vegetation, discharges from industrial facilities, creation of impervious surfaces in upland areas, construction and operation of dams, management of septic systems, urban and residential development, lakeshore habitat degradation, and agricultural practices. The primary sources of persistent contaminants in freshwater sediments are industrial processes, internal combustion engines, various consumer products, and past applications of agricultural and residential pesticides.

As noted earlier, the proposed alternatives would not be expected to differ with respect to effects on the factors identified above. In addition, the alternatives would not be expected to influence climate because none of the alternatives would be expected to result in any substantial changes in the generation of greenhouse gases—i.e., the use of fossil fuels for electricity generation, transportation, industrial processes, home heating, or agriculture (IPCC 2007). Further discussion of the anticipated effects of changing climatic conditions on water resources can be found in Subsection 5.2, Future Actions and Conditions.

4.4.2 Alternative 1, No-action

Under Alternative 1, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives, and Subsection 2.2.2, Alternative 1. When making decisions concerning the issuance of aquatic land use authorizations, Washington DNR would continue to consider the natural values of state-owned aquatic lands (Subsection 1.2.6, Washington DNR's Aquatics Division), but avoiding and minimizing adverse effects on surface water and sediment quality would not be a central goal of the Aquatics Division.

Washington DNR would not be required to implement programs aimed at avoiding and minimizing the potential for uses of state-owned aquatic lands to adversely affect surface water and sediment quality under Alternative 1 (Subsection 4.1.3.1, Analysis Assumptions). Also, Washington DNR would not be required to include measures to avoid and minimize adverse effects on water resources (e.g., by avoiding and minimizing input of excess nutrients or contaminants) in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight. Washington DNR would not be required to place restrictions on new uses based on the habitat value and/or the level of development at the proposed use site. In addition, Washington DNR would not be required to implement new programs to address the effects of uses that are not authorized by Washington DNR, nor would it implement an adaptive management and monitoring program. As a result, the potential benefits of implementing such practices and programs would not be realized under Alternative 1, and uses of state-owned aquatic lands would continue to affect water and sediment quality in the analysis area as described in Subsection 3.4.2, Existing Conditions, and Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

Overall, the effects on surface water and sediment quality in the analysis area would not change from existing conditions in the short term or the long term. This is because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and 3) many of the factors that influence surface water and sediment quality in the analysis area are outside of Washington DNR's control (Subsection 4.4.1, Effects Common to All Alternatives).

4.4.2.1 Marine Areas

Under Alternative 1, Washington DNR would not be required to implement risk-reduction practices and programs directed at reducing the potential for uses of state-owned aquatic lands to adversely affect water resources in marine areas. The quality of surface water and sediments in marine areas—including the presence of excess nutrients and fecal coliform bacteria, low levels of dissolved oxygen, and the presence of contaminants—would likely continue as described in Subsection 3.4.2.1, Existing Conditions—Marine Areas, as would the trends described therein.

Implementation of Risk-reduction Practices

Under Alternative 1, many of the potential adverse effects of authorized uses on surface water and sediment quality would be avoided, minimized, or mitigated to some extent through the application of rules and programs carried out by agencies with regulatory authority. As noted in Subsection 3.4.1, Existing and Relevant Management Measures and Regulatory Framework, such regulatory review does not, however, always result in the application of effective conservation measures. In addition, some uses of state-owned aquatic lands would not be subject to Federal, state (other than Washington DNR), or local regulatory review.

Under Alternative 1, Washington DNR would not be required to include measures to protect surface water and sediment quality (e.g., reducing the direct input of hazardous substances [including petroleum-related compounds] and nutrients from upland areas, prohibiting the use of treated wood for in-water structures, reducing wood waste accumulation, prohibiting storage of fuels and other toxic materials in or near nearshore areas, and maximizing water flow at marinas, shipyards, and terminals) in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight. As a result, many uses of state-owned aquatic lands would likely continue to adversely affect surface water and sediment quality by contributing copper and other toxic substances (e.g., polycyclic aromatic hydrocarbons) to marine waters. As discussed in Subsection 3.4, Water Resources, the primary sources of such hazardous substances in Puget Sound (e.g., agricultural pesticides, fertilizers, brake pads, roofing materials) would continue to be associated with human activities other than uses of state-owned aquatic lands.

Existing uses of state-owned aquatic lands would be more likely than proposed new uses to adversely affect surface water and sediment quality because permitting and regulatory review typically apply only to proposed new uses. For example, when reviewing applications to renew authorizations for existing overwater structures, Washington DNR would not be required to impose protective measures to ensure that work on the structures or associated vessels does not result in the discharge of hazardous substances into the water. Unless the structures undergo substantial renovation or reconfiguration, other agencies with regulatory authority would have no opportunity to require the implementation of such measures for existing structures (assuming such measures were not incorporated into the permits for such structures when they were originally built). The potential effects of these uses are described in Subsection 4.1.4.3, Contamination.

Programs to Address Effects of Uses Not Authorized by Washington DNR

In addition to the uses authorized by Washington DNR, uses of state-owned aquatic lands not authorized by Washington DNR would continue to adversely affect surface water and sediment quality under Alternative 1. Pertinent to this analysis are derelict structures and private recreational docks; the effects of these overwater and in-water structures are described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. The abandonment of structures and subsequent adverse effects of derelict structures on surface water and sediment quality would likely continue to be a comparatively rare occurrence because a high percentage of structures would be subject to a contract-based requirements for removal, per WAC 332-30-122(4) (Subsection 3.2.3.2, Uses Not Authorized by Washington DNR). Washington DNR would be expected to continue to remove derelict pilings and overwater structures through the Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands). Removal would eliminate the potential for such structures to adversely affect surface water and sediment quality due to contaminants present in the structures (as described in Subsection 4.1.4.3, Contamination). The primary goal of the Creosote Removal Program is the removal of toxic compounds from beaches, waters, and sediments. Continued operation of this program would address one of the primary sources of polycyclic aromatic hydrocarbons in Puget Sound (Ecology and King County 2011). The continued removal of derelict structures through the Creosote Removal Program would not, however, be assured with a 50-year commitment.

Under Alternative 1, private recreational docks would continue to be sited by statutory authority on state-owned aquatic lands abutting upland residential properties (Subsection 2.2.2.1, Private Recreational Dock Management). Washington DNR would not be required to implement programmatic measures for managing private recreational docks, nor would Washington DNR be required to impose use conditions for new docks on state-owned aquatic lands, specifying measures to avoid or minimize the degradation of aquatic habitat. The potential for recreational docks and their associated uses to contribute hazardous substances (e.g., copper in paints on boat hulls; Subsection 3.4.2.1, Existing Conditions—Marine Areas) to surrounding water and sediments would remain unchanged from current levels, although the area over which these effects occur would remain unknown. To regulate dock construction and maintenance, Washington DNR would continue to rely on shoreline master programs administered by local governments, HPAs issued by WDFW, and regional general permits issued by the Corps.

Monitoring and Adaptive Management

Under Alternative 1, Washington DNR would not conduct comprehensive compliance or effectiveness monitoring or engage in adaptive management. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspections. Most such visits would be linked to lease renewal (approximately once every 12 to 30 years) or to periodic re-valuations of rental rates (approximately once every 4 years) (Table 2-1) (Washington DNR 2013). The purpose of such visits would be to verify the general condition of any structures associated with the use. Staff conducting the inspections would not be directed to identify and assess changes in the quantity and quality of habitat (including water quality) for fish and wildlife.

As noted in Subsection 4.3.1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes, monitoring and adaptive management are not consistently incorporated into regulatory review and/or permitting processes (Quinn et al. 2007; San Juan Initiative 2008). As a result, the likelihood of Washington DNR taking measures to reduce surface water and sediment quality impacts by modifying management practices or identifying and correcting problems based on information gained from reviews of existing use authorizations would be relatively low.

4.4.2.2 Freshwater Areas

With the exception of shellfish aquaculture, uses that may adversely affect surface water and/or sediment quality in marine areas also occur in freshwater areas. For this reason, the potential for implementation of Alternative 1 to result in continued adverse effects on surface water and sediment quality in freshwater areas would be similar to the potential in marine areas. The conditions of surface water and sediment quality in freshwater areas—including elevated temperatures, high concentrations of fecal coliform bacteria, and the presence of contaminants—would likely continue as described in Subsection 3.4.2.2, Existing Conditions—Freshwater Areas, as would the trends described therein. Degradation of lakeshore habitat and delivery of excess nutrients via runoff from residential development and agricultural activities would continue to be major causes of water quality impacts in lakes. Human activities in upland areas (e.g., riparian vegetation removal, wastewater treatment plant operation, urban development) would continue to be primary causes of water quality impacts in rivers and streams.

On the whole, the programs and regulatory processes that influence the potential for surface water and sediment quality impacts in marine areas would have similar influence in freshwater areas. The potential for adverse effects would, therefore, be as described above. The one exception to this expectation concerns Washington DNR's Creosote Removal Program (Subsection 2.2.1.2, Elements Common to All Alternatives—Protection and Restoration of Aquatic Lands), which operates only in the marine and estuarine waters of Puget Sound. As such, the Creosote Removal Program would not reduce the effects of derelict structures in freshwater areas under Alternative 1.

4.4.3 Alternative 2, Proposed HCP

Under Alternative 2, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives. In addition, and in contrast to Alternative 1, Washington DNR would require users of state-owned aquatic lands to implement measures in the HCP Operating Conservation Program that reduce the potential for adverse effects on ITP-covered species and their habitat. These measures would be required for all new and renewed authorizations statewide. The measures are described in Table 2-1 and the potential effects addressed by the measures are identified in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. In contrast to the Washington DNR's management under Alternative 1, the central goals of the Aquatic Lands HCP Operating Conservation Program would include avoiding and minimizing adverse effects on ITP-covered species and their habitats, which would entail protecting water and sediment quality (Washington DNR 2013).

When engaging in any of the HCP-covered activities (i.e., authorization and management of shellfish aquaculture, log booming and storage, and overwater structures), Washington DNR would consider the potential direct and indirect effects of the use on ITP-covered species and their habitats. Through this review process, some uses may not be allowed in some locations or the footprints of some existing use authorizations may be modified to accommodate ITP-covered species or important habitat features. Such reviews and modifications would not take place under Alternative 1.

Also in contrast to Alternative 1, new and existing uses would be required to implement conservation measures under the terms and conditions of the lease or grant issued. Washington DNR would not allow new uses that alter the value and function of natural habitats, including water and sediment quality, in areas with little to no development and with high to moderate importance to proposed covered species (Subsection 2.2.3.3, Additional Commitments by Washington DNR—Habitat Protection and Restoration). No such restrictions would be imposed under Alternative 1. In addition, and in contrast to Alternative 1, Washington DNR would implement new programs to address the effects of uses that are not authorized by Washington DNR, and would implement an adaptive management and monitoring program.

The overall effect of implementing the HCP Operating Conservation Program, including the measures discussed above, on all state-owned aquatic lands under Alternative 2 would be a reduced risk, compared to Alternative 1, of adverse effects on surface water and sediment quality in the analysis area over the short term and the long term. This is because the amount of area subject to the effects identified in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis, would be expected to decrease over time, or at least to increase at a rate slower than under Alternative 1. As a result, surface water and sediment quality in the analysis area may improve compared to Alternative 1. This change would occur gradually over the course of 30 to 50 years, because ongoing effects associated with existing use authorizations would continue until those authorizations need to be renewed, or authorized structures undergo renovation or repair. In addition, as discussed in Subsection 2.2.3.1, Requirements for Authorized Uses of State-owned Aquatic Land, the schedule for ensuring individual use authorizations are in compliance with the terms and conditions specified in the Aquatic Lands HCP would be based on the life expectancy of the materials used for any structures associated with the use, allowing further delays in the implementation of measures that reduce the potential for adverse effects.

Although implementation of the HCP Operating Conservation Program would cease after 50 years, the potential benefits associated with HCP implementation would be expected to persist beyond the 50-year analysis period for this EIS, and such benefits are expected to be greater than those under Alternative 1. This is because facilities authorized or reauthorized during the term of the Aquatic Lands HCP would be sited and constructed in a manner aimed at avoiding or minimizing adverse effects. In addition, operational constraints already incorporated into existing use authorizations at the time of ITP expiration would remain in place until subsequent renewals.

Despite site-specific improvements, overall trends in surface water and sediment quality in the analysis area would likely be similar to those anticipated under Alternative 1. This is because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and 3) many of the factors that influence surface water and sediment quality in the analysis area are outside of Washington DNR's control (Subsection 4.4.1, Effects Common to All Alternatives).

The following subsections provide additional analysis of the potential effects of Alternative 2 on surface water and sediment quality in marine areas and freshwater areas, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of uses that are not authorized by Washington DNR, and 3) the opportunities for monitoring and adaptive management in response to information gathered from field audits.

4.4.3.1 Marine Areas

The risk-reduction practices and programs of the HCP Operating Conservation Program under Alternative 2 would be directed at reducing the potential for uses of state-owned aquatic lands to adversely affect surface water and sediment quality. In contrast to Alternative 1, the implementation of measures that reduce the input of hazardous substances associated with uses of state-owned aquatic lands under Alternative 2 may decrease the levels of toxic chemicals that are delivered to the waters and sediments of Puget Sound and other marine waterbodies. As a result, implementation of the Aquatic Lands HCP under Alternative 2 could result in improvements, compared to Alternative 1, in the quality of surface water and/or sediment at specific locations in the analysis area. These improvements would result from the implementation of the measures, programs, and adaptive management and monitoring elements of the HCP Operating Conservation Program, as described in the subsections below. Nevertheless, for the reasons discussed below, impacts to the quality of surface water and sediment quality conditions in marine areas—including excess nutrients and fecal coliform bacteria, low levels of dissolved oxygen, and the presence of contaminants—would likely continue as described in Subsection 3.4.2.1, Existing Conditions—Marine Areas, as would the trends described therein.

<u>Implementation of Risk-reduction Practices</u>

As under Alternative 1, many of the potential adverse effects of authorized uses on surface water and sediment quality would be avoided, minimized, or mitigated to some extent under Alternative 2 through the application of rules and programs carried out by agencies with regulatory authority. As noted in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes, however, such regulatory review does not always result in the application of effective conservation measures. Under Alternative 2, these rules and programs would be supplemented by conservation measures and management practices implemented as part of the HCP Operating Conservation Program. By focusing on uses for which the primary means of reducing potential adverse effects falls within Washington DNR’s proprietary authority, the Aquatic Lands HCP would address effects that may not be addressed through other regulatory channels. This contrasts with Alternative 1, under which Washington DNR would not be required to include measures to protect surface water and sediment quality in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight. Although the impacts of authorized uses on water and sediment quality would decrease at individual sites compared to Alternative 1, the concentrations of contaminants in the water and sediments of Puget Sound and other marine waterbodies would not be expected to decrease measurably because the sources of most contaminants are not associated with uses of state-owned aquatic lands.

By requiring applicants for new and renewed authorizations for overwater structures to develop and implement plans for reducing the direct input of hazardous substances and nutrients from upland areas adjoining state-owned aquatic lands, the Aquatic Lands HCP would be addressing one of the key sources of water quality impacts in marine areas, particularly in Puget Sound. Such plans would not be required under Alternative 1. Upland areas adjoining state-owned aquatic lands represent a very small proportion of the total acreage of urban and agricultural lands that contribute to surface water and sediment quality impacts via runoff, however. As such, this requirement would not be expected to result in measurable decreases in the concentrations of contaminants in marine areas, compared to Alternative 1.

Similarly, although the Aquatic Lands HCP's prohibition on the use of treated wood for in-water structures under Alternative 2 would address one of the primary sources of polycyclic aromatic hydrocarbons in Puget Sound (Ecology and King County 2011), agencies with regulatory authority already impose similar prohibitions in all marine areas through permitting and review processes. Restrictions on activities that may contribute copper and other toxic substances (e.g., polycyclic aromatic hydrocarbons) to marine waters would reduce the overall input of these substances under Alternative 2, compared to Alternative 1. Despite such reductions, the primary sources of such hazardous substances in Puget Sound (e.g., agricultural pesticides, fertilizers, brake pads, roofing materials) would continue to be associated with human activities other than uses of state-owned aquatic lands. Implementation of the Aquatic Lands HCP under Alternative 2 would not, therefore, be expected to result in substantial reductions in the overall input of toxic substances in marine waters.

Implementation of the HCP Operating Conservation Program would be expected to reduce the discharge of hazardous substances from new and renewed uses of state-owned aquatic lands. Other beneficial effects on water quality could result from reduced accumulation of wood waste and reduced storage of fuels and other toxic materials in or near nearshore areas. Requirements for marinas, shipyards, and terminals to maximize water flow would allow for improved mixing of nearshore waters, compared to Alternative 1, preventing the local accumulation of hazardous substances in sediments and water and reducing the need for maintenance dredging.

Programs to Address Effects of Uses Not Authorized by Washington DNR

As under Alternative 1, uses that have not been authorized by Washington DNR—specifically, derelict structures and private recreational docks—would continue to affect surface water and sediment quality under Alternative 2 as described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. In contrast to Alternative 1, however, all authorizations for uses of state-owned aquatic lands would require the removal of lessee- or grantee-owned structures when the authorization expires or the structures are no longer used as part of the authorized use. This requirement would remain in effect through the 50-year duration of the ITPs. As a result, the amount of area over which derelict structures adversely affect surface water or sediment quality would likely be less than under Alternative 1. In areas where the adverse effects of these overwater structures decrease, water and sediment quality would be expected to improve. This reduction would occur in combination with the reductions that would be expected to continue through the operation of the Creosote Removal Program. Compared to Alternative 1, the requirement to remove derelict structures, combined with continued operation of the Creosote Removal Program, would increase the extent to which Washington DNR addresses a primary source of polycyclic aromatic hydrocarbons in Puget Sound.

Additional benefits would be expected to result from Washington DNR’s commitment to implementing programmatic measures for the management of private recreational docks, combined with Washington DNR’s commitment to requiring all new private recreational docks on state-owned aquatic lands to comply with the conservation measures of the Aquatic Lands HCP. Under this HCP, owners of new private recreational docks would be required to implement protective measures to avoid or minimize the degradation of aquatic habitat. Such measures would prevent the discharge of hazardous substances during work on their docks and vessels. This requirement would reduce the potential for uses of recreational docks to contribute hazardous substances to surrounding water and sediments, compared to Alternative 1.

Monitoring and Adaptive Management

Compared to Alternative 1, implementation of effectiveness and compliance monitoring protocols and schedules under the Aquatic Lands HCP’s adaptive management and monitoring program would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner. No such program would be implemented under

Alternative 1 or through most review and/or permitting processes of Federal, state, and local agencies with regulatory authority.

Through the adaptive management and monitoring program, staff from Washington DNR would conduct field audits to assess whether the HCP Operating Conservation Program is being implemented as intended. Rather than being linked to lease renewal or rental rate re-valuation (as under Alternative 1), field audits would occur at a randomly selected sample of all use authorizations every year. In addition, and in contrast to Alternative 1, Washington DNR staff conducting effectiveness monitoring would identify and assess changes in the quantity and quality of habitat for ITP-covered fish and wildlife species. For example, staff would look for evidence of surface water and sediment quality impacts. In addition, information collected through effectiveness monitoring would be used to improve the efficacy of measures intended to avoid or minimize the adverse effects of authorized uses on surface water and sediment quality. Compared to Alternative 1, therefore, Washington DNR would have a greater likelihood of modifying management practices or readily identifying and correcting problems based on information gained from reviews of existing use authorizations, further reducing the risk of adverse effects.

4.4.3.2 Freshwater Areas

As under Alternative 1, the potential for Washington DNR's management under Alternative 2 to result in adverse effects on surface water and sediment quality in freshwater areas would be similar to that potential in marine areas. Implementation of the HCP Operating Conservation Program under Alternative 2 would reduce the risk that uses of state-owned aquatic lands would adversely affect surface water and sediment quality in lakes, rivers, and streams, compared to Alternative 1. Most sources of contaminants and nutrients in freshwater areas are associated with actions in upland areas or that are otherwise not attributable to Washington DNR's management of state-owned aquatic lands, however. For this reason, impacts to the quality of surface water and sediment quality conditions—including elevated temperatures, high concentrations of fecal coliform bacteria, and the presence of contaminants—would likely continue as described in Subsection 3.4.2.2, Existing Conditions—Freshwater Areas, as would the trends described therein.

On the whole, the programs and regulatory processes that influence the potential for surface water and sediment quality impacts in marine areas would have a similar influence in freshwater areas. Because the HCP Operating Conservation Program would apply to uses of state-owned aquatic lands in both freshwater and marine areas under Alternative 2, the potential for adverse effects would be as described in the discussion of Marine Areas, above. The exception to this expectation concerns Washington

DNR's Creosote Removal Program, which operates only in the marine and estuarine waters of Puget Sound. As such, and as under Alternative 1, the Creosote Removal Program would not reduce the effects of derelict structures in freshwater areas under Alternative 2.

As in marine areas, the potential for the HCP Operating Conservation Program to result in measurable improvements in surface water or sediment quality in freshwater areas would be limited by the extent of state ownership and by the preponderance of factors outside of Washington DNR's control. State-owned aquatic lands make up less than one-half of the total area in freshwater areas. In lakes, degradation of lakeshore habitat and runoff from residential development and agricultural activities would continue to be major causes of surface water and sediment quality impacts. Water and sediment quality in rivers and streams would continue to be affected primarily by human activities in upland areas under Alternative 2 as well as under Alternative 1.

4.4.4 Alternative 3, HCP for Marine Areas Only

Under Alternative 3, Washington DNR would implement the same HCP Operating Conservation Program as under Alternative 2, but in marine areas only. Freshwater areas would be managed as under Alternative 1. As a result, the risk of adverse effects on surface water and sediment quality in the analysis area would be less under Alternative 3 than under Alternative 1 in marine areas, but the same in freshwater areas. In both the short term and the long term, the potential benefits of HCP implementation anticipated under Alternative 3 would, therefore, occur over a greater area than under Alternative 1 but less than under Alternative 2.

Based on decreases in adverse effects associated with uses of state-owned aquatic lands, the quality of surface water and sediments in marine areas would be expected to show improvements, compared to Alternative 1, at specific locations. As under Alternative 2, however, trends in surface water and sediment quality in the analysis area overall would likely be similar to the trends anticipated under Alternative 1. Based on similar reasoning, Washington DNR's management under Alternative 3, as under Alternative 1, would not be expected to contribute to improvements in the quality of surface water and sediments in freshwater areas. As under Alternative 1 and Alternative 2, because Washington DNR's management of aquatic lands generally does not influence conditions in upland areas (which are the primary sources of water and sediment quality impacts in the analysis area), the effects of Washington DNR's management of state-owned aquatic lands on surface water and sediment quality would be relatively small. Since Alternative 3 includes implementation of the Aquatic Lands HCP in marine areas only, the relatively small benefits of HCP implementation described under Alternative 2 would be even less under Alternative 3 as compared to Alternative 1, both on state-owned aquatic lands and in the analysis area overall.

4.5 Noise

Analyses in this subsection address the effects of the proposed alternatives on the acoustic environment, comparing the effects of the action alternatives (Alternative 2 and Alternative 3) to those of Alternative 1, No-action. Also considered is the potential for Alternatives 2 and 3 to result in noise disturbance in locations or at intensities that differ from current conditions.

As described in the Aquatic Lands HCP and in Subsection 4.1.4.5 of this EIS, Noise and Visual Disruption, many uses of state-owned aquatic lands have the potential to generate noise that can disrupt human activities or disturb fish and wildlife species. Potential sources of noise disturbance associated with authorized uses of state-owned aquatic lands include operations at shellfish aquaculture sites (including predator deterrence), log handling facilities, equipment used for construction and maintenance of overwater structures (including in-water pile driving), and boat traffic. The adverse effects associated with these uses would continue under any of the proposed alternatives but these effects would be offset to varying degrees, depending on whether and where Washington DNR would implement risk-reduction practices (such as the examples of conservation measures provided in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis), specific programs, and adaptive management and monitoring.

Under any of the proposed alternatives, noise sources and trends in noise levels both underwater (including noise associated with natural sources and with human activities such as pile driving, shipping, and recreational boating) and in the air (in urban, rural, residential, and offshore areas) would be expected to continue as described in Subsection 3.5, Noise. Neither of the action alternatives would be expected to result in substantial changes in noise levels in the analysis area, compared to Alternative 1.

Under any of the proposed alternatives, proposed projects with the potential to generate noise at levels likely to result in substantial disturbance—particularly, those involving in-water pile driving—would be subject to regulatory review and permitting under Federal and state statutes such as the Rivers and Harbors Act, the Clean Water Act, and the State Hydraulic Code. To comply with the requirements of these acts and ESA, it is anticipated that such projects would be required to implement measures to avoid or minimize adverse effects on fish and wildlife. These requirements would not be expected to differ among the proposed alternatives. For these reasons, the amount and timing of elevated noise levels associated with pile driving under the action alternatives (Alternatives 2 and 3) would not be expected to differ from what would occur under Alternative 1.

Neither action alternative would likely result in a change in the rate at which existing treated wood pilings are removed and replaced with other types of pilings, compared to Alternative 1. First, leaseholders with existing structures that use treated wood would not be required to replace those pilings until the existing structure is due for maintenance or replacement. Replacement would not occur sooner under the action alternatives than under Alternative 1, and would be subject to the same regulatory requirements under all alternatives. Second, as discussed in Subsection 3.13.2.1, Costs Associated with Uses of State-owned Aquatic Lands, most new dock construction uses galvanized steel pilings, so Washington DNR's prohibition on the use of treated wood would not be likely to result in any noticeable changes in the types of pilings that are used for in-water structures.

As discussed in Subsection 4.2, Land Ownership and Use, it is possible that some uses may occur farther offshore under Alternatives 2 and 3 compared to Alternative 1, potentially reducing their audibility to sensitive receptors on shore (in both urban and rural areas), where such receptors (e.g., residential areas, hospitals, schools, performance spaces, certain businesses) are typically located. Conversely, increased noise levels in offshore areas (i.e., marine areas with water greater than 66 feet deep) could result in increased disturbance and risk of injury[13] to fish and wildlife in those areas (Subsection 4.8, Fish, Aquatic Invertebrates, and Associated Habitats, and Subsection 4.9, Wildlife and Wildlife Habitat). In addition, recreational users in offshore areas may similarly experience higher noise levels under Alternatives 2 and 3, compared to Alternative 1. Nonmotorized recreational users (e.g., kayakers) may be particularly sensitive to disturbance. Affected uses may include log handling facilities, boat mooring areas, certain shellfish aquaculture operations, docks, wharves, piers, marinas, rafts, shipyards, and terminals. Other uses, such as utility easements, transportation infrastructure, and public access, would continue to be allowed in nearshore areas.

Some of the uses with a higher likelihood of being excluded from nearshore areas tend to generate more noise than most of the uses that would face fewer restrictions. As a result, it is possible that the contribution of uses of state-owned aquatic lands to noise levels in nearshore areas and nearby locations on shore (in both urban and rural areas) may be less under Alternatives 2 and 3 than under

[13] As noted above, proposed projects with the potential to generate noise at levels likely to result in injury would be subject to regulatory review and permitting under Federal and state statutes. Such review and permitting processes commonly result in the implementation of measures to avoid or minimize adverse effects on fish and wildlife.

Alternative 1. Any such change would occur gradually under either Alternative 2 or Alternative 3, as existing uses come up for reauthorization over the 50-year term of the Aquatic Lands HCP.

4.6 Vegetation

This subsection describes the direct and indirect effects of the proposed alternatives on aquatic vegetation, comparing the effects of the action alternatives (Alternative 2 and Alternative 3) to those of Alternative 1, No-action, over the 50-year analysis period for this EIS. Analyses in this subsection compare how Washington DNR’s management of state-owned aquatic lands under the proposed alternatives would, in combination with the requirements identified in Subsection 3.6.1, Existing and Relevant Management Measures and Regulatory Framework, be expected to affect the distribution, abundance, and condition of aquatic vegetation as described in Subsection 3.6.2, Existing Conditions. The potential effects of Alternative 2 and Alternative 3 are discussed relative to the current management program represented by Alternative 1, No-action.

Effects analyses in this subsection focus on the types of native aquatic vegetation that may be affected by uses of state-owned aquatic lands and that would be the subject of protective measures under the action alternatives. These types are seagrasses, kelp, salt marsh plants, complex freshwater algae, and rooted freshwater plants. Other species that grow in the same locations as these types would likely be affected similarly; implementation of protective practices and programs under any of the alternatives would address factors (i.e., substrate type, presence of pollutants, availability of light) that influence the suitability of individual sites for any species. Therefore, the effects of the alternatives would be expected to apply to all vegetation that grows in the same locations as the species that would be the subject of protective measures under the action alternatives.

The features of the proposed alternatives that may influence the potential for uses of state-owned aquatic lands to affect aquatic vegetation include 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of uses that are not authorized by Washington DNR, and 3) the opportunities for monitoring and adaptive management in response to information gathered from field audits (as described in Subsection 2.2.2, Alternative 1 (No-action), and Subsection 2.2.3, Elements Common to Both Action Alternatives). The effects analysis for each alternative below considers each of these features in turn.

4.6.1 Effects Common to All Alternatives

Under all alternatives, uses of state-owned aquatic lands would continue to occur in marine and freshwater areas and would have the potential to affect aquatic vegetation through shading, physical disturbance, input of excess nutrients or contaminants, and loss of water clarity (Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis). Uses of state-owned aquatic lands would be expected to affect aquatic vegetation as described in Subsection 4.1.4.1, Interference with Water Currents and Sediment Transport; Subsection 4.1.4.2, Damage to Substrates and Aquatic Vegetation; Subsection 4.1.4.3, Contamination; Subsection 4.1.4.4, Shading; and Subsection 4.1.4.6, Decreased Habitat Complexity and Integrity (i.e., reduced light availability due to increased growth of algae in response to elevated nutrient levels). These effects would continue under any of the alternatives, but to varying degrees, depending on the implementation of practices and programs designed to avoid or minimize adverse effects on erosional processes, water quality, and vegetation, as well as the implementation of monitoring and adaptive management. Examples of avoidance and minimization measures are provided in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. The differences among the alternatives are analyzed in the following subsections.

Under any of the proposed alternatives, proposed projects in marine and freshwater areas would continue to undergo review through the existing network of local, state, and Federal regulatory and permitting processes (Subsection 3.6.1, Existing and Relevant Management Measures and Regulatory Framework), in many cases resulting in substantial protection of aquatic vegetation. As noted in Subsection 4.1.3.1, Analysis Assumptions, any potential changes in the regulatory environment cannot be predicted. For this reason, it is assumed for the analyses in this EIS that the effects of existing rules and regulations that are not part of the proposed alternatives would remain the same under all alternatives. As such, the regulatory requirements identified in Subsection 3.6.1, Existing and Relevant Management Measures and Regulatory Framework, would apply equally under all alternatives. Under all three alternatives, Washington DNR's Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands) would be expected to operate in marine areas only, and would not contribute to reducing the effects of derelict structures in freshwater areas.

None of the alternatives would be expected to affect regional climate, hydrologic regimes, water salinity, or water levels, all of which exert substantial influence over habitat conditions for many types of aquatic vegetation in marine areas and in freshwater areas. (Further discussion of the anticipated effects of changing climatic conditions on aquatic vegetation can be found in Subsection 5.2, Future Actions and Conditions.) In addition, none of the alternatives would be expected to affect the practices that have had the most substantial effects on aquatic vegetation in rivers (e.g., flow modification, flow diversion, channel straightening, channel confinement, removal of riparian vegetation, filling of floodplains and adjacent wetlands). In addition, many of the factors that influence the distribution and abundance of aquatic vegetation in the analysis area would continue to be outside of Washington DNR's control. For example, as discussed in Subsection 4.4, Water Resources, the alternatives would not be expected to differ substantially in their effects on surface water quality—particularly nutrient availability, which is an important factor influencing the distribution of vegetation in marine and freshwater areas.

Generally, it is not possible to state whether individual vegetation types would be affected differently under the alternatives. As discussed in Subsection 4.1.3, Analysis Approach, the number and locations of sites where current or prospective users of state-owned aquatic lands may submit applications for new or renewed use authorizations cannot be predicted. The presence of individual species at any given location would depend on numerous site-specific factors, as would the potential for an existing or new use to affect aquatic vegetation. For these reasons, the effects of each of the proposed alternatives would be expected to apply equally to all species of native aquatic vegetation that are the focus of this analysis.

4.6.2 Alternative 1, No-action

Under Alternative 1, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives, and Subsection 2.2.2, Alternative 1. When making decisions concerning the issuance of aquatic land use authorizations, Washington DNR would continue to consider the natural values of state-owned aquatic lands (Subsection 1.2.6, Washington DNR's Aquatics Division), but avoiding and minimizing adverse effects on aquatic vegetation would not be a central goal of the Aquatics Division.

Washington DNR would not be required to implement programs aimed at avoiding and minimizing the potential for uses of state-owned aquatic lands to adversely affect aquatic vegetation under Alternative 1. Also, Washington DNR would not be required to include measures to avoid and minimize adverse effects on aquatic vegetation (e.g., by avoiding and minimizing and shading and physical disturbance of vegetation and substrates, input of excess nutrients or contaminants, and loss of water clarity) in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight. Washington DNR would not be required to place restrictions on new uses based on the habitat value and/or the level of development at the proposed use site. In addition, Washington DNR would not be required to implement new programs to address the effects of uses that are not authorized by Washington DNR, nor would it implement an adaptive management and monitoring program.

As a result, the potential benefits of implementing such practices and programs would not be realized under Alternative 1, and uses of state-owned aquatic lands would continue to affect marine and freshwater vegetation in the analysis area, including the ecological functions (e.g., habitat structure, food web support) and ecological services (e.g., carbon sequestration, water quality maintenance) provided by aquatic vegetation, as described in Subsection 3.6.2, Existing Conditions, and Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

Overall, the effects on the abundance, distribution, and condition of aquatic vegetation in the analysis area would not change from existing conditions in the short term or the long term. This is because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and 3) many of the factors that influence the condition of aquatic vegetation in the analysis area are outside of Washington DNR's control (Subsection 4.6.1, Effects Common to All Alternatives).

The following subsections provide additional analysis of the potential effects of Alternative 1 on aquatic vegetation in marine areas and freshwater areas, based on how each alternative addresses 1) the degree of implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of uses that are not authorized by Washington DNR, and 3) the opportunities for monitoring and adaptive management in response to information gathered from field audits.

4.6.2.1 Marine Vegetation

Under Alternative 1, Washington DNR would not be required to implement risk-reduction practices and programs directed at reducing the potential for uses of state-owned aquatic lands to adversely affect aquatic vegetation in marine areas. Physical disturbance, excessive nutrients or contaminants, and loss of water clarity or decreases in light availability would continue to threaten the distribution, abundance, and condition of seagrasses, kelp, and salt marsh plants as described in Subsection 3.6.2.1, Existing Conditions—Marine Vegetation, and Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. Recently observed trends, including site-specific declines in the abundance of eelgrass and generalized increases in the abundance of floating kelp, would be expected to continue as described in Subsection 3.6.2.1, Existing Conditions—Marine Vegetation. The abundance of salt marsh vegetation in Puget Sound and other marine waterbodies would likely continue to be substantially lower than historical estimates. As noted in Subsection 3.6.2.1, Existing Conditions—Marine Vegetation, surfgrasses would likely continue to be exposed to few threats from human activities.

Implementation of Risk-reduction Practices

Under Alternative 1, many of the potential adverse effects of authorized uses on aquatic vegetation would be avoided, minimized, or mitigated to some extent through the application of rules and programs carried out by agencies with regulatory authority. As noted in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes, however, such regulatory review does not always result in the application of effective conservation measures. In addition, some uses of state-owned aquatic lands would not be subject to Federal, state, or local regulatory review.

Under Alternative 1, Washington DNR would not be required to include measures to protect seagrasses, kelps, and salt marsh vegetation in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight. As a result, many uses of state-owned aquatic lands would likely continue to affect aquatic vegetation as described in Subsection 4.1.4.1, Interference with Water Currents and Sediment Transport; Subsection 4.1.4.2, Damage to Substrates and Aquatic Vegetation; Subsection 4.1.4.3, Contamination; Subsection 4.1.4.4, Shading; and Subsection 4.1.4.6, Decreased Habitat Complexity and Integrity (i.e., reduced light availability due to increased growth of algae in response to elevated nutrient levels). Uses of state-owned aquatic lands would continue to contribute to the introduction and establishment of invasive plant species by causing disturbance and fragmentation of existing native plant communities.

Existing uses of state-owned aquatic lands would be more likely than proposed new uses to adversely affect aquatic vegetation because permitting and regulatory review typically apply only to proposed new uses. For example, when reviewing applications to renew authorizations for existing boathouses, covered moorage, or covered watercraft lifts near existing native aquatic vegetation (i.e., seagrasses, kelps, salt marsh plants), Washington DNR would not be required to impose measures to maximize light transmission. Unless the structures undergo substantial renovation or reconfiguration, other agencies with regulatory authority would have no opportunity to require the implementation of such measures for existing structures (assuming such measures were not incorporated into the permits for such structures when they were originally built).

Programs to Address Effects of Uses Not Authorized by Washington DNR

In addition to the uses authorized by Washington DNR, uses of state-owned aquatic lands not authorized by Washington DNR would continue to adversely affect aquatic vegetation under Alternative 1. Pertinent to this analysis are derelict structures and private recreational docks; the effects of these overwater and in-water structures are described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. The abandonment of structures and subsequent adverse effects of derelict structures on aquatic vegetation would likely continue to be a comparatively rare occurrence because a high percentage of structures would be subject to a contract-based requirements for removal, per WAC 332-30-122(4) (Subsection 3.2.3.2, Uses Not Authorized by Washington DNR). Washington DNR would be expected to continue to remove derelict pilings and overwater structures through the Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands). Removal would eliminate the potential for such structures to adversely affect seagrasses, kelps, and salt marsh vegetation through 1) erosion or sedimentation due to modified patterns of bank erosion and replenishment; 2) altered growth of vegetation due to contaminants present in the structures (as described in Subsection 4.1.4.3, Contamination); and 3) shading. The continued removal of derelict structures through the Creosote Removal Program would not, however, be assured with a 50-year commitment.

Under Alternative 1, private recreational docks would continue to be sited by statutory authority on state-owned aquatic lands abutting upland residential properties (Subsection 2.2.2.1, Private Recreational Dock Management). Washington DNR would not be required to implement programmatic measures for managing private recreational docks, nor would Washington DNR be required to impose use conditions for new docks on state-owned aquatic lands, specifying measures to avoid or minimize the degradation of aquatic habitat. The potential for uses of recreational docks to affect aquatic vegetation through shading, substrate modifications, contaminant input (e.g., from treated wood), and physical damage would remain unchanged from current levels, although the amount of area over which these effects occur would remain unknown. To regulate dock construction and maintenance, Washington DNR would continue to rely on shoreline master programs administered by local governments, HPAs issued by WDFW, and regional general permits issued by the Corps.

Monitoring and Adaptive Management

Under Alternative 1, Washington DNR would not conduct comprehensive compliance or effectiveness monitoring or engage in adaptive management. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspection visits. Most such visits would be linked to lease renewal (approximately once every 12 to 30 years) or to periodic re-valuations of rental rates (approximately once every 4 years) (Table 2-1) (Washington DNR 2013). The purpose of such visits would be to verify the general condition of any structures associated with the use. Staff conducting the inspections would not be directed to identify and assess changes in the quantity and quality of habitat (including aquatic vegetation) for fish and wildlife.

As noted in Subsection 4.3.1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes, monitoring and adaptive management are not consistently incorporated into regulatory review and/or permitting processes (Quinn et al. 2007; San Juan Initiative 2008). As a result, the likelihood of Washington DNR taking measures to reduce adverse effects on aquatic vegetation by modifying management practices or identifying and correcting problems based on information gained from reviews of existing use authorizations would be low.

4.6.2.2 Freshwater Vegetation

With the exception of shellfish aquaculture, uses that may adversely affect aquatic vegetation in marine areas also occur in freshwater areas. For this reason, the potential for implementation of under Alternative 1 to result in continued adverse effects on aquatic vegetation in freshwater areas (e.g., complex freshwater algae and rooted freshwater plants) would be similar to the potential in marine areas.

On the whole, the programs and regulatory processes that influence the potential for adverse effects on aquatic vegetation in marine areas would have similar influence in freshwater areas. The potential for adverse effects would, therefore, be as described above. The one exception to this expectation concerns Washington DNR’s Creosote Removal Program (Subsection 2.2.1.2, Elements Common to All Alternatives—Protection and Restoration of Aquatic Lands), which operates only in the marine and estuarine waters of Puget Sound. As such, the Creosote Removal Program would not reduce the effects of derelict structures in freshwater areas under Alternative 1.

Many uses of state-owned aquatic lands—particularly the construction of bank armoring and overwater structures—would continue to adversely affect freshwater vegetation (e.g., complex algae and rooted plants) in lakes by casting shade, altering substrates, and contributing to the introduction and establishment of invasive species. As noted above, Washington DNR’s management under Alternative 1 would not be expected to affect most of the practices (e.g., flow modification, flow diversion, channel straightening, channel confinement, removal of riparian vegetation, filling of floodplains and adjacent wetlands) that have had the most substantial effects on aquatic vegetation in rivers. The exception would be bank armoring, which Washington DNR would allow under Alternative 1 and which would continue to alter sediment dynamics that historically maintained characteristic native vegetation communities in rivers. As discussed in Subsection 4.6.1, Effects Common to All Alternatives, none of the proposed alternatives, including Alternative 1, would be expected to have any substantial effects on the other primary factors that influence the distribution and type of vegetation in freshwater areas (i.e., hydrologic regimes, nutrient inputs). Overall, Washington DNR's management under Alternative 1 would not be expected to contribute to improvements in the abundance, distribution, and condition of aquatic vegetation in freshwater areas.

4.6.2.3 ESA-Listed Plants

In its management of state-owned aquatic lands under Alternative 1, Washington DNR would not address the primary threats to known populations of Ute ladies'-tresses (i.e., upland development and encroachment by noxious weeds). In addition, Washington DNR would not require applicants for new or renewed uses of state-owned aquatic lands to conduct surveys or implement measures to protect known populations or potentially suitable habitat for Ute ladies'-tresses. Construction of bank armoring under Alternative 1 could reduce the availability of flood-prone river habitat with which the species is associated, potentially reducing opportunities for the establishment of new populations or the expansion of existing populations.

4.6.3 Alternative 2, Proposed HCP

Under Alternative 2, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives. In addition, and in contrast to Alternative 1, Washington DNR would require users of state-owned aquatic lands to implement measures in the HCP Operating Conservation Program that reduce the potential for adverse effects on ITP-covered species and their habitat. These measures would be required for all new and renewed authorizations statewide. The measures are described in Table 2-1 and the potential effects addressed by the measures are identified in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. In contrast to Washington DNR's management under Alternative 1, one of the central goals of the Aquatic Lands HCP would be to avoid and minimize alterations to and loss of biological communities (including native aquatic vegetation) that support the covered species (Washington DNR 2013). Many elements of the HCP Operating Conservation Program under Alternative 2 would be designed to meet this objective.

When engaging in any of the HCP-covered activities (i.e., authorization and management of shellfish aquaculture, log booming and storage, and overwater structures), Washington DNR would consider the potential direct and indirect effects of the use on ITP-covered species and their habitats, including native aquatic vegetation. Through this review process, some uses may not be allowed in some locations or the footprints of some existing use authorizations may be modified to accommodate ITP-covered species or important habitat features such as seagrasses, kelps, salt marsh plants, complex freshwater algae, and rooted freshwater plants. Such reviews and modifications would not take place under Alternative 1. For the express purpose of protecting native aquatic vegetation, Washington DNR would prohibit the construction of new docks, wharves, piers, marinas, rafts, shipyards, terminals, and nearshore buildings within specified buffer distances around existing native aquatic vegetation, and would require applicants for those uses to conduct surveys for aquatic vegetation unless the extent of existing vegetation can be delineated from available information. Such prohibitions would address threats to the distribution and condition of native aquatic vegetation, as identified in Subsection 3.6, Vegetation.

Also in contrast to Alternative 1, both new and existing uses would be required to implement conservation measures under the terms and conditions of the lease or grant issued. Washington DNR would not allow new uses that alter the value and function of natural habitats, including aquatic vegetation, in areas with little to no development and with high to moderate importance to proposed covered species (Subsection 2.2.3.3, Additional Commitments by Washington DNR—Habitat Protection and Restoration). No such restrictions would be imposed under Alternative 1. In addition, and in contrast to Alternative 1, Washington DNR would implement new programs to address the effects of uses that are not authorized by Washington DNR, and would implement an adaptive management and monitoring program.

The overall effect of implementing the HCP Operating Conservation Program, including measures discussed above, on all state-owned aquatic lands under Alternative 2 would be a reduced risk, compared to Alternative 1, of adverse effects on aquatic vegetation (as well as the ecological functions and ecosystem services provided by aquatic vegetation) in the analysis area over the short term and the long term. This is because the amount of area subject to the effects identified in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis, would be expected to decrease over time, or at least to increase at a rate slower than under Alternative 1. As a result, habitat conditions for aquatic vegetation in the analysis area may improve compared to Alternative 1, with resultant improvements in distribution and abundance. This change would occur gradually over the course of 30 to 50 years, because ongoing effects associated with existing use authorizations would continue until those authorizations need to be renewed, or authorized structures undergo renovation or repair. In addition, as discussed in Subsection 2.2.3.1, Requirements for Authorized Uses of State-owned Aquatic Land, the schedule for ensuring individual use authorizations are in compliance with the terms and conditions specified in the Aquatic Lands HCP would be based on the life expectancy of the materials used for any structures associated with the use, allowing further delays in the implementation of measures that reduce the potential for adverse effects.

Although implementation of the HCP Operating Conservation Program would cease after 50 years, the potential benefits associated with HCP implementation would be expected to persist beyond the 50-year analysis period for this EIS, and such benefits are expected to be greater than those under Alternative 1. This is because facilities authorized or reauthorized during the term of the Aquatic Lands HCP would be sited and constructed in a manner aimed at avoiding or minimizing adverse effects. In addition, operational constraints already incorporated into existing use authorizations at the time of ITP expiration would remain in place until subsequent renewals.

Despite site-specific improvements, overall trends in the distribution, abundance, and condition of aquatic vegetation would likely be similar to those anticipated under Alternative 1. This is because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and 3) many of the factors that influence the condition of aquatic vegetation in the analysis area are outside of Washington DNR's control (Subsection 4.6.1, Effects Common to All Alternatives).

The following subsections provide additional analysis of the potential effects of Alternative 2 on aquatic vegetation in marine areas and freshwater areas, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of uses that are not authorized by Washington DNR, and 3) the opportunities for monitoring and adaptive management in response to information gathered from field audits.

4.6.3.1 Marine Vegetation

The risk-reduction practices and programs of the HCP Operating Conservation Program under Alternative 2 would be directed at reducing the potential for uses of state-owned aquatic lands to adversely affect seagrasses, kelp, and salt marsh plants. Many of the effects described in Subsection 4.1.4, Pathways of Potential Effects Relevant to This Analysis—including physical disturbance and decreased availability of light—have been identified as threats to the distribution, abundance, and condition of these species. As a result, implementation of the Aquatic Lands HCP under Alternative 2 could result in improvements, compared to Alternative 1, in the condition of aquatic vegetation at specific locations in the analysis area. These improvements would result from the implementation of the measures, programs, and adaptive management and monitoring elements of the HCP Operating Conservation Program, as described in the subsections below.

Implementation of Risk-reduction Practices

As under Alternative 1, many of the potential adverse effects of authorized uses on aquatic vegetation would be avoided, minimized, or mitigated to some extent under Alternative 2 through the application of rules and programs carried out by agencies with regulatory authority. As noted in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes, however, such regulatory review does not always result in the application of effective conservation measures. Under Alternative 2, these rules and programs would be supplemented by conservation measures and management practices implemented as part of the HCP Operating Conservation Program. By focusing on uses for which the primary means of reducing potential adverse effects falls within Washington DNR's proprietary authority, the Aquatic Lands HCP would address effects that may not be addressed through other regulatory channels. This contrasts with Alternative 1, under which Washington DNR would not be required to include measures to protect native aquatic vegetation in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight.

Under Alternative 2, Washington DNR would be required to include measures to reduce the risk of adverse effects on seagrasses, kelp, and salt marsh vegetation in its use authorizations for state-owned aquatic lands. Washington DNR would require all new uses to avoid existing native aquatic vegetation that is attached to or rooted in substrate; Washington DNR would also require some uses to remain a specified distance from native aquatic vegetation. Such measures would reduce impacts related to shading. Other potential beneficial effects on aquatic vegetation would include reductions in the release of contaminants and the re-suspension of sediments, as well as reductions in the amount of aquatic vegetation subject to damage from boat traffic, activities at log handling facilities, shellfish aquaculture, scour and contamination by outfall effluent, and modification of nearshore currents.

Compared to Alternative 1, implementation of the HCP Operating Conservation Program under Alternative 2 would be expected to reduce the potential for authorized uses to affect aquatic vegetation as described in Subsection 4.1.4.2, Damage to Substrates and Aquatic Vegetation; Subsection 4.1.4.3, Contamination; and Subsection 4.1.4.4, Shading. The adverse effects of both new and existing uses would be reduced. For example, Washington DNR would require modifications to existing boathouses, covered moorage, and covered watercraft lifts near existing native aquatic vegetation, to maximize light transmission. Reductions in the effects of shading from those overwater structures could contribute to recovery of eelgrass, kelp, and salt marsh vegetation in areas where the abundance of those vegetation types has declined in response to human activities.

Many of the Aquatic Lands HCP conservation measures would also reduce the potential for direct damage to aquatic vegetation from shellfish aquaculture, log handling, scour, boat propellers, and floating structures striking the substrate. For the reasons discussed in the effects analysis for water resources (Subsection 4.4), Alternative 2 would not likely result in substantial changes in nutrient inputs or other water quality impacts that influence the distribution or condition of marine aquatic vegetation. In addition, implementation of protective measures for native aquatic vegetation would reduce the amount of disturbance and fragmentation of existing native plant communities compared to Alternative 1, reducing potential for introduction and establishment of invasive plant species.

Programs to Address Effects of Uses Not Authorized by Washington DNR

As under Alternative 1, uses that have not been authorized by Washington DNR—specifically, derelict structures and private recreational docks—would continue to affect aquatic vegetation under Alternative 2. As described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis, the effects of these uses would include shading, substrate modifications, contaminant input (e.g., from treated wood), and physical damage. In contrast to Alternative 1, however, all authorizations for uses of state-owned aquatic lands would require the removal of lessee- or grantee-owned structures when the authorization expires or the structures are no longer used as part of the authorized use. This requirement would remain in effect through the 50-year duration of the ITPs. As a result, the amount of area over which derelict structures adversely affect aquatic vegetation in the analysis area would likely be less than under Alternative 1. In areas where the adverse effects of these overwater structures decrease, habitat conditions for seagrasses, kelp, and salt marsh vegetation may improve, with resultant increases in distribution and abundance. The reductions in adverse effects would occur in combination with the reductions that would be expected to continue through the operation of the Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands).

Additional benefits to aquatic vegetation would be expected to result from Washington DNR's commitment to implementing programmatic measures for the management of private recreational docks, combined with Washington DNR's commitment to requiring all new private recreational docks on state-owned aquatic lands to comply with the conservation measures of the Aquatic Lands HCP. Under this HCP, owners of new private recreational docks would be required to implement measures designed to avoid or minimize the degradation of aquatic habitat. Such measures would protect native aquatic vegetation. This requirement would reduce the potential for uses of recreational docks to adversely affect seagrasses, kelp, and salt marsh vegetation, compared to Alternative 1. As discussed in

Subsection 4.6.1, Effects Common to All Alternatives, it is not possible to state whether individual vegetation types would be affected differently.

Monitoring and Adaptive Management

Compared to Alternative 1, implementation of effectiveness and compliance monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring program would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner. No such program would be implemented under Alternative 1 or through most review and/or permitting processes of Federal, state, and local agencies with regulatory authority.

Through the adaptive management and monitoring program, staff from Washington DNR would conduct field audits to assess whether the HCP Operating Conservation Program is being implemented as intended. Rather than being linked to lease renewal or rental rate re-valuation (as under Alternative 1), field audits would occur at a randomly selected sample of all use authorizations every year. In addition, and in contrast to Alternative 1, Washington DNR staff conducting effectiveness monitoring would identify and assess changes in the quantity and quality of habitat for ITP-covered fish and wildlife species. For example, staff would look for evidence of damage to aquatic vegetation.

In addition, information collected through effectiveness monitoring would be used to improve the efficacy of measures intended to avoid or minimize the adverse effects of authorized uses on native aquatic vegetation. Compared to Alternative 1, therefore, Washington DNR would have a greater likelihood of modifying management practices or readily identifying and correcting problems based on information gained from reviews of existing use authorizations, further reducing the risk of adverse effects on aquatic vegetation.

4.6.3.2 Freshwater Vegetation

As under Alternative 1, the potential for Washington DNR's management under Alternative 2 to result in adverse effects on aquatic vegetation in freshwater areas (e.g., complex freshwater algae and rooted freshwater plants) would be similar to that potential in marine areas. Implementation of the HCP Operating Conservation Program under Alternative 2 would reduce the risk that uses of state-owned aquatic lands would adversely affect aquatic vegetation in lakes, rivers, and streams, compared to Alternative 1.

On the whole, the programs and regulatory processes that influence the potential for adverse effects on aquatic vegetation in marine areas would have a similar influence in freshwater areas. Because the HCP

Operating Conservation Program would apply to uses of state-owned aquatic lands in both freshwater and marine areas under Alternative 2, the potential for adverse effects would be as described in the discussion of Marine Areas, above. As under Alternative 1, the ongoing operations of Creosote Removal Program would not reduce the effects of derelict structures in freshwater areas under Alternative 2 because the program operates in marine areas only.

As in marine areas, implementation of the HCP Operating Conservation Program under Alternative 2 would not likely result in any noticeable changes in nutrient inputs or other water quality impacts that influence the distribution or condition of aquatic vegetation in freshwater areas. In addition, the Aquatic Lands HCP would not substantially influence the potential for major controlling factors such as water level fluctuations, agricultural practices, or urbanization to affect aquatic vegetation in lakes or rivers. Compared to Alternative 1, Alternative 2 would reduce the potential adverse effects associated with shade, substrate alterations, and the introduction and establishment of invasive species in lakes by placing new restrictions the construction of bank armoring and overwater structures. Similarly, restrictions on bank armoring would reduce the extent to which uses of state-owned aquatic lands alter sediment dynamics that historically maintained characteristic native vegetation communities in rivers. Reductions in the adverse effects of uses of state-owned aquatic lands in lakes and rivers could contribute to gradual improvements, compared to Alternative 1, in the condition of aquatic vegetation in freshwater areas.

4.6.3.3 ESA-listed Plants

Under Alternative 2, as under Alternative 1, Washington DNR would not directly address the primary threats to known populations of Ute ladies'-tresses and would not require surveys or protective measures for known populations or potentially suitable habitat. Populations of Ute ladies'-tresses occur in upland areas and, therefore, would not benefit from the implementation of protective measures for vegetation on aquatic lands. It is possible that restrictions on the construction of bank armoring (Table 2-1) could reduce the amount of area, compared to Alternative 1, over which the construction of flood control structures interferes with natural processes that create habitat for the species. If such reductions in adverse effects occur, they could lead to increases in the amount of suitable habitat for Ute ladies'-tresses in the analysis area.

4.6.4 Alternative 3, HCP for Marine Areas Only

Under Alternative 3, Washington DNR would implement the same HCP Operating Conservation Program as under Alternative 2, but in marine areas only. Freshwater areas would be managed as under Alternative 1. As a result, the adverse effects on aquatic vegetation (and on the ecological functions and ecosystem services provided by aquatic vegetation) would be less under Alternative 3 than under Alternative 1 in marine areas on state-owned aquatic lands and in the analysis area overall, but the same in freshwater areas. In both the short term and the long term, the potential benefits of HCP implementation anticipated under Alternative 3 would, therefore, occur over a greater area than under Alternative 1 but less than under Alternative 2.

Based on decreases in adverse effects associated with uses of state-owned aquatic lands, the condition of seagrasses, kelp, salt marsh plants, and other marine vegetation would be expected to show improvements, compared to Alternative 1, at specific locations. Overall, however, as under Alternative 2, trends in the distribution and abundance of those species would likely be similar to the trends anticipated under Alternative 1. This is because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and 3) many of the factors that influence the distribution and abundance of aquatic vegetation in the analysis area are outside of Washington DNR's control (Subsection 4.6.1, Effects Common to All Alternatives). Washington DNR's management under Alternative 3, as under Alternative 1, would not be expected to contribute to improvements in the condition of complex algae, rooted plants and other aquatic vegetation freshwater areas.

Ute ladies'-tresses is known or expected to occur only in freshwater areas, on historical river channels and floodplains. As under Alternative 1, therefore, uses of state-owned aquatic lands that disrupt habitats in historical floodplains and similar areas could affect populations of Ute ladies'-tresses. In addition, continued construction of bank armoring could reduce the availability of flood-prone river habitat with which the species is associated.

4.7 Wetlands and Riparian Areas

This subsection describes the direct and indirect effects of the proposed alternatives on wetlands and riparian areas. Effects of the action alternatives (Alternative 2 and Alternative 3) are compared to those of Alternative 1, No-action, over the 50-year analysis period for this EIS. Analyses in this subsection compare how Washington DNR's management of state-owned aquatic lands under the proposed alternatives would, in combination with the requirements identified in Subsection 3.7.1, Existing and Relevant Management Measures and Regulatory Framework, be expected to affect the distribution, abundance, and condition of wetland sand riparian areas as described in Subsection 3.7.2, Existing Conditions. The potential effects of Alternative 2 and Alternative 3 are discussed relative to the current management program represented by Alternative 1, No-action.

Because most wetlands and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and because most proposed projects with the potential to affect wetlands and riparian areas are subject to regulatory review and permitting at the Federal, state, and local levels, the overall distribution, abundance, and condition (which includes function) of wetlands and riparian areas in the analysis area are largely influenced by activities outside of Washington DNR's authority. The effects analyses in this subsection address only those activities under Washington DNR's authority that may affect wetlands and riparian areas in the analysis area. The features of the proposed alternatives that may influence the potential for effects on wetlands and riparian areas would include 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of uses that are not authorized by Washington DNR, and 3) the opportunities for monitoring and adaptive management in response to information gathered from field audits (as described in Subsection 2.2.2, Alternative 1 (No-action), and Subsection 2.2.3, Elements Common to Both Action Alternatives). The effects analysis for each alternative considers each of these features in turn.

4.7.1 Effects Common to All Alternatives

Under any of the proposed alternatives, wetlands and riparian areas would continue to receive substantial protection through the existing network of local, state, and Federal regulatory and permitting processes (Subsection 3.7.1, Existing and Relevant Management Measures and Regulatory Framework). As noted in Subsection 4.1.3.1, Analysis Assumptions, any potential changes in the regulatory environment cannot be predicted. For this reason, it is assumed for the analyses in this EIS that the effects of existing rules and regulations that are not part of the proposed alternatives would remain the same under all alternatives. As such, the regulatory requirements identified in Subsection 3.7.1, Existing and Relevant Management Measures and Regulatory Framework, would apply equally under all alternatives, as would the regulatory definition of wetlands.

The proposed alternatives would not be expected to differ in their effects on the distribution and abundance of the approximately 25 square miles of tidal and 1,500 square miles of freshwater (i.e., lacustrine and riverine) wetlands in the analysis area, including the fact that tidal wetlands are found primarily in the Columbia River estuary, Willapa Bay, Grays Harbor, Skagit Bay, the Nooksack River delta, the Nisqually River delta, and several river deltas in Hood Canal. This is because the Federal, state, and local review and permitting processes described in Subsection 3.7.1, Existing and Relevant Management Measures and Regulatory Framework, would apply equally under any of the alternatives to proposed projects that involve direct effects on wetlands. These review and permitting processes would result in the implementation of measures designed to avoid, minimize, and mitigate for adverse effects on wetlands. In addition, Washington DNR would not implement, through the Aquatics Division, any requirements specifically aimed at protecting wetlands. Also, because neither the overall abundance nor the distribution of wetlands in Washington State would be expected to differ among the alternatives, the proportion of tidal and freshwater wetlands on state-owned aquatic lands would not be expected to differ among the alternatives.

As with wetlands, the alternatives would not be expected to differ in their effects on the distribution, and abundance of riparian areas in the analysis area. This is primarily because riparian areas are defined by their proximity to marine or freshwater areas, and none of the alternatives includes any provisions that would affect the amount and distribution of marine and freshwater areas in the analysis area. In addition, proposals for projects with the potential to affect the condition of riparian areas at locations managed under shoreline master programs would be required to ensure no net loss of riparian functions (Subsection 3.7.1, Existing and Relevant Management Measures and Regulatory Framework). As noted in Subsection 1.4.2, State Regulations, nearly all parcels of state-owned aquatic land likely fall within areas managed under shoreline master programs.

As discussed in Subsection 3.7.2, Existing Conditions, the direct loss and degradation of the approximately 25 square miles of tidal wetlands (including tidal marshes and tidal swamps) and 1,500 square miles of freshwater wetlands (including riverine and lacustrine wetlands) due to agricultural development, urbanization, timber harvest, road construction, diking, draining, filling, and other land management activities would be expected to continue under all three alternatives. Similarly, direct modification and degradation of riparian areas through inundation behind dams, conversion to agricultural lands, urban and residential development, and forest management practices would continue under all three alternatives. However, because most wetlands and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and because most proposed projects with the potential to affect wetlands and riparian areas are subject to regulatory review and permitting at the Federal, state, and local levels, these effects would likely be minimal both on state-owned aquatic lands and in the overall analysis area. Despite historic and ongoing losses, the wetlands and riparian areas would continue to perform the functions identified in Subsection 3.7.2, Existing Conditions. In both marine and freshwater areas, wetlands would continue to maintain water quality, moderate water quantity, and provide habitat for fish, wildlife, and plants. Likewise, riparian areas would continue to provide nearshore shade, organic nutrients, and structural habitat elements; moderate water and sediment supply; stabilize shorelines, enhance the retention and breakdown of pollutants and excess nutrients; and provide habitat for diverse communities of plants and animals in both marine area freshwater areas.

As discussed in Subsection 3.7.2, Existing Conditions, indirect degradation of wetlands and riparian areas through actions on state-owned aquatic lands that affect erosional processes, water quality, and vegetation would also be expected to continue under all three alternatives. This would include 1) indirect degradation through erosion or sedimentation due to modified patterns of bank erosion and replenishment as a result of the presence of overwater structures; 2) indirect degradation due to altered growth of wetland vegetation due to increased levels of nutrients or contaminants; and 3) indirect degradation through loss or diminished growth of wetland vegetation due to shading from structures that provide access between overwater structures and shore. Structures that contribute to these effects would include docks (including private recreational docks), piers, gangways, and other structures that provide access between overwater structures and shore, as well as derelict structures. However, because most wetlands and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and because most proposed projects with the potential to affect wetlands and riparian areas are subject to regulatory review and permitting at the Federal, state, and local levels, these effects would likely be minimal both on state-owned aquatic lands and in the overall analysis area.

The effects identified above would continue under any of the alternatives, but to varying degrees, depending on the implementation of practices and programs designed to avoid or minimize adverse effects on erosional processes, water quality, and vegetation, as well as the implementation of monitoring and adaptive management. Examples of avoidance and minimization measures are provided in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. The differences among the alternatives are analyzed in the following subsections.

4.7.2 Alternative 1, No-action

Under Alternative 1, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives, and Subsection 2.2.2, Alternative 1. When making decisions concerning the issuance of aquatic land use authorizations, Washington DNR would continue to consider the natural values of state-owned aquatic lands (Subsection 1.2.6, Washington DNR's Aquatics Division), but the avoidance and minimization of adverse effects on erosional processes, water quality, and vegetation (all of which can indirectly affect the condition of wetlands and riparian areas) would not be a central objective of the Aquatics Division.

Washington DNR would not be required to implement programs aimed at avoiding and minimizing the potential for uses of state-owned aquatic lands to adversely affect erosional processes, water quality, or vegetation under Alternative 1. Washington DNR would not be required to include measures that may indirectly avoid and minimize adverse effects on wetlands and riparian areas (e.g., by avoiding and minimizing modifications to patterns of bank erosion and replenishment, degradation of water quality, and shading of vegetation) in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight. In addition, Washington DNR would not be required to implement new programs to address the effects of uses that are not authorized by Washington DNR, nor would it implement an adaptive management and monitoring program. As a result, the potential benefits of implementing such practices and programs would not be realized under Alternative 1, and uses of state-owned aquatic lands would continue to affect wetlands and riparian areas indirectly (through effects on erosional processes, water quality, and vegetation) as described in Subsection 3.7.2, Existing Conditions, and Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

Overall, the effects on the condition of wetlands and riparian areas in the analysis area would not change from existing conditions in the short term or the long term. As mentioned in Subsection 3.7.1, Existing and Relevant Management Measures and Regulatory Framework, Washington DNR would, under Alternative 1, continue to have a limited effect on the condition of wetlands and riparian areas in the analysis area, because most wetlands and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and because most proposed projects with the potential to affect wetlands and riparian areas are subject to regulatory review and permitting at the Federal, state, and local levels. In both marine and freshwater areas, wetlands would continue to maintain water quality, moderate water quantity, and provide habitat for fish, wildlife, and plants. Likewise, riparian areas would continue to provide nearshore shade, organic nutrients, and structural habitat elements; moderate water and sediment supply; stabilize shorelines, enhance the retention and breakdown of pollutants and excess nutrients; and provide habitat for diverse communities of plants and animals in both marine and freshwater areas.

Implementation of Risk-reduction Practices

Under Alternative 1, many of the potential adverse effects of authorized uses on wetlands and riparian areas would be avoided, minimized, or mitigated to some extent through the application of rules and programs carried out by agencies with regulatory authority. As noted in Subsection 3.7.1, Existing and Relevant Management Measures and Regulatory Framework, such regulatory review does not, however, always result in the application of effective conservation measures. In addition, some uses of state-owned aquatic lands would not be subject to Federal, state, or local regulatory review.

Under Alternative 1, Washington DNR would not be required to include measures to protect erosional processes, water quality, and vegetation in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight. For example, Washington DNR would not require in-water and overwater structures to be designed and located in a manner that minimizes the obstruction of currents and the alteration of sediment transport. In addition, Washington DNR would not require the development of plans for reducing the direct input of hazardous substances and nutrients from upland areas adjoining state-owned aquatic lands, nor would it require new piers, gangways, and other access structures to allow transmission of light. As a result, many uses of state-owned aquatic lands would likely continue to degrade the condition of wetlands and riparian areas indirectly through erosion or sedimentation, altered growth of wetland and riparian vegetation due to the increased levels of nutrients or contaminants, and loss or diminished growth of wetland and riparian vegetation due to shading. The ways in which uses of state-owned aquatic lands contribute to these effects are described in greater detail in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. However, because most wetlands and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and because most proposed projects with the potential to affect wetlands and riparian areas are subject to regulatory review and permitting at the Federal, state, and local levels, these effects would likely be minimal both on state-owned aquatic lands and in the overall analysis area.

Programs to Address Effects of Uses Not Authorized by Washington DNR

In addition to the uses authorized by Washington DNR, uses of state-owned aquatic lands not authorized by Washington DNR would continue to adversely affect erosional processes, water quality, and vegetation under Alternative 1, resulting in indirect degradation of wetlands and riparian areas. Pertinent to this analysis are derelict structures and private recreational docks; the effects of these overwater and in-water structures on erosional processes, water quality, and vegetation are described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. The abandonment of structures and subsequent adverse effects of derelict structures on erosional processes, water quality, and vegetation would likely continue to be a comparatively rare occurrence because a high percentage of structures would be subject to a contract-based requirements for removal, per WAC 332-30-122(4) (Subsection 3.2.3.2, Uses Not Authorized by Washington DNR). Washington DNR would be expected to continue to remove derelict pilings and overwater structures through the Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands). Removal of structures through the Creosote Removal Program would eliminate the potential for such structures to degrade wetlands and riparian areas indirectly through 1) erosion or sedimentation due to modified patterns of bank erosion and replenishment; 2) altered growth of vegetation due to contaminants present in the structures; and 3) loss or diminished growth of wetland vegetation due to shading. The continued removal of derelict structures through the Creosote Removal Program would not, however, be assured with a 50-year commitment.

Under Alternative 1, private recreational docks would continue to be sited by statutory authority on state-owned aquatic lands abutting upland residential properties (Subsection 2.2.2.1, Private Recreational Dock Management). Washington DNR would not be required to implement programmatic measures for managing private recreational docks, nor would Washington DNR be required to impose use conditions for new docks on state-owned aquatic lands, specifying measures to avoid or minimize the degradation of aquatic habitat. The potential for uses of recreational docks to affect wetlands and riparian areas indirectly through erosion or sedimentation, contaminant input, or shading would remain unchanged from current levels, although the amount of area over which these effects occur would remain unknown. However, because most wetlands and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and because most proposed projects with the potential to affect wetlands and riparian areas are subject to regulatory review and permitting at the Federal, state, and local levels, these effects would likely be minimal both on state-owned aquatic lands and in the overall analysis area. To regulate dock construction and maintenance, Washington DNR would continue to rely on shoreline master programs administered by local governments, HPAs issued by WDFW, and regional general permits issued by the Corps.

Monitoring and Adaptive Management

Under Alternative 1, Washington DNR would not conduct comprehensive compliance or effectiveness monitoring or engage in adaptive management. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional field audits. Most such visits would be linked to lease renewal (approximately once every 12 to 30 years) or to periodic re-valuations of rental rates (approximately once every 4 years) (Washington DNR 2013). The purpose of such visits would be to verify the general condition of any structures associated with the use. Staff conducting the field audits would not be directed to identify and assess changes in the quantity and quality of habitat (including erosional processes, water quality, and aquatic vegetation) for fish and wildlife. The number of sites audited that would include wetland and riparian areas is unknown. But given that most wetland and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and that most proposed projects with the potential to affect wetlands and riparian areas are subject to other regulatory review and permitting processes, any effects of uses that are not identified by a field audit would likely be minimal both on state-owned aquatic lands and in the overall analysis area.

As noted in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes, monitoring and adaptive management are not consistently incorporated into regulatory review and/or permitting processes (Quinn et al. 2007; San Juan Initiative 2008). As a result, the likelihood of Washington DNR taking measures to reduce adverse effects on erosional processes, water quality, or aquatic vegetation by modifying management practices or identifying and correcting problems based on information gained from reviews of existing use authorizations would be low, as under existing conditions. However, because most wetlands and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and because most proposed projects with the potential to affect wetlands and riparian areas are subject to other regulatory review and permitting processes, any reduction in effects of uses on these resources resulting from Washington DNR's management would likely be minimal both on state-owned aquatic lands and in the overall analysis area.

4.7.3 Alternative 2, Proposed HCP

Under Alternative 2, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives. In addition, and in contrast to Alternative 1, Washington DNR would require users of state-owned aquatic lands to implement measures in the HCP Operating Conservation Program that reduce the potential for adverse effects on ITP-covered species and their habitat. These measures would be required for all new and renewed authorizations statewide. The measures are described in Table 2-1 and the potential effects addressed by the measures are identified in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

When engaging in any of the HCP-covered activities (i.e., authorization and management of shellfish aquaculture, log booming and storage, and overwater structures), Washington DNR would consider the potential direct and indirect effects of the use on ITP-covered species and their habitats, including wetlands and riparian areas. Through this review process, some uses may not be allowed in some locations or the footprints of some existing use authorizations may be modified to accommodate covered species or important habitat features, including those with the potential to indirectly affect the condition of wetlands and riparian areas (i.e., by affecting erosional processes, water quality, and vegetation). Such reviews and modifications would not take place under Alternative 1.

None of the elements of the HCP Operating Conservation Program would be expected to result in an increased risk of adverse effects on wetlands and riparian areas, compared to Alternative 1. As a result, the overall effect of implementing the Aquatic Lands HCP under Alternative 2, including new management practices (e.g., concerning derelict structures and private recreational docks), would be a reduction, compared to Alternative 1, in adverse effects on the condition wetlands and riparian areas (as well as the functions provided by wetlands and riparian areas) in the analysis area over the short term and the long term. In contrast to Washington DNR’s management under Alternative 1, the central objectives of the Aquatic Lands HCP would include 1) avoiding and minimizing alterations to natural, habitat-forming processes, such as wave and current energy and sediment transport, 2) avoiding and minimizing impacts to water quality, and 3) avoiding and minimizing alterations to and loss of biological communities (including vegetation) that support the covered species (Washington DNR 2013). Many elements of the HCP Operating Conservation Program under Alternative 2 would be designed to meet these objectives by avoiding and minimizing the potential for uses of state-owned aquatic lands to affect erosional processes, water quality, and vegetation, thereby decreasing the indirect degradation of wetlands and riparian areas. However, because most wetlands and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and because most proposed projects with the potential to affect wetlands and riparian areas are subject to regulatory review and permitting at the Federal, state, and local levels, any decrease in effects of uses due to implementation of the HCP would likely be minimal both on state-owned aquatic lands and in the overall analysis area.

The overall effect of implementing the HCP Operating Conservation Program on all state-owned aquatic lands under Alternative 2 would be a reduced risk, compared to Alternative 1, of adverse effects on wetlands and riparian areas in the analysis area over the short term and the long term. This is because the amount of area subjected to effects on erosional processes, water quality, and vegetation (as described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis) would be expected to decrease over time, or at least to increase at a rate slower than under Alternative 1. As a result, the likelihood of indirect adverse effects on wetlands and riparian areas would decrease compared to Alternative 1, with resultant improvements in the condition of wetlands and riparian areas in the analysis area. This change would occur gradually over the course of 30 to

50 years, because ongoing effects associated with existing use authorizations would continue until those authorizations need to be renewed, or authorized structures undergo renovation or repair. In addition, as discussed in Subsection 2.2.3.1, Requirements for Authorized Uses of State-owned Aquatic Land, the schedule for bringing individual leaseholds into compliance with the terms and conditions specified in the Aquatic Lands HCP would be based on the life expectancy of the materials used for any structures associated with the use, allowing further delays in the implementation of measures that reduce the potential for adverse effects. However, because most wetlands and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and because most proposed projects with the potential to affect wetlands and riparian areas are subject to other regulatory review and permitting processes, any decrease in the likelihood of adverse effects of uses associated with implementation of the HCP to wetlands and riparian areas under Alternative 2 would likely be relatively small as compared to Alternative 1 on both on state-owned aquatic lands and in the overall analysis area.

Overall, the effects on the condition of wetlands and riparian areas in the analysis area would be a marginal improvement in comparison to Alternative 1. Although Washington DNR would implement practices and programs that would reduce the potential for uses of state-owned aquatic lands to affect wetlands and riparian areas, Washington DNR would continue to have a limited effect on the condition of wetlands and riparian areas in the analysis area because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and 3) the large majority wetlands and riparian areas do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions). Unlike Alternative 1, wetlands and riparian areas may benefit from HCP measures. In both marine and freshwater areas, wetlands would continue to maintain water quality, moderate water quantity, and provide habitat for fish, wildlife, and plants. Likewise, riparian areas would continue to provide nearshore shade, organic nutrients, and structural habitat elements; moderate water and sediment supply; stabilize shorelines, enhance the retention and breakdown of pollutants and excess nutrients; and provide habitat for diverse communities of plants and animals in both marine area freshwater areas.

Although implementation of the HCP Operating Conservation Program would cease after 50 years, the potential benefits associated with HCP implementation would be expected to persist beyond the 50-year analysis period for this EIS, and such benefits are expected to be greater than those under Alternative 1. This is because uses and facilities authorized or reauthorized during the term of the

Aquatic Lands HCP would be sited and constructed in a manner aimed at avoiding or minimizing adverse effects. In addition, operational constraints already incorporated into existing use authorizations at the time of ITP expiration would remain in place until subsequent renewals.

Implementation of Risk-reduction Practices

As under Alternative 1, many potential adverse effects of authorized uses wetlands and riparian areas would be avoided, minimized, or mitigated to some extent under Alternative 2 through the application of rules and programs carried out by agencies with regulatory authority. Under Alternative 2, these rules and programs would be supplemented by conservation measures and management practices implemented as part of the HCP Operating Conservation Program. By focusing on uses for which the primary means of reducing potential adverse effects falls within Washington DNR’s proprietary authority, the Aquatic Lands HCP would address effects that may not be addressed through other regulatory channels. This contrasts with Alternative 1, under which Washington DNR would not be required to include measures to protect erosional processes, water quality, and vegetation in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight.

Although many uses of state-owned aquatic lands would likely continue to indirectly degrade the condition of wetlands and riparian areas through erosion or sedimentation, altered growth of wetland and riparian vegetation due to the increased levels of nutrients or contaminants, and loss or diminished growth of wetland and riparian vegetation due to shading, the extent to which these effects occur would be reduced, compared to Alternative 1. However, because most wetlands and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and because most proposed projects with the potential to affect wetlands and riparian areas are subject to other regulatory review and permitting processes, the benefits of implementation of the HCP Operating Conservation Program to wetlands and riparian areas under Alternative 2 would likely be relatively small as compared to Alternative 1 on both on state-owned aquatic lands and in the overall analysis area.

Under Alternative 2, the implementation of measures to reduce the risk of adverse effects on erosional processes, water quality, and vegetation would reduce the amount of area over which uses of state-owned aquatic lands indirectly degrade the condition of wetlands and riparian areas. For example, measures that require in-water and overwater structures to be designed and located in a manner that minimizes the obstruction of currents and the alteration of sediment transport (Subsection 4.3.3, Alternative 2, Proposed HCP—Substrates and Erosional Processes) would lead to reductions, compared to Alternative 1, in the erosion and sedimentation of wetlands and riparian areas. In addition, the requirement to develop plans for reducing the direct input of hazardous substances and nutrients from upland areas adjoining state-owned aquatic lands (Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources) would reduce the potential for indirect degradation of wetlands and riparian areas due to altered growth of wetland vegetation from increased levels of nutrients or contaminants. Lastly, the requirement for new piers, gangways, and other access structures to allow transmission of light (Table 2-1) would reduce the amount of area over which such structures contribute to the loss or diminished growth of wetland and riparian vegetation due to shading, compared to Alternative 1. By reducing the area over which uses of state-owned aquatic lands cause erosion and sedimentation, input of nutrients or contaminants, and shading, implementation of the HCP Operating Conservation Program under Alternative 2 would reduce the associated indirect adverse effects on the condition of wetlands and riparian areas in the analysis area, compared to Alternative 1. However, because most wetlands and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and because most proposed projects with the potential to affect wetlands and riparian areas are subject to other regulatory review and permitting processes, the benefits of implementation of the HCP Operating Conservation Program to wetlands and riparian areas under Alternative 2 would likely be relatively small as compared to Alternative 1 on both on state-owned aquatic lands and in the overall analysis area.

Programs to Address Effects of Uses Not Authorized by Washington DNR

As under Alternative 1, uses that have not been authorized by Washington DNR—specifically, derelict structures and private recreational docks—would continue to affect erosional processes, water quality, and vegetation under Alternative 2, resulting in indirect degradation of wetlands and riparian areas. In contrast to Alternative 1, however, all authorizations for uses of state-owned aquatic lands would require the removal of lessee- or grantee-owned structures when the authorization expires or the structures are no longer used as part of the authorized use. This requirement would remain in effect through the 50-year duration of the ITPs. As a result, the amount of area over which derelict structures indirectly affect wetlands and riparian areas by damaging substrates, interfering with sediment transport, degrading water quality, or affecting vegetation would likely be less than under Alternative 1. In areas where the adverse effects of these overwater structures decrease, the condition of wetlands and riparian areas would be expected to improve. The reductions in adverse effects would occur in combination with the reductions that would be expected to continue through the operation of the Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands).

Additional benefits to wetlands and riparian areas would be expected to result from Washington DNR's commitment to implementing programmatic measures for the management of private recreational docks, combined with Washington DNR's commitment to requiring all new private recreational docks on state-owned aquatic lands to comply with the conservation measures of the Aquatic Lands HCP. Under this HCP, owners of new private recreational docks would be required to implement measures designed to reduce the risk of adverse effects on substrates and erosional processes, water quality, species, and habitat. This requirement would reduce the amount of area over which recreational docks adversely affect wetlands and riparian areas, compared to Alternative 1. However, because most wetlands and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and because most proposed projects with the potential to affect wetlands and riparian areas are subject to other regulatory review and permitting processes, any decrease in the likelihood of adverse effects of uses associated with implementation of the HCP to wetlands and riparian areas under Alternative 2 would likely be relatively small as compared to Alternative 1 on both on state-owned aquatic lands and in the overall analysis area.

Monitoring and Adaptive Management

Compared to Alternative 1, implementation of effectiveness and compliance monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring program would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner. No such program would be implemented under Alternative 1 or through most review and/or permitting processes of Federal, state, and local agencies with regulatory authority.

Through the adaptive management and monitoring program, staff from Washington DNR would conduct field audits to assess whether the HCP Operating Conservation Program is being implemented as intended. Rather than being linked to lease renewal or rental rate re-valuation (as under Alternative 1), field audits would occur at a randomly selected sample of all use authorizations every year. In addition, and in contrast to Alternative 1, Washington DNR staff conducting effectiveness monitoring would identify and assess changes in the quantity and quality of habitat for ITP-covered fish and wildlife species. For example, staff would look for evidence of changes in slope profiles or sediment grain size distribution, impacts to water quality, or damage to vegetation.

In addition, information collected through effectiveness monitoring would be used to improve the efficacy of measures intended to avoid or minimize the adverse effects of authorized uses on erosional processes, water quality, and vegetation. Compared to Alternative 1, therefore, Washington DNR would have a greater likelihood of modifying management practices or readily identifying and correcting problems based on information gained from reviews of existing use authorizations, further reducing the risk of indirect adverse effects on wetlands and riparian areas. However, because most wetlands and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and because most proposed projects with the potential to affect wetlands and riparian areas are subject to other regulatory review and permitting processes, the benefits of implementation of the HCP Operating Conservation Program to wetlands and riparian areas under Alternative 2 would likely be relatively small as compared to Alternative 1 on both on state-owned aquatic lands and in the overall analysis area.

4.7.4 Alternative 3, HCP for Marine Areas Only

Under Alternative 3, Washington DNR would implement the same HCP Operating Conservation Program as under Alternative 2, but in marine areas only. Freshwater areas would be managed as under Alternative 1. As a result, the effects on wetlands and riparian areas (and on the condition of wetlands and riparian areas) would be less under Alternative 3 than under Alternative 1 in marine areas on state-owned aquatic lands and in the analysis area overall, but the same in freshwater areas. In both the short term and the long term, the potential benefits of HCP implementation anticipated under Alternative 3 would, therefore, occur over a greater area than under Alternative 1 but less than under Alternative 2.

Based on decreases in adverse effects associated with uses of state-owned aquatic lands on erosional processes, water quality, and vegetation, the condition of wetlands and riparian areas in marine areas would be expected to show marginal improvements, compared to Alternative 1. Washington DNR's management under Alternative 3, as under Alternative 1, would not be expected to contribute to improvements in the condition of wetlands and riparian areas in freshwater areas. However, as under Alternative 1 and Alternative 2, because most wetlands and riparian areas in the analysis area do not occur on state-owned aquatic lands (Subsection 3.7.2, Existing Conditions), and because most proposed projects with the potential to affect wetlands and riparian areas are subject to other regulatory review and permitting processes, the effects of Washington DNR's management of state-owned aquatic lands on wetlands and riparian areas would likely be relatively small. Since Alternative 3 includes implementation of the HCP in marine areas only, the relatively small benefits of implementation of the HCP described under Alternative 2 would be even less under Alternative 3 as compared to Alternative 1 on both on state-owned aquatic lands and in the overall analysis area.

4.8 Fish, Aquatic Invertebrates, and Associated Habitats

This subsection describes the direct and indirect effects of the proposed alternatives on fish, aquatic invertebrates, and associated habitats, including the biological, cultural, recreational, and economic values provided by fish and aquatic invertebrates. Effects of the action alternatives (Alternative 2 and Alternative 3) are compared to those of Alternative 1, No-action, over the 50-year analysis period for this EIS. Analyses in this subsection compare how Washington DNR's management of state-owned aquatic lands under the proposed alternatives would, in combination with the requirements identified in Subsection 3.8.1, Existing and Relevant Management Measures and Regulatory Framework, be expected to affect the distribution, abundance, and condition of habitat for fish and aquatic invertebrates in the analysis area, as described in Subsection 3.8.2, Existing Conditions. Analyses in this subsection address the effects of the alternatives on the distribution, abundance, and condition of key habitat components for fish and aquatic invertebrates, with the assumption that the distribution and abundance of fish and aquatic invertebrate species in the analysis area depend on the distribution, abundance, and condition of these key habitat components.

The analyses of effects on fish and aquatic invertebrates are based on review of the key habitat components described in Subsection 3.8.2.1, Key Habitat Components in Marine Areas, and Subsection 3.8.2.2, Key Habitat Components in Freshwater Areas (i.e., substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability). To a large extent, the effects of the alternatives on these key habitat components are addressed in the analyses for other resource areas. For this reason, discussions in this subsection rely on the conclusions of several other subsections. Analyses of the alternatives' potential to affect substrates are based on discussions in Subsection 4.3, Substrates and Erosional Process. Similarly, the effects analyses for water and sediment quality are based on discussions in Subsection 4.4, Water Resources, and the analyses for aquatic vegetation are based on those in Subsection 4.6, Vegetation.

The overall abundance, distribution, and condition of habitat for fish and aquatic invertebrates in the analysis area are influenced to a large extent by activities that occur in upland areas and that are, therefore, outside the authority of Washington DNR's Aquatics Division. The effects analyses address only those activities under Washington DNR's authority that may affect the conditions of key habitat components in the analysis area. The features of the proposed alternatives that may influence the potential for uses of state-owned aquatic lands to affect fish, aquatic invertebrates, and associated habitats include 1) the implementation of risk-reduction practices and conservation measures for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of uses that are not authorized by Washington DNR, and 3) the opportunities for monitoring and adaptive management in response to information gathered from field audits (as described in Subsection 2.2.2, Alternative 1 (No-action), and Subsection 2.2.3, Elements Common to Both Action Alternatives). The effects analysis for each alternative below considers each of these features in turn.

4.8.1 Effects Common to All Alternatives

Under all alternatives, fish and aquatic invertebrates (including proposed covered species such as all species of salmon and trout, as well as eulachon) would continue to support commercial, recreational, and tribal fisheries in marine and freshwaters throughout Washington State. Many species of fish and aquatic invertebrates would continue to play substantial roles in marine food webs that support fishes, seabirds, and mammals.

Concurrently, under all alternatives, uses of state-owned aquatic lands would continue to occur in marine and freshwater areas and would have the potential to affect species associated with habitats in those areas by altering erosional processes, water quality, physical habitat features, and biological communities (Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis). Uses of state-owned aquatic lands would be expected to contribute to habitat degradation and loss through adverse effects on substrate composition (i.e., distribution of consolidated and unconsolidated substrates), water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, human-related disturbance levels, and food/prey availability. In addition, many of the factors that influence the condition of key habitat components in the analysis area would continue to be outside of Washington DNR's control. For example, the primary sources of water and sediment quality impacts in both marine areas and freshwater areas would continue to be associated with runoff from upland areas (Subsection 4.4, Water Resources), which would continue to influence the distribution and abundance of fish and aquatic invertebrates in the analysis area. The habitat associations of and threats to all proposed covered species, as described in Subsection 3.8.2.3, Proposed Covered Species, would not differ among the alternatives.

Under any of the proposed alternatives, proposed projects in marine and freshwater areas would continue to undergo review through the existing network of local, state, and Federal regulatory and permitting processes (Subsection 3.8.1, Existing and Relevant Management Measures and Regulatory Framework), in many cases resulting in substantial protection of fish, aquatic invertebrates, and associated habitats. As noted in Subsection 4.1.3.1, Analysis Assumptions, any potential changes in the regulatory environment cannot be predicted. For this reason, it is assumed for the analyses in this EIS that the effects of existing rules and regulations that are not part of the proposed alternatives would remain the same under all alternatives. As such, the regulatory requirements identified in Subsection 3.8.1, Existing and Relevant Management Measures and Regulatory Framework, would apply equally under all alternatives. Under all three alternatives, Washington DNR's Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands) would be expected to operate in marine areas only, and would not contribute to reducing the effects of derelict structures in freshwater areas.

The effects identified above would continue under any of the alternatives, but to varying degrees, depending on the implementation of practices and programs designed to avoid or minimize adverse effects on erosional processes, water quality, and vegetation, as well as the implementation of monitoring and adaptive management. Examples of avoidance and minimization measures are provided in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. The differences among the alternatives are analyzed in the following subsections.

4.8.2 Alternative 1, No-action

Under Alternative 1, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives, and Subsection 2.2.2, Alternative 1. When making decisions concerning the issuance of aquatic land use authorizations, Washington DNR would continue to consider the natural values of state-owned aquatic lands (Subsection 1.2.6, Washington DNR's Aquatics Division), but avoiding and minimizing adverse effects on certain species and their habitats, as well as improving and restoring habitat quality, would not be central goals of the Aquatics Division.

Washington DNR would not be required to implement programs aimed at avoiding and minimizing the potential for uses of state-owned aquatic lands to adversely affect erosional processes, water quality, physical habitat features, or biological communities under Alternative 1. Also, it is not certain that Washington DNR would require modifications to uses in some areas to protect certain species or habitat features. Further, Washington DNR would not be required to include measures to avoid and minimize adverse effects on fish, aquatic invertebrates, and associated habitats (e.g., by avoiding and minimizing modifications to substrate types, degradation of water and sediment quality, and shading of vegetation, as well as disturbance due to noise and human activity) in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight. In addition, Washington DNR would not be required to implement new programs to address the effects of uses that are not authorized by Washington DNR, nor would it implement an adaptive management and monitoring program. As a result, the potential benefits of implementing such practices and programs would not be certain to be realized under Alternative 1, and uses of state-owned aquatic lands would continue to affect fish, aquatic invertebrates, and associated habitats as described in Subsection 3.8.2, Existing Conditions, and Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

Overall, the effects on the abundance, distribution, and condition of habitat for fish and aquatic invertebrates in the analysis area would not change from existing conditions in the short term or the long term, unless mitigation was required through other regulatory reviews. This is because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and 3) many of the factors that influence the condition of key habitat components in the analysis area are outside of Washington DNR's control (Subsection 4.8.1, Effects Common to All Alternatives).

The following subsections provide additional analysis of the potential effects of Alternative 1 on fish, aquatic invertebrates, and associated habitats in marine areas and freshwater areas, based on how each alternative addresses 1) the degree of implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of uses that are not authorized by Washington DNR, and 3) the opportunities for monitoring and adaptive management in response to information gathered from field audits.

4.8.2.1 Effects in Marine Areas

Under Alternative 1, Washington DNR would not be required to implement risk-reduction practices and programs directed at reducing the potential for uses of state-owned aquatic lands to adversely affect key habitat components for fish and aquatic invertebrates in marine areas, including the distribution of consolidated and unconsolidated substrates; the quality of water and sediment; the distribution and abundance of seagrasses, kelp, and salt marsh plants; light conditions; noise levels; disturbance levels; and food/prey availability. Many of the effects described in Subsection 4.1.4, Pathways of Potential Effects Relevant to This Analysis—including damage to or changes in the distribution of substrate types, contamination of water and sediment, shading of aquatic vegetation, and increased levels of noise and visual disruption—have been identified as threats to the distribution, abundance, and condition of habitat for fish and aquatic invertebrates. As a result, uses of state-owned aquatic lands would continue to affect fish, aquatic invertebrates, and associated habitats (including substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability) as described in Subsection 3.8.2.1, Key

Habitat Components in Marine Areas. Further, the status and trends of the distribution, abundance, and condition of habitat for fish and aquatic invertebrates in the analysis area would not be expected to change from current conditions.

Implementation of Risk-reduction Practices

Under Alternative 1, many of the potential adverse effects of authorized uses on fish, aquatic invertebrates, and associated habitats would be avoided, minimized, or mitigated to some extent through the application of rules and programs carried out by agencies with regulatory authority. As noted in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes, however, such regulatory review does not always result in the application of effective risk-reduction practices. In addition, some uses of state-owned aquatic lands would not be subject to Federal, state, or local regulatory review.

Under Alternative 1, Washington DNR would not be required to include measures to protect key habitat components for fish and aquatic invertebrates (i.e., substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability) in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight. For example, it is not certain that Washington DNR would require in-water and overwater structures to be designed and located in a manner that minimizes the obstruction of currents and the alteration of sediment transport, nor would Washington DNR place new restrictions on bank armoring. In addition, Washington DNR would not require users of state-owned aquatic lands to develop plans for reducing the direct input of hazardous substances and nutrients from upland areas adjoining state-owned aquatic lands or implement measures to avoid shading and physical damage of native aquatic vegetation. Washington DNR also would not restrict the timing or location of in-water construction, operation, or maintenance activities on state-owned aquatic lands; require the minimization of artificial night lighting on and from overwater structures; or restrict the timing or location of in-water activities with the potential to disturb forage fish habitat.

As a result, many uses of state-owned aquatic lands would likely continue to degrade habitat quality for fish and aquatic invertebrates through substrate damage, interference with sediment transport, degradation of water and sediment quality, loss or diminished growth of aquatic vegetation due to shading, or disturbance due to altered light conditions or elevated noise or disturbance levels during key life stages (e.g., forage fish spawning). The ways in which uses of state-owned aquatic lands contribute to these effects are described in greater detail in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

Programs to Address Effects of Uses Not Authorized by Washington DNR

In addition to the uses authorized by Washington DNR, uses of state-owned aquatic lands not authorized by Washington DNR would continue to adversely affect fish, aquatic invertebrates, and associated habitats under Alternative 1. Pertinent to this analysis are derelict structures and private recreational docks; the effects of these overwater and in-water structures on substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability are described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis. The abandonment of structures and subsequent adverse effects of derelict structures on key habitat components for fish and aquatic invertebrates would likely continue to be a comparatively rare occurrence because a high percentage of structures would be subject to a contract-based requirements for removal, per WAC 332-30-122(4) (Subsection 3.2.3.2, Uses Not Authorized by Washington DNR). Washington DNR would be expected to continue to remove derelict pilings and overwater structures through the Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands). Removal of structures through the Creosote Removal Program would eliminate the potential for such structures to degrade habitat for fish and aquatic invertebrates through 1) erosion or sedimentation due to modified patterns of bank erosion and replenishment; 2) altered growth of vegetation due to contaminants present in the structures; and 3) loss or diminished growth of vegetation due to shading. The continued removal of derelict structures through the Creosote Removal Program would not, however, be assured with a 50-year commitment.

Under Alternative 1, private recreational docks would continue to be sited by statutory authority on state-owned aquatic lands abutting upland residential properties (Subsection 2.2.2.1, Private Recreational Dock Management). Washington DNR would not be required to implement programmatic measures for managing private recreational docks, nor would Washington DNR be required to impose use conditions for new docks on state-owned aquatic lands, specifying measures to avoid or minimize the degradation of aquatic habitat. The potential for uses of recreational docks to affect fish, aquatic invertebrates, and associated habitats through erosion or sedimentation, contaminant input, or shading would remain unchanged from current levels, although the amount of area over which these effects occur would remain unknown. To regulate dock construction and maintenance, Washington DNR would continue to rely on shoreline master programs administered by local governments, HPAs issued by WDFW, and regional general permits issued by the Corps.

Monitoring and Adaptive Management

Under Alternative 1, Washington DNR would not conduct comprehensive compliance or effectiveness monitoring or engage in adaptive management. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspection visits. Most such visits would be linked to lease renewal (approximately once every 12 to 30 years) or to periodic re-valuations of rental rates (approximately once every 4 years) (Table 2-1) (Washington DNR 2013). The purpose of such visits would be to verify the general condition of any structures associated with the use. Staff conducting the inspections would not be directed to identify and assess changes in the quantity and quality of habitat (including aquatic vegetation) for fish and wildlife.

As noted in Subsection 4.3.1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes, monitoring and adaptive management are not consistently incorporated into regulatory review and/or permitting processes (Quinn et al. 2007; San Juan Initiative 2008). As a result, the likelihood of Washington DNR taking measures to reduce adverse effects on fish, aquatic invertebrates, or associated habitats by modifying management practices or identifying and correcting problems based on information gained from reviews of existing use authorizations would be low.

4.8.2.2 Effects in Freshwater Areas

With the exception of shellfish aquaculture, uses that may adversely affect fish, aquatic invertebrates, and associated habitats in marine areas also occur in freshwater areas. For this reason, the potential for implementation of Alternative 1 to result in continued adverse effects on fish, aquatic invertebrates, and associated habitats in freshwater areas (through substrate damage, interference with sediment transport, degradation of water and sediment quality, loss or diminished growth of aquatic vegetation due to shading, or disturbance during key life stages) would be similar to the potential in marine areas.

On the whole, the programs and regulatory processes that influence the potential for adverse effects on fish, aquatic invertebrates, and associated habitats in marine areas would have similar influence in freshwater areas. The potential for adverse effects would, therefore, be as described above. The one exception to this expectation concerns Washington DNR’s Creosote Removal Program (Subsection 2.2.1.2, Elements Common to All Alternatives—Protection and Restoration of Aquatic Lands), which operates only in the marine and estuarine waters of Puget Sound. As such, the Creosote Removal Program would not reduce the effects of derelict structures in freshwater areas under Alternative 1.

Many uses of state-owned aquatic lands—particularly the construction of bank armoring and overwater structures—would continue to adversely affect substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, and disturbance levels in lakes by casting shade, altering substrates, and contributing to the introduction and establishment of invasive species. In rivers, Washington DNR's management under Alternative 1 would not be expected to affect most of the practices that have had the most substantial effects on those key habitat components (Subsection 4.3.2, Alternative 1, No-action—Substrates and Erosional Processes; Subsection 4.4.2, Alternative 1, No-action—Water Resources; and Subsection 4.6.2, Alternative 1, No-action—Vegetation). The exception would be bank armoring, which Washington DNR would allow under Alternative 1 and which would continue to alter sediment dynamics and native vegetation communities in rivers. Overall, Washington DNR's management under Alternative 1 would not be expected to contribute to improvements in the abundance, distribution, and condition of habitat for fish and aquatic invertebrates in freshwater areas.

4.8.2.3 Effects on Proposed Covered Species

Based on the anticipated effects on habitat conditions for fish and aquatic invertebrates, discussed above, the abundance, distribution, and condition of habitat for all life stages of all 18 proposed covered species in the analysis area (Subsection 3.8.2.3, Proposed Covered Species) would not be expected to improve from current status and trends under Alternative 1. The extent of effects of ongoing uses of state-owned aquatic lands on the abundance and distribution of proposed covered species in the analysis area is unknown, but is likely not substantial because in most cases, effects associated with uses of state-owned aquatic lands have not been identified as threats to the species' survival. Additional information about the effects of state-owned aquatic lands on proposed covered species is presented in the Aquatic Lands HCP (Washington DNR 2013). A brief assessment of potential effects on each species (or group of species that have similar associations with habitats on state-owned aquatic lands) under Alternative 1 follows (see Subsection 3.8.2.3, Proposed Covered Species, for baseline information supporting comparisons of alternatives). Listing status is not expected to change for any proposed ITP-covered species under Alternative 1.

- **Pacific Lamprey:** Uses of state-owned aquatic lands may diminish survival of larvae in freshwater areas by adversely affecting silty substrates in slow-moving stream reaches where larvae are vulnerable to injury from sediment compaction and removal. In addition, all life stages may be adversely affected by water and sediment quality impacts in marine and freshwater areas; poor water quality has been identified as a threat to Pacific lamprey populations. Washington DNR's management of state-owned aquatic lands under Alternative 1 would not be expected to contribute to any of the other identified threats to Pacific lamprey populations (i.e., loss and modification of habitat due to flow regulation; channelization; chemical treatments; dams, culverts, tidegates, weirs, and water-diversion structures; and dredging of sediments).

- **Green Sturgeon:** Subadults and adults, as well as designated critical habitat for the southern distinct population segment of the North American green sturgeon, may be adversely affected by water and sediment quality impacts in the lower Columbia River, Willapa Bay, and Grays Harbor; bioaccumulation and concentration of contaminants (e.g., from degraded water or sediment quality) is one of the identified threats to green sturgeon populations. Washington DNR's management of state-owned aquatic lands under Alternative 1 would not be expected to contribute to any of the other identified threats to green sturgeon populations (i.e., loss or destruction of critical spawning habitat, which does not occur in the analysis area; loss or alteration of foraging habitat; and commercial fisheries bycatch) (Subsection 3.8.2.3, Proposed Covered Species). It is not known whether any uses of state-owned aquatic lands have any impacts on the migration patterns of green sturgeon along the Pacific Coast.

- **White Sturgeon, Coastal Cutthroat Trout, Pink Salmon, Chum Salmon, Coho Salmon, Steelhead Trout, Sockeye Salmon/Kokanee, Chinook Salmon, and Bull Trout:** Spawning adults, eggs, and newly hatched young in freshwater areas may be adversely affected by impacts to substrates in spawning and rearing areas of rivers and streams. In addition, juveniles and adults may be adversely affected by water and sediment quality impacts in both marine and freshwater areas because poor water quality (i.e., decreased dissolved oxygen and elevated levels of contaminants that can be bioaccumulated and concentrated in white sturgeon) has been identified as a threat to many of these species. Continued use of state-owned aquatic lands for net pen aquaculture of Atlantic salmon may contribute to sea louse infestations among native salmonids. Other major threats to populations of these species (e.g., blocked culverts; water-diversion structures; loss of riparian vegetation; timber harvest, agriculture, grazing, and urbanization; commercial and recreational fishing/bycatch; and irrigation withdrawals; Subsection 3.8.2.3, Proposed Covered Species) are not associated with uses of state-owned aquatic lands and would not be affected by Washington DNR's management of these lands under Alternative 1.

- **Bocaccio, Canary Rockfish, and Yelloweye Rockfish:** Uses of state-owned aquatic lands may adversely affect juveniles of these species by adversely affecting substrates and vegetation in marine rearing areas. Washington DNR's management of state-owned aquatic lands under Alternative 1 would not contribute to reducing one of the factors responsible for rockfish declines (habitat degradation) because Washington DNR would neither require in-water and overwater structures to be designed and located in a manner that minimizes the obstruction of currents and the alteration of sediment transport, nor restrict the use of bank armoring. In addition, all life stages may be adversely affected by water and sediment quality impacts in marine areas; water quality problems have been identified as a threat all three of these species. Other uses of state-owned aquatic lands that would be expected to degrade habitat for these species include the construction of bridges, sewer lines, and other structures, and the deployment of cables and pipelines. Most uses of state-owned aquatic lands would not be expected to contribute to other identified sources of habitat degradation (derelict fishing gear; burying of rocky habitat by dredge spoils and natural subtidal slope movement; overutilization).

- **Pacific Herring, Pacific Sand Lance, and Surf Smelt:** Uses of state-owned aquatic lands may adversely affect eggs, larvae, and juveniles of all three of these species (all of which provide a prey resource for numerous fish, marine mammals, and marine birds) by adversely affecting substrates and vegetation in marine spawning and rearing areas. Adults of Pacific sand lance, which burrow in in sandy substrates in shallow shoreline areas, may also be affected. All life stages of all three species may be adversely affected by water and sediment quality impacts in marine areas; degradation of open water habitat by pollution has been identified as a threat to Pacific herring populations. In addition, several uses of state-owned aquatic lands have been identified as threats to Pacific herring populations. These include bank armoring (which contributes to loss, modification and disruption of spawning habitat), and overwater structures (which shade vegetation and alter sediment transport due to pilings). Many uses of state-owned aquatic lands also have the potential to adversely affect Pacific herring by contributing to elevated noise levels. Lastly, uses of state-owned aquatic lands have the potential to contribute to threats to Pacific sand lance (i.e., physical disruption of spawning grounds and construction of overwater and nearshore structures that affect sediment movement) and surf smelt (i.e., modifications of upper intertidal spawning habitat). Under Alternative 1, Washington DNR's management of state-owned aquatic lands would not be expected to change the extent or location of the impacts associated with these uses.

- **Eulachon:** Uses of state-owned aquatic lands may adversely affect eggs and newly hatched young in freshwater areas by adversely affecting substrates in spawning and rearing areas in rivers and streams. In addition, eggs, larvae, and adults may be adversely affected by water and sediment quality impacts in both marine and freshwater areas; water quality degradation has been identified as a threat to eulachon populations. Washington DNR's management of state-owned aquatic lands under Alternative 1 would not be expected to contribute to any of the other identified threats to eulachon populations or critical habitat (i.e., effects of climate change on ocean conditions and on freshwater habitat; bycatch in commercial fisheries; dams and water diversions; dredging; and predation). Similar to other forage fish, eulachon would continue to provide a prey resource for numerous fish, marine mammals, and marine birds under Alternative 1. Because the causes of recent declines of eulachon populations are unknown, it is unknown whether or to what extent those declines would continue under Alternative 1. It is unlikely that Washington DNR's management of state-owned aquatic lands under Alternative 1 would have any substantial impact on eulachon population levels because Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and3) many of the factors that influence the condition of key habitat components for eulachon in the analysis area are outside of Washington DNR's control (Subsection 4.8.1, Effects Common to All Alternatives).

4.8.3 Alternative 2, Proposed HCP

Under Alternative 2, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives. In addition, and in contrast to Alternative 1, Washington DNR would require users of state-owned aquatic lands to implement measures in the HCP Operating Conservation Program that reduce the potential for adverse effects on ITP-covered species and their habitat. These measures would be required for all new and renewed authorizations statewide. The measures are described in Table 2-1 and the potential effects addressed by the measures are identified in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

When engaging in any of the HCP-covered activities (i.e., authorization and management of shellfish aquaculture, log booming and storage, and overwater structures), Washington DNR would consider the potential direct and indirect effects of the use on ITP-covered species and their habitats. Through this review process, some uses may not be allowed in some locations or the footprints of some existing use authorizations may be modified to accommodate ITP-covered species or important habitat features. Such reviews and modifications would not take place under Alternative 1.

In contrast to Washington DNR's management under Alternative 1, the central goals of the Aquatic Lands HCP Operating Conservation Program would include avoiding and minimizing adverse effects on ITP-covered species and their habitats to the maximum extent practicable, as well as improving and restoring habitat quality (Washington DNR 2013). Most proposed covered species are fish; actions that benefit fish would also benefit other species associated with aquatic habitats, including aquatic invertebrates. The HCP Operating Conservation Program under Alternative 2 would be designed to achieve the goals of impact minimization and habitat restoration by avoiding and minimizing the potential for uses of state-owned aquatic lands to adversely affect the following habitat components:

- Erosional processes
- Water quality
- Physical habitat features (e.g., substrate composition, access to habitat) that support covered species
- Biological communities (e.g., native aquatic vegetation, prey resources) that support covered species

Also in contrast to Alternative 1, lease holders of new and existing uses would be required to implement conservation measures under the terms and conditions of the lease or grant issued. Washington DNR would not allow new uses that alter the value and function of natural habitats, including substrates and aquatic vegetation, in areas with little to no development and with high to moderate importance to proposed covered species (Subsection 2.2.3.3, Additional Commitments by Washington DNR—Habitat Protection and Restoration). No such restrictions would be required under Alternative 1. In addition, and in contrast to Alternative 1, Washington DNR would implement new programs to address the effects of uses that are not authorized by Washington DNR, and would implement an adaptive management and monitoring program.

The overall effect of implementing the HCP Operating Conservation Program, including the measures discussed above, on all state-owned aquatic lands under Alternative 2 would be a reduced risk, compared to Alternative 1, of adverse effects on fish, aquatic invertebrates, and associated habitats in the analysis area over the short term and the long term. This is because the amount of area subject to the effects identified in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis, would be expected to decrease over time, or at least to increase at a rate slower than under

Alternative 1. Adverse effects would also be reduced because conservation measures would be employed to minimize and mitigate for adverse effects of the activities. As a result, habitat conditions for fish and aquatic invertebrates in the analysis area may improve compared to Alternative 1, with resultant improvements in distribution and abundance of species and habitat. This change would occur gradually over the course of 30 to 50 years, because ongoing effects associated with existing use authorizations would continue until those authorizations need to be renewed, or authorized structures undergo renovation or repair. In addition, as discussed in Subsection 2.2.3.1, Requirements for Authorized Uses of State-owned Aquatic Land, the schedule for ensuring individual use authorizations are in compliance with the terms and conditions specified in the Aquatic Lands HCP would be based on the life expectancy of the materials used for any structures associated with the use, allowing further delays in the implementation of measures that reduce the potential for adverse effects.

Although implementation of the HCP Operating Conservation Program would cease after 50 years, the potential benefits associated with HCP implementation would be expected to persist beyond the 50-year analysis period for this EIS, and such benefits are expected to be greater than under Alternative 1. This is because facilities authorized or reauthorized during the term of the Aquatic Lands HCP would be sited and constructed in a manner aimed at avoiding or minimizing adverse effects. In addition, operational constraints already incorporated into existing use authorizations at the time of ITP expiration would remain in place until subsequent renewals.

Despite site-specific improvements, overall trends in the distribution, abundance, and condition of habitat (and subsequent listing status) for fish and aquatic invertebrates would likely be similar to those anticipated under Alternative 1. This is because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and 3) many of the factors that influence the condition of key habitat components in the analysis area are outside of Washington DNR’s control (Subsection 4.8.1, Effects Common to All Alternatives).

The following subsections provide additional analysis of the potential effects of Alternative 2 on fish, aquatic invertebrates, and associated habitats in marine areas and freshwater areas, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of uses that are not authorized by Washington DNR, and 3) the opportunities for monitoring and adaptive management in response to information gathered from field audits.

4.8.3.1 Effects in Marine Areas

The risk-reduction practices and programs of the HCP Operating Conservation Program under Alternative 2 would be directed at reducing the potential for uses of state-owned aquatic lands to adversely affect key habitat components for fish and aquatic invertebrates in marine areas, including the distribution of consolidated and unconsolidated substrates, the quality of water and sediment, the distribution and abundance of seagrasses, kelp, and salt marsh plants, light conditions, noise levels, disturbance levels, and food/prey availability. Many of the effects described in Subsection 4.1.4, Pathways of Potential Effects Relevant to This Analysis—including damage to or changes in the distribution of substrate types, contamination of water and sediment, shading of aquatic vegetation, and increased levels of noise and visual disruption—have been identified as threats to the distribution, abundance, and condition of habitat for fish and aquatic invertebrates. As a result, implementation of the Aquatic Lands HCP under Alternative 2 could result in improvements, compared to Alternative 1, in the distribution and abundance of fish and aquatic invertebrates at specific locations in the analysis area.

<u>Implementation of Risk-reduction Practices</u>

As under Alternative 1, many of the potential adverse effects of authorized uses on fish, aquatic invertebrates, and associated habitats would be avoided, minimized, or mitigated to some extent under Alternative 2 through the application of rules and programs carried out by agencies with regulatory authority. As noted in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes, however, such regulatory review does not always result in the application of effective risk-reduction practices. Under Alternative 2, these rules and programs would be supplemented by conservation measures and management practices implemented as part of the HCP Operating Conservation Program. By focusing on uses for which the primary means of reducing potential adverse effects falls within Washington DNR’s authority, the Aquatic Lands HCP would address effects that may not be addressed through other regulatory channels. This contrasts with Alternative 1, under which there is no certainty that Washington DNR would include measures to protect fish, aquatic invertebrates, and associated habitats in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight.

As discussed in in the analyses of effects on substrates and erosional processes, water resources, and vegetation, implementation of risk-reduction practices would result in the following improvements in the condition of key habitat components for fish and aquatic invertebrates, compared to Alternative 1:

- Reduced amount of area subject to scour, compaction, and changes in the distribution of consolidated and unconsolidated substrates, due to implementation of measures that require in-water and overwater structures to be designed and located in a manner that minimizes the obstruction of currents and the alteration of sediment transport, as well as new restrictions on bank armoring (Subsection 4.3.3, Alternative 2, Proposed HCP—Substrates and Erosional Processes)
- Decreased levels of toxic chemicals that are delivered to the waters and sediments of Puget Sound and other marine waterbodies, due to requirements to develop plans for reducing the direct input of hazardous substances and nutrients from upland areas adjoining state-owned aquatic lands (however, as discussed in Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources, excess nutrients and fecal coliform bacteria, low levels of dissolved oxygen, and the presence of contaminants would continue to adversely affect fish, aquatic invertebrates, and associated habitats in marine areas, as under Alternative 1, because most of the major of impacts on water and sediment quality in marine waters in the analysis area would be associated with actions in upland areas or otherwise not attributable to Washington DNR's management of state-owned aquatic lands)
- Recovery of eelgrass, kelp, and salt marsh vegetation in areas where the abundance of those vegetation types has declined in response to human activities, due to requirements avoid shading and physical damage of native aquatic vegetation (Subsection 4.6.3, Alternative 2, Proposed HCP—Vegetation)

Implementation of risk-reduction practices under Alternative 2 would also result in improved access to habitat and food/prey availability in marine areas, compared to Alternative 1. Examples of beneficial measures that would be implemented under Alternative 2 include the following:

- In-water construction, operation, or maintenance activities on state-owned aquatic lands would not be allowed during sensitive life history phases (e.g., reproduction, migration) of ITP-covered species or forage fish predicted or observed to occur at the use authorization site. This would reduce interference with access to habitat or disruption of habitat use due to noise, artificial lighting, and human activity, compared to Alternative 1.
- Artificial night lighting on and from overwater structures would be required to be minimized by focusing the light on the docks surface and using shades that minimize illumination of the

surrounding environment. This also would reduce interference with access to habitat or disruption of habitat use due to artificial lighting, compared to Alternative 1.

- In-water activities with the potential to disturb forage fish spawning habitat or increase turbidity in spawning areas during spawning seasons would be required to maintain adequate vertical separation from the spawning habitat zone. This, in combination with measures protecting substrates, water and sediment quality, and vegetation, would reduce the extent to which uses of state-owned aquatic lands adversely affect food/prey availability, compared to Alternative 1.

By reducing the area over which uses of state-owned aquatic lands adversely affect the key habitat components identified above, implementation of the HCP Operating Conservation Program under Alternative 2 would reduce adverse effects on the abundance and distribution of fish and aquatic invertebrates in the analysis area, compared to Alternative 1.

Programs to Address Effects of Uses Not Authorized by Washington DNR

As under Alternative 1, uses that have not been authorized by Washington DNR—specifically, derelict structures and private recreational docks—would continue to affect substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability under Alternative 2, resulting in adverse effects on the abundance, distribution, and condition of habitat for fish and aquatic invertebrates. In contrast to Alternative 1, however, all authorizations for uses of state-owned aquatic lands would require the removal of lessee- or grantee-owned structures when the authorization expires or the structures are no longer used as part of the authorized use. This requirement would remain in effect through the 50-year duration of the ITPs. As a result, the amount of area over which derelict structures adversely affect fish, aquatic invertebrates, and associated habitats by damaging substrates, interfering with sediment transport, degrading water and sediment quality, or affecting vegetation would likely be less than under Alternative 1. In areas where the adverse effects of these overwater structures decrease, the condition of habitat for fish and aquatic invertebrates would be expected to improve. The reductions in adverse effects would occur in combination with the reductions that would be expected to continue through the operation of the Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands).

Additional benefits to fish, aquatic invertebrates, and associated habitats would be expected to result from Washington DNR's commitment to implementing programmatic measures for the management of private recreational docks, combined with Washington DNR's commitment to requiring all new private recreational docks on state-owned aquatic lands to comply with the conservation measures of the Aquatic Lands HCP. Under this HCP, owners of new private recreational docks would be required to implement measures designed to reduce the risk of adverse effects on substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability. This requirement would reduce the amount of area over which recreational docks adversely affect fish, aquatic invertebrates, and associated habitats, compared to Alternative 1.

Monitoring and Adaptive Management

Compared to Alternative 1, implementation of effectiveness and compliance monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring program would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner. Implementation of the HCP would also allow for modification of conservation measures as new information is gathered through monitoring and adaptive management. No such program would be implemented under Alternative 1 or through most review and/or permitting processes of Federal, state, and local agencies with regulatory authority.

Through the adaptive management and monitoring program, staff from Washington DNR would conduct field audits to assess whether the HCP Operating Conservation Program is being implemented as intended. Rather than being linked to lease renewal or rental rate re-valuation (as under Alternative 1), field audits would occur at a randomly selected sample of all use authorizations every year. In addition, and in contrast to Alternative 1, Washington DNR staff conducting effectiveness monitoring would identify and assess changes in the quantity and quality of habitat for ITP-covered fish and wildlife species. For example, staff would look for evidence of changes in slope profiles or sediment grain size distribution, impacts to water quality, or damage to vegetation (Washington DNR 2013).

In addition, information collected through effectiveness monitoring would be used to improve the efficacy of measures intended to avoid or minimize the adverse effects of authorized uses on erosional processes, water quality, and vegetation. Compared to Alternative 1, therefore, Washington DNR would have a greater likelihood of modifying management practices or readily identifying and correcting problems based on information gained from reviews of existing use authorizations, further reducing the risk of adverse effects on fish, aquatic invertebrates, and associated habitat.

4.8.3.2 Effects in Freshwater Areas

As under Alternative 1, the potential for Washington DNR's management under Alternative 2 to result in adverse effects on fish, aquatic invertebrates, and associated habitats in freshwater areas would be similar to that potential in marine areas. Implementation of the HCP Operating Conservation Program under Alternative 2 would reduce the risk that uses of state-owned aquatic lands would adversely affect aquatic key habitat components (i.e., substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, and disturbance levels) in lakes, ponds, rivers, and streams, compared to Alternative 1. Reductions in the adverse effects of uses of state-owned aquatic lands in lakes, ponds, rivers, and streams could contribute to gradual improvements, compared to Alternative 1, in the abundance, distribution, and condition of habitat for fish and aquatic invertebrates in freshwater areas.

With the exception of measures directed specifically at protecting forage fish (which occur in marine areas only), the measures implemented in marine areas would also be implemented in freshwater areas, so benefits of implementation would be realized in freshwater areas as well as in marine areas. These benefits would include 1) reduced interference with natural water movement processes that support sediment erosion and transport processes in lakes, rivers, and associated shorelines (Subsection 4.3.3, Alternative 2, Proposed HCP—Substrates and Erosional Processes); 2) reduced adverse effects on vegetation due to shade, substrate alterations, and the introduction and establishment of invasive species in lakes, or due to altered sediment dynamics in rivers (Subsection 4.6.3, Alternative 2, Proposed HCP—Vegetation); and 3) reduced adverse effects on access to habitat due to noise, artificial lighting, and human activity. As under Alternative 1, the ongoing operations of Creosote Removal Program would not reduce the effects of derelict structures in freshwater areas under Alternative 2 because the program operates in marine areas only.

As in marine areas, implementation of the HCP Operating Conservation Program in freshwater areas under Alternative 2 would not likely result in any noticeable changes in nutrient inputs or other impacts to water or sediment quality (Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources). As a result, elevated temperatures, low levels of dissolved oxygen, and elevated levels toxic compounds and pathogens would continue to adversely affect fish, aquatic invertebrates, and associated habitats in freshwater areas, as under Alternative 1.

4.8.3.3 Effects on Proposed Covered Species

Based on the anticipated improvements in habitat conditions for fish and aquatic invertebrates, discussed above, the abundance, distribution, and condition of habitat for all life stages of the proposed covered species in the analysis area would be expected to improve under Alternative 2, compared to Alternative 1. This result would be expected for several reasons:

- The conservation goals of the HCP Operating Conservation Program under Alternative 2 would include avoiding and minimizing adverse effects on ITP-covered species to the maximum extent practicable, as well as improving and restoring habitat quality.
- All of the species identified in Subsection 3.8.2.3, Proposed Covered Species, are proposed for ITP coverage, and all use habitats on state-owned aquatic lands.
- Washington DNR would not allow new uses that alter the value and function of natural habitats, including substrates and aquatic vegetation, in areas with little to no development and with high to moderate importance to proposed covered species.
- Implementation of the HCP Operating Conservation Program (including requirements for new and existing users of state-owned aquatic lands to implement conservation measures, implementation of programs to address uses that are not authorized by Washington DNR, and implementation of implementation of effectiveness and compliance monitoring and adaptive monitoring) in marine and freshwater areas under Alternative 2 would reduce the potential, compared to Alternative 1, for uses of state-owned aquatic lands to adversely affect key habitat components important to these species (i.e., substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability).

The extent to which the abundance and distribution of proposed covered species would be expected to improve is unknown, but the difference from Alternative 1 would likely be small because in many cases the habitat impacts addressed through the HCP Operating Conservation Program have not been identified as primary threats to the species' survival. A brief assessment of potential effects on each species (or group of species that have similar associations with habitats on state-owned aquatic lands) under Alternative 2 follows (Subsection 3.8.2.3, Proposed Covered Species, for baseline information supporting comparative analyses).

- **Pacific Lamprey:** Reduced impacts to silty substrates in slow-moving stream reaches may result in improved survival of larvae in freshwater areas because Pacific lamprey larvae are vulnerable to injury from sediment compaction and removal. In addition, reductions in water and sediment quality impacts in marine and freshwater areas may result in improved conditions for all life stages. Although such reductions would be slight (Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources), they would address one of the identified threats to Pacific lamprey populations (i.e., poor water quality). For these reasons, the abundance, distribution, and condition of habitat for all life stages of Pacific lamprey in the analysis area would be expected to improve under Alternative 2, compared to Alternative 1. Implementation of the HCP Operating Conservation Program under Alternative 2 would not address any of the other identified threats to Pacific lamprey populations (i.e., loss and modification of habitat due to flow regulation; channelization; chemical treatments; dams, culverts, tidegates, weirs, and water-diversion structures; and dredging of sediments) to a noticeable extent.

- **Green Sturgeon:** Reductions in water and sediment quality impacts in the lower Columbia River, Willapa Bay, and Grays Harbor may result in improved conditions for subadults and adults from the southern distinct population segment of the North American green sturgeon, including improvements in the condition of designated critical habitat. Although such reductions would be slight (Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources), they would address one of the identified threats to green sturgeon populations (i.e., bioaccumulation and concentration of contaminants). For these reasons, the abundance, distribution, and condition of habitat for subadult and adult green sturgeon in the analysis area would be expected to improve under Alternative 2, compared to Alternative 1. Implementation of the HCP Operating Conservation Program under Alternative 2 would not address any of the other identified threats to green sturgeon populations (i.e., loss or destruction of critical spawning habitat, which does not occur in the analysis area; loss or alteration of foraging habitat; and commercial fisheries bycatch). Because the impacts of uses of state-owned aquatic lands on the migration patterns of green sturgeon along the Pacific Coast are unknown, it is not known whether the habitat improvements anticipated under Alternative 2 would result in any reductions in impacts on migration patterns, compared to Alternative 1.

- **White Sturgeon, Coastal Cutthroat Trout, Pink Salmon, Chum Salmon, Coho Salmon, Steelhead Trout, Sockeye Salmon/Kokanee, Chinook Salmon, and Bull Trout:** Reduced impacts to substrates in rivers and streams may result in improved conditions for spawning adults, eggs, and newly hatched young in freshwater areas, as well as all life stages of kokanee. Reductions in water and sediment quality impacts in both marine and freshwater areas may result in improved conditions for juveniles and adults. Although such reductions would be slight (Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources), they would address an identified threat for many of these species (i.e., decreased dissolved oxygen and bioaccumulation and concentration of contaminants in white sturgeon). For these reasons, the abundance, distribution, and condition of habitat for all life stages of white sturgeon, coastal cutthroat trout, pink salmon, chum salmon, coho salmon, steelhead trout, sockeye salmon/kokanee, Chinook salmon, bull trout, and eulachon in the analysis area would be expected to improve under Alternative 2, compared to Alternative 1. As under Alternative 1, continued use of state-owned aquatic lands for net pen aquaculture of Atlantic salmon may contribute to sea louse infestations among native salmonids. Implementation of the HCP Operating Conservation Program under Alternative 2 would not address any of the other major threats to populations of these species (e.g., blocked culverts; water-diversion structures; loss of riparian vegetation; timber harvest, agriculture, grazing, and urbanization; commercial and recreational fishing/bycatch; and irrigation withdrawals) because these threats are not associated with uses of state-owned aquatic lands.

- **Bocaccio, Canary Rockfish, and Yelloweye Rockfish:** Reduced impacts to substrates and vegetation in marine areas may result in improved conditions for juveniles (albeit to a lesser extent for yelloweye rockfish than the other two species, because yelloweye rockfish juveniles do not typically occupy shallow, nearshore waters where most uses of state-owned aquatic lands occur). Implementation of the HCP Operating Conservation Program under Alternative 2 would address one of the factors responsible for rockfish declines (habitat degradation) by requiring in-water and overwater structures to be designed and located in a manner that minimizes the obstruction of currents and the alteration of sediment transport, and by restricting the use of bank armoring. In addition, reductions in water and sediment quality impacts in marine areas may result in improved conditions for all life stages of rockfish. Although such reductions would be slight (Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources), they would address an identified threat to all three species (i.e., water quality problems). For these reasons, the abundance, distribution, and condition of habitat for all life stages of bocaccio, canary rockfish, and yelloweye rockfish in the analysis area would be expected to improve under Alternative 2, compared to Alternative 1. However, other identified sources of habitat degradation (derelict fishing gear; construction of bridges, sewer lines, and other structures; deployment of cables and pipelines; and burying of rocky habitat by dredge spoils and natural subtidal slope movement) would not be addressed, nor would effects associated with overutilization.

- **Pacific Herring, Pacific Sand Lance, and Surf Smelt:** Reduced impacts to substrates and vegetation in marine areas may result in improved conditions for eggs, larvae, and juveniles of all three species, and adults of Pacific sand lance (which burrow in in sandy substrates in shallow shoreline areas). In addition, reductions in water and sediment quality impacts in marine areas may result in improved conditions for all life stages, albeit to a slight degree (Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources). Implementation of the HCP Operating Conservation Program under Alternative 2 would address the identified threats to Pacific herring populations (i.e., loss, modification and disruption of spawning habitat due to bank armoring; shading of vegetation due to overwater structures; altered sediment transport due to pilings; and degradation of open water habitat by pollution), as well as potential threats to Pacific sand lance (i.e., physical disruption of spawning grounds and construction of overwater and nearshore structures that affect sediment movement) and surf smelt (i.e., modifications of upper intertidal spawning habitat). For these reasons, the abundance, distribution, and condition of habitat for all life stages of Pacific herring, Pacific sand lance, and surf smelt (all of which provide a prey resource for numerous fish, marine mammals, and marine birds) in the analysis area would be expected to improve under Alternative 2, compared to Alternative 1. As discussed in Subsection 4.5, Noise, Alternative 2 would not be expected to result in substantial changes in noise levels in the analysis area, compared to Alternative 1. Consequently, no additional effects on these species resulting from noise levels would be anticipated under Alternative 2.

- **Eulachon:** Reduced impacts to substrates in rivers and streams may result in improved conditions for eggs and newly hatched young in freshwater areas. Reductions in water and sediment quality impacts in both marine and freshwater areas may result in improved conditions for eggs, larvae, and adults. Although such reductions would be slight (Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources), they would address an identified threat for eulachon (i.e., water quality degradation). For these reasons, the abundance, distribution, and condition of habitat for all life stages of eulachon in the analysis area would be expected to improve under Alternative 2, compared to Alternative 1. Implementation of the HCP Operating Conservation Program under Alternative 2 would not address any of the other prominent threats to eulachon populations (i.e., effects of climate change on ocean conditions and on freshwater habitat; bycatch in commercial fisheries; dams and water diversions; dredging; and predation) or critical habitat. As under Alternative 1, eulachon would continue to provide a prey resource for numerous fish, marine mammals, and marine birds under Alternative 2. As under Alternative 1, it is unlikely that Washington DNR's management of state-owned aquatic lands under Alternative 2 would have any substantial impact on eulachon population levels because Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands,

2) in many areas the State owns a small proportion of aquatic lands, and 3) many of the factors that influence the condition of key habitat components for eulachon in the analysis area are outside of Washington DNR's control (Subsection 4.8.1, Effects Common to All Alternatives).

4.8.4 Alternative 3, HCP for Marine Areas Only

Under Alternative 3, Washington DNR would implement the same HCP Operating Conservation Program as under Alternative 2, but in marine areas only. Freshwater areas would be managed as under Alternative 1. As a result, the effects on the abundance, distribution, and condition of habitat for fish and aquatic invertebrates would be less under Alternative 3 than under Alternative 1 in marine areas on state-owned aquatic lands and in the analysis area overall, but the same in freshwater areas. In both the short term and the long term, the potential benefits of HCP implementation anticipated under Alternative 3 would, therefore, occur over a greater area than under Alternative 1 but less than under Alternative 2.

Based on decreases in adverse effects associated with uses of state-owned aquatic lands on substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability, the abundance, distribution, and condition of habitat for fish and aquatic invertebrates in marine areas would be expected to show marginal improvements, compared to Alternative 1. Washington DNR's management under Alternative 3, as under Alternative 1, would not be expected to contribute to improvements in the condition of habitat for fish and aquatic invertebrates in freshwater areas.

Under Alternative 3, ongoing uses of state-owned aquatic lands would affect all life stages of proposed covered species that use habitats in freshwater areas as described under Alternative 1. These life stages include the larvae of Pacific lamprey; eggs and newly hatched young of white sturgeon, coastal cutthroat trout, pink salmon, chum salmon, coho salmon, steelhead trout, sockeye salmon/kokanee, Chinook salmon, bull trout, and eulachon (and, to a lesser extent, all life stages of those species, due to water and sediment quality impacts). Species and life stages that use habitats in marine areas would benefit from the implementation of the HCP Operating Conservation Program as described under Alternative 2. These life stages include adult Pacific lamprey; subadult and adult green sturgeon; juvenile and adult white sturgeon, coastal cutthroat trout, pink salmon, chum salmon, coho salmon, steelhead trout, sockeye salmon/kokanee, Chinook salmon, bull trout, and eulachon; and all life stages of bocaccio, canary rockfish, yelloweye rockfish, Pacific herring, Pacific sand lance and surf smelt.

4.9 Wildlife and Wildlife Habitat

This subsection describes the direct and indirect effects of the proposed alternatives on wildlife (including amphibians, turtles, birds, and marine mammals) and wildlife habitat. Effects of the action alternatives (Alternative 2 and Alternative 3) are compared to those of Alternative 1, No-action, over the 50-year analysis period for this EIS. Analyses in this subsection compare how Washington DNR's management of state-owned aquatic lands under the proposed alternatives would, in combination with the requirements identified in Subsection 3.9.1, Existing and Relevant Management Measures and Regulatory Framework, be expected to affect the distribution, abundance, and condition of habitat for wildlife in the analysis area, as described in Subsection 3.9.2, Existing Conditions. Analyses in this subsection address the effects of the alternatives on the distribution, abundance, and condition of key habitat components for wildlife, with the assumption that the distribution and abundance of wildlife species in the analysis area depend on the distribution, abundance, and condition of these key habitat components.

The analyses of effects on wildlife are based on review of the key habitat components described in Subsection 3.9.2.1, Key Habitat Components in Marine Areas, and Subsection 3.9.2.2, Key Habitat Components in Freshwater Areas (i.e., substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability). To a large extent, the effects of the alternatives on these key habitat components are addressed in the analyses for other resource areas. For this reason, discussions in this subsection rely on the conclusions of several other subsections. Analyses of the alternatives' potential to affect substrates are based on discussions in Subsection 4.3, Substrates and Erosional Process. Similarly, the effects analyses for water and sediment quality are based on discussions in Subsection 4.4, Water Resources, and the analyses for aquatic vegetation are based on those in Subsection 4.6, Vegetation.

The overall abundance, distribution, and condition of habitat for wildlife in the analysis area are influenced to a large extent by activities that occur in upland areas and that are, therefore, outside the authority of Washington DNR's Aquatics Division. The effects analyses address only those activities under Washington DNR's authority that may affect the conditions of key habitat components in the analysis area. The features of the proposed alternatives that may influence the potential for uses of state-owned aquatic lands to affect wildlife and wildlife habitat include 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of uses that are not authorized by Washington DNR, and 3) the opportunities for monitoring and adaptive management in response to information gathered from field audits. The effects analysis for each alternative below considers each of these features in turn.

4.9.1 Effects Common to All Alternatives

Under all alternatives, uses of state-owned aquatic lands would continue to occur in marine and freshwater areas and would have the potential to affect species associated with habitats in those areas by altering erosional processes, water quality, physical habitat features, and biological communities (Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis). Uses of state-owned aquatic lands would be expected to contribute to habitat degradation and loss through adverse effects on substrate composition (i.e., distribution of consolidated and unconsolidated substrates), water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, human-related disturbance levels, and food/prey availability. In addition, many of the factors that influence the condition of key habitat components in the analysis area would continue to be outside of Washington DNR's control. For example, the primary sources of water and sediment quality impacts in both marine areas and freshwater areas would continue to be associated with runoff from upland areas (Subsection 4.4, Water Resources), which would continue to influence the distribution and abundance of wildlife in the analysis area. The habitat associations of and threats to all proposed covered species, as described in Subsection 3.9.2.3, Proposed Covered Species, would not differ among the alternatives.

Under any of the proposed alternatives, proposed projects in marine and freshwater areas would continue to undergo review through the existing network of local, state, and Federal regulatory and permitting processes (Subsection 3.9.1, Existing and Relevant Management Measures and Regulatory Framework), in many cases resulting in substantial protection of wildlife species and habitats. As noted in Subsection 4.1.3, Analysis Assumptions, any potential changes in the regulatory environment cannot be predicted. For this reason, it is assumed for the analyses in this EIS that the effects of existing rules and regulations that are not part of the proposed alternatives would remain the same under all alternatives. As such, the regulatory requirements identified in Subsection 3.9.1, Existing and Relevant Management Measures and Regulatory Framework, would apply equally under all alternatives. Under all three alternatives, Washington DNR's Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands) would be expected to operate in marine areas only, and would not contribute to wildlife benefits by reducing the effects of derelict structures in freshwater areas.

4.9.2 Alternative 1, No-action

Under Alternative 1, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All

Alternatives, and Subsection 2.2.2, Alternative 1. When making decisions concerning the issuance of aquatic land use authorizations, Washington DNR would continue to consider the natural values of state-owned aquatic lands (Subsection 1.2.6, Washington DNR's Aquatics Division), but avoiding and minimizing adverse effects on certain species and their habitats, as well as improving and restoring habitat quality, would not be central goals of the Aquatics Division.

Washington DNR would not be required to implement programs aimed at avoiding and minimizing the potential for uses of state-owned aquatic lands to adversely affect erosional processes, water quality, physical habitat features, or biological communities under Alternative 1. Also, Washington DNR would not disallow or require modifications to uses in some areas to protect certain species or habitat features. Further, Washington DNR would not be required to include measures to avoid and minimize adverse effects on wildlife species and habitats (e.g., by avoiding and minimizing modifications to substrate types, degradation of water and sediment quality and shading of vegetation, as well as disturbance due to noise and human activity) in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight. In addition, Washington DNR would not be required to implement new programs to address the effects of uses that are not authorized by Washington DNR, nor would it implement an adaptive management and monitoring program. As a result, the potential benefits of implementing such practices and programs would not be realized under Alternative 1, and uses of state-owned aquatic lands would continue to affect wildlife species and habitats as described in Subsection 3.9.2, Existing Conditions, and Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

Overall, the effects on the distribution, abundance, and condition of habitat for wildlife in the analysis area would not change from existing conditions in the short term or the long term. This is because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and 3) many of the factors that influence the condition of key habitat components in the analysis area are outside of Washington DNR's control (Subsection 4.9.1, Effects Common to All Alternatives).

The following subsections provide additional analysis of the potential effects of Alternative 1 on wildlife species and habitats in marine areas and freshwater areas based on how each alternative addresses 1) the degree of implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of uses that are not authorized by Washington DNR, and 3) the opportunities for monitoring and adaptive management in response to information gathered from field audits.

4.9.2.1 Effects in Marine Areas

Under Alternative 1, Washington DNR would not be required to implement risk-reduction practices and programs directed at reducing the potential for uses of state-owned aquatic lands to adversely affect key habitat components for wildlife in marine areas, including the distribution of consolidated and unconsolidated substrates; the quality of water and sediment; the distribution and abundance of eelgrass, kelp, and salt marsh plants; light conditions; noise levels; disturbance levels; and food/prey availability. Many of the effects described in Subsection 4.1.4, Pathways of Potential Effects Relevant to This Analysis—including damage to or changes in the distribution of substrate types, contamination of water and sediment, shading of aquatic vegetation, and increased levels of noise and visual disruption—have been identified as threats to the distribution, abundance, and condition of habitat for wildlife. As a result, uses of state-owned aquatic lands would continue to affect wildlife species and habitats (including substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability) as described in Subsection 3.9.2.1, Key Habitat Components in Marine Areas. Further, the status and trends of the distribution, abundance, and condition of habitat for wildlife in the analysis area would not be expected to change from current conditions.

Implementation of Risk-reduction Practices

Under Alternative 1, many of the potential adverse effects of authorized uses on wildlife species and habitats would be avoided, minimized, or mitigated to some extent through the application of rules and programs carried out by agencies with regulatory authority. As noted in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes, however, such regulatory review does not always result in the application of effective conservation measures. In addition, some uses of state-owned aquatic lands would not be subject to Federal, state, or local regulatory review.

Under Alternative 1, Washington DNR would not be required to include measures to protect key habitat components for wildlife (i.e., substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability) in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight. For example, Washington DNR would not require in-water and overwater structures to be designed and located in a manner that minimizes the obstruction of currents and the alteration of sediment transport, nor would Washington DNR place new restrictions on bank armoring. In addition, Washington DNR would not require users of state-owned aquatic lands to develop plans for reducing the direct input of hazardous substances and nutrients from upland areas adjoining state-owned aquatic lands or implement measures to avoid shading and physical damage of native aquatic vegetation. Washington DNR also would not restrict the timing or location of in-water construction, operation, or maintenance activities on state-owned aquatic lands; require the minimization of artificial night lighting on and from overwater structures; or restrict the timing or location of in-water activities with the potential to disturb habitat for fish (i.e., forage fish) that are important prey for many wildlife species.

As a result, many uses of state-owned aquatic lands would likely continue to degrade habitat quality for wildlife through substrate damage, interference with sediment transport, degradation of water and sediment quality, loss or diminished growth of aquatic vegetation due to shading, or disturbance due to altered light conditions or elevated noise or disturbance levels from in-water construction, operation, or maintenance activities during key wildlife life stages (e.g., reproduction, migration). The ways in which uses of state-owned aquatic lands contribute to these effects are described in greater detail in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

Programs to Address Effects of Uses Not Authorized by Washington DNR

In addition to the uses authorized by Washington DNR, uses of state-owned aquatic lands not authorized by Washington DNR would continue to adversely affect the abundance, distribution and condition of wildlife species and habitats under Alternative 1. Pertinent to this analysis are derelict structures and private recreational docks. The effects of these overwater and in-water structures on substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability are described in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

The abandonment of structures and subsequent adverse effects of derelict structures on key habitat components for wildlife would likely continue to be a comparatively rare occurrence because a high percentage of structures would be subject to a contract-based requirements for removal, per WAC 332-30-122(4) (Subsection 3.2.3.2, Uses Not Authorized by Washington DNR). Washington DNR would be expected to continue to remove derelict pilings and overwater structures through the Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands). Removal of structures through the Creosote Removal Program would eliminate the potential for such structures to degrade habitat for wildlife through 1) erosion or sedimentation due to modified patterns of bank erosion and replenishment; 2) altered growth of vegetation due to contaminants present in the structures; and 3) loss or diminished growth of vegetation due to shading. The continued removal of derelict structures through the Creosote Removal Program would not, however, be assured with a 50-year commitment.

Under Alternative 1, private recreational docks would continue to be sited by statutory authority on state-owned aquatic lands abutting upland residential properties (Subsection 2.2.2.1, Private Recreational Dock Management). Washington DNR would not be required to implement programmatic measures for managing private recreational docks, nor would Washington DNR be required to impose use conditions for new docks on state-owned aquatic lands, specifying measures to avoid or minimize the degradation of aquatic habitat. The potential for uses of recreational docks to affect wildlife species and habitats through erosion or sedimentation, contaminant input, or shading would remain unchanged from current levels, although the amount of area over which these effects occur would remain unknown. To regulate dock construction and maintenance, Washington DNR would continue to rely on shoreline master programs administered by local governments, HPAs issued by WDFW, and regional general permits issued by the Corps.

Monitoring and Adaptive Management

Under Alternative 1, Washington DNR would not conduct comprehensive compliance or effectiveness monitoring or engage in adaptive management. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspection visits. Most such visits would be linked to lease renewal (approximately once every 12 to 30 years) or to periodic re-valuations of rental rates (approximately once every 4 years) (Table 2-1) (Washington DNR 2013). The purpose of such visits would be to verify the general condition of any structures associated with the use. Staff conducting the inspections would not be directed to identify and assess changes in the quantity and quality of habitat (including aquatic vegetation) for fish and wildlife.

As noted in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes, monitoring and adaptive management are not consistently incorporated into regulatory review and/or permitting processes (Quinn et al. 2007; San Juan Initiative 2008). As a result, the likelihood of Washington DNR taking measures to reduce adverse effects on wildlife species and habitats by modifying management practices or identifying and correcting problems based on information gained from reviews of existing use authorizations would be low.

4.9.2.2 Effects in Freshwater Areas

With the exception of shellfish aquaculture, uses that may adversely affect wildlife species habitats in marine areas also occur in freshwater areas. For this reason, the potential for implementation of Alternative 1 to result in continued adverse effects on wildlife species and habitats in freshwater areas (i.e., lakes, ponds, rivers, and streams) through substrate damage, interference with sediment transport, degradation of water and sediment quality (e.g., chemical contaminants), loss or diminished growth of aquatic vegetation, the introduction and establishment of invasive species in lakes, altered sediment dynamics in rivers, or disturbance during key wildlife life stages would be similar to the potential in marine areas.

On the whole, the programs and regulatory processes that influence the potential for adverse effects on wildlife species and habitats in marine areas would have similar influence in freshwater areas (i.e., lakes, ponds, rivers, and streams). The potential for adverse effects would, therefore, be as described above. The one exception to this expectation concerns Washington DNR's Creosote Removal Program (Subsection 2.2.1.2, Elements Common to All Alternatives—Protection and Restoration of Aquatic Lands), which operates only in the marine and estuarine waters of Puget Sound. As such, the Creosote Removal Program would not reduce the effects of derelict structures in freshwater areas under Alternative 1 and would, therefore, result in no benefits to the abundance, distribution, and condition of habitat for wildlife in freshwater areas.

Many uses of state-owned aquatic lands—particularly the construction of bank armoring and overwater structures—would continue to adversely affect key habitat components including substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, and disturbance levels in lakes by casting shade and night lighting, altering substrates, and contributing to the introduction and establishment of invasive species. In rivers, Washington DNR's management under Alternative 1 would not be expected to affect most of the practices that have had the most substantial effects on key habitat components (Subsection 4.3.2, Alternative 1, No-action—Substrates and Erosional Processes; Subsection 4.4.2, Alternative 1, No-action—Water Resources; and Subsection 4.6.2, Alternative 1, No-action—Vegetation). The exception would be bank armoring, which Washington DNR would allow under Alternative 1 and that would continue to alter sediment dynamics and native vegetation communities in rivers. Overall, Washington DNR's management under Alternative 1 would not be expected to contribute to improvements in the abundance, distribution, and condition of habitat for wildlife in freshwater areas within the analysis area.

4.9.2.3 Effects on Proposed Covered Species

Based on the anticipated effects on habitat conditions for wildlife, discussed above, the abundance, distribution, and condition of habitat for all life stages of all 11 proposed covered species in the analysis area (Subsection 3.9.2.3, Proposed Covered Species; Table 1-1) would not be expected to improve from current status and trends under Alternative 1. The extent of effects of ongoing uses of state-owned aquatic lands on the abundance and distribution of proposed covered species in the analysis area is unknown, but is likely not substantial because in most cases, effects associated with uses of state-owned aquatic lands have not been identified as threats to the species' survival. Additional information about the effects of state-owned aquatic lands on proposed covered species is presented in the Aquatic Lands HCP (Washington DNR 2013). A brief assessment of potential effects on each species (or group of species that have similar associations with habitats on state-owned aquatic lands) under Alternative 1 follows. Listing status and critical habitat designations are not expected to change for any proposed ITP-covered species under Alternative 1.

- **Columbia Spotted Frog, Oregon Spotted Frog, Northern Leopard Frog, Western Toad, and Pacific Pond Turtle:** Uses of state-owned aquatic lands may adversely affect life history stages described in Subsection 3.9.2.3, Proposed Covered Species. Breeding and overwintering adults, eggs, larvae, and juveniles of these species may be impacted by adversely affecting substrates and vegetation in freshwater areas. In addition, all life stages of the frog and toad species may be adversely affected by water and sediment quality impacts in freshwater areas; water quality degradation has been identified as a threat to frog and toad populations. In addition, bank armoring would continue to contribute to the loss of natural wetland and riverine disturbance processes that created early successional wetlands favorable to Oregon spotted frogs. These wetland habitat areas may be considered part of the final critical habitat designation currently proposed by the USFWS (78 Fed. Reg. 59334, September 26, 2013). Washington DNR's management of state-owned aquatic lands under Alternative 1 would not be expected to contribute substantially to other identified threats to populations of these species, including wetland habitat loss; dam construction, water development, and water level manipulations; grazing practices; mining; introductions of non-native species, fungal diseases, viruses, and parasites; beaver removal; use of fertilizers and pesticides for agriculture, mosquito control, and fish control; residential and commercial development; and removal of individuals from the wild.

- **Black Tern:** Nesting adults and young may be adversely affected by water and sediment quality impacts in freshwater areas on the east slopes of the Cascade Mountains and in the northeastern and southeastern portions of Washington State; impacts to prey species due to water quality impacts have been identified as a threat to black tern populations. In addition, recreational activities (e.g., swimming, fishing, birding, boating) associated with docks and other overwater structures on state-owned aquatic lands may contribute to disturbance of breeding black terns. Washington DNR's management of state-owned aquatic lands under Alternative 1 would not be expected to contribute substantially to any of the other identified threats to black tern life history stages or populations (i.e., drainage of wetlands that provide breeding and migration habitat; introductions of invasive plant species; nest predation; forage fish declines in wintering areas, which are not in the analysis area; and collisions with power lines, towers, and wind turbines during migration) (Subsection 3.9.2.3, Proposed Covered Species).

- **Common Loon and Harlequin Duck:** Nesting adults and young in freshwater areas may be adversely affected by impacts to lake shoreline habitats (common loon) or to stream habitats (harlequin duck). Life stages of wintering and molting birds of both species may be adversely affected by uses of state-owned aquatic lands (e.g., shoreline development, aquaculture, algae harvest) that degrade habitat conditions in coastal marine areas (including contamination of and reduced availability of prey species such as forage fish and invertebrates) (Subsection 3.9.2.3, Proposed Covered Species). All life stages of both species may be adversely affected by water and sediment quality impacts in both marine and freshwater areas; poor water quality (i.e., mercury and organochlorines that can be ingested by common loons, heavy metals and polycyclic aromatic hydrocarbons that can be bioaccumulated in harlequin ducks) has been identified as a threat to both of these species. In addition, boat traffic and recreational activities (e.g., fishing, rafting) associated with docks and other overwater structures on state-owned aquatic lands may contribute to disturbance of breeding, wintering, and molting common loons and harlequin ducks. Washington DNR's management of state-owned aquatic lands under Alternative 1 would not be expected to contribute substantially to other identified threats to populations of common loon and harlequin duck (i.e., water level fluctuations in lakes and reservoirs; oil and fuel spills; use of chemicals for invasive species management; logging and mining activities; ingestion of plastics; entanglement in fish gill nets).

- **Marbled Murrelet:** Foraging adults and young may be adversely affected by uses of state-owned aquatic lands that deplete forage fish populations in marine areas; changes in marine forage abundance, distribution, and quality have been identified as a threat to marbled murrelet life stages and populations Subsection 3.9.2.3, Proposed Covered Species). Washington DNR's management of state-owned aquatic lands under Alternative 1 would not be expected to contribute to any of the other identified threats to marbled murrelet populations or designated critical habitat (i.e., loss of terrestrial nesting habitat; nest predation; post-fledging mortality from oil spills, entanglement in nets and derelict gear, avian predation, and collisions; increased distance between nesting and foraging habitats). It is unlikely that Washington DNR's management of state-owned aquatic lands under Alternative 1 would have any substantial impact on marbled murrelet population levels because Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and 3) many of the factors that influence the condition of key habitat components for marbled murrelets in the analysis area are outside of Washington DNR's control (Subsection 4.9.1, Effects Common to All Alternatives).

- **Western Snowy Plover:** Uses of state-owned aquatic lands in marine areas along the Washington coast may adversely affect all life stages of western snowy plovers (and designated critical habitat for western snowy plovers) by adversely affecting substrates and vegetation (Subsection 3.9.2.3, Proposed Covered Species). In addition, human activity in beach areas on or near state-owned aquatic lands may contribute to disturbance of breeding or wintering western snowy plovers. Washington DNR's management of state-owned aquatic lands under Alternative 1 would not be expected to contribute substantially to other identified threats to populations of this species (i.e., introduction of non-native beach grasses, predation).

- **Southern Resident Killer Whale:** Uses of state-owned aquatic lands in marine areas may adversely affect all life stages of Southern Resident killer whales (and designated critical habitat for Southern Resident killer whales) by contributing to adverse effects on their primary prey species, salmon (Subsection 3.9.2.3, Proposed Covered Species; Subsection 4.8.2.3, Effects on Proposed Covered Species—Fish). The quantity and quality of prey were identified as one of the factors that may be limiting recovery of Southern Resident killer whale populations. In addition, Southern Resident killer whales may be adversely affected by water and sediment quality impacts in marine areas; the bioaccumulation of toxic chemicals has also been identified as a threat to this species. Another factor that may be limiting recovery is disturbance from sound and vessels; boats that use docks and other overwater structures on state-owned aquatic lands may contribute to disturbance of Southern Resident killer whales. Washington DNR's management of state-owned aquatic lands under Alternative 1 would not be expected to contribute substantially to the other identified threat to this species (i.e., oil spills).

4.9.3 Alternative 2, Proposed HCP

Under Alternative 2, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives. In addition, and in contrast to Alternative 1, Washington DNR would require users of state-owned aquatic lands to implement measures in the HCP Operating Conservation Program that reduce the potential for adverse effects on ITP-covered species and their habitat. These measures would be required for all new and renewed authorizations statewide. The measures are described in Table 2-1 and the potential effects addressed by the measures are identified in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

When engaging in any of the HCP-covered activities (i.e., authorization and management of shellfish aquaculture, log booming and storage, and overwater structures), Washington DNR would consider the potential direct and indirect effects of the use on ITP-covered species and their habitats. Through this review process, some uses may not be allowed in some locations, or the footprints of some existing use authorizations may be modified to accommodate ITP-covered species or important habitat features. Such review and modification would not take place under Alternative 1.

In contrast to Washington DNR's management under Alternative 1, the central goals of the Aquatic Lands HCP Operating Conservation Program would include avoiding and minimizing adverse effects on ITP-covered species and their habitats, as well as improving and restoring habitat quality (Washington DNR 2013). Most proposed covered species are fish; actions that benefit fish would also benefit other species that use aquatic habitats on state-owned aquatic lands, including amphibians, turtles, birds, and marine mammals. The HCP Operating Conservation Program under Alternative 2 would be designed to achieve the goals of impact minimization and habitat restoration by avoiding and minimizing the potential for uses of state-owned aquatic lands to adversely affect the following habitat components:

- Erosional processes

- Water quality
- Physical habitat features (e.g., substrate composition, access to habitat) that support covered species
- Biological communities (e.g., native aquatic vegetation, prey resources) that support covered species

Also in contrast to Alternative 1, new and existing uses would be required to implement conservation measures under the terms and conditions of the lease or grant issued. Washington DNR would not allow new uses that alter the value and function of natural habitats, including substrates and aquatic vegetation, in areas with little to no development and with high to moderate importance to proposed covered species (Subsection 2.2.3.3, Additional Commitments by Washington DNR—Habitat Protection and Restoration). No such restrictions would be imposed under Alternative 1. In addition, and in contrast to Alternative 1, Washington DNR would implement new programs to address the effects of uses that are not authorized by Washington DNR, and would implement an adaptive management and monitoring program. All of these measures would likely directly or indirectly benefit wildlife species.

The overall effect of implementing the HCP Operating Conservation Program, including measures discussed above, on all state-owned aquatic lands under Alternative 2 would be a reduced risk, compared to Alternative 1, of adverse effects on wildlife species and habitats in the analysis area over the short term and the long term. This is because the amount of area subject to the effects identified in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis, would be expected to decrease over time, or at least to increase at a rate slower than under Alternative 1. As a result, habitat conditions for wildlife in the analysis area may improve compared to Alternative 1, with resultant improvements in distribution and abundance of species and habitat. This change would occur gradually over the course of 30 to 50 years, because ongoing effects associated with existing use authorizations would continue until those authorizations need to be renewed, or authorized structures undergo renovation or repair. In addition, as discussed in Subsection 2.2.3.1, Requirements for Authorized Uses of State-owned Aquatic Land, the schedule for ensuring individual use authorizations are in compliance with the terms and conditions specified in the Aquatic Lands HCP would be based on the life expectancy of the materials used for any structures associated with the use, allowing further delays in the implementation of measures that reduce the potential for adverse effects.

Although implementation of the HCP Operating Conservation Program would cease after 50 years, the potential benefits associated with HCP implementation would be expected to persist beyond the 50-

year analysis period for this EIS, and such benefits are expected to be greater than those under Alternative 1. This is because structures authorized or reauthorized during the term of the Aquatic Lands HCP would be sited and constructed in a manner aimed at avoiding or minimizing adverse effects. In addition, operational constraints already incorporated into existing use authorizations at the time of ITP expiration would remain in place until subsequent renewals.

Despite site-specific improvements on wildlife habitat, overall trends in the distribution, abundance, and condition of habitat (and subsequent listing status) for wildlife in and adjacent to, the analysis area would likely be similar to those anticipated under Alternative 1. This is because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and 3) many of the factors that influence the condition of key habitat components in the analysis area are outside of Washington DNR's control (Subsection 4.9.1, Effects Common to All Alternatives).

The following subsections provide additional analysis of the potential effects of Alternative 2 on wildlife species and habitats in marine areas and freshwater areas, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of uses that are not authorized by Washington DNR, and 3) the opportunities for monitoring and adaptive management in response to information gathered from field audits.

4.9.3.1 Effects in Marine Areas

Risk-reduction practices and programs of the HCP Operating Conservation Program under Alternative 2 would be directed at reducing the potential for uses of state-owned aquatic lands to adversely affect key habitat components for wildlife in marine areas, including the distribution of consolidated and unconsolidated substrates; the quality of water and sediment; the distribution and abundance of eelgrasses, kelp, and salt marsh plants; light conditions; noise levels; disturbance levels; and food/prey availability. Many of the effects described in Subsection 4.1.4, Pathways of Potential Effects Relevant to This Analysis—including damage to or changes in the distribution of substrate types, contamination of water and sediment, shading of aquatic vegetation, and increased levels of noise and visual disruption—have been identified as threats to the distribution, abundance, and condition of habitat for wildlife. As a result, implementation of the Aquatic Lands HCP under Alternative 2 could result in improvements, compared to Alternative 1, in the distribution and abundance of wildlife at specific locations in the analysis area.

Implementation of Risk-reduction Practices

As under Alternative 1, many of the potential adverse effects of authorized uses on wildlife species and habitats would be avoided, minimized, or mitigated to some extent under Alternative 2 through the application of rules and programs carried out by agencies with regulatory authority. As noted in Subsection 3.3.1, Existing and Relevant Management Measures and Regulatory Framework—Substrates and Erosional Processes, however, such regulatory review does not always result in the application of effective conservation measures. Under Alternative 2, these rules and programs would be supplemented by conservation measures and management practices implemented as part of the HCP Operating Conservation Program. By focusing on uses for which the primary means of reducing potential adverse effects on wildlife and other resources falls within Washington DNR's proprietary authority, the Aquatic Lands HCP would address effects that may not be addressed through other regulatory channels. This contrasts with Alternative 1, under which Washington DNR would not be required to include measures to protect wildlife species and habitats in its use authorizations for state-owned aquatic lands, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight.

As discussed in in the analyses of effects on substrates and erosional processes, water resources, and vegetation, implementation of risk-reduction practices would result in the following improvements in the condition of key habitat components for wildlife, compared to Alternative 1:

- Reduced amount of area subject to scour, compaction, and changes in the distribution of consolidated and unconsolidated substrates, due to implementation of measures that require in-water and overwater structures to be designed and located in a manner that minimizes the obstruction of currents and the alteration of sediment transport, as well as new restrictions on bank armoring (Subsection 4.3.3, Alternative 2, Proposed HCP—Substrates and Erosional Processes)

- Decreased levels of toxic chemicals that are delivered to the waters and sediments of Puget Sound and other marine waterbodies, due to requirements to develop plans for reducing the direct input of hazardous substances and nutrients from upland areas adjoining state-owned aquatic lands (however, as discussed in Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources, excess nutrients and fecal coliform bacteria, low levels of dissolved oxygen, and the presence of contaminants would continue to adversely affect wildlife in marine areas, as under Alternative 1, because most of the major of impacts on water and sediment quality in marine waters in the analysis area would be associated with actions in upland areas or otherwise not attributable to Washington DNR's management of state-owned aquatic lands)

- Recovery of eelgrass, kelp, and salt marsh vegetation in areas where the abundance of those vegetation types has declined in response to human activities, due to requirements avoid shading and physical damage of native aquatic vegetation (Subsection 4.6.3, Alternative 2, Proposed HCP—Vegetation)

Implementation of risk-reduction practices under Alternative 2 would also result in improved access to habitat and food/prey availability in marine areas, compared to Alternative 1. Examples of beneficial measures that would be implemented under Alternative 2 include the following:

- In-water construction, operation, or maintenance activities on state-owned aquatic lands would not be allowed during key wildlife life stages (e.g., reproduction, migration) of ITP-covered species or forage fish (which are important prey resources for numerous wildlife species, not just those proposed for ITP coverage) predicted or observed to occur at the use authorization site. This would reduce interference with access to habitat or disruption of habitat use due to noise, artificial night lighting and in-water activities with the potential to disturb fish (i.e., forage fish) that are important prey for many wildlife species, compared to Alternative 1.

- Artificial night lighting on and from overwater structures would be required to be minimized by focusing the light on the docks surface and using shades that minimize illumination of the surrounding environment. This also would reduce interference with access to habitat or disruption of habitat use due to artificial lighting, compared to Alternative 1.

- In-water activities with the potential to disturb forage fish spawning habitat or increase turbidity in spawning areas during spawning seasons would be required to maintain adequate vertical separation from the spawning habitat zone. This, in combination with measures protecting substrates, water and sediment quality, and vegetation, would reduce the extent to which uses of state-owned aquatic lands adversely affect food/prey availability, compared to Alternative 1.

By reducing the area over which uses of state-owned aquatic lands adversely affect the key habitat components identified above, implementation of the HCP Operating Conservation Program under Alternative 2 would reduce adverse effects on the abundance and distribution of wildlife in the analysis area, compared to Alternative 1.

Programs to Address Effects of Uses Not Authorized by Washington DNR

As under Alternative 1, land uses that have not been authorized by Washington DNR—specifically, derelict structures and private recreational docks—would continue to affect substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability under Alternative 2, resulting in adverse effects on the abundance, distribution, and condition of habitat for wildlife. In contrast to Alternative 1, however, all authorizations for uses of state-owned aquatic lands would require the removal of lessee- or grantee-owned structures when the authorization expires or the structures are no longer used as part of the authorized use. This requirement would remain in effect through the 50-year duration of the ITPs. As a result, the amount of area over which derelict structures adversely affect wildlife species and habitats by damaging substrates, interfering with sediment transport, degrading water and sediment quality, or affecting vegetation would likely be less than under Alternative 1. In areas where the adverse effects of these overwater structures decrease, the condition of habitat for wildlife would be expected to improve. In contrast to Alternative 1, the reductions in adverse effects would occur in combination with the reductions that would be expected to continue through the operation of the Creosote Removal Program (Subsection 2.2.1.2, Protection and Restoration of Aquatic Lands).

Additional benefits to wildlife species and habitats would be expected to result from Washington DNR's commitment to implementing programmatic measures for the management of private recreational docks, combined with Washington DNR's commitment to requiring all new private recreational docks on state-owned aquatic lands to comply with the conservation measures of the Aquatic Lands HCP. Under this HCP, owners of new private recreational docks would be required to implement measures designed to reduce the risk of adverse effects on substrates composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability. This requirement, in combination with shoreline master programs, the state HPA program, and regional general permitting requirements, would reduce the amount of area over which recreational docks adversely affect wildlife species and habitats, compared to Alternative 1.

Monitoring and Adaptive Management

Compared to Alternative 1, implementation of compliance and effectiveness monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring program would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner. No such program would be implemented under

Alternative 1 or through most review and/or permitting processes of Federal, state, and local agencies with regulatory authority.

Through the monitoring and adaptive management program, staff from Washington DNR would conduct field audits to assess whether the HCP Operating Conservation Program is being implemented as intended. Rather than being linked to lease renewal or rental rate re-valuation, as under Alternative 1, field audits would occur at a randomly selected sample of all use authorizations every year. In addition, and in contrast to Alternative 1, Washington DNR staff conducting effectiveness monitoring would identify and assess changes in the quantity and quality of habitat for ITP-covered fish and wildlife species. For example, staff would look for evidence of changes in slope profiles or sediment grain size distribution, impacts to water quality, or damage to vegetation (Washington DNR 2013).

In addition, information collected through effectiveness monitoring would be used to improve the efficacy of measures intended to avoid or minimize the adverse effects of authorized uses on erosional processes, water quality, and vegetation. Compared to Alternative 1, therefore, Washington DNR would have a greater likelihood of modifying management practices or readily identifying and correcting problems based on information gained from reviews of existing use authorizations, further reducing the risk of adverse effects on wildlife species and habitats.

4.9.3.2 Effects in Freshwater Areas

As under Alternative 1, the potential for Washington DNR's management of state-owned aquatic lands under Alternative 2 to result in adverse effects on wildlife species and habitats in freshwater areas would be similar to that potential in marine areas, with the exception of shellfish aquaculture. Implementation of the HCP Operating Conservation Program under Alternative 2 would reduce the risk that uses of state-owned aquatic lands would adversely affect aquatic key habitat components (i.e., substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, and disturbance levels) in freshwater areas (i.e., lakes, ponds, rivers, and streams), compared to Alternative 1. Reductions in the adverse effects of uses of state-owned aquatic lands in freshwater areas (i.e., lakes, ponds, rivers, and streams) could contribute to gradual improvements, compared to Alternative 1, in the abundance, distribution, and condition of habitat for wildlife in freshwater areas.

With the exception of proposed measures directed specifically at protecting forage fish (which occur in marine areas only), the measures implemented in marine areas would also be implemented in freshwater areas, so benefits of implementation would be realized in freshwater areas as well as in marine areas. These benefits would include 1) reduced interference with natural water movement processes that support sediment erosion and transport processes in lakes, rivers, and associated shorelines (Subsection 4.3.3, Alternative 2, Proposed HCP—Substrates and Erosional Processes); 2) reduced adverse effects related to the loss or diminished growth of aquatic vegetation, substrate damage, and the introduction and establishment of invasive species in lakes, or due to altered sediment dynamics in rivers (Subsection 4.6.3, Alternative 2, Proposed HCP—Vegetation); and 3) reduced adverse effects on wildlife access to habitat due to noise, artificial lighting, and human activity, including disturbances during key wildlife life stages. As under Alternative 1, the ongoing operations of Creosote Removal Program would not reduce the effects of derelict structures in freshwater areas under Alternative 2 because the program would continue to operate in marine areas only.

As in marine areas, implementation of the HCP Operating Conservation Program in freshwater areas under Alternative 2 would not likely result in any noticeable changes in nutrient inputs or other impacts to water or sediment quality (Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources). As a result, substrate damage, degradation of water and sediment quality (e.g., chemical contaminants), would continue to adversely affect wildlife species and habitats in freshwater areas, as under Alternative 1.

4.9.3.3 Effects on Proposed Covered Species

Based on the anticipated improvements in habitat conditions for wildlife species, discussed above, the abundance, distribution, and condition of habitat for all life stages of the proposed covered species in the analysis area would be expected to improve under Alternative 2, compared to Alternative 1 (Subsection 3.9.2.3, Proposed Covered Species). However, listing status and critical habitat designations are not expected to change for any proposed ITP-covered species under Alternative 2. Life stage improvements would be expected for several reasons:

- The conservation goals of the HCP Operating Conservation Program under Alternative 2 would include avoiding and minimizing adverse effects on ITP-covered species, as well as improving and restoring habitat quality.
- All of the species identified in Subsection 3.9.2.3, Proposed Covered Species, are proposed for ITP coverage, and all use habitats on state-owned aquatic lands.
- Washington DNR would not allow new uses that alter the value and function of natural habitats, including substrates and aquatic vegetation, in areas with little to no development and with high to moderate importance to proposed covered species. In addition, Washington DNR would commit to protecting natural habitat value and function in areas that have been identified as habitat for highly vulnerable species. Currently, Washington DNR has identified two species

(Oregon spotted frog and Pacific pond turtle) that meet the criteria for protection. Both species are associated with freshwater habitats (Subsection 3.9.2.3, Proposed Covered Species—Wildlife). Leasing would be contingent on the implementation of protections for these species' habitat in state-owned aquatic lands along the Black River and portions of Black Lake in Thurston and Lewis Counties, and along shorelands adjacent to Beacon Rock and the surrounding wetland complex along the Columbia River in Skamania County (Washington DNR 2013).

- Implementation of the HCP Operating Conservation Program (including requirements for new and existing users of state-owned aquatic lands to implement conservation measures, implementation of programs to address uses that are not authorized by Washington DNR, and implementation of implementation of effectiveness and compliance monitoring and adaptive monitoring) in marine and freshwater areas under Alternative 2 would reduce the potential, compared to Alternative 1, for uses of state-owned aquatic lands to adversely affect key habitat components important to these species (i.e., substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability).

The extent to which the abundance and distribution of proposed covered species would be expected to improve is unknown, but the difference from Alternative 1 would likely be small because in many cases the habitat impacts addressed through the HCP Operating Conservation Program have not been identified as primary threats to the species' survival. A brief assessment of potential effects on each species (or group of species that have similar associations with habitats on state-owned aquatic lands) under Alternative 2 follows (see Subsection 3.9.2.3, Proposed Covered Species, for baseline information supporting comparative analyses).

- **Columbia Spotted Frog, Oregon Spotted Frog, Northern Leopard Frog, Western Toad, and Pacific Pond Turtle:** Reduced impacts to substrates and vegetation in freshwater areas may result in improved survival of breeding and overwintering adults, eggs, larvae, and juveniles of these species. Reductions in water and sediment quality impacts in freshwater areas may also result in improved conditions for these species. Although such reductions would be slight (Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources), they would address an identified threat to frog and toad populations. In addition, new restrictions on bank armoring would reduce the extent to which uses of state-owned aquatic lands contribute to the loss of natural wetland and riverine disturbance processes that created early successional wetlands favorable to Oregon spotted frogs. For these reasons, the abundance, distribution, and condition of habitat for all life stages of Columbia spotted frog, Oregon spotted frog, northern leopard frog, western toad, and Pacific pond turtle in the analysis area would be expected to improve under Alternative 2, compared to Alternative 1 (Subsection 3.9.2.3, Proposed Covered Species). Implementation of the HCP Operating Conservation Program under Alternative 2 would not address other identified threats to these species (i.e., wetland habitat loss; dam construction, water development, and water level manipulations; grazing practices; mining; introductions of non-native species, fungal diseases, viruses, and parasites; beaver removal; use of fertilizers and pesticides for agriculture, mosquito control, and fish control; residential and commercial development; and removal of individuals from the wild).

- **Black Tern:** Reductions in water and sediment quality impacts in freshwater areas may result in improved conditions for nesting adults and young by reducing impacts to prey species. Although such reductions would be slight (Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources), they would address an identified threat to black tern populations. Also, timing restrictions on in-water construction, operation, or maintenance activities may reduce the potential for disturbance of breeding black terns, although these restrictions would not apply to the recreational activities (e.g., swimming, fishing, birding, boating) that have been identified as a source of adverse effects on breeding populations of black terns. For these reasons, the abundance, distribution, and condition of habitat for nesting adult and young black terns in the analysis area would be expected to improve under Alternative 2, compared to Alternative 1. Implementation of the HCP Operating Conservation Program under Alternative 2 would not address other identified threats to this species (i.e., drainage of wetlands that provide breeding and migration habitat; introductions of invasive plant species; nest predation; forage fish declines in wintering areas, which are not in the analysis area; and collisions with power lines, towers, and wind turbines during migration).

- **Common Loon and Harlequin Duck:** Reductions in impacts to lake shoreline habitats and stream habitats may result in improved reproductive success of common loons and harlequin ducks by reducing adverse effects on nesting adults and young. Reduced impacts to substrates and vegetation in coastal marine areas may result in improved conditions for wintering and molting birds of both species. In addition, reductions in water and sediment quality impacts in both marine and freshwater areas may result in improved conditions for all life stages by reducing impacts to prey species and by reducing impacts due to ingestion and bioaccumulation of contaminants. Although such reductions would be slight (Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources), they would address an identified threat to populations of both species. Also, timing restrictions on in-water construction, operation, or maintenance activities may reduce the potential for disturbance of breeding, wintering, and molting common loons and harlequin ducks, although these restrictions would not apply to most boat traffic and recreational activities (e.g., fishing, rafting) that have been identified as sources of adverse effects on both species. For these reasons, the abundance, distribution, and condition of habitat for breeding, wintering, and molting common loons and harlequin ducks in the analysis area would be expected to improve under Alternative 2, compared to Alternative 1. Implementation of the HCP Operating Conservation Program under Alternative 2 would not address other identified threats to these species (i.e., water level fluctuations in lakes and reservoirs; oil and fuel spills; use of chemicals for invasive species management; logging and mining activities; ingestion of plastics; entanglement in fish gill nets).

- **Marbled Murrelet:** Reductions in impacts to forage fish populations may result in reduce the extent to which changes in marine forage abundance, distribution, and quality would be a threat to marbled murrelet populations in Washington State. For this reason, the abundance, distribution, and condition of habitat for foraging marbled murrelets in the analysis area would be expected to improve under Alternative 2, compared to Alternative 1. Implementation of the HCP Operating Conservation Program under Alternative 2 would not address other identified threats to this species or critical habitat (i.e., loss of terrestrial nesting habitat; nest predation; post-fledging mortality from oil spills, entanglement in nets and derelict gear, avian predation, and collisions; increased distance between nesting and foraging habitats). As under Alternative 1, it is unlikely that Washington DNR's management of state-owned aquatic lands under Alternative 2 would have any substantial impact on marbled murrelet population levels because Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, 2) in many areas the State owns a small proportion of aquatic lands, and 3) many of the factors that influence the condition of key habitat components for marbled murrelets in the analysis area are outside of Washington DNR's control (Subsection 4.9.1, Effects Common to All Alternatives).

- **Western Snowy Plover:** Reduced impacts to substrates and vegetation in marine areas along the Washington coast may result in improved conditions for all life stages of western snowy plovers and their designated critical habitat. Also, timing restrictions on in-water construction, operation, or maintenance activities may reduce the potential for disturbance of breeding or wintering western snowy plovers by human activity in beach areas. For these reasons, the abundance, distribution, and condition of habitat for western snowy plovers in the analysis area would be expected to improve under Alternative 2, compared to Alternative 1. Implementation of the HCP Operating Conservation Program under Alternative 2 would not address other identified threats to this species or critical habitat (i.e., introduction of non-native beach grasses, predation).

- **Southern Resident Killer Whale:** Reduced impacts to substrates, water quality, and vegetation in marine areas may result in improved conditions for all life stages of Southern Resident killer whales and their designated critical habitat by reducing adverse effects on their primary prey species, salmon. The resulting improvements would address one of the factors that may be limiting recovery of Southern Resident killer whale populations. In addition, reductions in water and sediment quality impacts in marine areas may result in improved conditions for all life stages of Southern Resident killer whales by reducing impacts associated with the bioaccumulation of toxic chemicals. Although such reductions would be slight (Subsection 4.4.3, Alternative 2, Proposed HCP—Water Resources), they would address an identified threat to this species. Lastly, timing restrictions on in-water construction, operation, or maintenance activities may reduce the potential for disturbance of Southern Resident killer whales from sound and vessels. For these reasons, the abundance, distribution, and condition of habitat for Southern Resident killer whales in the analysis area would be expected to improve under Alternative 2, compared to Alternative 1. Implementation of the HCP Operating Conservation Program under Alternative 2 would not address the other identified major threats to this species (i.e., oil spills).

4.9.4 Alternative 3, HCP for Marine Areas Only

Under Alternative 3, Washington DNR would implement the same HCP Operating Conservation Program as under Alternative 2, but in marine areas only. Freshwater areas would be managed as under Alternative 1. As a result, the effects on the abundance, distribution, and condition of habitat for wildlife would be less under Alternative 3 than under Alternative 1 in marine areas on state-owned aquatic lands and in the analysis area overall, but the same in freshwater areas. In both the short term and the long term, the potential benefits of HCP implementation anticipated under Alternative 3 would, therefore, occur over a greater area than under Alternative 1 but less than under Alternative 2.

Based on decreases in adverse effects associated with uses of state-owned aquatic lands on substrate composition, water and sediment quality, aquatic vegetation conditions, light conditions, noise levels, disturbance levels, and food/prey availability, the abundance, distribution, and condition of habitat for wildlife in marine areas would be expected to show marginal improvements, compared to Alternative 1. Washington DNR's management under Alternative 3, as under Alternative 1, would not be expected to contribute to improvements in the condition of habitat for wildlife in freshwater areas.

Under Alternative 3, ongoing uses of state-owned aquatic lands would affect all life stages of proposed covered species that use habitats in freshwater areas as described under Alternative 1 (Subsection 3.9.2.3, Proposed Covered Species). These include the all life stages of life stages of Columbia spotted frog, Oregon spotted frog, northern leopard frog, western toad, and Pacific pond turtle; and nesting adult and young black terns, common loons, and harlequin ducks. Species and life stages that use habitats in marine areas would benefit from the implementation of the HCP Operating Conservation Program as described under Alternative 2. These life stages include wintering and molting common loons and harlequin ducks; foraging adult and juvenile marbled murrelets; all life stages of western snowy plovers; and all life stages of Southern Resident killer whales. As under Alternatives 1 and 2, there would be no change in listing status or critical habitat designations under Alternative 3.

4.10 Recreation

This subsection describes the direct and indirect effects of the proposed alternatives on recreational activities associated with uses of state-owned aquatic lands, comparing the effects of the action alternatives (Alternative 2 and Alternative 3) to those of Alternative 1, No-action, over the 50-year analysis period for this EIS. Analyses in this subsection compare how Washington DNR's management of state-owned aquatic lands under the proposed alternatives would, in combination with the requirements identified in Subsection 3.10.1, Existing and Relevant Management Measures and Regulatory Framework, be expected to affect the public use of and access to state-owned aquatic lands for recreational activities as described in Subsection 3.10.2, Existing Conditions. The potential effects of Alternative 2 and Alternative 3 are discussed relative to the current management program represented by Alternative 1, No-action.

4.10.1 Effects Common to All Alternatives

Under any of the proposed alternatives, the types of recreational activities that depend on the use of and access to state-owned aquatic lands would be expected to continue as described in Subsection 3.10.2, Existing Conditions, through the short term and the long term. In addition, many boaters would continue to rely on boat moorage and launch facilities on state-owned aquatic lands. Nearly all use authorizations for overwater structures associated with recreational activities would likely continue to be in marine areas.

The effects on direct public use of and access to state-owned aquatic lands, and on the numbers of overwater structures used for recreation would not differ under the alternatives. This is because none of the alternatives includes any restrictions on the direct public use of or access to state-owned aquatic lands or on the number of overwater structures (e.g., boat ramps, launches, docks, marinas, rafts, floats, and mooring buoys) that may be placed on state-owned aquatic lands. Similarly, the occurrence of recreational activities involving the direct use of state-owned aquatic lands (e.g., walking, swimming, recreational harvest of shellfish and edible seaweeds, sightseeing, beachcombing, birdwatching, waterfowl hunting, photography, beach fishing) would not be expected to differ substantially under the proposed alternatives because Washington DNR would not impose any restrictions on public access.

Because none of the alternatives includes any provisions concerning the number of authorizations for boat moorage or launch facilities (i.e., boat ramps, launches, hoists, docks, piers, marinas, rafts, floats, mooring buoys) on state-owned aquatic lands, the number of such authorizations would not be expected to differ among the alternatives. Similarly, because boat storage opportunities (as indicated by the number of authorizations for overwater structures and other boat moorage sites on state-owned aquatic lands) would not be expected to differ among the alternatives, neither would the number of boats registered in Washington State.

Under all alternatives, participants in motorized boating and sailing would continue to depend on overwater structures (e.g., docks, piers, marinas, rafts, floats, mooring buoys) for boat moorage, and overwater structures that are attached to shore (e.g., docks, piers, marinas, boat ramps, launches, hoists) would continue to be readily accessible from land. For overwater structures that are not attached to shore (e.g., rafts, floats, mooring buoys), the means of access between moored vessels and shore would continue to take the form of small, motorized vessels or human-powered means (e.g., swimming, rowboats, kayaks).

As noted in Subsection 4.1.3.1, Analysis Assumptions, any potential changes in the regulatory environment cannot be predicted. Thus, it is assumed for the analyses in this EIS that the effects of existing rules and regulations that are not part of the proposed alternatives would remain the same under all alternatives. As such, the regulatory requirements identified in Subsection 3.10.1, Existing and Relevant Management Measures and Regulatory Framework, would apply equally under all alternatives. For example, under all three alternatives WAC 332-52-155 would continue to limit the amount of time that vessels may be moored or anchored on state-owned aquatic lands. Under all three alternatives, proposals to construct new overwater structures or to reconfigure existing overwater structures would continue to be subject to regulatory review and/or permitting at the Federal, state, and local levels, commonly resulting in the implementation of measures that affect the placement of such structures relative to shore (Subsection 3.10.1, Existing and Relevant Management Measures and Regulatory Framework).

4.10.2 Alternative 1, No-action

Under Alternative 1, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives, and Subsection 2.2.2, Alternative 1, No-action. Measures designed to minimize potential effects on the species and habitats addressed elsewhere in this document would not be incorporated into use authorization agreements (Subsection 2.2.2, Alternative 1, No-action). Washington DNR would not be required to implement protective measures or management practices that would require the relocation or reconfiguration of existing overwater structures that are not attached to shore and that are used for recreation. Existing rafts, floats, mooring buoys would likely remain at their current locations.

Overall, existing access to and direct use of aquatic lands in Washington State would be expected to continue under Alternative 1 as described in Subsection 3.10.2, Existing Conditions. Washington DNR would not be required to impose restrictions on the placement of overwater structures close to shore, beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight. For persons who engage in motorized boating or sailing and who use human-powered means (e.g., swimming, rowboats, kayaks) to travel between shore and vessels moored at overwater structures not attached to shore (e.g., rafts, floats, mooring buoys), the amount of effort needed for such access would not change from current conditions.

4.10.3 Alternative 2, Proposed HCP

Under Alternative 2, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives. In addition, and in contrast to Alternative 1, Washington DNR would require authorized users of state-owned aquatic lands to implement measures in the HCP Operating Conservation Program that reduce the potential for adverse effects on covered species and their habitat to the maximum extent practicable . These measures would be required for all new and renewed authorizations statewide, including for existing overwater structures that are not attached to shore.

In contrast to Alternative 1, Washington DNR's implementation of the HCP Operating Conservation Program under Alternative 2 would likely require some existing overwater structures that are not attached to shore to be moved further away from shore, because the HCP would include provisions that would require certain overwater structures currently located close to shore to be moved further away from shore. For example, existing floats and mooring buoys where boats ground out at low water would have to be moved to deeper water when scheduled maintenance occurs (Table 2-1). Some existing rafts could also be moved. This would only occur, however, in cases where owners of rafts determine that relocation would be more practicable than renovating the structures to increase light penetration. If structures that are not attached to shore (e.g., rafts, floats, mooring buoys) are moved farther from shore, some persons who engage in motorized boating or sailing and use human-powered means (e.g., swimming, rowboats, kayaks) to travel between moored vessels and shore may be less likely to use these boat moorage facilities on state-owned aquatic lands because of increased physical challenges to travel longer distances, compared to Alternative 1.

Overall, based on proposed changes in the placement of existing overwater structures that are not attached to shore under the HCP Operating Conservation Program, Alternative 2 may result in a marginal reduction, compared to Alternative 1, in access to recreational activities associated with aquatic lands in Washington State. Some of the measures implemented by Washington DNR under Alternative 2 may limit the number of boat moorage facilities located close to shore. However, the measures would apply only to certain types of structures under certain conditions (e.g., mooring buoys or floats where boats ground out at low water, rafts that are moved rather than renovated).

4.10.4 Alternative 3, HCP for Marine Areas Only

Under Alternative 3, Washington DNR would implement the same HCP Operating Conservation Program as under Alternative 2, but in marine areas only. Freshwater areas would be managed as under Alternative 1. As a result, potential effects on recreational activities associated with state-owned aquatic lands would be greater under Alternative 3 than under Alternative 1 in marine areas, but the same in freshwater areas. As under Alternative 2, therefore, some existing rafts, floats, and mooring buoys may be moved farther from shore. As a result, some persons who engage in motorized boating or sailing and use human-powered means (e.g., swimming, rowboats, kayaks) to travel between moored vessels and shore may be less likely to use these boat moorage facilities on state-owned aquatic lands because of increased physical challenges to travel longer distances, compared to Alternative 1. These effects would occur in marine areas only, however.

Even though implementation of the HCP Operating Conservation Program would be limited to marine areas, the effects of Alternative 3 on recreational activities associated with uses of state-owned aquatic lands would likely be similar in magnitude to the effects under Alternative 2. This is because existing authorizations for overwater structures that are not attached to shore are predominantly in marine areas. As noted in Subsection 4.10.1, Effects Common to All Alternatives, nearly all existing use authorizations for overwater structures associated with recreational activities would likely continue to be in marine areas.

4.11 Visual Resources

This subsection describes the direct and indirect effects of the proposed alternatives on 1) the visual and aesthetic quality in the analysis area, including impacts to high-quality scenery, and 2) the visual and aesthetic experiences of viewers such as residents and users of parks and other public spaces. The analyses compare the effects of the action alternatives (Alternative 2 and Alternative 3) to those of Alternative 1, No-action, over the 50-year analysis period for this EIS. Visual or scenic impacts are defined as the change in aesthetic value resulting from the introduction of human modifications (e.g., structures and materials) to the landscape. Many uses of state-owned aquatic lands result in the introduction of structures (e.g., roads, bridges, breakwaters, log handling facilities, and overwater structures, including derelict structures) and other materials (e.g., trash, supporting infrastructure for shellfish aquaculture) into the surrounding environment.

The overall aesthetic character of the analysis area is largely influenced by activities outside of Washington DNR's authority. The effects analyses address only those activities under Washington DNR's authority that may impact the aesthetic character and public values within the analysis area. Washington DNR's management of state-owned aquatic lands under any of the alternatives would have the potential to influence the placement of some overwater structures in the visible landscape, and to reduce the introduction of materials associated with shellfish aquaculture. Therefore, the analyses are limited to a review of the alternatives' potential to influence the placement of overwater structures and the introduction of materials associated with shellfish aquaculture.

Analyses in this subsection compare how Washington DNR's management of state-owned aquatic lands under the proposed alternatives would, in combination with the requirements identified in Subsection 3.11.1, Existing and Relevant Management Measures and Regulatory Framework, be expected to affect the quality of visual resources described in Subsection 3.11.2, Existing Conditions. The potential effects of Alternative 2 and Alternative 3 are discussed relative to the current management program represented by Alternative 1, No-action. The primary features of the proposed alternatives that may influence the potential for visual impacts of uses of state-owned aquatic lands in the analysis area are the implementation of practices and programs that would influence the placement of certain structures (e.g., roads, bridges, breakwaters, log handling facilities, and overwater structures, including derelict structures; Subsection 3.11.2, Existing Conditions) or reduce the introduction of other materials (e.g., trash, supporting infrastructure for shellfish aquaculture; Subsection 3.11.2, Existing Conditions). The effects analysis for each alternative considers each of these features in turn.

4.11.1 Effects Common to All Alternatives

None of the alternatives includes any requirements specifically directed at reducing the visual impacts of uses of state-owned aquatic lands. Under all three alternatives, Washington DNR would continue to work toward minimizing the visual impacts of various uses of state-owned aquatic land, to maintain the visual and aesthetic quality of an area, and to support visual and aesthetic experiences. Some uses would continue to result in visual modifications that would be unacceptable to nearby residents and to users of parks and other public spaces (Subsection 3.11.2, Existing Conditions). Shellfish aquaculture would likely continue to be a major source of visual impacts for many viewers. The amount of state-owned aquatic lands devoted to shellfish aquaculture, and the use of tubes and nets, would not be expected to differ under the alternatives; therefore, concerns about the effect of aquaculture on the scenic characteristics of beaches would continue. Other visual impacts that would not differ under the alternatives are those related to roads, bridges, and breakwaters. The alternatives do not have different provisions concerning the location of those features on state-owned aquatic lands, so the visual and aesthetic impact of their placement would be the same under any alternative.

As noted in Subsection 4.1.3.1, Analysis Assumptions, any potential changes in the regulatory environment cannot be predicted. Thus it is assumed for the analyses in this EIS that the effects of existing rules and regulations that are not part of the proposed alternatives would remain the same under all alternatives. As such, the regulatory requirements identified in Subsection 3.11.1, Existing and Relevant Management Measures and Regulatory Framework, would apply equally under all alternatives. The visual impacts associated with uses of state-owned aquatic lands would be expected to continue through the short term and the long term under any of the proposed alternatives.

4.11.2 Alternative 1, No-action

Under Alternative 1, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives, and Subsection 2.2.2, Alternative 1, No-action. Measures designed to minimize potential effects on the species and habitats addressed elsewhere in this document would not be incorporated into use authorization agreements (Subsection 2.2.2, Alternative 1, No-action). In both urban and natural areas as well as marine and freshwater areas, the visual impacts associated with uses of state-owned aquatic lands (i.e., structures and other materials) would not be expected to change and would be minimized to varying degrees by the implementation of requirements identified in Subsection 3.11.1, Existing and Relevant Management Measures and Regulatory Framework.

For example, per the Corps' nationwide permit for commercial shellfish aquaculture, operators of shellfish aquaculture facilities would not be allowed to store aquaculture gear (e.g., supporting infrastructure or tubes and nets used to protect geoducks and other shellfish from predators) below the line of mean higher high water for more than 7 consecutive days. This provision would continue to limit the amount of time that gear is both visible and susceptible to being be picked up by an incoming tide and deposited on other beaches nearby. However, if any unsecured tubes or nets are among the gear being stored, they could be picked up by an incoming tide over the course of 7 days. In addition to storing aquaculture gear below the line of mean higher high water for no more than 7 consecutive days, operators of shellfish aquaculture facilities would continue to be required to prevent predator exclusion nets (but not necessarily tubes) from breaking free and littering surrounding areas.

Washington DNR would not be required to implement protective measures or management practices that could reduce the visual impact of shellfish aquaculture in marine areas, nor would Washington DNR require certain uses to occur farther offshore, where they may be less visible to viewers close to shore. The presence of derelict structures would continue to be a visual impact in many areas, although the abandonment of structures would likely continue to be a comparatively rare occurrence because a high percentage of structures would be subject to a contract-based requirements for removal, per WAC 332-30-122(4) (Subsection 3.2.3.2, Uses Not Authorized by Washington DNR).

Overall, the impact on high-quality scenery within the analysis area would not change from existing conditions. Under Alternative 1, Washington DNR would continue to have a limited effect on visual resources in the analysis area because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, and 2) in many areas the State owns a small proportion of aquatic lands. Areas of high-quality scenery would remain an important resource to Washington residents and visitors and continued to be viewed as an integral part of the Washington experience.

4.11.3 Alternative 2, Proposed HCP

Under Alternative 2, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives. In addition, and in contrast to Alternative 1, Washington DNR would require authorized users of state-owned aquatic lands to implement measures in the HCP Operating Conservation Program that reduce the potential for adverse effects on covered species and their habitat. These measures would be required for all new and renewed authorizations statewide. Many measures would be applied in areas close to shore, where the water is shallow enough to support the growth of native aquatic vegetation that would be the subject of the Aquatic Lands HCP's protective measures. In both urban and natural areas, therefore, implementation of these measures may provide incidental protection of visual resources by reducing both the number of structures close to shore and the introduction of other materials, compared to Alternative 1.

As discussed in Subsection 4.2, Land Ownership and Use, it is possible that some uses in both marine and freshwater areas may occur farther offshore under Alternative 2 than under Alternative 1, potentially reducing their visibility to viewers close to shore. Affected uses may include log handling facilities and several types of overwater structures, many of which are commonly considered to represent substantial modifications to the visual environment, particularly in areas of high-quality scenery. For viewers close to shore, therefore, the implementation of the HCP Operating Conservation Program under Alternative 2 could translate into a reduction in the visual impact of structures, compared to Alternative 1. Any changes in the visual quality of areas close to shore would occur gradually, as existing uses are considered for reauthorization over the 50-year term of the Aquatic Lands HCP.

Also in contrast to Alternative 1, all authorizations for uses of state-owned aquatic lands would require the removal of lessee- or grantee-owned structures when the authorization expires or the structures are no longer used as part of the authorized use. This requirement would remain in effect through the 50-year duration of the ITPs. As a result, the amount of area over which derelict structures create visual impacts would likely be less than under Alternative 1.

Some of the measures that would be required at shellfish aquaculture facilities in marine areas may reduce the visual impacts of trash and infrastructure in such areas, compared to Alternative 1. For example, the requirement to remove all excess or unsecured materials (e.g., supporting infrastructure or tubes and nets used to protect geoducks and other shellfish from predators) and trash from state-owned aquatic lands before the next incoming tide (Table 2-1) may reduce the visual impact of materials associated with shellfish aquaculture, compared to Alternative 1. Although the Corps' nationwide permit for commercial shellfish aquaculture does not include any directly comparable provisions, this HCP requirement would likely result in more timely removal of excess or unsecured materials than under Alternative 1. Under Alternative 1, the only relevant provision under the nationwide permit is one that prohibits storing aquaculture gear below the line of mean higher high water for more than 7 consecutive days. The HCP measure that would be implemented under Alternative 2 addresses only excess or unsecured materials, which could mean that aquaculture gear that is neither excess nor unsecured would be allowed to remain on state-owned aquatic lands beyond the time of the next incoming tide. Nevertheless, it is likely that the HCP measure would reduce the likelihood that materials associated with shellfish aquaculture may be picked up by an incoming tide and deposited on other beaches nearby, compared to Alternative 1. Also, the HCP requirement for both tubes and nets to be installed securely could reduce the visual impacts associated with gear breaking free and littering surrounding areas compared to Alternative 1 (under which only nets would typically be addressed through the Corps' nationwide permit for commercial shellfish aquaculture).

Overall, the impact on high-quality scenery within the analysis area would marginally improve in comparison to Alternative 1. Although Washington DNR would implement measures for aquaculture operations that may incidentally limit impacts on visual resources, Washington DNR would continue to have a limited effect on visual resources in the analysis area because 1) Washington DNR, as the proprietary manager of state-owned aquatic lands, does not have regulatory oversight of uses of those aquatic lands, and 2) in many areas the State owns a small proportion of aquatic lands. Unlike Alternative 1, areas of high-quality scenery may benefit from HCP measures, and would remain an important resource to Washington residents and visitors and continued to be viewed as an integral part of the Washington experience.

4.11.4 Alternative 3, HCP for Marine Areas Only

Under Alternative 3, Washington DNR would implement the same HCP Operating Conservation Program as under Alternative 2, but in marine areas only. Freshwater areas would be managed as under Alternative 1. As a result, the potential for uses of state-owned aquatic lands to create visual impacts would be less under Alternative 3 than under Alternative 1 in marine areas, but the same in freshwater areas.

Even though implementation of the HCP Operating Conservation Program would be limited to marine areas, the effects of Alternative 3 on visual resources would likely be similar in magnitude to the effects anticipated under Alternative 2, including impacts to high-quality scenery in the analysis area. First, all shellfish aquaculture would continue to occur in marine areas only, so the potential for Alternative 3 to reduce the visual impact of shellfish aquaculture (e.g., trash, infrastructure, tubes, nets), would be identical to that of Alternative 2. With regard to the distance of log handling facilities and overwater structures (including derelict structures) from shore, the locations of future use authorizations cannot be predicted, so a reliable estimate of the proportion of future uses that would be addressed under Alternative 3 is not possible. However, as discussed in Subsection 4.1.3, Analysis

Approach, it is likely that a substantial proportion of future use authorizations would occur within marine areas and would, therefore, be addressed by the HCP Operating Conservation Program under Alternative 3.

4.12 Cultural Resources

This subsection describes the direct and indirect effects of the proposed alternatives on cultural resources in the analysis area, including sites, buildings, objects, structures (including derelict structures), districts, Indian trust resources (plants, animals, materials, usual and accustomed grounds and stations), and traditional cultural properties. The analyses compare the effects of the action alternatives (Alternative 2 and Alternative 3) to those of Alternative 1, No-action, over the 50-year analysis period for this EIS. The potential effects of Alternative 2 and Alternative 3 are discussed relative to the current management program represented by Alternative 1, No-action.

Analyses in this subsection compare how Washington DNR's management of state-owned aquatic lands under the proposed alternatives would, in combination with the requirements identified in Subsection 3.12.1, Existing and Relevant Management Measures and Regulatory Framework, be expected to affect the risk of adverse effects on cultural resources as described in Subsection 3.12.2, Existing Conditions. Analyses focus on the potential for ground-disturbing activities on state-owned aquatic lands to affect unrecorded cultural resources because sites and resources that have been found and recorded would continue to receive protection under the various Federal, state, and local review and permitting processes identified in Subsection 3.12.1, Existing and Relevant Management Measures and Regulatory Framework. Based on the level of protection currently provided to recorded cultural resources, unrecorded cultural resources would be at risk of adverse effects from Washington DNR's management of state-owned aquatic lands under any of the alternatives. The primary features of the proposed alternatives that may influence the potential for uses of state-owned aquatic lands to adversely affect cultural resources that have not been found and recorded are the implementation of practices and programs that would influence the amount and distribution of ground-disturbing activities on state-owned aquatic lands.

4.12.1 Effects Common to All Alternatives

The proposed alternatives would not be expected to differ in their direct effects on identified and recorded cultural resources in the analysis area. This is because the Federal, state, and local review and permitting processes described in Subsection 3.12.1, Existing and Relevant Management Measures and Regulatory Framework, would apply equally under any of the alternatives to proposed projects that involve effects on recorded cultural resources. Most proposed projects with the potential to affect cultural resources involve ground-disturbing activities and are, therefore, subject to regulatory review and permitting at the Federal, state, and local levels (e.g., the Rivers and Harbors Act, Clean Water Act, and/or the State Hydraulic Code). These review and permitting processes would result in the implementation of measures designed to avoid, minimize, and mitigate for adverse effects on cultural resources. In addition, cultural resources staff from the Washington DNR Aquatics Program would continue to review all Joint Aquatic Resources Project Applications, collect field information, and conduct preliminary cultural resources evaluations for all aquatic use authorizations on a site-by-site basis, identifying and recording many (but not necessarily all) cultural resources that have not already been found and recorded by the State Department of Archaeology and Historic Preservation and determining how effects would be mitigated. As noted in Subsection 4.1.3.1, Analysis Assumptions, any potential changes in the regulatory environment cannot be predicted. It is, therefore, assumed for the analyses in this EIS that the effects of existing rules and regulations that are not part of the proposed alternatives would remain the same under all alternatives. As such, the regulatory requirements identified in Subsection 3.12.1, Existing and Relevant Management Measures and Regulatory Framework, would apply equally under all alternatives. Beyond these existing review and permitting processes, Washington DNR would not implement, through the Aquatics Division, any requirements specifically aimed at protecting cultural resources.

Cultural resources occurring in the form of sites, buildings, objects, structures (including derelict structures), districts, Indian trust resources (plants, animals, materials, usual and accustomed grounds and stations), and traditional cultural properties, would continue to provide evidence of, or reflect, significant activities and would continue to play an active part in the current and traditional cultural practices of ethnic groups in Washington State under any of the alternatives. In addition, many cultural resources would continue to be located on or near aquatic lands in marine and freshwater areas with some cultural resources remaining prevalent in marine areas rather than in freshwater areas (Subsection 3.12.2, Existing Conditions) (Appendix A, Additional Information to Support the Analyses of Cultural Resources and Environmental Justice).

None of the alternatives includes any requirements specifically directed at reducing the potential for uses of state-owned aquatic lands to adversely affect unrecorded cultural resources. Therefore, ground-disturbing activities associated with some uses would continue to affect unrecorded cultural resources through the short term and the long term by damaging or destroying sites or modifying features that are important to historical or cultural context; changing settings through the introduction of noise or the construction of new elements that are out of character with the existing setting; disturbing shorelines or submerged resources during construction, demolition, and maintenance activities; and degrading or reducing the availability of or access to culturally important plant and animal resources. Under any of the alternatives, the potential for such effects could be reduced through the implementation of measures intended to avoid or minimize the disturbance of substrates and aquatic vegetation along shorelines and in shallow water, where many cultural resources are likely to occur. Examples of some such measures are provided in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

4.12.2 Alternative 1, No-action

Under Alternative 1, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives, and Subsection 2.2.2, Alternative 1, No-action. Washington DNR would not be required to include measures in its use authorizations for state-owned aquatic lands that may avoid and minimize adverse effects on cultural resources by avoiding or minimizing disturbance of substrates and aquatic vegetation along shorelines and in shallow water, where many cultural resources are likely to occur (i.e., providing incidental protection to cultural resources). As a result, the potential benefits of implementing such practices and programs would not be realized under Alternative 1, and uses of state-owned aquatic lands in marine areas and freshwater areas would continue to affect unrecorded cultural resources, including sites, buildings, objects, structures (including derelict structures), districts, Indian trust resources (plants, animals, materials, usual and accustomed grounds and stations), and traditional cultural properties, as well as shell middens (which are most commonly found in marine areas), as described in Subsection 3.12.2, Existing Conditions. Because Washington DNR would not make a 50-year commitment to require all users of state-owned aquatic lands to remove derelict structures, the risk of adverse effects on cultural resources due to substrate disturbance and the use of heavy equipment (or loss of derelict structures that are unrecorded cultural resources) during structure removal would not differ from existing conditions. The abandonment of structures and subsequent adverse effects of derelict structures on cultural resources would likely continue to be a comparatively rare occurrence because a high percentage of structures would be subject to a contract-based requirements for removal, per WAC 332-30-122(4) (Subsection 3.2.3.2, Uses Not Authorized by Washington DNR).

Overall, the amount and distribution of ground-disturbing activities on state-owned aquatic lands would not change from existing conditions. Many uses of state-owned aquatic would continue to occur in areas that are close to shore—i.e., along shorelines and in shallow waters, where many cultural resources are likely to occur—and would, therefore, have the potential to adversely affect unrecorded cultural resources. Washington DNR's management of state-owned aquatic lands under Alternative 1 would not be expected to contribute to any changes in the number or distribution of unrecorded cultural resources that are damaged, destroyed, or degraded in the short term or the long term. Because most proposed projects with the potential to affect cultural resources (recorded or unrecorded) are subject to regulatory review and permitting at the Federal, state, and local levels, these effects would likely be low both on state-owned aquatic lands and in the overall analysis area.

4.12.3 Alternative 2, Proposed HCP

Under Alternative 2, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives. In addition, and in contrast to Alternative 1, Washington DNR would require authorized users of state-owned aquatic lands to implement measures in the HCP Operating Conservation Program that reduce the potential for adverse effects on covered species and their habitat. These measures would be required for all new and renewed authorizations statewide. The measures are described in Table 2-1 and the potential effects addressed by the measures are identified in Subsection 4.1.4, Pathways of Potential Effects of Uses Relevant to This Analysis.

Compared to Alternative 1, Alternative 2 would result in a reduction in the amount and distribution of ground-disturbing activities that affect unrecorded cultural resources on state-owned aquatic lands. As discussed in Subsection 4.3, Substrates and Erosional Process, and Subsection 4.6, Vegetation, many elements of the HCP Operating Conservation Program implemented under Alternative 2 would be aimed at avoiding or minimizing the disturbance of substrate and aquatic vegetation along shorelines and in shallow water, where many cultural resources are likely to occur. Because many cultural resources, including sites, buildings, objects, structures (including derelict structures), districts, Indian trust resources (plants, animals, materials, usual and accustomed grounds and stations), and traditional cultural properties, as well as shell middens (which are most commonly found in marine areas) are located in such areas (Subsection 3.12.2, Existing Conditions), measures that reduce disturbance in these areas would be expected to reduce the potential for adverse effects on unrecorded cultural resources in marine and freshwater areas, compared to Alternative 1. In other words, the HCP Operating Conservation Program would afford incidental protection to cultural resources at the sites where the measures are implemented. Also, issuance of ITPs under Alternative 2 would be considered a Federal undertaking under section 106 of the National Historic Preservation Act and would, therefore, require the review of potential effects on cultural resources. A similar Federal undertaking is not anticipated under Alternative 1; therefore, no Federal section 106 review would likely occur.

For all of the reasons identified above, through the implementation of measures that would avoid or minimize ground-disturbing activities along shorelines and in shallow water Washington DNR's management of state-owned aquatic lands under Alternative 2 would be expected to contribute to a reduction, compared to Alternative 1, in the number and distribution of unrecorded cultural resources that are damaged, destroyed, or degraded in the short term and the long term. However, because most proposed projects with the potential to affect cultural resources (recorded or unrecorded) are subject to regulatory review and permitting at the Federal, state, and local levels (Subsection 3.12.1, Existing and Relevant Management Measures and Regulatory Framework), these effects would likely be low both on state-owned aquatic lands and in the overall analysis area.

The implementation of the HCP Operating Conservation Program under Alternative 2 would not eliminate all potential effects on cultural resources. For example, the requirement to remove derelict structures (many of which occur along shorelines and in shallow water, where many cultural resources are likely to occur) could result in an increased risk of adverse effects on cultural resources, compared to Alternative 1, due to substrate disturbance and the use of heavy equipment during structure removal. Moreover, some derelict structures may be unrecorded cultural resources. Because Alternative 1 does not include a 50-year commitment to the continued removal of derelict structures, the potential for structure removal projects to adversely affect cultural resources would be higher under Alternative 2 than under Alternative 1. The potential for such projects to adversely affect cultural resources would be minimized by Washington DNR's collection of field information and preliminary cultural resources evaluations for all aquatic use authorizations on a site-by-site basis on state-owned aquatic lands (Subsection 3.12.1, Existing and Relevant Management Measures and Regulatory Framework).

4.12.4 Alternative 3, HCP for Marine Areas Only

Under Alternative 3, Washington DNR would implement the same HCP Operating Conservation Program as under Alternative 2, but in marine areas only. Uses in freshwater areas would be managed as under Alternative 1. As a result, the potential for uses of state-owned aquatic lands to adversely affect cultural resources would be less under Alternative 3 than under Alternative 1 in marine areas, but the same in freshwater areas. In both the short term and the long term, the potential benefits of HCP implementation anticipated under Alternative 3 would, therefore, occur over a greater area than under Alternative 1 but less than under Alternative 2. As under Alternative 2, issuance of ITPs under Alternative 3 would be considered a Federal undertaking under section 106 of the National Historic Preservation Act and would, therefore, require the review of potential effects on cultural resources. This would result in a cultural resource benefit in marine areas where Alternative 3 applies since some cultural resources are more prevalent in marine areas than in freshwater areas (e.g., shell middens) (Subsection 3.12.2, Existing Conditions).

Based on decreases in the amount and distribution of ground-disturbing activities along shorelines and in shallow water, the number and distribution of unrecorded cultural resources that are damaged, destroyed, or degraded would be reduced compared to Alternative 1, in the short term and the long term. These differences would apply equally to nearly all unrecorded cultural sites, buildings, objects, structures, districts, Indian trust resources (plants, animals, materials, usual and accustomed grounds and stations), and traditional cultural properties; because shell middens are most commonly found in marine areas, however, the level of incidental protection afforded by Alternative 3 would be very similar to that of Alternative 2. As under Alternative 1 and Alternative 2, because most proposed projects with the potential to affect cultural resources are subject to other regulatory review and permitting processes, the effects of Washington DNR's management of state-owned aquatic lands on cultural resources would be relatively small. Since Alternative 3 includes implementation of the Aquatic Lands HCP in marine areas only, the relatively small benefits of HCP implementation described under Alternative 2 would be even less under Alternative 3 as compared to Alternative 1 both on state-owned aquatic lands and in the analysis area overall.

4.13 Social and Economic Environment

This subsection describes the direct and indirect effects of the three alternatives on costs associated with using state-owned aquatic lands; revenue, jobs, and income within industries supported by uses of state-owned aquatic lands; and the social and economic value of ecosystem services provided by state-owned aquatic lands. The analyses compare the effects of the action alternatives (Alternative 2 and Alternative 3) to those of Alternative 1, No-action, over the 50-year analysis period for this EIS. The potential effects of Alternative 2 and Alternative 3 are discussed relative to the current management program represented by Alternative 1, No-action.

Analyses in this subsection compare how Washington DNR's management of state-owned aquatic lands under the proposed alternatives would, in combination with the requirements identified in Subsection 3.13.1, Existing and Relevant Management Measures and Regulatory Framework, be expected to affect the social and economic environment as described in Subsection 3.13.2, Existing Conditions, including the four industries (aquaculture, forestry, recreation, and commerce) that are supported by uses of state-owned aquatic lands. Analyses are based on the potential for restrictions on, and requirements for, uses of state-owned aquatic lands to result in increased costs for holders of existing use authorizations in those four industries; cost increases under any of the alternatives could lead to decreases in revenue, jobs, and/or income for users of state-owned aquatic lands in the affected industries. Analyses in this subsection also address the potential effects of the alternatives on the social and economic value of ecosystem services provided by state-owned aquatic lands, based on the effects of the alternatives on the physical and biological resources and processes that support the provision of those services.

Because the types and locations of future use authorizations cannot be accurately predicted, the types and locations of existing use authorizations are assumed to be representative of the types and locations of future use authorizations for this analysis. The primary features of the proposed alternatives that may influence the costs associated with uses of state-owned aquatic lands (and, thus, potentially to influence revenue, jobs, and income in the affected industries) are the implementation of practices and programs that may increase the costs associated with using state-owned aquatic lands.

The effects of the alternatives on revenue, jobs, and income cannot be evaluated at the local or regional scale, because such an analysis would depend on site-specific information about operations and infrastructure; such information is not available, nor is it practicable to obtain. Depending on site-specific circumstances, the costs could be negligible at one site and relatively large at another. For example, the cost of modifying or moving facilities to ensure that boats and other floating objects (e.g., logs) do not damage substrates would vary depending on the gradient of the shoreline at any particular site. Also, the flexibility and financial ability of individual holders of use authorizations to pay for any potential cost increases under the alternatives would vary. The list of current authorized users of state-owned aquatic lands includes large corporations, private landowners, local governments, and collectives, each of which would have different resources available to implement the measures.

Implementing the HCP Operating Conservation Program under either of the action alternatives could necessitate changes in investments in infrastructure, operations, or both for some holders of existing use authorizations. Quantifying all of the costs associated with such changes would require more information about facilities and operations at existing use authorizations than is currently available. Instead, discussions in this subsection are based on readily available cost estimates (e.g., construction costs of various components of overwater structures). Where such estimates are not available, the analyses consist of qualitative discussions of potential impacts.

4.13.1 Effects Common to All Alternatives

Under all of the alternatives, applicants for new and reconfigured structures and uses would be required to comply with all Federal, state, and local review and permitting processes described in Subsection 3.13.1, Existing and Relevant Management Measures and Regulatory Framework. These processes may require the use of materials and installation or operations that result in increased costs to the applicant. The requirements and associated costs for these processes would be the same among alternatives, regardless of the proposed HCP under Alternative 2 and Alternative 3.

The general patterns of distribution and abundance of existing authorized uses of state-owned aquatic lands by county would not be expected to differ among the alternatives. As discussed in Subsection 3.13.2, Existing Conditions, information about the distribution and abundance of authorized uses represents a snapshot of conditions at a single moment in time and does not necessarily represent the actual number of use authorizations that may be affected under any of the alternatives. However, because none of the alternatives includes any restrictions on the counties in which use authorizations would be allowed, the general patterns indicated in Table 3-5 would not be expected to differ among the alternatives.

Because none of the alternatives would limit the kinds of uses that may be authorized on state-owned aquatic lands, the proportion of uses that generate revenue, jobs, and income in the aquaculture, forestry, recreation, and commerce industries would not differ under the alternatives. Similarly, authorizations for uses that are less are strongly associated with potential changes in the operation of Washington DNR's Aquatics Division (e.g., easements for roads and utilities, land encumbrances for administrative purposes, and use authorizations for outfalls, floating homes, and areas used for fill and for contaminated sediment mitigation) would continue to comprise approximately one-half of use authorizations. Lastly, the schedules for expiration of existing use authorizations would not differ among the alternatives, because those schedules were set in the past, at the time the use authorizations were established. It is also assumed for this analysis that, under any of the alternatives, holders of use authorizations for state-owned aquatic lands would renew existing authorizations when the need arises. As noted in Subsection 4.1.3, Analysis Approach, any decisions to use privately owned or other lands would depend on individual economic and logistical considerations and cannot be predicted with any certainty.

Trends in revenue, jobs, and income associated with the aquaculture industry would not be expected to differ among the alternatives, because those trends would largely continue to be the product of economic factors beyond Washington DNR's control. Similarly, based on the large number of jobs in portions of the forestry industry that are not supported by uses of state-owned aquatic lands (e.g., manufacturing, logging, silviculture), log booming and storage would likely continue to support a small proportion of the jobs in that industry. In the recreation industry, the extent to which uses of state-owned aquatic lands contribute to revenue, jobs, and income associated with recreational boating and marinas in Washington State would continue to be unknown. Lastly, differences in the management of state-owned aquatic lands under the action alternatives would not be expected to have any influence on a considerable proportion of the economic activity in the commerce industry because much of the economic activity in that industry would continue to be associated with ports in major cities; most of these are either located on private property or operated under Port Management Agreements with Washington DNR, and would not, therefore, be subject to the HCP Operating Conservation Program under the action alternatives. Notably, in contrast to those aspects of the social and economic environment that are common among alternatives, the potential effects on ecosystem services are expected to differ among alternatives as described below.

4.13.2 Alternative 1, No-action

Under Alternative 1, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives, and Subsection 2.2.2, Alternative 1, No-action. Measures designed to minimize potential effects on the species and habitats addressed elsewhere in this document would not be incorporated into use authorization agreements in all counties statewide (Subsection 2.2.2, Alternative 1, No-action). Because Washington DNR would not be required to include measures in its use authorizations for state-owned aquatic lands that place restrictions on the location and/or operation of shellfish aquaculture facilities, log handling facilities, and overwater structures (beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight), operators of these uses would not see a reduction in the amount of aquatic areas available for private use and would not face costs to comply with such measures over the 50-year analysis period for this EIS. As a result, there would be no potential for such increased costs to affect revenue, jobs, or income in the aquaculture, forestry, recreation, or commerce industries, because Washington DNR would not be required to impose measures with the potential to increase costs for holders of use authorizations for shellfish aquaculture or finfish aquaculture facilities (aquaculture industry); log handling facilities (forestry industry); private docks, mooring buoys, public or private marinas or yacht clubs, and non-water-dependent structures, such as nearshore buildings (e.g., restaurants, retail outlets, office buildings) (recreation industry); or navigational buoys, commercial mooring buoys, and commercial marinas (commerce industry). As noted in Subsection 4.13.1, Effects Common to All Alternatives, measures such as those identified in Subsection 3.13.2.1, Costs Associated with Uses of State-owned Aquatic Lands, would continue to be implemented through Federal, state, and local regulatory review and permitting processes.

In addition, ongoing effects on physical and biological resources would continue to diminish the ability of state-owned aquatic lands in the analysis area to provide ecosystem services. Uses of state-owned aquatic lands would be expected to continue to contribute to adverse effects on natural ecosystem functions that have values both in economic terms and in terms of human well-being.

4.13.3 Alternative 2, Proposed HCP

Under Alternative 2, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives. In addition, and in contrast to Alternative 1, Washington DNR would require authorized users of state-owned aquatic lands to implement measures in the HCP Operating Conservation Program that reduce the potential for adverse effects on covered species and their habitat. These measures would be required for all new and renewed authorizations in all counties statewide. Implementation of measures that place restrictions on the location and/or operation of shellfish aquaculture facilities, log handling facilities, and overwater structures would reduce the amount of aquatic areas available for private use (Subsection 4.2.3.2, Uses of Aquatic Lands in Washington State—Alternative 2). In addition, implementation of these measures may result in increased costs for industries and individuals associated with these uses compared to Alternative 1, summarized below. As a result, Alternative 2 would have a greater potential than Alternative 1 to adversely affect revenue, jobs, or income in the aquaculture, forestry, recreation, or commerce industries.

4.13.3.1 Effects on Revenue, Jobs, and Income

Holders of existing authorizations for uses that support revenue, jobs, and income in the aquaculture, forestry, recreation, and commercial industries could face increased materials and installation costs, compared to Alternative 1, to comply with the requirements of the HCP Operating Conservation Program under Alternative 2. The primary materials-related costs under Alternative 2 would be driven by the implementation of measures that address construction materials. Under the Aquatic Lands HCP, existing and new docks, piers, and floats in sensitive areas would be required to include provisions for light transmission. As discussed in Subsection 3.13.2.1, Costs Associated with Uses of State-owned Aquatic Lands, available information suggests that surface materials at existing docks and marinas could be replaced with HCP-compliant materials with no resultant increase in annualized material and installation costs, compared to Alternative 1. The ability of individual users to afford the higher upfront costs of HCP-compliant materials would vary with their financial situation, however. Most small businesses and individuals would be less likely than larger companies to have sufficient cash reserves to pay the upfront material and installation costs associated with replacement decking. In some cases, the upfront materials and installation costs as well as operational costs of complying with the requirements of the Aquatic Lands HCP could be prohibitive for some existing or prospective users of state-owned aquatic lands.

In addition to materials and installation costs, holders of existing authorizations for uses that support revenue, jobs, and income in the aquaculture, forestry, recreation, and commercial industries would face increased operational costs, compared to Alternative 1, to comply with the requirements of the HCP Operating Conservation Program under Alternative 2. The sources of these costs would differ among the industries and are addressed separately in the subsections below.

For existing use authorizations associated with all industries, plans to implement the HCP Operating Conservation Program under Alternative 2 would be developed at the time of renewal. The time frame for compliance would be defined in individual authorization agreements and based on the life expectancy of materials used for any structures associated with the use (Subsection 2.2.3.1, Requirements for Authorized Uses of State-owned Aquatic Land). For example, if the operator of an existing overwater structure installed new treated wood decking in 2010 and the use authorization is scheduled for renewal in 2015, the renewed authorization would likely include a provision for replacing the existing deck in 2023, based on the estimated service life (13 years) of treated wood. For each use authorization, therefore, any economic impacts associated with HCP compliance would occur over the term of the renewed use authorization. At a broader scale, the collective effects of HCP compliance under Alternative 2 would be spread out over a period of several decades, based on the number of use authorizations that are due for renewal in any given year. Of the 1,890 use authorizations that were active in 2011 and that were identified as having a high likelihood of being affected by the Aquatic Lands HCP, approximately 50 percent would be due for renewal by 2021. By 2034, that number would be 90 percent (Figure 3-1). Based on the long time frame over which the HCP Operating Conservation Program would be implemented (i.e., as individual use authorizations are considered for renewal), the potential for substantial adverse effects on revenue, jobs, or income in the aquaculture, forestry, recreation, or commerce industries would likely be low.

Aquaculture

In the aquaculture industry, implementation of the HCP Operating Conservation Program at shellfish aquaculture or finfish aquaculture facilities under Alternative 2 could result in effects on shellfish aquaculture operations, beyond the effects potentially associated with the Corps' nationwide permit for commercial shellfish aquaculture in Washington State (3.13.1, Existing and Relevant Management Measures and Regulatory Framework). Under the Aquatic Lands HCP, protective buffers for native aquatic vegetation may be as great as 25 feet, compared to 10 feet under the nationwide permit. In addition, the buffers would apply not only to eelgrass and kelp but also to other native species of aquatic vegetation. The Corps' nationwide permit does not address finfish aquaculture, so protective buffers at finfish aquaculture facilities under Alternative 2 would constitute new restrictions, compared to Alternative 1.

Restrictions on operations in such buffers could reduce operational efficiency, compared to Alternative 1, by reducing the amount of area available for aquaculture operations and/or reducing the density of culture systems. Quantifying the potential economic impact of implementing the HCP Operating Conservation Program under Alternative 2 would require data about operations and infrastructure at individual use authorization sites. Such data are not available. An alternative source of information could be a study of the economic effects of the Corps' nationwide permit for commercial shellfish aquaculture. No such study has been conducted, however (P. Sanguinetti, pers. comm., U.S. Army Corps of Engineers, September 2, 2011). Some potential costs of implementing the HCP Operating Conservation Program may be offset through funding from the Natural Resources Conservation Service (Subsection 3.13.2.1, Costs Associated with Uses of State-owned Aquatic Lands).

In addition, the amount of state revenue from rents and fees paid for aquaculture use authorizations could be reduced. As noted in Subsection 3.13.2.2, Revenue, Jobs, and Income, rents and fees for aquaculture use authorizations are established through negotiation. It is possible that holders of use authorizations for shellfish aquaculture could successfully negotiate reduced lease rates, based on costs incurred from complying with the requirements of the HCP Operating Conservation Program. If this occurred, state revenues generated by rents and fees for aquaculture use authorizations could decrease, compared to Alternative 1. The amount of any such decrease would depend on individual negotiation processes and cannot be predicted.

The effects of Alternative 2 on revenue, jobs, and income associated with aquaculture on state-owned aquatic lands would be concentrated in counties along the Pacific Coast or Hood Canal. Of 138 existing use authorizations for aquaculture and commercial fisheries, 72 (52 percent) are in Pacific and Grays Harbor counties, and another 28 (20 percent) are in Mason and Jefferson counties (Table 3-5).

Forestry

In the forestry industry, the implementation of measures directed at reducing wood and bark accumulation may necessitate modifications to bark removal and disposal procedures, resulting in increased operational costs under Alternative 2, compared to Alternative 1, due to reduced opportunities to conduct bark removal and disposal at central locations (Subsection 3.13.2.1, Costs Associated with Uses of State-owned Aquatic Lands). Labor effort to comply with other measures directed at reducing the accumulation of wood and bark at log handling facilities (e.g., maintaining containment booms, using cranes instead of rolling logs off of barges, disposing of loose bark and wood debris at upland locations) may also result in increased operational costs, compared to Alternative 1. In addition, some operators of log handling facilities may be required to modify or move facilities to ensure that boats and other floating objects (e.g., logs) do not damage substrates. Infrastructure modifications to comply with this requirement could result increased construction costs, compared to Alternative 1. In situations where facilities must be located where damage will not occur, operators could incur increased operational costs due to reduced operational efficiency, for example if a suitable location is a substantial distance from other parts of the operation. In the interviews conducted for this analysis, industry experts expressed concern that some operators may find that the new measures under Alternative 2 render transportation of logs on waterways economically infeasible, in which case they may choose to ship logs via truck (Groves 2011). It is not possible to state with certainty whether such a change would occur or, if it did, to what extent.

The effects of Alternative 2 on revenue, jobs, and income in the forestry industry would most likely affect the counties where state-owned aquatic lands are used for log booming, rafting, or storage. These counties are all located in western Washington, along Hood Canal, Puget Sound, the lower Columbia River, and Grays Harbor (Table 3-5).

Recreation

In the recreation industry, the implementation of measures directed at reducing impacts of overwater structures on sensitive resources may result in increased operational costs under Alternative 2, compared to Alternative 1 (Subsection 3.13.2.1, Costs Associated with Uses of State-owned Aquatic Lands). Examples of increased operational costs that may affect revenue, jobs, or income in the recreation industry include those associated with modifying facilities (e.g., outfalls, boathouses, covered moorage facilities, or covered watercraft lifts that impact or occur in predicted habitat for ITP-covered species and their prey, as well as mooring buoys where vessels strike bottom) or moving them out of areas with sensitive resources. In addition, some holders of use authorizations for mooring buoys would incur increased costs, compared to Alternative 1, stemming from Aquatic Lands HCP requirements to use embedded anchors and midline floats to prevent anchors or lines from dragging. No information is available to evaluate the potential costs of modifying or moving facilities.

Based on the distribution of existing use authorizations on state-owned aquatic lands, the effects of Alternative 2 on revenue, jobs, and income in the recreation industry would occur in all parts of the state (Table 3-5), but primarily western Washington. Nearly 90 percent of the leases in the industry are in counties that border or include marine areas in Puget Sound and Hood Canal.

Commerce

In the commerce industry, as in the recreation industry, the implementation of measures directed at reducing impacts of overwater structures on sensitive resources may result in increased operational costs under Alternative 2, compared to Alternative 1 (Subsection 3.13.2.1, Costs Associated with Uses of State-owned Aquatic Lands). Examples of increased operational costs that may affect revenue, jobs, or income in the commerce industry include those associated with modifying facilities at commercial marinas (e.g., outfalls, covered moorage facilities, or covered watercraft lifts that impact or occur in predicted habitat for ITP-covered species and their prey, as well as mooring buoys where vessels strike bottom) or moving them out of areas with sensitive resources. No information is available to evaluate the potential costs of modifying or moving such facilities.

Based on the distribution of existing use authorizations on state-owned aquatic lands, the effects of Alternative 2 on revenue, jobs, and income in the commerce industry would be concentrated in 14 counties that border or include marine areas in Puget Sound or the Pacific Ocean. Of 233 existing commerce-related leases of state-owned aquatic lands statewide, 212 (91 percent) are in those counties (Table 3-5).

4.13.3.2 Effects on Ecosystem Services

As discussed in Subsection 3.13.2.3, Ecosystem Services, natural ecosystem functions have values that can be described both in economic terms and in terms of human well-being. To the extent that implementation of the HCP Operating Conservation Program would contribute to improved ecosystem function in the marine and fresh waters of Washington State (see Subsection 4.3, Substrates and Erosional Processes; Subsection 4.4, Water Resources; Subsection 4.6, Vegetation; Subsection 4.7, Wetlands and Riparian Areas; Subsection 4.8, Fish, Aquatic Invertebrates, and Associated Habitats; and Subsection 4.9, Wildlife and Wildlife Habitat), Alternative 2 would be expected to provide both economic and human use benefits, compared to Alternative 1. A quantification of these benefits and a comparison to potential costs would be beyond the scope of this analysis. It is possible, however, that ecosystem service benefits under Alternative 2 could offset some of the costs associated with HCP implementation, at least at a regional scale. In other words, some individual users of state-owned aquatic lands could face increased costs, while the benefits would be realized by businesses and residents statewide.

4.13.4 Alternative 3, HCP for Marine Areas Only

Under Alternative 3, Washington DNR would implement the same HCP Operating Conservation Program as under Alternative 2, but in marine areas only. Freshwater areas would be managed as under Alternative 1. As a result, similar to Alternative 2, Alternative 3 would reduce the amount of aquatic areas available for private use, compared to Alternative 1, and would have a greater potential to lead to decreases in revenue, jobs, or income in the aquaculture, forestry, recreation, or commerce industries. In contrast to Alternative 2, however, the potential adverse effects would be limited to counties that include or border marine areas. Because there would be no changes in the rules that govern uses of state-owned aquatic lands in freshwater areas, there would be no reduction in the amount of aquatic areas available for private use and no potential for increased costs to lead to decreases in revenue, jobs, or income in the aquaculture, forestry, recreation, or commerce industries in counties that include freshwater areas only. As a result, the potential for adverse effects would be limited to counties in western Washington that border or include Puget Sound, the Pacific Ocean, or the lower Columbia River because these counties include marine areas where the Aquatic Lands HCP would be implemented under Alternative 3.

Nevertheless, a substantial proportion of the existing authorized uses of state-owned aquatic lands would be affected by implementation of the Aquatic Lands HCP under Alternative 3. Based on information presented in Table 3-5, approximately 90 percent of the existing use authorizations in the aquaculture, forestry, recreation, or commerce industries occur in counties that border or include marine areas. Although the proportion of these authorizations that occur in freshwater areas is unknown, it is likely that most of them are in marine areas and would, therefore, face the potential for increased costs due to implementation of the Aquatic Lands HCP under Alternative 3.

Lastly, as under Alternative 2, improved ecosystem function under Alternative 3 would be expected to provide both economic and human well-being benefits, compared to Alternative 1. Although the improvements to ecosystem function would occur in marine areas only, the benefits to human well-being could accrue to individuals living throughout the state. In freshwater areas, uses of state-owned aquatic lands would be expected to continue to contribute to adverse effects on natural ecosystem functions that have values both in economic terms and in terms of human well-being, as under Alternative 1.

4.14 Environmental Justice

This subsection addresses the potential for Washington DNR's management of state-owned aquatic lands under the three proposed alternatives to result in disproportionately high and adverse human health or environmental effects on low-income or minority populations in the analysis area. Analyses in this subsection focus only on potential adverse environmental effects on the social and economic environment because neither of the action alternatives has the potential for adverse effects on human health (i.e., air quality and water quality). This is because Washington DNR's management of state-owned aquatic lands under any of the alternatives would not be expected to influence air quality in the analysis area, and both action alternatives would include the implementation of measures aimed at reducing the potential for adverse effects on water quality (Subsection 4.4, Water Resources). The analyses compare the effects of the action alternatives (Alternative 2 and Alternative 3) to those of Alternative 1, No-action, over the 50-year analysis period for this EIS. The potential effects of Alternative 2 and Alternative 3 are discussed relative to the current management program represented by Alternative 1, No-action.

For this analysis, the potential for adverse effects is indicated by the potential for authorized users of state-owned aquatic lands to incur increased costs, compared to Alternative 1, for compliance with the Aquatic Lands HCP under the action alternatives, based on the results of the analysis in Subsection 4.13, Social and Economic Environment. As with the analyses in that subsection, discussions in this subsection focus on existing use authorizations (Table 3-5) because, under any of the alternatives, applicants for new authorizations would likely be required through various Federal, state, and local review and permitting processes (Subsection 3.14.1, Existing and Relevant Management Measures and Regulatory Framework) to implement measures with the potential to result in increased costs. Holders of existing use authorizations would be required to implement such measures only under the action alternatives. The potential for disproportionately high and adverse effects on low-income or minority populations is indicated by the occurrence of any such cost increases in counties with elevated environmental justice concerns. The occurrence of use authorizations for state-owned aquatic lands within these counties serves as an indicator of potential risk of disproportionate effects on these populations.

As discussed in Subsection 4.13, Social and Economic Environment, the potential exists for Washington DNR's management of the Aquatics Division under any of the alternatives to result in increased costs for some holders of use authorizations of state-owned aquatic lands (e.g., shellfish aquaculture facilities, log handling facilities, mooring buoys). If implementation of the HCP Operating

Conservation Program under the action alternatives were to adversely affect economic activity associated with these types of uses in any of the counties with elevated environmental justice concerns, then the potential would exist for low-income and/or minority populations to be affected disproportionately. The occurrence of existing use authorizations for state-owned aquatic lands within these counties (Table 3-5) serves as an indicator of potential risk of disproportionate effects on these populations.

Any actual adverse effects on low-income and minority populations under any of the alternatives cannot be determined, nor is it possible to determine whether any such increases would constitute disproportionately high and adverse effects. This is because the alternatives address the management of a large and diverse body of lands (i.e., state-owned aquatic lands throughout Washington State) over a long period of time (50 years), and the location and types of use authorizations that may be pursued in the future cannot be predicted, nor can the measures that may be required for any specific use authorizations (Subsection 4.1.3, Analysis Approach). It would be speculative, therefore, to identify the location, nature, or severity of specific environmental justice concerns.

As noted in Subsection 4.13, Social and Economic Environment, operational costs and materials costs associated with use authorizations would be expected to increase under Alternative 2 and Alternative 3 due to implementation of risk reduction measures. With respect to materials costs, all costs associated with use authorizations would be similar among alternatives with the exception of potential increases in upfront materials and installation costs associated with replacement decking on existing structures under Alternative 2 and Alternative 3. Therefore, the effects analyses in the following subsections focus on potential disproportional adverse effects of these potential increases in upfront materials and installation costs as well as in operational costs associated with implementation of risk-reduction practices.

4.14.1 Effects Common to All Alternatives

Environmental justice would continue to be addressed as described in Subsection 3.14.1, Existing and Relevant Management Measures and Regulatory Framework, under all three proposed alternatives. This is because the Federal, state, and local review and permitting processes for proposed projects (either new uses or changes to existing uses) would apply equally under any of the alternatives. Additionally, any proposed projects involving Federal funding, approval, or permitting would be required to identify and address any disproportionately high and adverse effects on low-income and minority populations. Further, under any of the alternatives, applicants for new and reconfigured structures and uses would be required through Federal, state, and local review and permitting processes to implement measures that may result in increased costs, with potential adverse economic effects on low-income and minority populations (see Subsection 3.14.2, Existing Conditions).

Under any of the alternatives, as under existing conditions, management of state-owned aquatic lands would not affect how and whether state and local review/permitting processes address potential disproportionately high and adverse effects on low-income and minority populations. Washington DNR would continue to not implement any requirements specifically aimed at addressing or protecting low-income and minority populations. In addition, under any of the alternatives, Washington DNR's management of state-owned aquatic lands would continue to have the potential to contribute to adverse effects on low-income and minority populations by contributing to increased costs for uses such as shellfish aquaculture facilities, log handling facilities, and mooring buoys.

4.14.2 Alternative 1, No-action

Under Alternative 1, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives, and Subsection 2.2.2, Alternative 1, No-action. Measures designed to minimize potential effects on the species and habitats addressed elsewhere in this document would not be incorporated into use authorization agreements in all counties statewide (Subsection 2.2.2, Alternative 1, No-action). Because Washington DNR would not be required to impose measures (beyond the measures implemented through the permitting and review processes of agencies with regulatory oversight) that place restrictions on the location and/or operation of certain uses (e.g., shellfish aquaculture facilities, log handling facilities, mooring buoys), operators of these uses would not face operational costs to comply with such measures over the 50-year analysis period for this EIS. As a result, there would be no potential for such increased upfront materials and installation costs or operational costs to result in adverse economic effects in counties with elevated environmental justice concerns.

4.14.3 Alternative 2, Proposed HCP

Under Alternative 2, Washington DNR's program for managing state-owned aquatic lands in marine and freshwater areas would continue as described in Subsection 2.2.1, Elements Common to All Alternatives. In addition, and in contrast to Alternative 1, Washington DNR would require authorized users of state-owned aquatic lands to implement measures in the HCP Operating Conservation Program that reduce the potential for adverse effects on species and their habitat. These measures would be required for all new and renewed authorizations in all counties statewide.

As described in Subsection 4.13, Social and Economic Environment, the upfront materials and installation costs associated with replacement decking to comply with the requirements of the Aquatic

Lands HCP could increase for some users under Alternative 2 and compared to Alternative 1. These increased costs may even be prohibitive for some existing or prospective users of state-owned aquatic lands. In addition, implementation of measures that place restrictions on the location and/or operation of certain uses (e.g., shellfish aquaculture facilities, log handling facilities, mooring buoys) may result in increased costs for operators of these uses compared to Alternative 1, as described in Subsection 4.13, Social and Economic Environment, and summarized below. As a result, Alternative 2 would have a greater potential than Alternative 1 for adverse economic effects in counties with elevated environmental justice concerns.

Compliance with the requirements of the HCP Operating Conservation Program may cause users of state-owned aquatic lands to incur increased operational costs, compared to Alternative 1. As discussed in Subsection 4.13, Social and Economic Environment, the effects of Alternative 2 on jobs and incomes from authorized uses (e.g., shellfish aquaculture), as well as costs for other authorized uses (e.g., log handling facilities, mooring buoys), cannot be evaluated at the local or regional scale.

As described in Subsection 4.13, Social and Economic Environment, examples of potential sources of increased operational costs include the following:

- Restrictions on shellfish operations in protective buffers for native aquatic vegetation could reduce operational efficiency at shellfish aquaculture facilities, compared to Alternative 1, by reducing the amount of area available for shellfish culture and/or reducing the density of culture systems.
- The implementation of measures directed at reducing wood and bark accumulation may necessitate modifications to bark removal and disposal procedures, resulting in increased operational costs at log handling facilities, compared to Alternative 1.
- Requirements to use embedded anchors and midline floats at mooring buoys, to prevent anchors or lines from dragging, may result in increased operational costs for operators of recreational facilities, compared to Alternative 1.

Based on the distribution of use authorizations among counties with elevated environmental justice concerns, the potential exists for increased upfront materials and installation costs and operational costs to disproportionately adversely affect low-income populations in some counties. Of particular concern are Pacific County, Grays Harbor County, and Mason County. All three counties have elevated rates of poverty and unemployment, compared to the statewide values, and Pacific County has a low socioeconomic resiliency rating (Table 3-6). In addition, all three counties have substantial numbers of aquaculture leases on state-owned aquatic lands (Table 3-5), and shellfish aquaculture has been identified as a major economic activity in both Pacific and Grays Harbor counties (Subsection 3.13.2.2, Revenue, Jobs, and Income—Aquaculture). Although the effects on individual leaseholders cannot be estimated, the potential exists for increased operating expenses at aquaculture facilities to have an adverse effect on low-income populations in those three counties.

Twenty-two other counties have elevated proportions of low-income populations (Table 3-6). Nine of these (Adams, Columbia, Ferry, Garfield, Klickitat, Lincoln, Stevens, Walla Walla, and Whitman) do not have any use authorizations for uses with a high likelihood of being affected by implementation of the Aquatic Lands HCP (Table 3-5) and would, therefore, be extremely unlikely to experience any adverse effects on low-income populations resulting from HCP Operating Conservation Program implementation under Alternative 2. Of the remaining counties, four (Clark, Cowlitz, Mason, and Whatcom) have substantial numbers of use authorizations for state-owned aquatic lands, primarily for recreational and commercial facilities (Table 3-5). The potential exists for increased operational costs associated with HCP Operating Conservation Program compliance to be borne disproportionately by low-income populations in those four counties. Based on the low number of use authorizations in the remaining nine counties (Franklin, Grant, Kittitas, Lewis, Okanogan, Pend Oreille, Skamania, Wahkiakum, and Yakima; with 3 to 13 authorizations apiece), the potential for HCP Operating Conservation Program implementation under Alternative 2 to result in disproportionately high and adverse effects on low-income populations would be low.

Four counties (Adams, Franklin, Grant, and Yakima) are identified as counties with elevated environmental justice concerns based on relatively high proportions of minority populations (Table 3-6). Of these, Adams County has no active authorizations for uses of state-owned aquatic lands, and the other three counties have three authorizations apiece (Table 3-5). In light of the small number of use authorizations in these counties, the potential for HCP Operating Conservation Program implementation under Alternative 2 to result in adverse effects that would be felt disproportionately by minority populations would be extremely low.

Overall, under Alternative 2, the potential for adverse effects on minority or low-income populations in the analysis area may increase in comparison to Alternative 1. However, whether this increase would affect minority or low-income populations disproportionately cannot be determined.

4.14.4 Alternative 3, HCP for Marine Areas Only

Under Alternative 3, Washington DNR would implement the same HCP Operating Conservation Program as under Alternative 2, but in marine areas only. Freshwater areas would be managed as under

Alternative 1. As a result, similar to Alternative 2, Alternative 3 would have a greater potential, compared to Alternative 1, for disproportionately high and adverse effects on low-income and minority populations; in contrast to Alternative 2, potential adverse effects would be limited to counties bordering marine areas. Because there would be no changes in the rules that govern uses of state-owned aquatic lands in freshwater areas, there would be no potential for disproportionate effects on low-income or minority populations in counties that include freshwater areas only. As a result, the potential for adverse effects would be limited to counties in western Washington that border or include Puget Sound, the Pacific Ocean, or the lower Columbia River because these counties (i.e., Clark, Cowlitz, Grays Harbor, Lewis, Mason, Pacific, Skamania, Wahkiakum, and Whatcom) include marine areas where the Aquatic Lands HCP would be implemented under Alternative 3.

The potential for increased upfront materials and installation costs as well as operational costs to disproportionately adversely affect low-income populations in Pacific County and Grays Harbor County would be as described for Alternative 2. The potential for adverse effects would be related primarily to increased upfront materials and installation costs associated with replacement decking on existing structures and operational costs for shellfish aquaculture facilities, which are located in marine areas. Most of the remaining counties with elevated proportions of low-income populations are located in eastern Washington, where no marine areas are present. The only counties that include both marine areas and use authorizations for shellfish aquaculture operations, recreational facilities, commercial facilities, or log handling facilities are Clark, Cowlitz, Mason, Skamania, Wahkiakum, and Whatcom counties (Table 3-5, Table 3-6). For this reason, the potential for Aquatic Lands HCP implementation under Alternative 3 to result in disproportionately high and adverse effects on low-income populations in these six counties would be lower than under Alternative 2, but greater than under Alternative 1.

As mentioned above, the four counties with minority populations that exceed statewide averages by at least 20 percentage points are all located in eastern Washington (i.e., Adams, Franklin, Grant, and Yakima), where no marine areas are present. For this reason, there would be no potential for HCP Operating Conservation Program implementation under Alternative 3 to result in adverse effects in those counties.

Overall, the potential for adverse effects on minority or low-income populations in the analysis area may increase in comparison to Alternative 1, but that increase would be less than under Alternative 2 since the HCP would only apply to uses in marine areas.

Table 4-1. Comparison of the effects of the alternatives.

Resource Area	Alternative 1 No-action[14]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Land Ownership and Use	Washington DNR would not be required to consider the status of a site as habitat for vulnerable species (as indicated by ESA listing status or other factors) when identifying lands to be considered for conveyance.	Compared to Alternative 1, Washington DNR's emphasis on retention and acquisition of lands most in need of protection may lead to greater retention and acquisition of lands in nearshore and littoral areas that provide habitat for species proposed for ITP coverage through the Aquatic Lands HCP.	As under Alternative 2, Alternative 3 may lead to increased retention and acquisition of lands in nearshore marine areas, compared to Alternative 1. Because HCP conservation priorities would be applied in marine areas only, the levels of retention and acquisition in freshwater areas would likely be similar to those under Alternative 1.
	The overall distribution of use authorizations by ecosystem would likely exhibit the general patterns evident in Table 3-3. The bulk of use authorizations would likely continue to be in nearshore marine areas.	Implementing the HCP Operating Conservation Program could reduce the amount of area available for some types of use authorizations in shallow waters in marine and freshwater areas, thereby altering the overall distribution of uses by ecosystem when compared to Alternative 1.	As under Alternative 2, Alternative 3 would be expected to reduce the amount of area available in shallow and/or nearshore waters for many commercial and recreational use authorizations, compared to Alternative 1. The magnitude of the reduction would be less than under Alternative 2, however, and would be limited to marine areas.
	Uses not authorized by Washington DNR, including the abandonment of vessels and structures, would continue to result in the encumbrance of state-owned aquatic lands. The continuation of Washington DNR's restoration programs, including derelict vessel removal, creosote removal, and restoration, would not be assured with a 50-year commitment.	As a result of the implementation of HCP requirements concerning the removal of derelict structures, the amount of area encumbered by derelict structures would likely decrease more rapidly under Alternative 2 than under Alternative 1. The continuation of Washington DNR's restoration programs, including derelict vessel removal, creosote removal, and restoration, would be assured with a 50-year commitment.	The amount of area encumbered by derelict structures would likely decrease more rapidly than under Alternative 1 but less rapidly than under Alternative 2 because measures requiring the removal of derelict structures would be applied in marine areas only. The continuation of Washington DNR's restoration programs, including derelict vessel removal, creosote removal, and restoration, would be assured with a 50-year commitment.

[14] Under all alternatives, including Alternative 1, No-action, uses authorized by Washington DNR on state-owned aquatic lands would be subject to permitting and regulatory oversight from numerous Federal, state, and local agencies. To varying degrees, potential adverse effects would be avoided or reduced through the implementation of measures required by other agencies with permitting authority.

Resource Area	Alternative 1 No-action[14]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Land Ownership and Use (continued)	Current policy does not establish the duration of Commissioner's Orders that withdraw certain freshwater or marine areas from the option of leasing or that prohibit or limit specific types of uses; such withdrawals or restrictions could be revoked at any time. No *de facto* conservation areas would be established to protect natural habitat value and function in areas that have been identified as habitat for highly vulnerable species. Waterfront sites near aquatic lands would continue to be desirable locations for businesses and residential developments, and existing developments would likely remain in place. The visual quality of aquatic lands would likely continue to influence uses of waterfront areas, either positively or negatively.	The duration of any Commissioner's Orders issued would be at least as long as the ITP term, providing greater certainty that areas would continue to be managed as specified under Commissioner's Orders for a known period under Alternative 2, compared to Alternative 1. *De facto* conservation areas would be established through Washington DNR's commitment to protect natural habitat value and function in areas that have been identified as habitat for highly vulnerable species. By reducing the amount of nearshore and littoral habitat available for log handling facilities, marinas, docks, wharves, and floating homes, the HCP Operating Conservation Program could contribute to reductions in the amount of waterfront development associated with those uses. Conversely, the implementation of measures that reduce the visual impacts of some aquatic land uses may render some waterfront properties more desirable for development as residential areas, park and recreation facilities, restaurants, or other businesses, possibly leading to an increase in such uses, compared to Alternative 1.	Similar to Alternative 2, Alternative 3 would provide greater certainty that areas established under Commissioner's Orders would remain withdrawn or restricted for a known period than under Alternative 1. This would apply only in marine areas, however. No *de facto* conservation areas would be established to protect habitat for highly vulnerable species because no such habitat has been identified on state-owned aquatic lands in marine areas. Such locations could be identified in the future, however, if additional information is collected on the status of species in marine environments and/or if land ownership changes. Compared to Alternative 1, Alternative 3 could reduce the amount of waterfront development associated with log handling facilities, marinas, docks, or wharves, but adjacent to marine waterbodies only. The potential for decreased visual impacts from uses of state-owned aquatic lands to result in an increase in waterfront development in some areas would likely be similar to that under Alternative 2.

Resource Area	Alternative 1 No-action[14]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Substrates and Erosional Processes	In both freshwater and marine areas, Washington DNR use authorizations would not be required to include measures to protect substrates and erosional processes, beyond the measures required through other permitting processes. As a result, many uses of state-owned aquatic lands would likely continue to damage aquatic substrates and interfere with sediment transport. The continued removal of derelict structures through the Creosote Removal Program would not be assured with a 50-year commitment. Also, Washington DNR would not be required to impose use conditions that avoid or minimize the potential for new private recreational docks to degrade aquatic habitat. As a result, these uses would continue to affect substrates and erosional processes at current levels. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspections.	In both freshwater and marine areas, the implementation of conservation measures and management practices as part of the HCP Operating Conservation Program would be expected to decrease the amount of area subject to scour, compaction, changes in sediment composition, and other effects, or at least to increase that amount at a rate slower than under Alternative 1. Washington DNR would, for the 50-year duration of the ITPs, require the removal of derelict structures from state-owned aquatic lands within the footprints of new and reauthorized leaseholds. Washington DNR would also require all new private recreational docks on state-owned aquatic lands to comply with HCP conservation measures. As a result, the amount of area over which derelict structures and private recreational docks damage substrates or interfere with sediment transport would likely be less than under Alternative 1. Implementation of monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring programs would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner, compared to Alternative 1.	In marine areas, the potential for adverse effects on substrates and erosional processes would be as described for Alternative 2, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of land uses that are not authorized by Washington DNR, and 3) the opportunities for adaptive management in response to information gathered from monitoring programs. In freshwater areas, the potential for adverse effects on substrates and erosional processes would be as described for Alternative 1, because the HCP Operating Conservation Program would not be implemented in freshwater areas.

Resource Area	Alternative 1 No-action[14]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Water Resources	In both freshwater and marine areas, Washington DNR use authorizations would not be required to include measures to protect water resources, beyond the measures required through other permitting processes. As a result, many uses of state-owned aquatic lands would likely continue to contribute to the degradation of water and sediment quality. The continued removal of derelict structures through the Creosote Removal Program would not be assured with a 50-year commitment. Also, Washington DNR would not be required to impose use conditions that avoid or minimize the potential for new private recreational docks to degrade aquatic habitat. As a result, these uses would continue to affect water and sediment quality at current levels. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspections.	In both freshwater and marine areas, the implementation of conservation measures and management practices as part of the HCP Operating Conservation Program would be expected to decrease the risk of water and sediment quality degradation, or at least to increase the risk at a rate slower than under Alternative 1. Washington DNR would, for the 50-year duration of the ITPs, require the removal of derelict structures from state-owned aquatic lands within new and reauthorized leasehold footprints. Washington DNR would also require all new private recreational docks on state-owned aquatic lands to comply with HCP conservation measures. As a result, the amount of area over which derelict structures and private recreational docks affect water and sediment quality would likely be less than under Alternative 1. Implementation of monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring programs would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner, compared to Alternative 1.	In marine areas, the potential for adverse effects on water and sediment quality would be as described for Alternative 2, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of land uses that are not authorized by Washington DNR, and 3) the opportunities for adaptive management in response to information gathered from monitoring programs In freshwater areas, the potential for adverse effects on water and sediment quality would be as described for Alternative 1, because the HCP Operating Conservation Program would not be implemented in freshwater areas.
Noise	Noise sources and trends in noise levels would be expected to continue as described in Subsection 3.5, Noise. Proposed projects with the potential to generate noise at levels likely to result in substantial disturbance would be subject to regulatory review and permitting under Federal and state statutes.	Alternative 2 would not be expected to result in substantial changes in noise levels in the analysis area, compared to Alternative 1. Proposed projects with the potential to generate noise at levels likely to result in substantial disturbance would be subject to regulatory review and permitting under Federal and state statutes.	Alternative 3 would not be expected to result in substantial changes in noise levels in the analysis area, compared to Alternative 1. Proposed projects with the potential to generate noise at levels likely to result in substantial disturbance would be subject to regulatory review and permitting under Federal and state statutes.

Resource Area	Alternative 1 No-action[14]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Vegetation	In both freshwater and marine areas, Washington DNR use authorizations would not be required to include measures to protect aquatic vegetation, beyond the measures required through other permitting processes. As a result, many uses of state-owned aquatic lands would likely continue to affect aquatic vegetation. The continued removal of derelict structures through the Creosote Removal Program would not be assured with a 50-year commitment. Also, Washington DNR would not be required to impose use conditions that avoid or minimize the potential for new private recreational docks to degrade aquatic habitat. As a result, these uses would continue to affect aquatic vegetation at current levels. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspections. Uses of state-owned aquatic lands that disrupt habitats in historical floodplains and similar areas could affect populations of Ute ladies'-tresses. Construction of bank armoring could reduce the availability of flood-prone river habitat with which the species is associated.	In both freshwater and marine areas, the implementation of conservation measures and management practices (e.g., buffers) as part of the HCP Operating Conservation Program would be expected to decrease the risk of adverse effects on aquatic vegetation, or at least to increase the risk at a rate slower than under Alternative 1. Washington DNR would, for the 50-year duration of the ITPs, require the removal of derelict structures from state-owned aquatic lands within new and reauthorized leasehold footprints. Washington DNR would also require all new private recreational docks on state-owned aquatic lands to comply with HCP conservation measures. As a result, the amount of area over which derelict structures and private recreational docks affect aquatic vegetation would likely be less than under Alternative 1. Implementation of monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring programs would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner, compared to Alternative 1. Compared to Alternative 1, implementation of the HCP Operating Conservation Program under Alternative 2 would reduce the potential for any populations of Ute ladies'-tresses on historical river channels and floodplains to be affected by uses of state-owned aquatic lands. Restrictions on the construction of bank armoring could lead to increases in the availability of flood-prone river habitat with which the species is associated.	In marine areas, the potential for adverse effects on aquatic vegetation would be as described for Alternative 2, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of land uses that are not authorized by Washington DNR, and 3) the opportunities for adaptive management in response to information gathered from monitoring programs In freshwater areas, the potential for adverse effects on aquatic vegetation would be as described for Alternative 1, because the HCP Operating Conservation Program would not be implemented in freshwater areas. As under Alternative 1, uses of state-owned aquatic lands that disrupt habitats in historical floodplains and similar areas could affect populations of Ute ladies'-tresses. Construction of bank armoring could reduce the availability of flood-prone river habitat with which the species is associated.

Resource Area	Alternative 1 No-action[14]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Wetlands and Riparian Areas	In both freshwater and marine areas, Washington DNR use authorizations would not be required to include measures to minimize the risk of adverse effects on erosional processes, water quality, and vegetation, beyond the measures required through other permitting processes. As a result, many uses of state-owned aquatic lands would likely continue to affect wetlands and riparian areas. The continued removal of derelict structures through the Creosote Removal Program would not be assured with a 50-year commitment. Also, Washington DNR would not be required to impose use conditions that avoid or minimize the potential for new private recreational docks to degrade aquatic habitat. As a result, these uses would continue to affect wetlands and riparian areas at current levels. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspections.	In both freshwater and marine areas, the implementation of conservation measures and management practices as part of the HCP Operating Conservation Program would be expected to decrease the risk of adverse effects on erosional processes, water quality, and vegetation, or at least to increase the risk at a rate slower than under Alternative 1, thereby reducing the potential for adverse effects on wetlands and riparian areas. Washington DNR would, for the 50-year duration of the ITPs, require the removal of derelict structures from state-owned aquatic lands within new and reauthorized leasehold footprints. Washington DNR would also require all new private recreational docks on state-owned aquatic lands to comply with HCP conservation measures that reduce the risk of adverse effects of the structure and associated activities on substrates and erosional processes, water quality, species, and habitat. As a result, the amount of area over which derelict structures and private recreational docks affect wetlands and riparian areas would likely be less than under Alternative 1. Implementation of monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring programs would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner, compared to Alternative 1.	In marine areas, the potential for adverse effects on wetlands and riparian areas would be as described for Alternative 2, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of land uses that are not authorized by Washington DNR, and 3) the opportunities for adaptive management in response to information gathered from monitoring programs. In freshwater areas, the potential for adverse effects on wetlands and riparian areas would be as described for Alternative 1, because the HCP Operating Conservation Program would not be implemented in freshwater areas.

Resource Area	Alternative 1 No-action[14]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Fish, Aquatic Invertebrates, and Associated Habitats	In both freshwater and marine areas, Washington DNR use authorizations would not be required to include measures to minimize the risk of adverse effects on aquatic species and habitats, beyond the measures required through other permitting processes. As a result, many uses of state-owned aquatic lands would likely continue to affect fish, aquatic invertebrates, and their habitats. The continued removal of derelict structures through the Creosote Removal Program would not be assured with a 50-year commitment. Also, Washington DNR would not be required to impose use conditions that avoid or minimize the potential for new private recreational docks to degrade aquatic habitat. As a result, these uses would continue to affect fish, aquatic invertebrates, and their habitats at current levels. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspections. Uses of state-owned aquatic lands would continue to disturb individuals and contribute to the degradation of habitat conditions for species proposed for ITP coverage.	In both freshwater and marine areas, the implementation of conservation measures and management practices as part of the HCP Operating Conservation Program would be expected to decrease the risk of adverse effects on erosional processes, water quality, and the physical habitat features and biological communities that support covered species, or at least to increase the risk at a rate slower than under Alternative 1, thereby reducing the potential for adverse effects on fish, aquatic invertebrates, and their habitats. Washington DNR would, for the 50-year duration of the ITPs, require the removal of derelict structures from state-owned aquatic lands within new and reauthorized leasehold footprints. Washington DNR would also require all new private recreational docks on state-owned aquatic lands to comply with HCP conservation measures. As a result, the amount of area over which derelict structures and private recreational docks affect fish, aquatic invertebrates, and their habitats would likely be less than under Alternative 1. Implementation of monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring programs would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner, compared to Alternative 1. Implementation of the HCP Operating Conservation Program would be expected to reduce the risk of adverse effects on species proposed for ITP coverage, compared to Alternative 1.	In marine areas, the potential for adverse effects on fish, aquatic invertebrates, and their habitats would be as described for Alternative 2, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of land uses that are not authorized by Washington DNR, and 3) the opportunities for adaptive management in response to information gathered from monitoring programs. In freshwater areas, the potential for adverse effects on fish, aquatic invertebrates, and their habitats would be as described for Alternative 1, because the HCP Operating Conservation Program would not be implemented in freshwater areas. Implementation of the HCP Operating Conservation Program would be expected to reduce the risk of adverse effects on species proposed for ITP coverage, compared to Alternative 1. This risk reduction would occur only in marine areas, however, benefitting adult Pacific lamprey; subadult and adult green sturgeon and white sturgeon; juvenile and adult salmonids and eulachon; and all life stages of rockfish and forage fish. In freshwater areas, uses of state-owned aquatic lands would continue to disturb individuals and contribute the degradation of habitat conditions for larval Pacific lamprey and eggs and newly hatched white sturgeon, salmonids, and eulachon.

Resource Area	Alternative 1 No-action[14]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Wildlife and Wildlife Habitat	In both freshwater and marine areas, Washington DNR use authorizations would not be required to include measures to minimize the risk of adverse effects on wildlife species and habitats, beyond the measures required through other permitting processes. t As a result, many uses of state-owned aquatic lands would likely continue to affect wildlife and wildlife habitat. The continued removal of derelict structures through the Creosote Removal Program would not be assured with a 50-year commitment. Also, Washington DNR would not be required to impose use conditions that avoid or minimize the potential for new private recreational docks to degrade aquatic habitat. As a result, these uses would continue to affect wildlife and wildlife habitat at current levels. Opportunities for staff from Washington DNR to identify problems at use authorization sites and to recommend corrective measures would be limited to occasional inspections. Uses of state-owned aquatic lands would continue to disturb individuals and contribute to the degradation of habitat conditions for species proposed for ITP coverage.	In both freshwater and marine areas, the implementation of conservation measures and management practices as part of the HCP Operating Conservation Program would be expected to decrease the risk of adverse effects on forage and prey species, as well as on habitat integrity and accessibility (including effects related to light, noise, and disturbance), or at least to increase the risk at a rate slower than under Alternative 1, thereby reducing the potential for adverse effects on wildlife and wildlife habitat. Washington DNR would, for the 50-year duration of the ITPs, require the removal of derelict structures from state-owned aquatic lands within new and reauthorized leasehold footprints. Washington DNR would also require all new private recreational docks on state-owned aquatic lands to comply with HCP conservation measures. As a result, the amount of area over which derelict structures and private recreational docks affect wildlife and wildlife habitat would likely be less than under Alternative 1. Implementation of monitoring protocols and schedules under the Aquatic Lands HCP's adaptive management and monitoring programs would increase the likelihood that problems resulting from uses of state-owned aquatic lands would be identified and corrected in a timely manner, compared to Alternative 1. Implementation of the HCP Operating Conservation Program would be expected to reduce the risk of adverse effects on species proposed for ITP coverage, compared to Alternative 1.	In marine areas, the potential for adverse effects on wildlife and wildlife habitat would be as described for Alternative 2, based on 1) the implementation of risk-reduction practices for authorized uses of state-owned aquatic lands, 2) the operation of programs that address the effects of land uses that are not authorized by Washington DNR, and 3) the opportunities for adaptive management in response to information gathered from monitoring programs. In freshwater areas, the potential for adverse effects on habitats would be as described for Alternative 1, because the HCP Operating Conservation Program would not be implemented in freshwater areas. Implementation of the HCP Operating Conservation Program would be expected to reduce the risk of adverse effects on species proposed for ITP coverage, compared to Alternative 1. This risk reduction would occur only in marine areas, however, benefitting foraging marbled murrelets; western snowy plovers; wintering and molting common loons and harlequin ducks; and Southern Resident killer whales. In freshwater areas, uses of state-owned aquatic lands would continue to disturb individuals and contribute to the degradation of habitat conditions for breeding, resting, and overwintering amphibians and pond turtles; and nesting and foraging black terns, common loons, and harlequin ducks.

Resource Area	Alternative 1 No-action[14]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
Recreation	Washington DNR would not require the implementation of additional protective measures or management practices, beyond the measures required through other permitting processes that would require the relocation or reconfiguration of existing overwater structures used for recreation.	If structures that are not attached to shore (e.g., rafts, floats, mooring buoys) are moved away from shore, persons who use human-powered means (e.g., rowboats, kayaks) to travel between moored motor vessels and shore may encounter increased physical challenges, compared to Alternative 1. If this occurs, some persons may be less likely to use certain recreational facilities on state-owned aquatic lands.	As under Alternative 2, the accessibility of some rafts, floats, and mooring buoys could be reduced compared to Alternative 1. Such changes would occur in marine areas only, however.
Visual Resources	Derelict structures would continue to create visual impacts in many areas. Washington DNR would not be required to implement additional protective measures or management practices, beyond the measures required through other permitting processes, that could reduce the visual impact of shellfish aquaculture, nor would Washington DNR require certain uses to occur farther offshore, where they may be less visible to shore-based viewers.	Requirements for the removal of derelict structures may reduce the visual impacts of such structures. Some of the measures that would be required at shellfish aquaculture facilities may reduce the visual evidence of human activity in such areas, compared to Alternative 1. Also, implementing the HCP Operating Conservation Program could reduce the amount of area available for some types of use authorizations in shallow waters in marine and freshwater areas, causing some facilities and structures to be placed farther offshore, potentially reducing their visibility to viewers on shore.	The potential for uses of state-owned aquatic lands to create visual impacts would be less under Alternative 3 than under Alternative 1 in marine areas (where all shellfish aquaculture facilities occur), but the same in freshwater areas.
Cultural Resources	Washington DNR would comply with all Federal and state laws and requirements regarding the protection of cultural resources. In both freshwater and marine areas, Washington DNR use authorizations would not be required to include additional measures that may result in the protection of cultural resources, beyond the measures required through other permitting processes. Washington DNR would not be required to implement protective measures or management practices	Through the implementation of the HCP Operating Conservation Program, the number of cultural sites damaged or destroyed by ground-disturbing activities would likely be lower than under Alternative 1. Some elements of the program—for example, the requirement to remove derelict structures—could result in an increased risk of adverse effects on cultural resources, compared to Alternative 1.	As under Alternative 2, implementation of the HCP Operating Conservation Program under Alternative 3 would be expected to reduce the risk of adverse effects on cultural resources, compared to Alternative 1, but only in marine areas. The potential for adverse effects on cultural resources in freshwater areas would be as described for Alternative 1, because the HCP Operating Conservation Program would not be implemented in freshwater areas.

Resource Area	Alternative 1 No-action[14]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
	aimed at reducing substrate damage or that would reduce the amount of construction of new structures in shallow and nearshore waters. As a result, the risk that uses of state-owned aquatic lands could result in adverse effects on cultural resources would likely continue at current levels.		
Social and Economic Environment	Operators of shellfish aquaculture facilities, log handling facilities, and overwater structures would not see a reduction in the amount of aquatic areas available for private use and would not face operational, materials, or installation costs to comply with measures required by Washington DNR that restrict the location and/or operation of facilities or the materials that may be used for structures. Project reviews under various Federal, state, and local statutes, regulations, rules, and policies commonly result in the implementation of measures that restrict the location and conduct of many uses of state-owned aquatic lands, potentially leading to increased operational or materials and installation costs. The annualized life-cycle costs of some materials that meet permitting requirements are equal to or less than the annualized costs of other commonly used materials. Uses of state-owned aquatic lands would continue to contribute to adverse effects on natural ecosystem functions	Implementation of measures that place restrictions on the location and/or operation of shellfish aquaculture facilities, log handling facilities, and overwater structures would reduce the amount of aquatic areas available for private use. In addition, implementation of these measures may result in increased operational costs for industries and individuals associated with these uses compared to Alternative 1. Holders of existing authorizations could face increased materials and installation costs, compared to Alternative 1, to comply with the requirements of the HCP Operating Conservation Program. However, the life-cycle costs of materials that would be consistent with the Aquatic Lands HCP requirements for light transmission and protection of water and sediment quality would likely be similar to the replacement costs anticipated under Alternative 1. To the extent that implementation of the HCP Operating Conservation Program would contribute to improved ecosystem function in the marine and fresh waters of Washington State, Alternative 2 would be expected to provide both economic and human use benefits, compared to Alternative 1.	As under Alternative 2, implementing the HCP Operating Conservation Program under Alternative 3 would reduce the amount of aquatic areas available for private use and could necessitate some changes in leaseholders' investments in infrastructure, operations, or both. Although effects would be limited to marine areas, approximately 90 percent of leases most likely to be affected by implementation of the HCP Operating Conservation Program (including all shellfish aquaculture leases) occur in marine areas. As under Alternative 2, the life-cycle costs of materials that would be consistent with the Aquatic Lands HCP requirements would likely be similar to the replacement costs anticipated under Alternative 1. The potential for increased costs to lead to decreases in revenue, jobs, or income in the aquaculture, forestry, recreation, or commerce industries would be limited to counties in western Washington that border or include Puget Sound, the Pacific Ocean, or the lower Columbia River. As under Alternative 2, improved ecosystem function under Alternative 3 would be

Resource Area	Alternative 1 No-action[14]	Alternative 2 Proposed HCP	Alternative 3 HCP for Marine Areas Only
	that have values both in economic terms and in terms of human well-being.		expected to provide both economic and human well-being benefits, compared to Alternative 1. Although the improvements to ecosystem function would occur in marine areas only, the benefits to human well-being could accrue to individuals living throughout the state.
Environmental Justice	There would be no potential for low-income or minority populations to be affected disproportionately by changes in the rules that govern uses of state-owned aquatic lands.	Compared to Alternative 1, increased upfront materials and installation costs and operational costs could disproportionately adversely affect low-income populations in Pacific, Grays Harbor, and Mason counties. Similarly, increased operational costs associated with HCP compliance for recreational and commercial facilities in Clark, Cowlitz, Mason, and Whatcom counties could be borne disproportionately by low-income populations. In light of the small number of use authorizations in counties with minority populations that exceed statewide averages by at least 20 percentage points, the potential for HCP implementation under Alternative 2 to result in adverse effects that would be felt disproportionately by minority populations would be extremely low.	The potential for increased operational costs to be borne disproportionately by low-income populations in Pacific, Grays Harbor, and Mason counties would be as described for Alternative 2. Because not all authorizations for recreational and commercial facilities are in marine areas, the potential for HCP implementation under Alternative 3 to result in disproportionately high and adverse effects on low-income populations in Clark, Cowlitz, Mason, and Whatcom counties would be lower than under Alternative 2, but higher than under Alternative 1. The four counties with minority populations that exceed statewide averages by at least 20 percentage points are all in eastern Washington. For this reason, there would be no potential for HCP implementation under Alternative 3 to result in adverse effects that would be felt disproportionately by minority populations in those counties.

5. CUMULATIVE EFFECTS

5.1 Introduction

The National Environmental Policy Act defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). Section 3, Affected Environment, describes the baseline conditions for each resource and reflects the effects of past and existing actions (including actions that occur on state-owned aquatic lands as well as upland areas or aquatic lands held by private landowners, municipalities, counties, ports, the Federal government, or other interests). Section 4, Environmental Consequences, evaluates the direct and indirect effects of the alternatives on each resource's baseline conditions. Section 5, Cumulative Effects, now considers the cumulative effects of the alternatives in the context of past actions, existing conditions, and reasonably foreseeable future actions and conditions.

5.1.1 Analysis Approach

Discussions in this section describe future actions and conditions likely to occur and contribute to potential cumulative impacts on the resource areas addressed in this EIS (Subsection 5.2, Future Actions and Conditions) and the potential effects that may occur as a result of implementing any one of the alternatives in the context of other anticipated actions (Subsection 5.3, Resource Effects from Climate Change and Future Actions). Only the resource areas that are expected to be directly or indirectly affected (adversely or otherwise) under the action alternatives are analyzed here. Similar to the analyses of direct and indirect effects, and consistent with the approach employed in the Aquatic Lands HCP, analyses of cumulative effects on fish and wildlife species are based on the availability of suitable habitat. For physical and biological resources, the cumulative effects analysis area consists of waterbodies throughout Washington. For social and economic resources, the cumulative effects analysis area consists of the entire State of Washington. These represent the areas in which past, present, and reasonably foreseeable future actions would be likely to contribute to cumulative effects on the resource areas under consideration for this analysis. The time frame for the cumulative effects analyses is approximately 50 years, which is the expected term of the ITPs the Services would issue under the action alternatives (Subsection 1.1, Introduction). This period also encompasses the time frame for short-term and long-term effects discussed in Section 4, Environmental Consequences.

The importance of some portions of the analysis area is recognized at the national level. Two waterbodies in the analysis area—Puget Sound and the Lower Columbia River—are among

28 designated estuaries of national significance under the National Estuary Program. The primary objective of the National Estuary Program is to protect estuaries of national significance that are threatened by human-caused degradation. Puget Sound has been the focus of particular attention, including the creation of the Puget Sound Partnership to lead efforts to restore and protect Puget Sound by 2020.

An exhaustive analysis of all past, ongoing, and reasonably foreseeable future project-level actions with the potential to affect the physical, biological, and social environments throughout the State of Washington is not feasible. In addition, the Proposed Action and alternatives do not represent different ways of carrying out a specific action at a certain time and place but rather different sets of land use restrictions that would be applied over a wide area and a 50-year time frame. Moreover, the land use restrictions that may be implemented at any given site would vary, depending on site-specific conditions and the type of use that is proposed. For these reasons, the analyses of cumulative effects in this section assess the overall trends in cumulative effects on resource areas addressed in Section 4, Environmental Consequences. The purpose of effects analysis for each resource area is to qualitatively assess whether the incremental impacts of either of the action alternatives would interact with other actions to result in conditions that differ substantially from conditions that would exist under Alternative 1, No-action. As with the analyses of direct and indirect effects, the major conclusions relative to the cumulative effects analyses for most resource areas are expressed in terms of the potential level, direction, and magnitude of cumulative impacts on each resource area.

Many plans, regulations, and laws are in place to minimize the adverse environmental effects of development and to restore habitat function (Subsection 1.4, Relationship to Other Plans, Regulations, and Laws). Continued implementation of plans and enforcement of laws are expected to limit, to varying extents, the potential for future cumulative impacts on many resource areas. It is unclear, however, whether these plans, regulations, and laws will be successful in meeting their environmental goals and objectives. In addition, it is difficult to predict the magnitude of effects from future development and habitat restoration for several reasons: 1) the activities have not yet been proposed; 2) mitigation measures have not been identified for many proposed projects; 3) it is uncertain whether mitigation measures will be fully implemented or have the intended results; and 4) due to the 50-year time frame of this analysis, it is difficult to predict future actions with certainty over time. It is possible, nevertheless, to estimate a general trend in expected cumulative impacts of future development and habitat restoration activities in combination with climate change.

5.1.2 Existing and Anticipated Regulatory Environment

As with the analysis of direct and indirect effects in Section 4, Environmental Consequences, discussions in this section are based on the premise that existing regulations will remain in place and will be enforced for the 50-year analysis time frame. An ongoing and reasonably foreseeable change in the regulatory environment exists for local shoreline master programs. The 2003 State Legislature passed legislation requiring local governments to update their shoreline master programs by 2014. At that time, many such programs had not been updated since the 1970s. The current update process is the result of new rules established by Ecology governing shoreline activities and uses. Among other requirements, these rules establish a standard of no net loss in the ecological function of the shoreline environment. The implementation of updated shoreline master programs statewide is expected to reduce the potential for future unsustainable development and provide shoreline landowners with a clearer set of standards.

Another foreseeable change in the regulatory environment concerns the Hydraulic Code (Subsection 1.4.2, State Regulations). WDFW is currently revising the rules for HPAs (WAC 220-110) to improve protections for fish and to streamline the permit approval process. Proposed changes to the rules would: 1) incorporate up-to-date fish science and technology, 2) simplify the permitting of certain types of projects, 3) improve procedural and administrative requirements to better align with statutory changes made since the rules were last revised, and 4) establish a structure for adaptive management in response to changing science and technology and/or results of effectiveness monitoring. WDFW has initiated an EIS for the rule change proposal and a decision is expected in autumn 2013.

In addition to the anticipated updates in shoreline master programs and HPA rules, marine spatial planning is an additional tool that a may be applied to the regulatory environment. Marine spatial planning is a process intended to improve marine resource management by planning for human uses in locations that reduce conflict, increase certainty, and allow a balance of activities maximizing the social, economic, and ecological benefits of ocean resources. In March 2010, the State Legislature enacted a marine spatial planning law to address resource use conflicts in Washington waters. In 2012, the Legislature provided $2.1 million in funds to begin marine spatial planning off Washington’s coast. The funds are appropriated through the Washington DNR marine resources stewardship account with coordination among the State Ocean Caucus, the four Coastal Treaty Tribes, the four coastal Marine Resource Committees, and the newly formed stakeholder body of the Washington Coast Marine Advisory Council.

5.2 Future Actions and Conditions

Discussions in this subsection identify known actions that are reasonably likely to occur and contribute to potential cumulative impacts on the resource areas addressed in this EIS. Also discussed are reasonably foreseeable changes in the condition of the environment. Expected future actions and conditions include continuing accumulations of greenhouse gases (contributing to global climate change), proposed developments, and planned habitat restoration activities. Climate change and development are both linked to expected population increases in the region and worldwide. Additional future actions, of which the Services are not aware, may occur within the analysis area, so reviewers are encouraged to comment on additional actions that should be considered.

5.2.1 Climate Change

A scientific consensus exists that, due to past and continuing accumulations of carbon dioxide and other greenhouse gases in the atmosphere, worldwide temperatures are rising and many natural systems are being affected (IPCC 2007). Climate change is likely to reduce the amount and impair the quality and accessibility of suitable habitat for many species, while providing increased habitat for others. Anticipated impacts of climate change include increased water temperatures, rising sea levels, and changes in hydrological processes, all with concomitant changes in habitat-forming processes (Mantua et al. 2007). Furthermore, protective buffers around sensitive areas (e.g., native aquatic vegetation) enhance a system’s capacity to recover from external pressures such as droughts or management mistakes and provides for biodiversity conservation (Fischer et al. 2006). Climate change could affect resource conditions under all of the alternatives equally.

Specific to Washington State, the *Washington Climate Change Impacts Assessment* (Climate Impacts Group 2009) identified several key findings relevant to the resource areas that are analyzed in this EIS. These are summarized below.

- **Hydrology.** Changes in temperature and precipitation will continue to decrease snowpack and will affect streamflow and water quality (e.g., high turbidity) throughout Washington State and the Pacific Northwest. Warmer temperatures will result in more winter precipitation falling as rain rather than snow throughout much of the Pacific Northwest, particularly in mid-elevation basins where average winter temperatures are near freezing. In rivers with a strong dependence on snowmelt (i.e., most rivers in the Pacific Northwest), this change will result in earlier peak spring streamflows and lower summer streamflows (Elsner et al. 2009).

- **Sea Level.** Rising sea levels will shift coastal beaches inland and increase erosion of unstable bluffs (Huppert et al. 2009). Low-lying coastal areas will eventually be inundated by seawater or periodically over-washed by waves and storm surges. Coastal wetlands will become increasingly brackish as seawater inundates freshwater wetlands. New brackish and freshwater wetland areas will be created as seawater inundates low-lying inland areas or as the freshwater table is pushed upward by higher seawater levels (Pfeffer et al. 2008).

- **Ocean Acidification.** As the concentration of carbon dioxide in the atmosphere increases, so does the rate at which the gas is absorbed by oceanic waters. Dissolved carbon dioxide increases the acidity of ocean surface waters. Virtually every major biological function has been shown to respond to acidification changes in seawater, including photosynthesis, respiration rates, growth rates, calcification rates, reproduction, and recruitment (Ocean Carbon and Biogeochemistry Program 2009). Likely impacts include reduced growth and survival of commercially important shellfish, reduced fitness and abundance of ecologically important prey (e.g., pteropods, euphausiids) of commercial fish species, and direct effects on commercially important fish species and coldwater corals (Osgood 2008).

- **Coastal Processes.** The physical and chemical effects of climate change are expected to manifest themselves in six primary ways: 1) inundation of low-lying areas by high tides as sea level rises; 2) flooding of coasts due to increased wave energy and storm strength during major storm events, especially near river mouths; 3) accelerated erosion of coastal bluffs; 4) shifting of beach profiles, moving the position of the high water line landward; 5) saltwater intrusion into coastal freshwater aquifers; and 6) increased ocean temperature and acidity. Similar forces will affect the environment throughout the analysis area, but shore areas will respond differently depending upon substrate (sand versus bedrock), slope (shallow versus steep cliffs), and the surrounding conditions (exposed versus sheltered from storms) (Huppert et al. 2009).

- **Fish Habitat.** Rising stream temperatures will likely reduce the quality and extent of freshwater habitat for salmon. In most analyzed streams and lakes, the duration of periods that cause thermal stress and migration barriers to salmon is projected to at least double and perhaps quadruple by the 2080s (Mantua et al. 2009). The greatest increases in thermal stress are anticipated in the Interior Columbia River Basin and the Lake Washington Ship Canal. The combined effects of warming stream temperatures and altered stream flows will very likely reduce the reproductive success of many salmon populations in Washington watersheds, but impacts will vary according to different life-history types and watershed types. As more winter precipitation falls as rain rather than snow, higher winter stream flows will scour streambeds, damaging spawning redds and washing away incubating eggs. Earlier peak stream flows flush young salmon from rivers to estuaries before they are physically mature enough for transition, increasing a variety of stressors including the risk of predation (Mantua et al. 2009). In forested areas, increased severity and frequency of fires and insect infestations may lead to increased water temperatures and sediment input, further impacting fish habitat quality (ISAB 2007).

Climate change can also have wide-ranging effects on aquatic vegetation. The effects of climate change likely include loss or alteration of vegetation due to sea level rise or changes in hydrologic regimes, changes in ecosystem processes, altered distributions of organisms in response to changes in temperature or precipitation, and an increase in ocean acidity (Snover et al. 2005). Sea level rise associated with climate change is expected to increase erosion and landslides and decrease some shoreline and estuarine habitats, particularly coastal salt marshes and seagrasses (Short and Neckles 1999; Duarte 2002; Scavia et al. 2002). Changes to hydrologic processes, such as flow regimes, circulation, mixing, and stratification, and to water temperatures and chemistry, are expected to influence both marine and freshwater vegetation. Increases in marine water temperatures may affect plankton diversity, distribution, and abundance, driving changes in other species' composition and abundance in the marine food webs. An example of climate-related changes in freshwater areas can be seen in Lake Washington, where warmer air temperatures have lengthened the period of summer stratification (Winder and Schindler 2004). Longer periods of stratification, in turn, affect the timing of phytoplankton and zooplankton blooms, potentially disrupting the interactions between predators and prey at the base of the food chain.

5.2.2 Development

Projected human population growth throughout Washington State is expected to bring increased pressure on aquatic ecosystems in the analysis area. Based on population projections from the Office of Financial Management, Washington's total population is expected to grow from 6.7 million in 2010 to 8.8 million in 2040. Most of the growth is projected to occur in four counties in western Washington: King, Snohomish, Pierce, and Clark (Office of Financial Management 2012). Notably, more than 66 percent of the state's projected growth is expected to occur in counties that border Puget Sound. In contrast, the counties with the greatest anticipated rates of population increase (Adams, Douglas, Franklin, and Grant, with 2040 population estimates ranging from 42 percent to 108 percent above 2010 census counts) are in eastern Washington. The counties in which populations are projected to decrease or to increase at the lowest rates (less than 10 percent) are primarily along the Pacific coast and in the southeastern and northeastern corners of the state (Office of Financial Management 2012).

Population growth and associated urban development exert many pressures on aquatic ecosystems. First, as the population increases, so does the demand for uses of state-owned aquatic lands, along with the associated effects on physical and biological resources. In addition, increased use of land for housing, transportation, and other infrastructure results in increases in impervious surface area, which affects hydrological and ecosystem functions by modifying natural drainage and runoff and by changing the natural habitats that support aquatic organisms (Alberti et al. 2007). Additional pressures associated with human population growth include shoreline modifications, shoreline and upland development, increased demand for potable water, and increased input of pathogens, pharmaceuticals, chemical toxins, and nutrients into freshwater and marine ecosystems (Ruckleshaus and McClure 2007). If current approaches to development and land use are maintained, population growth can be expected to reduce habitat availability and diversity in both marine and freshwater ecosystems (Ruckleshaus and McClure 2007). The greatest impacts would likely occur in areas with the greatest anticipated amounts and rates of population growth.

As noted above, the impacts of human activities on Puget Sound have been the focus of particular attention. Although many types of human activity threaten the health of the Puget Sound ecosystem, there is considerable agreement among regional scientists and community leaders that the alteration and loss of habitat and the ongoing input of pollutants are the top two immediate and pervasive threats facing Puget Sound. Habitat alteration has occurred throughout the estuaries, rivers, forests, and beaches of Puget Sound, and thousands of pounds of additional pollutants enter the waterways daily (Puget Sound Partnership 2009).

Examples of some prominent planned projects with the potential to affect aquatic resources in Washington State are described below. Most of these projects are the subject of planned or ongoing EISs, indicating potentially significant environmental effects. As discussed in Subsection 5.1.1, Analysis Approach, the projects described below are not intended to be an exhaustive list but rather to provide examples of projects contributing to trends in the condition of the resources that are the subject of this analysis.

5.2.2.1 Coal Export Terminals

Two companies have announced plans for new coal export facilities in Washington. Pacific International Terminals has proposed building a deep-water marine terminal, called the Gateway Pacific Terminal, at Cherry Point in Whatcom County. The proposed terminal would handle import and export of up to 54 million dry metric tons per year of bulk commodities, mostly exporting coal. The U.S. Army Corps of Engineers, Ecology, and Whatcom County will conduct a coordinated environmental review of Pacific International Terminals' application for the terminal under NEPA and SEPA. The public scoping comment period extended from September 24, 2012, through January 21, 2013. Publication of a draft EIS is expected in 2014 or later.

Millennium Bulk Terminals-Longview, LLC, proposes to construct a new coal export terminal at an existing industrial site on the Columbia River near Longview. Upon completion, the facility would handle up to 44 million metric tons of coal per year. The complete proposed facility would require construction of eight rail lines, two new docks, two shiploaders, four coal stockpile pads, and associated facilities, conveyors, and equipment. The U.S. Army Corps of Engineers, Ecology, and Cowlitz County will conduct a coordinated environmental review (in the form of an EIS) of the proposal under NEPA and SEPA.

An additional coal export terminal is under consideration in Boardman, along the Columbia River in Oregon. Increased marine traffic and coal terminal operations associated with any of the proposed terminals identified above have the potential for adverse effects on aquatic ecosystems and fisheries.

5.2.2.2 Naval Undersea Warfare Center, Keyport Range Extension

In July 2011, the U.S. Navy issued a Record of Decision to extend the area of three underwater range sites used for testing and evaluation of autonomous undersea vehicles and to increase the number of tests and days of testing that occur within these operational areas. The three range sites are in Puget Sound (Keyport Range), Hood Canal (Dabob Bay Range Complex), and off the Washington coast (Quinault Underwater Tracking Range). Based on analyses in the Final EIS, the Navy determined that the proposed action will result in approximately 17,000 episodes of non-injurious harassment of marine mammals annually, but there will be no significant impacts on biological resources in terrestrial or aquatic environments.

5.2.2.3 Columbia River Navigation Maintenance

In November 2010, the U.S. Army Corps of Engineers completed a project to dredge the lower 103 miles of the Columbia River, increasing the depth of the navigation channel from 40 feet to 43 feet. Annual maintenance dredging is expected to continue for several decades. In addition, the U.S. Army Corps of Engineers is preparing to repair three jetties at the mouth of the Columbia River to maintain the navigation channel for deep-draft shipping. Interim repairs completed in 2007 entailed the placement of approximately 226,000 tons of stone on the north and south jetties. Additional jetty repairs will be necessary to address near- and long-term maintenance needs and to reduce the potential need for emergency repairs and/or emergency dredging and the resultant impacts to navigation. The initial construction schedule is projected to be from 2014 through 2020. Both endeavors are likely to allow increases in the amount of commercial shipping traffic on the Lower Columbia River.

5.2.2.4 Liquefied Natural Gas Terminal, Warrenton, Oregon

Oregon LNG proposes to construct, own, and operate a bi-directional liquefied natural gas production, shipping, and receiving hub and a natural gas pipeline on the Skipanon Peninsula near the mouth of the Columbia River in Warrenton, Oregon. If built, the Oregon LNG project would include a marine shipping and receiving terminal, two full-containment storage tanks, and facilities for ship berthing and offloading. A 2,100-foot pier would extend into the Columbia River, where a basin would be dredged for tankers to unload. The proposed terminal would have the capacity to produce and ship up to 9.6 million tons of liquefied natural gas per year and would also have the capacity to import and re-vaporize up to 500 million cubic feet of natural gas per day during regional supply emergencies.

Oregon Pipeline, an affiliated company, is planning the construction of an 86-mile pipeline, which would connect to the regional pipeline in Woodland, Washington. The project received land use approval from the City of Warrenton, and the Port of Astoria approved a lease for the project. The applicant has submitted an application to the Federal Energy Regulatory Commission; an EIS for the project has not yet been completed.

5.2.2.5 Columbia River Crossing

The Federal Highway Administration and the Federal Transit Administration issued a Record of Decision on December 2011 for the Columbia River Crossing project, which is a bridge, transit, highway, bicycle, and pedestrian improvement project to improve safety and mobility on the Interstate 5 corridor between Portland, Oregon, and Vancouver, Washington. Transportation improvements include expanding Interstate 5, providing increased light rail capacity, constructing an additional bridge across the Columbia River, and improving highway freight mobility. To protect ESA-listed fish and marine mammals, NMFS's biological opinion for the project requires that in-water impact pile driving be completed during a work window between September 15 and April 15. The biological opinion also establishes limits on the sound levels of impact pile driving.

5.2.2.6 Marine Energy Projects

In recent years, interest in projects that generate electricity from waves or directly from the flow of water in ocean currents, tides, or inland waterways has grown. Boehlert et al. (2008) identified several ecosystem elements with the potential for a demonstrable response to wave energy development. Examples include changes to sediment transport processes due to wave reduction; changes to benthic habitat due to modifications to water circulation and currents; changes in the species composition and predator effects of fish communities; increased risk of injury to marine birds due to collisions with above-water structures; and increased risk of entanglement of marine mammals and sea turtles.

In March 2014, the Federal Energy Regulatory Commission issued a pilot license to Snohomish County Public Utility District No. 1 for an offshore tidal energy pilot project in Admiralty Inlet in Puget Sound. The license authorizes the public utility district to study, monitor, and evaluate the environmental, economic, and cultural effects of the proposed 600-kilowatt project. The pilot license contains measures to protect fish, wildlife, cultural and aesthetic resources, navigation, and existing infrastructure. The license also contains several monitoring and adaptive management requirements to protect against adverse impacts. The Federal Energy Regulatory Commission also issued a preliminary permit to Snohomish County Public Utility District No. 1 for a smaller tidal energy project at Deception Pass, also in Puget Sound. The preliminary permit allows the public utility district to study the feasibility of the proposed project, but it does not authorize project construction. The Federal Energy Regulatory Commission does not have any other current licenses or permits for marine energy project in Washington waters.

5.2.3 Habitat Restoration

Habitat restoration efforts are planned and underway throughout Washington State, supported by Federal, state, and local agencies; tribes; environmental organizations; and communities. Projects supported by these entities focus on improving general habitat and ecosystem function or on species-specific conservation objectives. Recovery plans for ESA-listed and state-listed species also identify habitat protection and management efforts intended to help stabilize and rebuild populations. The following species proposed for ITP coverage are the subject of draft or final recovery plans in Washington State: Oregon spotted frog, Pacific pond turtle, western snowy plover, marbled murrelet, chum salmon, coho salmon, steelhead, Chinook salmon, bull trout, and Southern Resident killer whale. Anticipated restoration and conservation efforts with the potential to result in benefits that may be realized at a regional scale are presented below. While these efforts are reasonably likely to occur, funding levels may vary from year to year. As with proposed development projects, the efforts described below are not intended to be an exhaustive list but rather to provide examples of projects contributing to trends in the condition of the resources that are the subject of this analysis.

Puget Sound Marine and Nearshore Protection and Restoration Grant Program. Through the National Estuary Program, EPA receives Federal funding to support efforts to protect and restore Puget Sound. In February 2011, EPA awarded more than $21 million for restoration and protection projects, with most funds dedicated to projects benefiting critical ecosystems. Consistent with the Action Agenda for the protection and restoration of Puget Sound (Puget Sound Partnership 2009), protection and restoration projects focus on marine and nearshore protection and restoration; watershed protection and restoration; and the prevention, reduction, and control of toxics, nutrients, and pathogens in the region's waters. In addition, both the Puget Sound Partnership and the Northwest Indian Fisheries Commission have cooperative agreements with EPA to assist in Puget Sound recovery. Puget Sound Partnership funding is focused on regional engagement and Action Agenda management. Northwest Indian Fisheries Commission funding provides sub-awards to 20 federally-recognized tribes located within the greater Puget Sound Basin to implement high-priority projects that will contribute directly to the restoration and protection of Puget Sound.

Lower Columbia River Estuary Program. Similar to the Puget Sound Partnership, the Lower Columbia River Estuary Partnership, funded through the National Estuary Program, implements a comprehensive conservation and management plan aimed at achieving a high level of biological integrity for the Lower Columbia River (below Bonneville Dam) and estuary. Restoration activities focus on habitat restoration, contaminant reduction, public education, and stewardship. Accomplishments since 1999 include acquiring, protecting, or restoring more than 16,000 acres of Lower Columbia River habitat; compiling data on toxic contaminants in the lower river; collecting almost 19,000 acres of bathymetry data and mapping 300,000 acres of floodplain land cover and altered wetlands; and engaging 10,450 volunteers in science education and volunteer projects.

Federal Columbia River Power System, Columbia River, Washington, Oregon, and Idaho. The Bonneville Power Association, Bureau of Reclamation, and U.S. Army Corps of Engineers are parties to a 10-year commitment to operate the 14 Federal dams on the Columbia and Snake Rivers in a manner that protects fish listed under the ESA. The parties are committed to achieving at least 96 percent dam passage survival for spring juvenile migrants and 93 percent dam passage survival for summer migrants on average, per dam. The Bonneville Power Association has negotiated memoranda of agreement (also referred to as the 2008 Columbia Basin Fish Accords) with four American Indian tribes (Confederated Tribes of Umatilla Indian Reservation, Confederated Tribes of Warm Springs Reservation, Confederated Tribes and Bands of Yakama Nation, and Confederated Tribes of Colville Indian Reservation), two states (Idaho and Montana), and two Federal action agencies (Bureau of Reclamation and U.S. Army Corps of Engineers) to augment and advance conservation of listed fish. The memoranda of agreement are for 10 years, and they include projects to benefit fish (such as habitat restoration, hatchery actions, and hydropower actions), as described in the Federal Columbia River

Power System biological opinion. The Fish Accords will result in $933 million in funding for fish recovery from 2008 through 2017.

Community-based Restoration Program (CRP). The CRP is a financial and technical assistance program authorized under the Magnuson Stevens Reauthorization Act of 2006 and administered by the National Oceanic and Atmospheric Administration (NOAA). The program helps communities implement habitat restoration projects. Within the Pacific Northwest and Alaska, the CRP has supported over 300 projects benefiting more than 1,400 acres of estuarine and riparian habitat and opening approximately 400 miles of in-stream salmon habitat. NOAA has contributed more than $8 million for restoration activities in the Pacific Northwest region with partners providing an additional $20 million in non-Federal and in-kind matching funds.

Pacific Coastal Salmon Recovery Fund (PCSRF), Columbia and Snake Rivers. Congress created the PCSRF in 2000 to address ESA-listed salmon, as well as impacts from the Pacific Salmon Treaty Agreement between the U.S. and Canada. Under the PCSRF, states and tribes of the Pacific Coast region (Washington, Oregon, California, Idaho, and Alaska) implement projects and activities to restore and protect salmon and steelhead and their habitat. The types of projects funded by the PCSRF have included protection, restoration, and creation of in-stream, wetland, estuarine, riparian, and upland habitats; land acquisition; fish passage; hatchery enhancements; watershed planning and assessment; and research, monitoring, and evaluation studies.

Northwest Power Planning and Conservation Council Fish and Wildlife Program, Columbia and Snake Rivers. The Fish and Wildlife Program was developed for the 31 dams within the Columbia River basin that are operated by the U.S. Army Corps of Engineers (21 dams) and Bureau of Reclamation (10 dams). Due to construction and operation of these dams, the Northwest Power Act requires the Northwest Power Planning and Conservation Council to prepare a program to protect, mitigate, and enhance fish and wildlife habitat and related spawning grounds affected by hydroelectric development. Currently, the program is implemented through recommendations from individual subbasin plans that were developed locally in the tributary subbasins of the Columbia River and then incorporated into the program in 2009. The program budget averages $143 million per year for funding projects. Funding is allocated for spill and flow management to support fish survival, predator control, fish habitat improvements, funding support for the Fish Passage Center, and the designation of new protected areas.

State of Oregon. The Oregon Plan for Salmon and Watersheds includes voluntary restoration actions by private landowners, monitoring, and scientific oversight that is coordinated with state and Federal agencies and tribes. The Oregon Legislature allocates monies drawn from the Oregon Lottery and salmon license plant funds, which have provided $100 million and $5 million, respectively, to projects benefiting water, salmon, and other fish throughout Oregon. Projects include reducing road-related impacts to salmon and trout streams by improving water quality, fish habitat, and fish passage; providing monitoring and education support; helping local coastal watershed councils; and providing staff technical support. More information can be found at http://www.oregon plan.org.

State of Washington. The Governor's Salmon Recovery Office was developed from Washington's Salmon Recovery Act and includes the Salmon Recovery Funding Board (SRFB). The SRFB has helped finance more than 900 salmon recovery projects focused on habitat protection and restoration projects. Approximately $270 million was allocated from 2007 to 2009, while $401 million was identified for habitat projects from 2009 to 2011. The SRFB administers two grant programs (Salmon Recovery Funding Board Grants and Family Forest Fish Passage Program Grants). Municipalities, tribal governments, state agency nonprofit organizations, regional fisheries enhancement groups, and private landowners may apply for these grants. More information can be found at http://www.governor.wa.gov/gsro.

Regional and Local Habitat Restoration and Conservation Support. Numerous environmental organizations, communities, and tribes have contributed to salmon habitat restoration and conservation efforts. These projects are often funded by in-kind matches with funding provided by NOAA CRP, PCSRF, state salmon recovery funds, and other sources. The projects vary, ranging from small- to large-scale efforts that include habitat conservation, creation, enhancement, restoration, and protection. Some project examples include donating conservation easements, excavating new tidal channels, removing invasive species, stabilizing stream banks, installing or upgrading culverts, removing barriers to fish migration, planting riverbanks, conserving water, restoring wetlands, and managing grazing to protect high quality aquatic habitat, among others.

Columbia River Estuary Cormorant Management. The U.S. Army Corps of Engineers, Portland District, is considering management alternatives for reducing predation by double-crested cormorants on Columbia River basin juvenile salmonids listed under the ESA. The management alternatives will be studied in an EIS under NEPA. In 2010 and 2011, the colony consumed approximately 18 percent of the Columbia River out-migrating salmon for each year. Research funded by the U.S. Army Corps of Engineers found that reduced rates of predation by cormorants could lead to increases in average annual population rates for ESA-listed salmon. Overall, the benefits from managing double-crested cormorants could be comparable to other individual recovery efforts for ESA-listed salmon.

5.3 Effects on Resources from Climate Change and Future Actions

This subsection considers potential effects of the alternatives in the context of past actions, existing conditions, and reasonably foreseeable future actions (e.g., development) and conditions (e.g., environmental responses to climate change). Discussions in this subsection address impacts of the proposed action described and evaluated in Section 4, Environmental Consequences, in addition to impacts of past, present, and reasonably foreseeable future actions on affected resources. As explained in Subsection 5.1, Introduction, analyses in this subsection qualitatively assess whether either of the action alternatives would cause cumulative impacts to depart substantially from conditions that would exist under Alternative 1, No-action.

Note that the action alternatives would apply additional restrictions on uses of state-owned aquatic lands. These restrictions would reduce the potential for Washington DNR-authorized activities to contribute to adverse effects on physical and biological resources in the aquatic environment. In some cases, these additional restrictions would improve ecosystem function and resilience to external pressures such as climate change. For example, biodiversity conservation provided by protective buffers around sensitive areas (e.g., native aquatic vegetation) enhances a system’s natural resiliency. Thus, while it is not anticipated that any of the alternatives would exacerbate climate change impacts, and while some of the alternatives may increase ecosystem function and resilience, adverse impacts from climate change are anticipated to occur in the project area independent of Washington DNR’s management of the Aquatics Division under any of the alternatives.

5.3.1 Substrates and Erosional Processes

Subsection 3.3, Substrates and Erosional Processes, describes how past and present conditions have influenced the processes of sediment transport and deposition in the analysis area, as well as the erosional processes of shorelines and streambanks. Descriptions in that subsection reflect conditions resulting from past development and ongoing restoration actions, as well as the effects of climate change to date. The effects of the alternatives on substrates and erosional processes are described in Subsection 4.3, Substrates and Erosional Processes. This subsection considers effects that may occur as a result of the alternatives being implemented in the context of other anticipated future actions, which are described in Subsection 5.2, Future Actions and Conditions.

As described in Subsection 5.2.1, Climate Change, large-scale shifts in weather patterns are expected to change erosional processes substantially, particularly in coastal areas. Beaches and bluffs composed of unconsolidated sediments could be subject to accelerated rates of erosion and avulsion (i.e., sudden losses or gains of land area as a result of the action of water) due to increased wave energy and storm strength (Fredrickson 2009). Such changes could exacerbate the effects of existing substrate disturbance from uses of state-owned aquatic lands. In addition, shoreline modifications that accompany human population growth will exert pressure on natural processes of sediment erosion and transport. Based on the above, the effects of other actions and conditions may lead to a greater risk of impacts to processes such as wave and current energy and sediment transport than are considered in Subsection 4.3, Substrates and Erosional Processes. In addition, the extent to which restoration actions in the analysis area will offset the impacts of climate change and development on substrates and erosional processes is unknown. Substantial restoration of natural processes of wave and current energy and sediment transport may not be realized in the action area over the 50-year time frame of this analysis. However, improvements from ongoing and planned programs and projects will likely occur to varying degrees during this time frame and may continue beyond it.

Although Alternative 2 and Alternative 3 would generally reduce risk of adverse effects on substrates and erosional processes compared to Alternative 1 (Subsection 4.3, Substrates and Erosional Processes), ongoing and future uses of state-owned and other aquatic lands would continue to pose such risks and may exacerbate the effects of climate change on processes of sediment erosion and transport. Notably, the reduction in risk associated with HCP implementation under Alternative 3 would be limited to marine areas; thus, ongoing and future uses of state-owned and other aquatic lands without the benefit of protections under the HCP would lead to adverse impacts on substrates and erosional processes in freshwater areas under Alternative 3 compared to Alternative 2.

5.3.2 Water Resources

Subsection 3.4, Water Resources, describes how past and present conditions have influenced water and sediment quality in Washington State, including conditions resulting from past development and ongoing restoration actions. These current conditions also reflect the effects of climate change to date. The effects of the alternatives on water and sediment quality are described in Subsection 4.4, Water Resources. This subsection considers effects that may occur as a result of the alternatives being implemented in the context of other anticipated future actions, which are described in Subsection 5.2, Future Actions and Conditions.

As described in Subsection 5.2.2, Development, anticipated increases in the amount of impervious surface area in locations with expanding populations are expected to affect hydrological functions (Alberti et al. 2007). In both marine and freshwater areas, urban and residential development (e.g., contaminated runoff from streets and roads) have been identified as major contributors to the degradation of water and sediment quality (Subsection 3.4, Water Resources). In addition, climate change is expected to affect the quality of water statewide by increasing stream temperatures. Based on the above, the effects of other actions and conditions may lead to greater impairments of water and sediment quality than are considered in Subsection 4.4, Water Resources. In addition, the extent to which restoration actions in the analysis area will offset the impacts of climate change and development on water and sediment quality is unknown. Substantial improvements in water and sediment quality may not be realized in the action area over the 50-year time frame of this analysis. However, improvements from ongoing and planned programs and projects will likely occur to varying degrees over this time frame and may continue beyond it.

Although Alternative 2 and Alternative 3 would generally reduce risk of adverse effects on water and sediment quality compared to Alternative 1 (Subsection 4.4, Water Resources), ongoing and future uses of state-owned and other aquatic lands would continue to pose such risks and may exacerbate the effects of climate change on water resources. Notably, the reduction in risk associated with HCP implementation under Alternative 3 would be limited to marine areas.

5.3.3 Noise

Subsection 3.5, Noise, describes how past and present conditions have influenced noise levels. These conditions represent effects from natural noise sources (e.g., wind, waves, animal sounds) and those associated with human activities (e.g., oil drilling and production, dredging and construction, sonar systems). Subsection 3.5, Noise, also describes sensitive noise receptors (e.g., residents, recreational users). The effects of the alternatives on noise levels are described in Subsection 4.5, Noise. This section considers effects that may occur as a result of the alternatives being implemented in the context of other anticipated future actions, which are described in Subsection 5.2, Future Actions and Conditions.

As described in Subsection 5.2.2, Development, projected human population growth throughout Washington State is expected to bring increased development in the analysis area. Notably, more than 66 percent of the state’s projected growth is expected to occur in counties that border Puget Sound. Development has been identified as a major contributor to increased noise levels. As was described in Subsection 5.2.2, prominent planned projects with the potential to add to noise levels are coal export terminals, Columbia River Crossing, marine energy projects, etc. In addition, climate change is expected to cause increased wave energy and storm strength during major storm events, which increases natural noise levels.

Overall, potential for increased noise levels in the analysis area may decrease under Alternative 2 and Alternative 3 in comparison to Alternative 1, but that decrease would be less under Alternative 3 since the HCP would only apply to uses in marine areas.

5.3.4 Vegetation

Subsection 3.6, Vegetation, describes how past and present conditions have influenced the condition of aquatic vegetation in Washington State, including conditions resulting from past development and ongoing restoration actions. These current conditions also reflect the effects of climate change to date. The effects of the alternatives on vegetation are described in Subsection 4.6, Vegetation. This subsection considers effects that may occur as a result of the alternatives being implemented in the context of other anticipated future actions, which are described in Subsection 5.2, Future Actions and Conditions.

As described in Subsection 5.2.1, Climate Change, large-scale shifts in weather patterns are expected to result in changes to habitat-forming processes, including processes that influence the capacity for individual areas to support aquatic vegetation. For example, increased sediment input from river systems (resulting from increased tree die-off from warmer, drier summers and increased fire occurrence, for example) could increase turbidity. High turbidity decreases light penetration, potentially leading to reduced growth of submerged aquatic vegetation. Increased wave energy and storm strength may result in increased rates of substrate loss and physical damage to plants. In addition, shoreline modifications and increased demand for aquatic lands uses that accompany human population growth will exert pressure on aquatic vegetation in nearshore and littoral areas. Based on the above, the effects of other actions and conditions may lead to a greater risk of impacts to aquatic vegetation than are considered in Subsection 4.6, Vegetation. In addition, the extent to which restoration actions in the analysis area will offset the impacts of climate change and development on aquatic vegetation is unknown. Substantial improvements in the condition of aquatic vegetation may not be realized in the action area over the 50-year time frame of this analysis.

Although Alternative 2 and Alternative 3 would generally reduce the risk of adverse effects on aquatic vegetation compared to Alternative 1 (Subsection 4.6, Vegetation), ongoing and future uses of state-owned and other aquatic lands would continue to pose such risks and may exacerbate the effects of climate change on aquatic vegetation. Notably, the reduction in risk associated with HCP implementation under Alternative 3 would be limited to marine areas.

However, improvements from ongoing and planned programs and projects will likely occur to varying degrees over this time frame and may continue beyond it.

5.3.5 Fish, Aquatic Invertebrates, and Associated Habitats

Subsection 3.8, Fish, Aquatic Invertebrates, and Associated Habitat, describes how past and present conditions have influenced the condition of fish, aquatic invertebrates, and their habitats in Washington State, including conditions resulting from past development and ongoing restoration actions. These current conditions also reflect the effects of climate change to date. The effects of the alternatives on this resource area are described in Subsection 4.8, Fish, Aquatic Invertebrates, and Aquatic Habitat. This subsection considers effects that may occur as a result of the alternatives being implemented in the context of other anticipated future actions, which are described in Subsection 5.2, Future Actions and Conditions.

As noted in Subsection 4.8, Fish, Aquatic Invertebrates, and Aquatic Habitat, the key aspects of habitat for fish and aquatic invertebrates pertinent to this analysis are sediment supply and transport, water and sediment quality, the distribution and condition of aquatic vegetation, and habitat integrity and accessibility (which includes issues related to shading, light, noise, and disturbance). The potential cumulative impacts of the alternatives on substrates and erosional processes, water and sediment quality, and aquatic vegetation are addressed in the preceding subsections. Based on those analyses, the effects of other actions and conditions may lead to a greater potential for adverse effects on habitat conditions for fish and aquatic invertebrates than are considered in Subsection 4.8, Fish, Aquatic Invertebrates, and Aquatic Habitat.

In addition to the previously described effects on substrates and erosional processes, water resources, and vegetation, climate change and urban development have the potential to contribute to cumulative impacts on habitat integrity and accessibility. For example, increases in the incidence of major storm events may lead to increased rates of damage to aquatic lands and the infrastructure associated with uses of those lands. Efforts to repair such damage would entail elevated levels of human activity in nearshore and littoral areas, resulting in increased disturbance and harm of aquatic species (Fredrickson 2009). In riverine ecosystems, changes in hydrology and temperature caused by a changing climate have the potential to negatively impact aquatic ecosystems, with salmonids being especially sensitive (Independent Science Advisory Board [ISAB] 2007). Table 5-1 identifies potential impacts of climate change on different life stages of salmonids, based on an assessment of the impacts of climate change on salmonid species in the Columbia River basin. In addition to the impacts associated with climate change, human population growth will lead to increased demand for uses of state-owned aquatic lands.

Furthermore, the extent to which restoration actions in the analysis area will offset the impacts of climate change and development on fish, aquatic invertebrates, and their habitats is unknown.

Substantial improvements in habitat for these species may not be realized in the action area over the 50-year time frame of this analysis. However, improvements from ongoing and planned programs and projects will likely occur to varying degrees over this time frame and may continue beyond it.

Table 5-1. Potential impacts of climate change on salmon life cycle stages.

Life Stage	Potential Effects of Elevated Temperatures
Egg	1) Lower survival due to changed thermal regime during incubation 2) Increased mortality due to more frequent flood flows as snow level rises 3) Faster embryonic development, leading to earlier hatching 4) Increased maintenance metabolism, leading to smaller fry 5) Lower disease resistance, possibly leading to lower survival
Spring and Summer Rearing	1) Early emergence due to faster yolk utilization 2) Reduced survival rates of smaller fry 3) Increased maintenance metabolism, leading to greater food demand 4) Decreased growth rates if food is limited or if temperatures exceed optimal levels; conversely, growth could be enhanced if food is available and temperatures do not reach stressful levels 5) Increased predation risk if temperatures exceed optimal levels
Overwinter Rearing	1) Lower winter survival for smaller fish at start of winter 2) Increased mortality due to more frequent flood flows as snow level rises 3) Increased metabolic demands in warmer winter temperatures, possibly contributing to lower winter survival if food is limited, or higher winter survival if growth and size are enhanced 4) Lower winter survival due to increased predator activity and/or metabolic demand in warmer winter temperatures

Source: ISAB 2007

Although Alternative 2 and Alternative 3 would generally reduce the risk of adverse effects on habitat for these species compared to Alternative 1 (Subsection 4.8, Fish, Aquatic Invertebrates, and Aquatic Habitat), ongoing and future uses of state-owned and other aquatic lands would continue to pose such risks and may exacerbate the effects of climate change on fish and aquatic invertebrates. Notably, the reduction in risk associated with HCP implementation under Alternative 3 would be limited to marine areas.

5.3.6 Wildlife and Wildlife Habitat

Subsection 3.9, Wildlife and Wildlife Habitat, describes how past and present conditions have influenced the condition of wildlife species and their habitats in Washington State, including conditions resulting from past development and ongoing restoration actions. The effects of the alternatives on this resource area are described in Subsection 4.9, Wildlife and Wildlife Habitat. This subsection considers effects that may occur as a result of the alternatives being implemented in the context of other anticipated future actions, which are described in Subsection 5.2, Future Actions and Conditions.

As noted in Subsection 4.9, Wildlife and Wildlife Habitat, the key aspects of wildlife habitat pertinent to this analysis are the availability of aquatic vegetation and prey species, as well as the integrity and accessibility of habitat (which includes issues related to light levels, noise conditions, and disturbance conditions). The effects of other actions and conditions may lead to a greater potential for adverse effects on wildlife habitat conditions, including Vegetation (Subsection 4.6) and Fish, Aquatic Invertebrates, and Aquatic Habitat (Subsection 4.8) than are considered in Subsection 4.9, Wildlife and Wildlife Habitat.

In addition climate change and development have the potential to contribute to cumulative impacts on habitat integrity and accessibility. The potential for increased disturbance and harm of wildlife species due to the effects of climate change and human population growth would be as described for fish and aquatic invertebrates, above. In their 5-year review of the marbled murrelet, the U.S. Fish and Wildlife Service (2009) concluded that climate change is likely to result in changes to that species' marine environment. While physical changes to the nearshore environment seem likely, much remains to be learned about the magnitude, geographic extent, and temporal and spatial patterns of change, and their effects on coastal and marine species (U.S. Fish and Wildlife Service 2009). In addition, the extent to which restoration actions in the analysis area will offset the impacts of climate change and development on wildlife and their habitats is unknown. Substantial improvements in habitat for these species may not be realized in the action area over the 50-year time frame of this analysis. However, improvements from ongoing and planned programs and projects will likely occur to varying degrees over this time frame and may continue beyond it.

Although Alternative 2 and Alternative 3 are intended to reduce the risk of adverse effects on habitat for these species compared to Alternative 1 (Subsection 4.9, Wildlife and Wildlife Habitat), ongoing and future uses of state-owned and other aquatic lands would continue to pose some level (though less) of effects on habitat in addition to the present and future effects of climate change on wildlife species and their habitats. Notably, the reduction in risk associated with HCP implementation under Alternative 3 would be limited to marine areas.

5.3.7 Cultural Resources

Subsection 3.12, Cultural Resources, describes how past and present conditions have influenced cultural resources in Washington State. These conditions represent effects from many years of development, habitat restoration, and, most likely, indirect effects from climate change. The effects of the alternatives on cultural resources are described in Subsection 4.12, Cultural Resources. This subsection considers effects that may occur as a result of the alternatives being implemented in the context of other anticipated future actions, which are described in Subsection 5.2, Future Actions and Conditions.

As described in Subsection 5.2.1, Climate Change, large-scale shifts in weather patterns are expected to change erosional processes in many areas. Such changes may impact cultural resources. For example, accelerated rates of erosion and avulsion due to increased wave energy and storm strength could expose new archaeological and historical sites, putting them at risk of damage, destruction, or degradation. Similarly, shoreline modifications that accompany human population growth will exert pressure on natural processes of sediment erosion and transport. Based on the above, the effects of other actions and conditions may lead to a greater risk of impacts to cultural resources than are considered in Subsection 4.12, Cultural Resources.

Although Alternative 2 and Alternative 3 would generally reduce the risk of adverse effects on cultural resources compared to Alternative 1 (Subsection 4.12, Cultural Resources), ongoing and future uses of state-owned and other aquatic lands would continue to pose such risks and may exacerbate the effects of climate change on cultural resources. Notably, the reduction in risk associated with HCP implementation under Alternative 3 would be limited to marine areas.

5.3.8 Social and Economic Environment

Subsection 3.13, Social and Economic Environment, describes how past and present conditions have influenced socioeconomic conditions in Washington State. These conditions represent effects from many years of development, habitat restoration, and, most likely, indirect effects from climate change. The effects of the alternatives on the social and economic environment are described in Subsection 4.13, Social and Economic Environment. This subsection considers effects that may occur as a result of the alternatives being implemented in the context of other anticipated future actions, which are described in Subsection 5.2, Future Actions and Conditions.

Population increases and urban development are expected to result in increased demand for uses of state-owned aquatic lands. Such increases will occur statewide but will likely be most acute in areas with the greatest anticipated rates of growth (e.g., Adams, Douglas, Franklin, and Grant counties). Demand will remain high in the Puget Sound region, which is home to most of Washington State’s current and anticipated future population. It is not possible to determine whether increased demand will result in increased or decreased costs for prospective users of state-owned aquatic lands. Any such changes would depend on the decisions of individual users and other landowners and cannot accurately be predicted.

Fredrickson (2009) identified the following potential effects of climate change on uses of state-owned aquatic lands. The lists below are organized by the industries described in Subsection 3.13, Social and Economic Environment.

Aquaculture

- In coastal areas where tracts of state-owned aquatic land are not defined by tidal datums (e.g., Willapa Bay, Grays Harbor), gradual inundation due to rising sea levels may result in water depths too great to support ground-based aquaculture at some sites.
- In areas where boundaries of state-owned aquatic land move with shifting tidal datums (e.g., some Puget Sound tidelands), substrates on newly inundated tidelands may be unsuitable for aquaculture.
- Flooding and heavy precipitation due to the increased incidence of major storm events may
    - damage infrastructure and equipment,
    - contribute to scouring of substrate,
    - uproot in-ground stocks, and
    - interfere with the harvest of in-ground stocks.
- Shoreline erosion may increase turbidity in the water column, negatively affecting shellfish aquaculture.
- Gradual inundation, episodic flooding, and shoreline changes (erosion, accretion, and avulsion) may increase pressure to armor shorelines. Increased shoreline armoring could negatively affect shellfish via increased scouring of substrate due to reflected wave energy.
- Warmer water temperatures may lead to increased incidence of harmful algal blooms.
- Ocean acidification will have direct negative effects on larval, juvenile, and adult shellfish, and may indirectly affect shellfish by reducing phytoplankton abundance (Fredrickson 2009).

Huppert et al. (2009) also noted that shellfish production in Washington State may be negatively impacted by increasing ocean temperatures and acidity, shifts in disease and growth patterns, and more frequent harmful algal blooms.

Forestry

- As sea levels rise, new areas may become available for log booming and storage.
- Shoreline changes (e.g., mass wasting in bluff systems) could render existing sites unsuitable.
- Environmental impacts of log booming and storage may be exacerbated by the effects of climate change. For example, storm surges may carry wood waste over a greater area, including adjacent uplands. Also, ocean acidification and increased water temperature may place additional stress on nearshore species and habitats affected by log booming and storage. Such impacts could hinder the ability of the Aquatics Division to ensure environmental protection of state-owned aquatic lands that are used for this purpose. If this occurs, Washington DNR may face additional pressure to curtail the authorization of log booming and storage on state-owned aquatic lands (Fredrickson 2009).

Recreation

- Docks and piers may need to be reconfigured or rebuilt to accommodate higher water levels resulting from sea level rise.
- Increased storm frequency and intensity could lead to elevated rates of damage to overwater structures.
- Shoreline changes (increased erosion, avulsion, accretion) could damage overwater structures and surrounding areas.
- Over the long term, warmer air temperatures and drier summers could increase the demand for overwater structures associated with recreational activities (e.g., private recreational docks, marinas, boat ramps).
- Shoreline changes and increased sediment input from river systems (resulting from increased tree die-off from warmer, drier summers and increased fire occurrence, for example) could increase the need for dredging at some marinas. Conversely, the need for dredging could be reduced by rising sea levels (Fredrickson 2009).

Commerce

- Terminals, piers, and wharves may need to be reconfigured or rebuilt to accommodate higher water levels resulting from sea level rise.
- Shoreline changes and increased sediment input from river systems (resulting from increased tree die-off from warmer, drier summers and increased fire occurrence, for example) could

increase the need for dredging at some facilities. Conversely, the need for dredging could be reduced by rising sea levels (Fredrickson 2009).

The viability of marine ports depends on their ability to move goods to and from inland locations quickly and efficiently along the transportation chain. If the transportation networks that serve Washington are unable to adapt to climate change impacts, the adaptive capacity of port terminals may be irrelevant (Fredrickson 2009).

Based on the above, climate change could result in increased costs under all EIS alternatives for operators of facilities associated with any of the industries considered in Subsection 4.13, Social and Economic Environment. Under all alternatives, some cost increases may be offset by improved ecosystem function and resilience resulting from the implementation of habitat protection and restoration programs throughout the state. Additional gains in ecosystem function and resilience would be realized through the implementation of the HCP Operating Conservation Program under the action alternatives. The extent to which any of these actions may offset increased materials and operational costs is unknown.

Compared to Alternative 1, the two action alternatives could further add to these costs, as users of state-owned aquatic lands could incur increased material and installation costs associated with replacement decking as well as operational costs. Based on the above, the effects of other actions and conditions may lead to worse regional and local economic conditions and a greater risk of impacts to economic activity than are considered in Subsection 4.13, Social and Economic Environment. It is noteworthy that under Alternative 3, the potential adverse effects would be limited to counties that include or border marine areas, whereas under Alternative 2, the potential adverse effects would apply to marine and freshwater areas.

5.3.9 Environmental Justice

Subsection 3.14, Environmental Justice, describes how past and present conditions have influenced environmental justice in Washington State. These conditions represent effects from many years of development, habitat restoration, and, most likely, indirect effects from climate change. Subsection 3.14, Environmental Justice, also describes the methods for identifying environmental justice user groups and communities of concern. For this analysis, user groups and communities of concern include those associated with the industries most likely to be affected by changes in the rules that govern uses of state-owned aquatic lands (i.e., shellfish aquaculture, forestry, recreation, or commerce) in counties identified as having an elevated risk of disproportionate effects on low-income and/or minority populations. The effects of the alternatives on the social and economic environment are described in

Subsection 4.14, Environmental Justice. This subsection considers effects that may occur as a result of the alternatives being implemented in the context of other anticipated future actions, which are described in Subsection 5.2, Future Actions and Conditions.

As described in Subsection 5.3.7, Social and Economic Environment, climate change could result in increased costs for users of state-owned aquatic lands. Based on that analysis, the effects of other actions and conditions may lead to greater costs for user groups and communities of concern than what is considered in Subsection 4.14, Environmental Justice, for all alternatives. This could be a particular concern in Pacific County, Grays Harbor County, and Mason County. These counties are identified in Subsection 4.14, Environmental Justice, as having an elevated risk of disproportionate effects on low-income populations due to increased operating expenses at aquaculture facilities under the action alternatives. Overall, potential for adverse effects on minority or low-income populations in the analysis area may increase under Alternative 2 and Alternative 3 in comparison to Alternative 1, but that increase would be less under Alternative 3 since the HCP would only apply to uses in marine areas.

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7. DISTRIBUTION LIST

In addition to entities and individuals presented in the distribution list below, the Services and Washington DNR have notified state-owned aquatic lands leasees of the draft HCP and NEPA document. For information on the leasees who were notified, contact Mr. David Palazzi of the Washington DNR at David.Palazzi@dnr.wa.gov.

Federal and State Agencies and Parks

Birch Bay State Park

Gifford Pinchot National Forest

Governor's Salmon Recovery Office

Mount Baker Snoqualmie Olympic National Forest

National Oceanic and Atmospheric Administration Fisheries

National Park Service

North Cascades National Park

Olympic National Park

Puget Sound Partnership

Salmon Recovery Funding Board

San Juan Island National Historic Park

Seattle City Light

U.S. Army Corps of Engineers

U.S. Army Corps of Engineers, Seattle District

U.S. Army Corps of Engineers, Walla Walla District

U.S. Department of Agriculture Forest Service

U.S. Department of Agriculture Wildlife Services

U.S. Environmental Protection Agency

U.S. Environmental Protection Agency Region 10

U.S. Fish and Wildlife Service

Washington Department of Archaeology and Historic

Washington Department of Ecology

Washington Department Fish and Wildlife

Washington Department of Health

Washington Governor's Office

Washington Office of Financial Management

Washington Parks and Recreation

Washington State Department of Agriculture

Washington State Department of Ecology

Washington State Department of Fish and Wildlife

Washington State Department of Natural Resources

Washington State Department of Transportation

Washington State Department of Transportation - Ferries
Washington State Recreation and Conservation Office

Organizations and Associations

10,000 Years Institute
ACDivers
Adolphson and Associates
Alcoa Intalco Works
Alpha Marine Installers
American Bird Conservancy
American Rivers North West
Anchor Environmental
Audubon Washington
Bainbridge Island Land Trust
Ballard Diving and Salvage
Bay Center Mariculture Company
Bellingham Bay Action Team
Bellingham Marine Industries
Big Claw Maritime
Blackwater Marine
Buse Timber and Sales
Cadman Seattle and Lehigh Northwest Cement
Cascade Chapter, Sierra Club
Cascade Land Conservancy
Center for Environmental Law and Policy
Center for Land Management
Center for Salish Community Strategies
Central Basin Audubon Society
Chehalis River Basin Land Trust
Chehalis River Council
Chums of Barker Creek
Citizens for a Healthy Bay
Climate Solutions
Coast Seafoods Company
Columbia Riverkeeper
Confluence Environmental Company
ConocoPhillips Ferndale Refinery
Conservation Northwest
Ducks Unlimited, Inc.

Dungeness River Audubon Center
Dungeness River Management Team
East Lake Washington Audubon Society
Ecological Solutions, Inc.
Ecosystem First, LLC
Elliott Bay Marina
EnviroVision Corporation
Fidalgo Dive Services
Forterra
Foss Maritime Company
Friends of Skagit County
Friends of the Cedar River Watershed
Friends of the Columbia Gorge
Friends of Grays Harbor
Friends of the Hylebos Wetlands
Friends of the San Juan Islands
Global Diving and Salvage
Grays Harbor Audubon Society
Halsan Frey, LLC
Hargit Marine Services
Henderson Bay Shoreline Association
Highlands Associates
Homeport Properties, Inc.
Hood Canal Environmental Council
International Marine Association Protecting Aquatic Life
Jefferson Land Trust
Kitsap Audubon Society
Kitsap Diving Association
Kittitas Audubon Society
Kulshan Services LLC
Liveaboard Association of Puget Sound
Long Live the Kings
Lower Hood Canal Watershed Coalition
Marine Floats Corporation
Marine Restoration & Construction
Mount Adams Resource Stewards
Northwest Marine Trade Association
Nordic Spirit

North Cascades Audubon Society
North Central Washington Audubon Society
North Forty Lodging LLC
North Olympic Land Trust
North Olympic Salmon Coalition
Northern Marine Salvage
Northwest Demolition and Dismantling
Northwest Docks
Northwest Fly Anglers
Northwest Marine Trade Association
Northwest Treasure Supply
Norton Arnold and Company
Olympic Coast Marine Sanctuary
Olympic Environmental Council
Olympic Forest Coalition
Olympic Peninsula Audubon Society
Outcomes by Levy LLC
Pacific Coast Joint Venture
Pacific Coast Shellfish Growers Association
Parametrix, Inc.
People for Puget Sound
Perkins Coie
Pilchuck Audubon Society
Preserve Our Islands
Protect Our Shorelines
Puget Creek Restoration Society
Puget Sound Action Team
Puget Soundkeeper Alliance
Rocky Mountain Elk Foundation
Rubber Manufacturers Association
San Juan Beachwatchers Program
San Juan Enterprises
San Juan Marine Resources Committee
Seattle Audubon Society
Seattle Shellfish LLC
Shared Salmon Strategy
Skagit Conservation District
Skagit Fisheries Enhancement Group

Skagit Land Trust
Snohomish County Marine Resources Committee
Sound Ecological Services
Southwest Puget Sound Watershed Council
Spadoni Brothers/Hooker Marine Salvage
Spokane Audubon Society
Stilly-Snohomish Fisheries Enhancement Task Force
Tahoma Audubon Center
Taylor Resources, Inc.
TEC, Inc.
Terralogic GIS
The Nature Conservancy
The Nature Conservancy - Ellsworth Nature Reserve
The Puget Creek Restoration Society
The Trust for Public Land
The Undersea Company
The Xerces Society
Thurston Conservation District
Underwood Conservation District
URS Corporation
Vancouver Audubon Society
Vashon-Maury Island Land Trust
Washington Biodiversity Council
Washington Cattlemen's Association
Washington State Conservation Commission
Washington Council of Trout Unlimited
Washington Environmental Council
Washington Fly Fishing Club
Washington Forest Protection Association
Washington Native Plant Society
Washington Ports
Washington Public Ports Association
Washington State Association of Counties
Washington Trout
Washington Water Trust
Washington Yacht Club
Waterfront Construction
West Coast Divers and Marine

Whidbey Audubon Society

Washington Waterfowl Association

Whatcom Conservation District

Whatcom Land Trust

Native American Tribes

Colville Confederated Tribes

Confederated Tribes of the Chehalis

Confederated Tribes and Bands Yakama Nation

Cowlitz Indian Tribe

Hoh Tribe

Jamestown S'Klallam Tribe

Kalispel Tribe of Indians

Lower Elwha Klallam Tribe

Lummi Nation

Makah Tribe

Muckleshoot Indian Tribe

Natural Resources Skagit Coop, Swinomish

Nisqually Tribe

Nooksack Tribe

Port Gamble S'Klallam

Point No Point Treaty Council

Puyallup Tribe

Quileute Tribe

Samish Indian Nation

Sauk-Suiattle Tribe

Shoalwater Bay Tribe

Skokomish Tribe

Snohomish Tribe of Indians

Snoqualmie Tribe

Spokane Tribe of Indians

Squaxin Island Tribe

Stillaguamish Tribe

Suquamish Tribe

Tulalip Tribes

Upper Columbia United Tribes

Upper Skagit Tribe

Yakama Indian Nation

Yakima Nation Department of Natural Resources

Yakima Nation Fisheries

State Counties, Councils, and Commissioners' Offices

Adams County

Asotin County Commissioners' Office

Benton County Commissioners' Office

Benton County Planning Department

Bremerton-Kitsap County Health District

Chelan County Commissioners' Office

Chelan County Planning Department

Chelan County Public Works

Clallam County Commissioners' Office

Clallam County Marine Resource Committee

Clallam County Planning Director

Clark County Commissioners' Office

Clark County Department of Community Development

Columbia County Commissioners' Office

Cowlitz County Commissioners' Office

Douglas County Commissioners' Office

Ferry County Commissioners' Office

Ferry County Planning Department

Franklin County Commissioners' Office

Franklin County Planning Department

Garfield County Commissioners' Office

Grant County Commissioners' Office

Grays Harbor County Commissioners' Office

Island County Commissioners' Office

Island County Planning Department

Jefferson County Commissioners' Office

Jefferson County Marine Resource Committee

King County Council

King County Metro, Wastewater Treatment Division

King County Department of Natural Resources, Water and Land Resources

King County Department of Natural Resources - Parks

Kitsap County Commissioners' Office

Kitsap County Department of Community Development

Kitsap Health Districts

Kittitas County Commissioners' Office

Klickitat County Commissioners' Office

Klickitat County Planning
Lewis County Commissioners' Office
Lincoln County Commissioners' Office
Lincoln County Planning Department
Mason County Commissioners' Office
Mason County Planning
Okanogan County Commissioners' Office
Okanogan County Planning Department
Pacific County Commissioners' Office
Pacific County Planning
Pend Oreille County Commissioners' Office
Pend Oreille County Planning Department
Pierce County Council
Pierce County Public Works, Environmental Service, Water, Habitat Protection
San Juan County Council
Skagit County Commissioners' Office
Skagit County Planning Department
Skagit County Public Works
Skamania County Commissioners' Office
Snohomish County Council
Snohomish County Department of Public Works
Spokane County Commissioners' Office
Stevens County Commissioners' Office
Stevens County Planning Department
Thurston County Commissioners' Office
Thurston County Planning Department
Wahkiakum County Commissioners' Office
Wahkiakum County Planning Department
Walla Walla County Commissioners' Office
Walla Walla County Planning Department
Whatcom County Council
Whatcom County Planning and Development
Whatcom County Planning Department
Whitman County Commissioners' Office
Whitman County Planning Department
Yakima County Commissioners' Office

Cities and Towns

City of Aberdeen

City of Airway Heights
City of Algona
City of Arlington
City of Auburn
City of Bellingham
City of Bothell
City of Bremerton
City of Buckley
City of Burien
City of Burlington
City of Carnation
City of Cashmere
City of Centralia
City of Chelan
City of Chewelah
City of Clarkston
City of Cle Elum
City of College Place
City of Colville
City of Cosmopolis
City of Dayton
City of Duvall
City of Ellensburg
City of Elma
City of Enumclaw
City of Fife
City of Gig Harbor
City of Grand Coulee
City of Grandview
City of Hoquiam
City of Issaquah
City of Kenmore
City of Kennewick
City of Kent
City of Langley
City of Longview
City of Lynnwood
City of Maple Valley

City of McCleary
City of Mercer Island
City of Mill Creek
City of Milton
City of Monroe
City of Montesano
City of Mount Vernon
City of Mountlake Terrace
City of Mukilteo
City of Newport
City of Normandy Park
City of Oak Harbor
City of Ocean Shores
City of Olympia
City of Orting
City of Othello
City of Pacific
City of Pasco
City of Pateros
City of Port Orchard
City of Port Townsend
City of Poulsbo
City of Prosser
City of Puyallup
City of Quincy
City of Redmond
City of Renton
City of Ridgefield
City of SeaTac
City of Seattle
City of Sedro-Woolley
City of Sequim
City of Snohomish
City of Snoqualmie
City of South Bend
City of Spokane
City of Sultan
City of Tacoma

City of Woodland
Seattle City Attorney's Office
Town of Friday Harbor
Town of La Conner
Town of Millwood
Town of Naches

Elected officials

Representative Adam Smith
Representative Cathy McMorris Rogers
Representative Dave Reichert
Representative Denny Heck
Representative Jaime Herrera-Beutler
Representative James McDermott
Representative Richard "Doc" Hastings
Representative Rick Larsen
Senator Maria Cantwell
Senator Patty Murray

Media

Associated Press (AP) - Seattle Bureau
Capital Press
Capitol Press
Central Kitsap Reporter
Chinook Observer
Daily Journal of Commerce
Fox News Channel
KING-TV
KIRO-TV
Kitsap Sun
KOMO-TV
KSFC-FM
Northwest Public Radio
Peninsula Daily News
San Juan Islander
Seattle Post Intelligencer
Seattle Times
Skagit Valley Herald
South Beach Bulletin

The Chronicle
The Daily News
The Daily World
The Olympian
The Pacific County Press
The Reflector
The Spokesman-Review - Coeur d'Alene Bureau
The Willapa Harbor Herald
Tri-City Herald
Walla Walla Union-Bulletin
Wenatchee World
Yakima Herald-Republic

Ports

Port of Allyn
Port of Anacortes
Port of Bellingham
Port of Benton
Port of Bremerton
Port of Brownsville
Port of Camas Washougal
Port of Clarkston
Port of Columbia
Port of Coupeville
Port of Edmonds
Port of Everett
Port of Friday Harbor
Port of Grays Harbor
Port of Hoodsport
Port of Ilwaco
Port of Indianola
Port of Kalama
Port of Kennewick
Port of Keyport
Port of Klickitat
Port of Longview
Port of Manchester
Port of Olympia
Port of Port Angeles

Port of Port Townsend

Port of Poulsbo

Port of Ridgefield

Port of South Whidbey/Langley

Port of Shelton

Port of Silverdale

Port of Skagit County

Port of Skamania County

Port of South Whidbey Island

Port of Tacoma

Port of Vancouver

Port of Wahkiakum County No 2

Port of Walla Walla

Port of Whitman County

Port of Willapa Harbor

Port of Woodland

Water Resource Inventory Areas

Grays Harbor County WRIA 22, 23

Hood Canal Coordinating Council WRIA 14-17

Island County Public Works WRIA 6

King County WRIA 8

King County WRIA 9

Kitsap County WRIA 15

Klickitat County WRIA 29, 30

Lower Columbia Fish Recovery – Board of Directors. WRIA 25-29

Nisqually River Salmon Recovery WRIA 11

North Olympic Peninsula LE WRIA 17-20

Pacific County WRIA 24

Pend Oreille Conservation District WRIA 62

Pierce County WRIA 10, 12

Quinault Indian Nation, WRIA 21

San Juan County WRIA 2

Skagit Watershed Council WRIA 3, 4

Snake River Salmon Recovery Board WRIA 32, 33, 35

Snohomish WRIA 7

Stillaguamish Lead Entity WRIA 5

Upper Columbia--Colville Tribe WRIA 49

Upper Columbia--Foster Creek Con. Dist. WRIA 44, 5

Upper Columbia--Okanogan County WRIA 48

WRIA 15 Watershed Planning Unit

WRIA 17 Watershed Planning Unit

WRIA 19 Planning Unit

Yakima River Basin Salmon Recovery Board WRIA 37-39

Universities

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GLOSSARY OF KEY TERMS

Note: These definitions are specific to the Washington DNR Aquatic Lands HCP. Additional definitions may exist in other contexts.

Abandoned Vessel A vessel 1) that has been left, moored, or anchored in the same area without the express consent, or contrary to the rules, of the owner, manager, or lessee of the aquatic lands below or on which the vessel is located for either a period of more than 30 consecutive days or for more than a total of 90 days in any 365-day period, and 2) for which the owner is not known or cannot be located, or the owner is known but is unwilling to take control of the vessel.

Accretion A natural or artificial process whereby the size of a beach, spit, bar, or flat gradually increases through the deposition of sand, gravel, or sediment particles.

Adaptive Management A formal process for 1) evaluating the current status of resources, 2) evaluating the effectiveness of rules and guidance necessary to meet the goals and objectives for the protection, maintenance, and enhancement of those resources, and 3) based on the findings of that evaluation, making any necessary adjustments to management practices to achieve resource objectives.

Adfluvial A fish life history strategy in which spawning and juvenile rearing take place in rivers or streams, with adults living in lakes or reservoirs.

Algae Photosynthetic, primarily aquatic organisms that lack lignin and xylem; algae include seaweeds as well as microscopic phytoplankton.

Algal Bloom The rapid reproduction of microscopic algae leading to large, dense populations.

Ambient Light Natural light that is not filtered or blocked by water, structures, or organisms.

Anadromous A fish life history strategy in which spawning and juvenile rearing take place in fresh water, followed by migration to salt water for the adult phase.

Anaerobic A situation in which molecular oxygen is virtually absent from the environment.

Anthropogenic Caused by humans.

Aquaculture The culture and/or farming of food fish, shellfish, and other aquatic plants and animals in fresh water, brackish water, or salt water areas; for this analysis, shellfish aquaculture includes the operations, facilities, and structures associated with the commercial planting and harvesting of shellfish.

Aquatic Land All tidelands, shorelands, harbor areas, and the beds of navigable waters, including lands owned by the State and those owned by other public or private entities.

Aquatic Vegetation Plants and algae that either require or tolerate partial or total submergence in water and that are attached to or rooted in the substrate for most of each day (in marine environments) or most of the growing season (in freshwater environments). See also native aquatic vegetation.

Archaeological Resource Any site, object, structure, artifact, implement, or location of prehistorical or archaeological interest, whether previously recorded or still unrecognized, including, but not limited to, those pertaining to prehistoric and historic American Indian or aboriginal burials, campsites, dwellings, and habitation sites, including rock shelters and caves, their artifacts and implements of culture such as projectile points, arrowheads, skeletal remains, grave goods, basketry, pestles, mauls and grinding stones, knives, scrapers, rock carvings and paintings, and other implements and artifacts of any material that are located in, on, or under the surface of any lands or waters owned by or under the possession, custody, or control of the State of Washington or any county, city, or political subdivision of the State.

Archaeological Site A resource that represents a physical record of past human activity from the pre-contact period (i.e., before Euro-American entry into the region for exploration and trade, roughly 200 years ago) or the historical period.

Armoring	Physical modifications to the shoreline implemented to control erosion or flooding, or to limit shoreline migration at a specific location.
Atmospheric Deposition	The addition of nitrogen compounds to water bodies from atmospheric sources.
Authorization Agreement	A generic term for a legal instrument authorizing the use of state-owned aquatic lands. Authorizations include leases, easements (also called rights-of-way), and licenses such as rights of entry and waterway permits.
Baseline Condition	The biological, chemical, and physical conditions in which a project or action will be located, and to which impacts will occur. Baseline condition is the standard against which anticipated future conditions and actions are compared.
Basin	A part of the surface of the earth occupied by a drainage system, consisting of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.
Beach Nourishment	The process of replenishing a beach, either naturally by longshore transport or artificially by deposition of dredged material.
Bedlands	Submerged lands that lie waterward of adjoining tidelands or shorelands and below the line of extreme low tide or the line of navigability.
Benthic	Of or referring to the region of a waterbody that includes the bottom substrate, the zone of substrate-water interface, and the organisms that dwell within or on the substrate.
Bioaccumulation	An increase in the concentration of a chemical within the tissues of an organism over time.
Biodiversity	The number and variety of species within a given ecosystem or region. Biodiversity is often used as an indicator of the health of an ecosystem, with higher diversity usually meaning greater health.

Biological Opinion	A scientific judgment of whether a project described in a biological assessment is likely to result in jeopardy for threatened and endangered species and their habitat. A biological opinion can include conservation recommendations to avoid or minimize possible adverse effects; impose reasonable and prudent measures to minimize harmful impacts; and require monitoring and reporting.
Biomass	The amount of living or very recently dead organic matter in a given area.
Biota	All of the living organisms of a given area or time.
Boat Launch	An incline or short roadway extending beyond the ordinary low water line to provide access for vehicles launching or retrieving boats, distinguished from a boat ramp by the presence of mechanical tackles or lifts to move boats into and out of the water.
Boat Ramp	An incline or short roadway extending beyond the ordinary low water line to provide access for vehicles launching or retrieving boats.
Boathouse	A building, usually built partly over water, for housing or storing boats. Boathouses are commonly attached to or part of a series of docks.
Boulder	A rock with a diameter greater than 10 inches.
Brackish Water	Water with salinities greater than those found in fresh water, but less than full sea water. Brackish water naturally occurs in estuaries.
Breakwater	An offshore structure used for dissipating the force of waves as they approach a marina, harbor, or beach. Breakwaters typically extend perpendicular from the shore into the water, redirecting currents or creating sheltered moorage.
Broadcast Spawning	A reproductive strategy in which both eggs and sperm are expelled into the water at the same time and which relies on proximity for fertilization.
Bulkhead	A form of armoring generally built on private lands above the ordinary high water line (i.e., outside the area of state ownership).

Bycatch Aquatic organisms caught in a fishery that are not the target species or individuals of the target species too small or of the wrong gender to be legally kept.

Candidate Species A species that is actively being considered for listing as endangered or threatened at the Federal or state level.

Channel A natural or artificial waterway of perceptible extent that either periodically or continuously contains moving water, or that forms a connecting link between two bodies of water.

Channel Incision The process of a stream or river cutting into the substrate and lowering the level of the waterbody, undercutting banks, and making flood events less frequent or halting them altogether.

Cobble Rocks with a diameter between 3 and 10 inches.

Commissioner's Order A document through which the Commissioner of Public Lands withdraws certain parcels of state-owned aquatic lands from the option of leasing, or prohibits or limits specific types of use, thereby establishing protection habitat areas determined by Washington DNR to have significant natural value.

Community Any naturally occurring group of species inhabiting a common environment, interacting with each other especially through food relationships, and relatively independent of other groups.

Compliance Monitoring Monitoring conducted to determine the degree to which authorized users of state-owned aquatic lands are adhering to HCP conservation measures.

Confluence The point where two or more water bodies flow together.

Connectivity Proximity of acceptable habitat to other areas of acceptable habitat sufficient to allow species to travel from one area of acceptable habitat to another. Also can refer to a connection between parts of a process such as sediment transport between feeder bluffs and beaches.

Consolidated Habitat Habitat where the substrate is solid material such as bedrock, or where the material is so interlocked that it is not mobile.

Core Remaining Habitat for At-risk HCP-covered Species A set of lands that would receive special protection under the Aquatic Lands HCP, defined as locations of known habitat meeting all three of the following criteria:

1. DNR management authority can be confirmed either on or immediately adjacent to the habitat.
2. The species in question is ESA-listed and/or state-listed as threatened or endangered and/or has a state rank of S1 or S2, as defined by the Washington Natural Heritage Program.
3. The species in question has a relatively small geographic range, or discrete documented habitat locations are known to fulfill critical life history requirements for the species.

Covered Activities Specific activities that are authorized or conducted by Washington DNR on state-owned aquatic lands and for which Washington DNR is applying for ITPs.

Covered Lands Lands directly owned by the State of Washington and managed by Washington DNR that underlie navigable fresh, marine, and estuarine waters within the State of Washington.

Covered Species Species of fish and wildlife that occur on state-owned aquatic lands and that might be affected by activities that Washington DNR conducts or authorizes.

Critical Habitat Specific geographic areas designated by NMFS and USFWS. Critical habitat designations include those areas occupied by threatened and endangered species at the time of their listing, which contain the physical and biological features essential to the conservation of the species.

Cubic Feet Per Second A measure of water flow expressed as the number of cubic feet of water that flows past a given point in one second.

Cultural Resources	Sites, buildings, objects, structures, or districts that provide evidence of, or reflect, significant human activities. Cultural resources also play an active part in the current or traditional cultural practices of ethnic groups in Washington State.
Cumulative Impacts	Per 40 CFR 1508.7, "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions."
Current	The flow of water.
Delta	A low-lying landform at the confluence of a river and a larger waterbody. Deltas are formed by the deposition of the sediment carried by the river.
Deposition	The deposit of materials (for example, sediment or wood waste) in an area. Deposition can occur through natural means such as wave action or currents, or through human-induced means.
Depositional Area	A portion of a waterbody where suspended sediment is deposited.
Derelict Fishing Gear	Fishing gear (e.g., pots, nets, lines, hooks) that has been abandoned underwater.
Derelict Structure	A structure, such as treated wood pilings, vessels, and equipment, no longer used as part of the permitted use at a use authorization site, or at the termination of the authorization.

Derelict Vessel

A vessel for which the controlling owner is known and can be located, and that

1. Has been moored, anchored, or otherwise left in the waters of the state or on public property
2. Has been left on private property without authorization of the owner
3. Has been left for a period of 7 consecutive days, and
   a. is sunk or in danger of sinking,
   b. is obstructing a waterway, or
   c. is endangering life or property.

Desalinization

The removal of salts from seawater for the purpose of rendering the water drinkable or otherwise usable for humans.

Detritus

Organic waste material from decomposing dead plants or animals.

Dike

A bank, usually of earth, used to confine or control water. A dike differs from a levee in that it protects land that would otherwise be continuously underwater.

Dissolved Oxygen

The amount of gaseous oxygen dissolved in the water column.

Distinct Population Segment

Under the ESA, the term "species" includes any subspecies of fish, wildlife, or plants, and any "distinct population segment" of any species of vertebrate fish or wildlife that interbreeds when mature. The ESA thus considers a distinct population segment of vertebrates to be a "species." Under NMFS policy for Pacific salmon, a population or group of populations is considered a distinct population segment if it represents an evolutionarily significant unit of the biological species.

Disturbance

A temporary change in average environmental conditions that causes a pronounced change in an ecosystem.

Dock

A structure used by boats and ships for taking on or landing cargo or passengers, typically attached to shore via fixed piers with walkways or gangways. Docks can be floating (i.e., able to rise or fall with water level fluctuations) or raised, and are supported by various arrangements of pilings, floats, or both.

Dolphin	A structure consisting of multiple pilings lashed together and used for moorage, as protection, or to mark boundaries.
Dredge	To deepen by removing substrate material and depositing it in another location. Also, the mechanical or hydraulic equipment used for such excavation.
Dredge Spoils	The piles of sediment or other materials removed through the process of dredging and deposited in a new location.
Dry Dock	A structure used for building, repairing, or deconstructing vessels too large to be pulled up onto land. Dry docks are floated under the vessel to be worked on and then raised to lift the vessel out of the water.
Dynamic Equilibrium	The balancing point at which movement in one direction is equal to movement in the opposite direction. Movement continues but there is no net gain in any direction.
Ecological Services	The benefits to humans arising from the ecological functions of healthy ecosystems.
Ecosystem	The combination and interaction of all biotic and abiotic factors in an area, usually delineated by natural geographic barriers.
Effectiveness Monitoring	Monitoring conducted to determine if measures implemented for the protection, maintenance, and enhancement of resources have the desired effect.
Effluent	Wastewater, treated or otherwise.
Embayment	An indentation of the shoreline.
Emergence	For salmon, the emergence of salmon fry from the gravel of a red; the point in salmonid life histories where they change from larva to fry.
Emergent Vegetation	Aquatic plants that are rooted in the water but extend most of their form above the water.

Encumbrance	A right, other than an ownership interest, to a property, restricting the ability of others to use the property. Leases and other use authorizations issued by Washington DNR represent encumbrances on state-owned aquatic lands.
Endangered Species	Any species that is in danger of becoming extinct throughout all or a significant portion of its range.
Enhancement	The improvement of existing habitat or the addition of new habitat through restoration.
Entrainment	The process by which surface sediment is incorporated into a fluid flow (such as air, water, or even ice) as part of the operation of erosion.
Erosion	The changing of a surface by mechanical action, friction, thermal expansion, contraction, or impact.
Estuary	The region near a river mouth where fresh water mixes with salt water to create brackish water. Includes the tidally influenced part of a river.
Eutrophication	The process of nutrient enrichment in a waterbody. Eutrophic waters are usually oxygen poor and highly turbid.
Evolutionarily Significant Unit (ESU)	As employed by NMFS to identify distinct population segments of Pacific salmon under the ESA, a population that is substantially reproductively isolated from other population units of the same species, and that represents an important component in the evolutionary legacy of the species.
Exposed	A term describing a section of coastline that is not sheltered from ocean waves and frequently or continually contends with strong waves.
Extreme High Tide	The highest high tide recorded during a given period.
Extreme Low Tide	The lowest low tide recorded during a given period.
Fecal Coliform Bacteria	Bacteria found in the intestinal tract of animals and excreted from the body in feces. Levels of fecal coliform bacteria in waterbodies are used as an indicator of fecal contamination in the water and can lead to shellfish harvesting closures.

Fecundity The potential reproductive capacity of an organism or population.

Federally Listed Species formally listed as threatened or endangered under the Federal Endangered Species Act; designations are made by the USFWS or NMFS.

Fetch The distance over unobstructed open water on which waves are generated by a wind having a constant direction and speed.

Fill Soil, rock material, trash, or other debris used to extend the margins of land into a waterbody, or to convert wetlands into terrestrial lands. Fill is usually protected on the waterward margin by bank armoring.

Also, the transformation of aquatic land into terrestrial land by dumping rock, trash, dirt, or other materials into the water close to a shoreline until the substrate has been raised above the waterline.

Filter Feeder An animal that obtains food by filtering the water column through a membrane and straining out plankton and organic particles. Also referred to as a suspension feeder.

Fine Sediment A type of unconsolidated habitat consisting of a mixture of silt and clay.

Finfish Fish with fins. The term is used to separate fish with fins from shellfish, jellyfish, starfish, and any other aquatic organism that might otherwise be lumped under the term “fish.”

Fjord A long, narrow, marine waterbody with relatively steep sides carved by glacial activity.

Flats Areas of gently sloping shores that contain fine to coarse unconsolidated sediments. Also referred to as mud flats, salt flats, or tidal flats.

Float An anchored floating platform not attached to shore and used for recreation by swimmers or for temporary boat moorage.

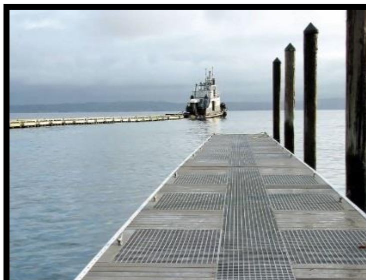
Floating Aquaculture An aquaculture technique that involves placing shellfish on longlines, trays, baskets, or nets that are suspended from floats or rafts so that they hang below the surface of the water.

Floating Bog	A mass of floating vegetation (algae, aquatic plants, grasses, trees) that is not rooted to a lakebed. Floating bogs can reach several acres in size and change location as they are pushed by waves, wind, and currents.
Floating Home	A house placed upon a barge or similar flat-bottomed structure incapable of self-propulsion. Floating homes are typically moored to pilings, with a gangway or dock providing access to the home from the shoreline.
Floodplain	A flat or nearly flat lowland that borders a stream or river and is covered by its waters when it is at flood stage.
Flow Regime	The frequency, magnitude, duration, and timing of high and low flows, as well as the rate of change and interannual variation of streamflow.
Flushing	The replacement of old water with new water through inputs or tidal cycles.
Fluvial	A salmonid life history strategy in which spawning and juvenile rearing take place in small freshwater streams, followed by migration to larger rivers for the adult phase.
Forage Fish	Small fish that breed prolifically and serve as food for predatory fish.
Fouling	The growth of invertebrates and/or algae on underwater structures or shellfish.
Freshwater Ecosystem	A biological community and associated physical environment in an area of water with a very low content of dissolved salt, as opposed to brackish water or salt water. For this analysis, freshwater ecosystems consist of the lacustrine ecosystem and the riverine ecosystem.
Freshwater Wetland	A riverine or lacustrine wetland.
Fry	The lifestage of a salmonid after emerging from the redd and before leaving the natal stream to migrate to another waterbody.
Gangway	A narrow ramp, usually with railings, that connects a dock to piers or to the shore. Also referred to as a walkway.

Geomorphology The study of the forms of land and the processes producing them.

Grain Size The size of soil or rock particles that make up the substrate at a given location.

Grating Materials shaped in the form of grids, grates, lattices, etc., typically employed to allow the passage of light through the surfaces of overwater structures.


Example of a grated deck surface

Gravel Substrate particles with diameters between approximately 0.08 inch and 3 inches.

Ground-based Aquaculture An aquaculture technique that involves growing shellfish directly on or in the substrate (bottom culture), in bags laid on racks or directly onto the substrate (bag culture), or on lines staked into the ground to raise the shellfish above the substrate (longline culture).

Groundwater Water that collects or flows beneath the Earth's surface, filling the porous spaces in soil, sediment, and rocks. Groundwater originates from rain and from melting snow and ice and is the source of water for aquifers, springs, and wells.

Groundwater Recharge The movement of water from the surface to an underground supply.

Habitat The natural environment in which an organism lives, or the physical environment that surrounds a population.

Habitat Conservation Plan (HCP) An implementable conservation program for the long-term protection and benefit of a species in a defined area; required as part of a section 10 incidental take permit application under the Endangered Species Act.

Hard Armoring Materials, such as riprap, sea walls, bulkheads, and breakwaters that deflect wave energy and block erosion.

Harm	A form of take of ESA-listed species. USFWS defines harm to include significant habitat modification or degradation that actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, and sheltering. NMFS' definition of harm includes significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, spawning, migrating, rearing, and sheltering.
Heavy Metal	A metallic element that is toxic to organisms. Some heavy metals are necessary to organisms at low concentrations and toxic at high concentrations (for example, iron, copper, zinc) and others are toxic at any concentration (for example, lead, mercury, plutonium).
Herbivore	An organism that primarily feeds on plants and/or algae.
Higher High Water	In areas with two tidal cycles per day, the higher of the two high waters.
Historic Archaeological Resource	A property that is listed in or eligible for listing in the Washington State Register of Historic Places or the National Register of Historic Places as defined in the National Historic Preservation Act of 1966, as amended.
Historic Site	A site, area, structure, or other evidence of human activities illustrative of the origins, evolution, and development of the nation, State, or locality; a place associated with a personality important in history; or a place where significant historical events are known to have occurred even though no physical evidence of the event remains.
Hydrology	The dynamics of water movement through an area.
Impervious Surface	A constructed surface (building, street, sidewalk, parking lot) covered by impenetrable materials such as concrete, asphalt, or brick. Such surfaces increase runoff and can contribute toxins and pollutants to nearby waterbodies.
Implementation Agreement	A part of an application for an incidental take permit, typically accompanying an HCP, specifying the terms and conditions, resources, schedule of activities, and expectations to the parties of the agreement.

Incidental Take	The taking of a federally listed species that results from, but is not the purpose of, carrying out an otherwise lawful activity.
Incidental Take Permit	A permit issued by USFWS and/or NMFS to a non-Federal entity (State, tribe, private landowner) that authorizes incidental take of threatened or endangered species, per ESA section 10(a)(1)(B).
Intertidal Zone	The area between the extreme high and low tide lines, which is exposed to the air periodically.
Invasive Species	A species that is living outside its natural distribution due to having been brought there intentionally or accidentally by humans and that is outcompeting other species to the point of damaging biodiversity.
Invertebrate	An animal that lacks a bony or cartilaginous skeletal structure.
Jetty	A structure extending into a waterbody to prevent channels, river mouths, or bay entrances from shifting position or to direct or confine stream or tidal flow.
Kelp	Large seaweeds (algae) in the taxonomic order Laminariales. Examples include bull kelp (*Nereocystis luetkeana*), winged kelp (*Alaria marginata*), and sugar kelp (*Saccharina latissima*).
Lacustrine	Pertaining to a lake or lakes. Also refers to a life history variant of sockeye salmon, in which fish spawn along lake shores and rear in lakes for 1 to 3 years before out-migrating to the ocean.
Lacustrine Ecosystem (Lakes)	Non-flowing inland waters, lacking ocean-derived salt, that are impounded by either natural or anthropogenic processes. The lacustrine ecosystem generally includes lakes, ponds, and reservoirs, as well as associated (lacustrine) wetlands.
Larva (plural: Larvae)	The newly-hatched lifestage for species that will undergo a metamorphosis. Many aquatic species have a larval stage during which they are included in the zooplankton.
Leaf Litter	Decomposing but recognizable leaves and other debris forming a layer on top of the soil or other substrates

Levee	A bank, usually of earth, used to confine or control riverine water during flood events. A levee differs from a dike in that it protects land that would be underwater only during flood events.
Life History	A description of all the lifestages of an organism including birth, growth, maturity, reproduction, and death.
Life Stage	One particular phase of an organism's life history.
Line of Navigability	A measured line at a depth sufficient for ordinary navigation as determined by the Board of Natural Resources for a particular body of water.
Listed Species	A species formally listed as endangered or threatened by a Federal agency (USFWS or NMFS) or listed as endangered, threatened, or sensitive by a State agency (Washington Fish and Wildlife Commission).
Littoral	Of or pertaining to the shore, in either marine or freshwater systems. The littoral zone in lacustrine ecosystems extends waterward to a depth of 6.6 feet (2 meters).
Log Booming	The placement of logs into the water, removal of such logs from the water, assembly and disassembly of log rafts, and water-based sorting and temporary holding of logs.
Log Handling	A general term that includes log booming and log storage.
Log Storage	Storing logs in water, either assembled in rafts or otherwise prepared for shipment. Log storage does not include the temporary holding of logs to be taken directly into a vessel or processing facility.
Longline	In floating aquaculture, a set of surface floats or rafts from which ropes are suspended. The ropes hang below the surface of the water, providing a surface to which shellfish can attach. In ground-based aquaculture, a culture technique in which oysters are grown in clusters on rope lines suspended a short distance (typically 3 feet or less) off the bottom, between upright stakes of polyvinyl chloride or metal pipe.

Longshore Current	A water current that moves parallel to the shoreline.
Longshore Drift	The transportation of sediment by water currents along a coast.
Lower Low Water	In areas with two tidal cycles per day, the lower of the two low waters.
Lowest Low Water	A reference surface whose distance below mean sea level corresponds to the average level of lowest low water of any tide. Compare to extreme low tide.
Mainstem	The primary downstream segment of a river, as contrasted to its tributaries.
Marina	A facility composed of numerous overwater and other structures and interrelated activities that support boating activities.
Marine Ecosystem	A biological community and associated physical environment in an area of water with a relatively high content of dissolved salt, as opposed to fresh water. For this analysis, estuaries and tidally influenced rivers (including the Columbia River from its mouth to the Bonneville Dam) are part of the marine ecosystem, as are intertidal and subtidal areas.
Marsh	An area of soft, wet, or periodically inundated marine or freshwater land, generally treeless and usually characterized by grasses, sedges, rushes, and other low growth.
Mean Higher High Water	The average of all the higher high water heights of each tidal day observed over a period of 19 years.
Mean Lower Low Water	The average of all the lower low water heights of each tidal day observed over a period of 19 years.
Mean Sea Level	The average location of the interface between ocean and atmosphere over a period of time long enough that all random and periodic variations of short duration average to zero.
Meander	A curve in a shoreline or river channel. Also, a type of surveying in which boundary lines attempt to follow some non-linear natural feature, such as a river or lake edge.

Meander Zone	The area surrounding a river within which all meanders of that river occur.
Metamorphosis	An extreme physical change marking the transition from one lifestage to another, such as a tadpole changing into a frog.
Migration	The seasonal travel of an animal between two distinct locations. Also, the shifting of a river, sand dune, or other topographic feature due to natural processes.
Monitor Species (State Status)	A species that is being monitored for status and distribution and managed by WDFW to prevent it from becoming endangered, threatened, or sensitive.
Monitoring	Regularly scheduled testing, sampling, and/or surveys of defined parameters to determine a condition.
Mooring Buoy	A floating object moored to the bottom of a waterbody and outfitted with equipment to receive a vessel's mooring chain or hawser. A mooring buoy typically consists of an anchor, a tether, and a float marking the location of the anchoring system.
Natal	Pertaining to birth. For salmonids the natal stream is the one in which they were hatched.
National Environmental Policy Act (NEPA)	The law requiring all Federal agencies to consider and analyze all significant environmental impacts of any action proposed by those agencies; to inform and involve the public in the agencies' decision making processes; and to consider the environmental impacts in those processes.
National Marine Fisheries Service (NMFS)	The Federal agency that is the listing authority for marine mammals and anadromous fish under the Endangered Species Act.

Native Aquatic Vegetation	For this analysis, plants belonging to any of four groups for which the Aquatic Lands HCP would include protective measures under either of the action alternatives: marine plants (seagrasses and salt marsh plants that have their roots inundated for the majority of an average day), kelps (algae in the order Laminariales), complex freshwater algae (stoneworts and brittleworts), and rooted freshwater plants (submerged, floating, and emergent).
Native Species	Any species of a given geographic location, that includes that given geographic location within its natural distribution, where natural distribution is defined as the total geographic area a species has colonized without human assistance.
Navigable Waters	Waters subject to the ebb and flow of the tide and/or that are used for the transport of interstate or foreign commerce either historically, currently, or in the future (33 CFR 329). For the purpose of establishing State title, Washington DNR presumes ". . . all bodies of water meandered by government surveyors. . . " to be navigable unless declared otherwise by a court.
Nearshore Building	A building built partly over or near the water.
Nearshore Marine Ecosystem	Portions of the marine ecosystem extending from the extreme high water line offshore to a depth of 66 feet (20 meters)— i.e., the depth where the light levels are potentially sufficient to support the long-term survival of attached submerged vegetation.
Net Pen	A type of finfish aquaculture in which the fish being farmed are kept in large, submerged, pens made of netting to allow the passage of water.
Nexus	A relationship that establishes jurisdiction for a Federal agency over a proposed action. Examples of actions with a Federal nexus under ESA section 7 include the following: • Actions on Federal land • Actions that require a Federal permit (such as a wetland permit) or license • Actions using Federal funds

Non-point Source Pollution	Pollution that does not come from one specific location but from many locations along and surrounding a waterbody.
Non-water-dependent Use	A use of state-owned aquatic lands that could operate in a location other than on the waterfront. Examples include hotels, condominiums, apartments, restaurants, retail stores, and warehouses that are not part of a marine terminal or transfer facility.
Nutrient	An element or compound that is essential for plant and animal growth. Elevated concentrations of some nutrients, such as nitrogen and phosphorus, can degrade water quality.
Nutrient Load	The total concentration of all nutrients in a given waterbody or section of a waterbody at a given point in time.
Offshore Marine Ecosystem	Portions of the marine ecosystem encompassing waters deeper than 66 feet (20 meters)—i.e., the depth where light levels are insufficient to support the long-term survival of attached submerged aquatic vegetation.
Ordinary High Water	The water level of a lake or river so common and usual and so long continued in ordinary years as to mark its presence upon the sediment and the vegetation. Usually delineated by the line of permanent upland vegetation. In marine areas, in the absence of physical evidence otherwise, the ordinary high water line is typically the mean higher high water line.
Organic Matter	Material from living organisms.
Outfall	The terminal end of a pipe or structure that discharges stormwater or wastewater directly into a waterbody.
Oversight	The concept that separate government agencies have authority over each other and monitor each other's actions and decisions.
Overwater Structure	A structure built over, or placed in, aquatic lands at or below the ordinary high water line.

Pelagic	Of, relating to, or living in open oceans or seas rather than waters adjacent to land or inland water.
Phytoplankton	Photosynthetic organisms that are carried by water currents.
Pier	A raised platform attached to shore and supported by pilings driven into the substrate.
Plankton	Suspended microorganisms with relatively little power of locomotion that drift in the water and are subject to the action of waves or currents. Includes phytoplankton and zooplankton.
Point Source Pollution	Pollution that is discharged from one or more discrete points or pipes.
Polycyclic Aromatic Hydrocarbon	A compound built from two or more benzene rings. Often the byproducts of petroleum processing or combustion, many polycyclic aromatic hydrocarbons are toxic or carcinogenic at relatively low levels.
Pool	A topographic depression within a stream channel characterized by deeper water, laminar flow, and lower water velocities.
Population	A collection of interbreeding organisms of the same species.
Pre-contact Period	The period before Euro-American entry into the Pacific Northwest for exploration and trade, roughly 200 years ago.
Private Recreational Dock	A dock owned privately and used exclusively for private recreational purposes, with all or a portion of the structure on state-owned aquatic lands.
Propeller Scour	Increased turbidity, formation of depressions in sediment, and physical uprooting of aquatic vegetation resulting from the turbulence produced by boat propellers.
Propeller Wash	The surface waves produced by the propeller of a boat.
Proposed Threatened or Endangered Species	A species proposed by the U.S. Fish and Wildlife Service or NMFS for listing as threatened or endangered under the Endangered Species Act; not a final designation.

Proprietary Authority	The authority provided by ownership of a piece of property. Washington DNR exerts proprietary authority over state-owned aquatic lands. In this capacity, Washington DNR does not have the authority to enforce laws or regulations that govern land uses.
Pumpout	A facility used to empty vessels' wastewater holding tanks.
Raft	A flat structure made of planks, barrels, or other materials, that floats on water, and that is used for transport or emergencies, or as a platform for swimmers.
Redd	A pocket excavated within the substrate by a female salmonid for her eggs.
Refuge	Habitat area that provides protection from predators or disturbance.
Remediation	The removal of pollutants or contaminants from the environment.
Resident	A salmonid life history strategy in which individual fish spend their entire lives in smaller streams.
Resource Cycling	A natural process whereby resources such as water or nutrients are taken up by one individual and then passed on during life or after death.
Restoration of Aquatic Lands	Restoration work includes, but is not limited to, beach litter cleanup, removal of derelict and hazardous fishing gear, enhancement of salmon habitat, and revegetation with native plants.
Resuspension	A process by which sedimentary or biological particles are swept up from the substrate and suspended in the water column through increased water energy or turbulence.
Revised Code of Washington (RCW)	A revised, consolidated, and codified form and arrangement of all the laws of the State of a general and permanent nature.
Riffle	A shallow riverine area characterized by surface water turbulence, high water velocity, and exposed substrate.

Riparian	Pertaining to the banks or shoreline of a waterbody. Riparian areas are transitional between terrestrial and aquatic ecosystems and are distinguished by gradients in biophysical conditions, ecological processes, and biota.
Riverine	Pertaining to a river or rivers.
Riverine Ecosystem (Rivers)	An ecosystem defined by the flow of water from higher to lower elevations. The riverine ecosystem includes stream channels, associated floodplains, riverine wetlands, and riparian areas found within the meander zone.
Salinity	A measure of the concentration of dissolved salts in water.
Salmonid	A fish belonging to the family Salmonidae, such as trout, salmon, char, or whitefish.
Salt Marsh	A coastal wetland that is regularly flooded by salt water brought in by the tides; typically located at or above the mean higher high water line in areas where sediment supply and accumulation are relatively high.
Sand	Substrate particles with diameters between approximately 0.0025 inch and 0.08 inch.
Scoping	A process for determining the range of alternatives and impacts to be discussed in a NEPA or SEPA review document.
Scour	The removal of underwater material or resuspension of sediment by waves, turbulence, or currents.
Sediment	Rock and soil particles deposited by water, wind, or glaciers.
Sediment Load	The amount of sediment being carried suspended in the water column.
Sediment Transport	The movement of sediment particles along a current pathway.
Sediment Trapping	The removal and storage of sediment from the water column, usually by slowing water flow.

Sedimentation	The accumulation of sediment particles that have settled out from the water column.
Seagrass	Flowering plants from the family Zosteraceae that grow in marine environments. Examples include eelgrass (*Zostera marina*) and surfgrasses (*Phyllospadix* spp.).
Semi-colonial	A nesting strategy in which a small group of birds nests in relatively close proximity, defending their nests only against predators.
Sensitive Species (State Status)	A species that is vulnerable or declining and likely to become endangered or threatened throughout a significant portion of its range within Washington State.
Shellfish	An aquatic shelled mollusk (e.g., mussel, clam, oyster, or scallop); for this analysis, ‘shellfish’ specifically means an edible species either in the wild or cultured for commercial consumption
Sheltered	Protected from the wind and from wave energy. The opposite of exposed.
Shipyard	A facility for the maintenance and repair of vessels.
Shorelands	Generally, submerged lands associated with navigable rivers and lakes not affected by the ebb and flow of tides. For purposes of ownership, shorelands are statutorily defined as lands located between the line of ordinary high water and the line of navigability.
Shoreline	The intersection of the surface plane of water with the shore or beach.
Silt	Substrate particles with diameters between approximately 0.00015 inch and 0.0025 inch.
Skirting	Material used to limit access or prevent flotsam from accumulating under a dock, for safety purposes or for aesthetic reasons.
Species of Concern (Federal Status)	A species about which NMFS or USFWS has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA.

State Environmental Policy Act (SEPA)	The basic State statute (Chapter 43.21C RCW) for protection of the environment. SEPA requires all State agencies to consider and analyze all significant environmental impacts of any action proposed by those agencies; to inform and involve the public in the agencies' decision making processes; and to consider the environmental impacts in the agencies' decision making processes.
Stormwater	Water that originates from precipitation events.
Stratification	The division of the water column into horizontal layers based on temperature and/or salinity.
Subadult	The lifestage between juvenile and adult, in which some adult characteristics have developed but the organism is not yet reproductively mature.
Substrate	Any surface to which something can attach. Also, the bottom of any lake, river, or ocean.
Substrate Composition	All of the grain sizes present in the sediment at a given location.
Subtidal	The part of a marine ecosystem that is never exposed to the air even at extreme low tides.
Take	Under ESA, to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect a federally listed threatened or endangered species, or to attempt to engage in any such conduct.
Taxonomic	Pertaining to the classification of organisms into groups or referring to one or more of those groups.
Terminal	A point of interchange between land and water carriers, such as a pier, wharf, or group of such, equipped with facilities for care and handling of cargo and/or passengers.
Terrestrial	Growing or living on or particular to the land, as opposed to the aquatic environment.
Threatened Species	Any species that is likely to become endangered in the foreseeable future.

Threshold	A measurable standard in a physical or chemical characteristic which, when exceeded, begins producing a given effect, result, or response.
Tidal Wetland	A wetland in a marine ecosystem that is periodically inundated with tidal waters, including estuarine areas within the intertidal zone with emergent vegetation (i.e., vegetation other than seagrasses or seaweeds).
Tidally Influenced	Subject to daily fluctuations in water level and salinity due to the tidal cycle of a marine waterbody. Rivers that empty into an ocean are tidally influenced for a certain distance upstream.
Tidelands	Marine and estuarine waters affected by the ebb and flow of tides and located between the ordinary high tide and extreme low tide line.
Toxin	A chemical substance that has a negative impact on organisms.
Traditional Cultural Property	A site eligible for the National Register of Historic Places based on an association with a tribal community's beliefs, customs, or practices.
Tributary	A stream or river that flows into a larger stream or river.
Trophic	Pertaining to nutrition or nutritional processes. For organisms, involving the feeding habits or food relationships of different organisms in a food chain.
Trust Resources of Indian Tribes	The traditional materials and other resources American Indian peoples use to sustain their cultures.
Turbidity	A measure of the cloudiness of water, indicating the quantities of suspended particles and plankton. Higher turbidity results in lower levels of light penetration through the water column.
U.S. Fish and Wildlife Service (USFWS)	The Federal agency that is the listing authority for species, other than some marine mammals and most anadromous fish, under the Endangered Species Act.
Unconsolidated Habitat	Aquatic habitat consisting of clay, silt, mud, sand, gravel, or cobble substrates, or any combination of those substrates.

Upland	Land or an area of land lying above the level where water flows or where flooding occurs.
Viable Population	A population that is of sufficient size and distribution to be able to persist for a long period of time in the face of demographic variations, random events that influence the genetic composition of the population, and fluctuations in environmental conditions, including some catastrophic events.
Washington Administrative Code (WAC)	The compilation of all current, permanent rules of State agencies.
Water Column	The dimension between the substrate and surface waters.
Water Quality	The physical, chemical, and biological characteristics of water in relationship to a set of standards.
Water-dependent Use	A use authorized by Washington DNR that cannot exist without being located on or in the water. Examples include water-borne commerce, aquaculture, log booming, moorage and launching facilities, public fishing piers and parks, and ferry terminals.
Water-oriented Use	A use that historically was on a waterfront location, but with existing technology could be located away from the waterfront. Examples include watercraft sales, fish processing, and houseboats.
Watershed	A topographic area where water from rain or snowmelt drains downhill into a large body of water such as a river, lake, or ocean. The watershed includes the streams that carry the water as well as the land surfaces from which water drains into those streams.
Wave Board	A type of floating breakwater consisting of a vertical wall.
Wetland	An area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions; includes swamps, bogs, fens, and similar areas.

Wharf An overwater structure attached to the shore of a harbor or the bank of a river or canal, where ships may dock to load and unload cargo or passengers. Associated structures may include piers, warehouses, or other facilities necessary for handling ships.

Zooplankton Microscopic animals carried by water currents.

INDEX

APPENDIX A

Additional Information to Support the Analyses of Cultural Resources and Environmental Justice

Cultural Resources

Introduction

Cultural developments in Washington State have been shaped by the geography and ecology of the region. These resources reflect the diverse history and cultural patterns of the peoples who have resided in Washington State, as well as providing important information about the aboriginal use of landscapes in both marine and freshwater settings.

Archaeological Overview

Washington State prehistory spans at least 12,800 years and encompasses two culture areas, including the Northwest Coast and the Plateau (Ames et al. 1998; Ames and Maschner 1999; Carlson 1990; Walker 1998). Though these culture areas are temporarily congruent, cultural differences have existed between the two for at least the last 6,000 years. These differences are largely due to changing environmental conditions and interactions with different groups of people.

The earliest people to inhabit both culture areas are known as Paleo-Indians. Paleo-Indians implemented a combination of maritime, littoral, and terrestrial economies to survive in the Northwest Coast and primarily focused on riverine, game, and root resources in the Plateau (Ames and Maschner 1999; Walker 1998). They were primarily hunter-gatherers who lived in highly mobile groups with low populations. During the earliest portions of occupation, much of the terrain was uninhabitable due to glaciers. People predominantly occupied coastal areas in Western Washington as ocean levels were substantially lower than they are today (Kirk and Daugherty 2007). In the Plateau, people tended to live adjacent to large river systems.

As the climate began to warm, ocean levels rose and submerged much of the coastline. The interior lands opened up as the glaciers receded, and people began to occupy more areas of the Puget Sound basin and upper reaches of the Plateau (Ames and Maschner 1999). The Early Archaic period spans approximately 11,000 to 6,400 years ago, during which there were numerous cultural changes in Washington. These changes primarily occurred in the types of tools being manufactured and in the expansion in resource exploitation. Trade networks expanded in both culture areas. Permanent winter dwellings started being used in both culture areas as well. The Middle and Late Archaic periods span from approximately 6,400 years ago to the introduction of smallpox in 1775. During this time, people in the Northwest Coast continued in their maritime economy and began to construct plank houses and settle in year-round villages (Ames and Maschner 1999). Tributary rivers became more important on the Plateau and occupation of side canyons increased during the last 4,000 years. Plateau people also began practicing transhumance, where they would spend winters along river bottoms and summers in the uplands. Populations in both culture areas increased due to abundant food resources, and contact and trade expanded to groups in eastern Washington. New tools, such as the bow and arrow and heavy-duty woodworking implements, were introduced in both areas. Social stratification in some Northwest Coast groups began during this time, which also brought the introduction of potlatch ceremonies.

Historical Overview

Euro-American explorations of the Pacific Northwest began in the early eighteenth century when European sailors explored and charted the Pacific Northwest Coast. Although Mexican and Spanish settlers established the first permanent European settlement at a trading post at Neah Bay in 1792, the exploration of the Northwest began in earnest after the Louisiana Purchase of 1803 and the arrival of Lewis and Clark. Trading posts at Astoria, Oregon, Fort Vancouver, Fort Nisqually, and the San Juan Islands encouraged the exploration of the Columbia River and western Washington. The establishment of forts in Walla Walla, Okanagan, and Spokane spurred exploration of the east side of the Cascade Mountains. During the 1840s, missionaries followed the path of the fur traders by founding missions in the Yakima and Walla Walla valleys (Vaughan and Ferriday 1974).

Conflicts with the tribes initially limited settlement of the region. By the mid-1860s, however, military action, treaties, and federal legislation encouraging homesteading of “vacant lands” resulted in increased occupation of the region by Euro-Americans. In Washington Territory, the Donation Land Claim Act of 1850 and the Homestead Act of 1862 allowed settlers to acquire land if they substantially improved it (Ficken and LeWarne 1988). Sites located along rivers and streams were highly desirable for their ready source of water for drinking and agricultural purposes.

Like the tribes, many of the settlers were drawn by the rich resources along the Puget Sound, rivers, valleys, and stream courses. Real estate speculation became common, with investment groups platting towns and subdivisions near major sources of water. Early settlers on the coast took advantage of the rich fisheries and lowland timber. Throughout Washington, towns grew prosperous by being located near a major waterway, deep harbor, and natural resources such as timberland. Mining and logging operations relied on water for power and timber and mineral resources transport from mountainous areas (University of Washington n.d.; Bagley 1929).

The manipulation of water was essential to the economic development of the state. Dikes, dams, and other measures were built to reduce the damage from the annual flooding of rivers in the Puget Sound basin (Stein 2001; Klingle 2007). Similarly, the development of extensive irrigation systems comprised of ditches, canals, and dams facilitated the growth of eastern Washington as a major agricultural area (Honey et al. 1979, Wilson 1990:223; Bureau of Reclamation 2007). Rivers were also used to furnish inexpensive hydroelectric power. What initially began as individual power companies serving a local area from a small water source emerged in the 1920s and 1930s into large systems that transmitted of 100,000 and higher voltage over hundreds of miles (Soderberg 1988). The development of these hydroelectric facilities resulted in the creation of dams on major rivers and lakes across the state and the installation of hundreds of miles of transmission lines (Klingle 2007).

The military also played important roles in the development of communities through Washington during the mid to late twentieth century. In addition to important military bases in Spokane, Bremerton, Seattle, and Everett, ship building and airplane production became critical to the region’s growth (Lentz 2000). Many of the plants were located on rivers or in harbors to facilitate movement of goods. The demand for workers at these facilities spurred growth throughout the state and resulted in explosive residential and commercial growth, often located to take advantage of the views and recreational facilities along the coastlines, lakes, and rivers. With this growth, many small agriculture communities evolved into large suburban and urban areas that are now considered historic.

Types of Cultural Resource Sites

Due to the number of cultural resources within the analysis area, researchers categorized the resources by type to facilitate their evaluation. As a result of variations in survey methods and recording requirements, there is some overlap between resources within these categories; for example, a railroad may have been recorded as an archaeological site by one survey team and as a historical site by another. Additionally, an area considered a TCP by an Indian tribe may contain both archaeological and historical sites and may also be currently used as part of an Indian trust.

Archaeological Sites

Archaeological sites are resources that represent a physical record of past human activity from the pre-contact period (i.e., before Euro-American entry into the region for exploration and trade, roughly 200 years ago) and the historical period. These resources provide an opportunity to understand the activities of the diverse cultures that have occupied Washington State. Examples of pre-contact archaeological resources associated with American Indian tribes include shell middens, campsites, house pits, rock art, fish traps, reef nets, and burial sites. Historical archaeological sites include government installations and fortifications, townsites, and railroad resources. In contrast to historical sites, archaeological resources from the historical period typically are nonfunctioning remnants, including those from buildings, structures, docks, railroad tracks, and bridges.

Archaeological sites from all periods commonly are located in both marine and freshwater areas, along coastal areas and shorelines, over water, and underwater. Recorded archaeological resources in Washington encompass a wide range of site types, including historic and prehistoric sites, objects, and features that are eligible for listing on the National Register of Historic Places. Although sites of all types have been documented in all parts of the state, the distribution of some types may be influenced by geographic factors. For example, shell middens, which are most strongly associated with the marine settings where shellfish are abundant, are more prevalent in western Washington. Conversely, talus pits are found more often in eastern Washington, where talus slopes are a more common landscape feature than in western Washington (M. Major, pers. comm., Washington DNR, Archaeologist, March 26, 2013).

Prehistoric lithics and lithic scatters—Archaeological sites containing lithic materials are found throughout Washington State. These stone artifacts range from formal tools to debris from tool production. They can provide information on the technological organization and mobility patterns of the groups who used the site.

Prehistoric campsites—Prehistoric campsites are places where groups of inhabitants performed activities of subsistence. Such sites often contain hearth features, stone (lithic) tools and associated production debris (debitage), animal and plant remains, and evidence of dwellings. They can offer a breadth of information on group mobility, technological organization, diet, and environmental conditions.

Prehistoric housepits—A prehistoric housepit is a large semi-subterranean depression that remains from where a structure was built overhead. Housepit sites often contain hearth features, lithic tools and debitage, animal and plant remains, and in some cases, burial remains. They can provide information on social organization, group mobility, technological organization, diet, environmental conditions, and burial practices.

Prehistoric villages—A prehistoric village is an area occupied by several households. Village sites often contain foundations, hearth features, shell middens, lithic tools and debitage. They may also have burial sites.

Prehistoric pictographs and petroglyphs—Petroglyphs are images created through carving or incising a rock surface. Pictograph sites are hand etchings into solid rock. They may still be considered traditional cultural properties by contemporary tribes. Some pictograph sites occur in rockshelter settings where an array of activities took place, leaving behind very well-preserved organic (floral and faunal) remains. Rockshelters are an extremely rare site type.

Prehistoric shell middens—Shell middens are refuse pits that contain shell from gathering activities. They also may contain stone tools and associated debris, bird and mammal remains, floral remains, and in some cases, human remains. They are considered very important because the chemical properties of shell often act to preserve delicate artifacts. They can provide information regarding seasonality, diet, and environmental conditions.

Burials—A burial is the interment of a human into the ground. The sites often are unmarked and can contain more than one individual.

Historic habitations/structures/towns—Historic habitation and structure sites are homesteads and farmsteads related to the influx of Euro-American settlers into Washington State. Historic buildings may be noted for their significance in relationship to and ability to provide information on historic events, people, cultural practices, settlement patterns, and building technologies of the time. They can also convey socioeconomic and subsistence information.

Prehistoric/historic multicomponent sites—Multicomponent sites have both a prehistoric and historic component to the overall site. Often Euro-American settlement brought about the occupation of the same location as chosen in the past. Sites usually consist of a prehistoric element, such as a lithic scatter or midden, combined with historic buildings, structures or mining elements. They can offer information on the continuation of land use over time as well as what is provided by the individual components.

Shipwrecks/submerged features—Submerged features include shipwrecks and other underwater resources. Most of these features are from the historic period.

Pre-contact talus pits—Pre-contact talus pits include hunting blinds, storage pits, caches and other depressions.

Pre-contact cairns—Consisting of rock piles or caches, cairns may contain a burial. Cairns could also have served as landscape information markers.

Historical Sites

Historical sites include buildings, structures, objects, and districts built after the arrival of Euro-Americans in this region. Historical sites usually have the majority of the structure intact and, in most cases, are usable. Historical sites commonly found in Washington State include vessels, bridges, towns, wharves, piers, boathouses, mines, dams, and buildings. Other major site types include bridges, government installations, and irrigation and power resources.

Irrigation and power resources—These sites include irrigation ditches and canals associated with the expansion of agriculture. This category also includes diversion channels and dikes implemented to control flood and facilitate transportation. Resources relating to the use of hydroelectric power, such as flumes, dams, and transmission lines, are also considered in this category.

Buildings, vessels, parks, towns/districts—Historic buildings, structures, and objects remain intact throughout the project area. Areas with large concentrations of sites from a similar period are often listed as a historic district and may include parks, educational facilities, or neighborhoods. The extant resources in these historic districts range from individual single-family residences to warehouses and docks associated with the growth of maritime trade on Puget Sound in the late nineteenth and early twentieth centuries. Scattered across the state are complexes and structures associated with the settlement of the region by Euro-Americans. Sites include location markers for landings by European explorers, log cabins built by early homesteaders, historical vessels, and railroad grades.

Government installations—Historic United States government installations range from early forts to mid-twentieth century naval air stations. Extant resources at these historic properties include docks, housing, officer’s quarters, schoolhouses and outbuildings. Smaller scale resources include lookout towers in remote areas. Lightstations and lighthouses are often complexes with ancillary buildings including storage buildings and a dwelling for the keeper.

Bridges—Due to their importance in trade, engineering, and community development, many bridges are listed on the National Register. These range from smaller community bridges to the floating bridges on Lake Washington.

Traditional Cultural Properties

Traditional cultural properties are resources with religious and cultural significance that have been identified (often with traditional names) by American Indian tribes in Washington State. These places are important for the practice of tribal members’ traditional values and beliefs. Places of significance include a number of geographical locations and uses including but not limited to landscapes, natural resource gathering areas, sacred sites, burials, and legendary places.

Traditional cultural properties are sites eligible for the National Register of Historic Places based on an association with a community's beliefs, customs, or practices. Such properties are frequently associated with oral traditions or practices of an American Indian tribe or ethnic community, often being connected with significant legends or myths (Parker and King 1998). Due to the importance of water to many of the groups in Washington State, traditional cultural properties are often associated with specific rivers, lakes, waterfalls, or beaches. Though rare, there may be archaeological sites associated with these areas.

Traditional cultural properties are best known through connected oral or other community knowledge. American Indian tribes commonly retain documentation for all properties of religious and cultural significance; however, access to this documentation is confidential and largely restricted.

Indian Trust Resources

Indian trust resources include the traditional materials and other resources used by native peoples to sustain their cultures. These resources include the usual and accustomed grounds and stations for subsistence, ceremonial, cultural, and commercial benefits. The native landscapes of Washington State provide a variety of plants, animals, and materials traditionally and currently used in medicines, foods, tools, textiles, building materials, carvings, and sacred objects. The American Indian tribes that entered into treaties with the United States in 1855 maintain the right to resources on ceded territories. These treaties give the tribes the right to fish and gather shellfish in accustomed grounds. This right to fish includes a trust responsibility on the part of the Federal government to help ensure that the fishery continues to be productive. The citizens also reserve the right to hunt and gather roots and berries on open and unclaimed land.

There are now 29 federally recognized American Indian tribes living in Washington State, with others that once occupied the area now living in adjacent states and Canada (Governor's Office of Indian Affairs 2011). Federally recognized tribes in eastern Washington include the Colville Confederated Tribes, Kalispel Tribe, Spokane Tribe, and Confederated Bands and Tribes of the Yakama Nation. Western Washington tribes include the Chehalis Confederated Tribes, Cowlitz Indian Tribe, Hoh Tribe, Jamestown S'Klallam Tribe, Lower Elwha Klallam Tribe, Lummi Tribe, Makah Indian Tribe, Muckleshoot Indian Tribe, Nisqually Tribe, Nooksack Tribe, Port Gamble S'Klallam Tribe, Puyallup Tribe, Quileute Indian Tribe, Quinault Indian Nation, Samish Indian Nation, Sauk-Suiattle Tribe, Shoalwater Bay Tribe, Skokomish Indian Tribe, Snoqualmie Tribe, Squaxin Island Tribe, Stillaguamish Tribe, Suquamish Tribe, Swinomish Indian Tribal Community, Tulalip Tribes, and Upper Skagit Tribe (Governor's Office of Indian Affairs 2011).

American Indian tribes gather many raw materials such as bark and grasses for baskets and mats, wood for carving, and medicinal plants from Washington's forests, rivers, streams, and beaches (Table A-1). Salmon, shellfish, deer, elk, cedar, beargrass, and huckleberries are the most prominent and commonly used resources. The traditional use of plants and animals varies by tribe. Although forests and meadows provide important resources to the tribes, many of these resources are found primarily in water (e.g., fish, shellfish, mammals) or in streamside wetlands (e.g., tule, cattail) (Ruby and Brown 1982; Suttles and Lane 1990).

Table A-1. Culturally important plant and animal resources for American Indian tribes in Washington.

Resources	Western Washington	Eastern Washington
Fish	Chinook, coho, pink, chum, and sockeye salmon; steelhead; cutthroat trout; Dolly Varden; smelt; sturgeon	Chinook, coho, chum, and sockeye salmon; steelhead; bull trout; cutthroat trout; lamprey; suckers; mountain whitefish, sturgeon
Shellfish	Sea mussel; bay mussel; rock scallop; Olympia oyster; abalone; barnacles; urchins; butter clam, horse clam; geoduck; razor clam; red rock crab; Dungeness crab; spider crab; octopus	Freshwater mussels
Mammals	Black-tailed deer; Columbia white-tailed deer; elk; bear; river otter; beaver; harbor seal; northern sea lion; orca; gray whale; sea otter	Mule deer; elk; black bear; otter
Birds	Albatross; gulls; marbled murrelet; ancient murrelet; whistling swan; trumpeter swan; snow goose; Canada goose; dabbling ducks; sandhill crane; heron; loon; bald eagle; golden eagle; hawks; falcons	Sage grouse; California and mountain quail; blue grouse; waterfowl
Food and Medicine Plants	Huckleberries; blueberries; trailing blackberry; blackcap raspberry; salmonberry; thimbleberry; salal; serviceberry; soapberry; wild carrot; wapato; camas; bracken root; sand verbena; thistle root; surf grass; buttercup; clover roots; cow parsnip; hogfennel	Blue huckleberry; serviceberry; chokecherry; currant; blackberry; snowberry; camas; wild carrot; chocolate lily; tree lichen; pine cambium; bitterroot; wild celery
Raw Materials	Yew, alder, and cedar wood; spruce root; cedar, hemlock, and willow bark; beargrass; nettle; cattail; tule	Cedar bark, wood and boughs; beargrass; tule; hemp

Sources: Gunther 1973; Ruby and Brown 1982; Suttles and Lane 1990; Walker 1998.

Environmental Justice

The EPA, working with the Enforcement Subcommittee of the National Environmental Justice Advisory Council, has developed technical guidance for conducting environmental justice assessments. Much of this guidance is concerned with identifying low-income and minority populations relative to the location of a proposed action that is planned for a specific time and place. Such guidance has very limited or no applicability to analyses, such as this, that are concerned with programmatic actions designed to establish direction for broad land areas, rather than scheduling activities on specific parcels of land. More relevant to this analysis are measures that assess target populations that may be disproportionately affected by HCP implementation under the action alternatives. These groups include persons and businesses in the economic industries identified in Subsection 3.13, Social and Economic Environment—namely, aquaculture, forest products, recreation, and commerce, as well as residents of floating homes.

No demographic or economic information is available about the persons who have authorizations to use state-owned aquatic lands, or about the owners, operators, and employees of businesses that rely on those lands. A direct analysis of target populations, therefore, is not possible. Instead, the environmental justice analysis in this EIS identifies counties in which various demographic and economic measures indicate elevated proportions of low-income and/or minority populations, compared to statewide averages. The occurrence of existing use authorizations for state-owned aquatic lands within these counties serves as an indicator of potential risk of disproportionate effects on these populations. If the implementation of the HCP Operating Conservation Program under the action alternatives were to adversely affect economic activity in any of the industries described in Subsection 3.13, Social and Economic Environment—and if any of the counties with elevated proportions of low-income and/or minority populations have relatively high concentrations of existing leases for uses of state-owned aquatic lands in any of those industries—then the potential exists for low-income and/or minority populations to be affected disproportionately.

Guidance for conducting environmental justice analyses recommends that low-income populations should be identified where 1) more than 50 percent of the population of the affected area is classified as low-income or 2) the percentage of the population of the affected area that is classified as low-income is meaningfully greater than the comparable percentage in the general population or other appropriate unit of geographic analysis (EPA 1998). Similar guidelines are used for identifying minority populations. For this analysis, low-income and minority populations were identified at the county level, using state-level data as the basis for comparison to the general population. Poverty rates and 3-year average unemployment rates were used to identify low-income populations. If a county's poverty rate or unemployment rate exceeded 50 percent or was at least 120 percent of the statewide rate, the county was identified as being at an elevated risk of disproportionate effects on low-income populations. Consideration was also given to counties with low socioeconomic resiliency ratings. Lastly, if the proportion of any minority groups within a county exceeded 50 percent or was at least 20 percentage points higher than the statewide proportion, the county was identified as being at an elevated risk of disproportionate effects on minority populations.

Poverty status is a primary indicator of low-income populations. Data from the U.S. Census Bureau American Community Survey (2012b) indicate that 12.1 percent of the population of Washington State lived below the poverty line in 2010. The poverty rates in 19 counties were equal to or greater than 14.5 percent (i.e., 120 percent of the statewide poverty rate). Those counties, identified in Table A-2, have been identified as being at an elevated risk of disproportionate effects on low-income populations. No counties in Washington had poverty rates exceeding 50 percent.

A second indicator of low-income populations is based on the 3-year average unemployment rate. For the period from January 2009 to December 2011, Washington had a three-year average unemployment rate of 9.5 percent (Washington State Employment Security Department 2012). Ten counties had unemployment rates equal to or greater than 11.4 percent (i.e., 120 percent of the statewide unemployment rate) (Table A-3).

Table A-2. Poverty rate estimates in Washington counties, 2010.

County	Rate (Percent)	County	Rate (Percent)	County	Rate (Percent)
Island	8.0	Benton	12.7	**Pacific**	**16.8**
Snohomish	8.4	Lewis	13.3	**Cowlitz**	**16.9**
Kitsap	9.4	Asotin	13.5	**Walla Walla**	**17.5**
Skamania	9.4	Jefferson	13.5	**Pend Oreille**	**18.3**
San Juan	10.1	Spokane	14.1	**Klickitat**	**19.5**
King	10.2	Douglas	14.3	**Okanogan**	**19.5**
Thurston	10.3	Clallam	14.3	**Franklin**	**19.9**
Clark	10.9	**Whatcom**	**15.0**	**Grant**	**20.4**
Chelan	11.5	**Stevens**	**15.1**	**Ferry**	**20.8**
Pierce	11.6	**Mason**	**15.6**	**Kittitas**	**21.2**
Skagit	11.7	**Garfield**	**15.7**	**Yakima**	**21.8**
Lincoln	12.1	**Grays Harbor**	**16.1**	**Adams**	**25.1**
Wahkiakum	12.2	**Columbia**	**16.4**	**Whitman**	**27.6**
Washington State Poverty Rate: 12.1 percent					

Source: U.S. Census Bureau 2012b
Bold typeface indicates counties with poverty rates equal to or greater than 120 percent of the statewide rate.

Table A-3. Three-year average unemployment rates in Washington counties, January 2009 through December 2011 (not seasonally adjusted).

County	Rate (Percent)	County	Rate (Percent)	County	Rate (Percent)
Whitman	6.3	Island	9.1	Klickitat	10.6
San Juan	7.0	Kittitas	9.1	Mason	11.2
Walla Walla	7.3	Asotin	9.2	Columbia	11.3
Benton	7.4	Adams	9.4	**Pacific**	**12.7**
Garfield	7.6	Spokane	9.5	**Stevens**	**12.7**
Kitsap	7.9	Jefferson	9.6	**Cowlitz**	**12.8**
Douglas	8.1	Yakima	9.7	**Skamania**	**12.9**
Thurston	8.2	Pierce	9.9	**Clark**	**13.2**
Chelan	8.5	Snohomish	10.0	**Grays Harbor**	**13.3**
Franklin	8.6	Okanogan	10.1	**Lewis**	**13.5**
King	8.6	Grant	10.2	**Pend Oreille**	**13.7**
Lincoln	8.6	Clallam	10.3	**Wahkiakum**	**13.8**
Whatcom	8.6	Skagit	10.3	**Ferry**	**14.0**
Washington State Unemployment Rate: 9.5 percent					

Source: Washington State Employment Security Department 2012
Bold typeface indicates counties with unemployment rates equal to or greater than 120 percent of the statewide rate.

Socioeconomic resiliency refers to the ability of an area's population and economy (e.g., community, county, or region) to adapt to economic changes or shocks (Daniels 2004). Resiliency is generally related to diversity; areas or socioeconomic systems with higher diversity are less likely to be affected by changes in the system. A high degree of resiliency implies that an area can adapt quickly to economic fluctuations or changes. When specific firms or business industries experience downturns in such areas, unemployment rates may rise only briefly until displaced individuals find other employment (Daniels 2004). In contrast, areas or socioeconomic systems with low resiliency may experience more long-term negative impacts in response to limited downturns, with unemployment or out-migration rates remaining high for several years. Socioeconomic resiliency values were calculated by using an unweighted average of lifestyle diversity, economic diversity, and population density ratings (Daniels 2004). Counties in the bottom one-third of overall socioeconomic resiliency values were assigned a rating of "low," indicating an elevated risk of negative effects in response to downturns in individual firms or economic industries. Counties with low resiliency ratings are in eastern and southwestern Washington, away from most population centers (Table A-4).

Table A-4. Socioeconomic resiliency rating values for Washington counties.

County	Resiliency Value	County	Resiliency Value	County	Resiliency Value
High Rating		**Medium Rating**		**Low Rating**	
King	3.78	Franklin	2.67	Kittitas	1.72
Pierce	3.39	Chelan	2.61	Pacific	1.67
Thurston	3.39	Clallam	2.50	Adams	1.44
Kitsap	3.33	Walla Walla	2.39	Stevens	1.44
Clark	3.22	Grant	2.28	Okanogan	1.28
Skagit	3.17	Grays Harbor	2.17	Klickitat	1.11
Snohomish	3.17	Asotin	2.11	Wahkiakum	1.00
Spokane	3.17	Jefferson	2.11	Columbia	0.94
Whatcom	3.17	Douglas	2.00	Ferry	0.83
Island	2.94	Lewis	2.00	Garfield	0.78
Yakima	2.89	Mason	2.00	Lincoln	0.78
Cowlitz	2.72	San Juan	1.94	Skamania	0.78
Benton	2.67	Whitman	1.89	Pend Oreille	0.67

Source: Daniels 2004

Four counties have minority populations that exceed statewide averages by at least 20 percentage points (Table A-5). In these counties, the populations of only two minority groups (Hispanic and Other [i.e., not white, African American, Asian, or Native American]) were high enough to indicate an elevated risk of disproportionate effects on minority populations. Table A-5 also summarizes the three preceding tables, thereby identifying all counties at risk of disproportionate effects on low-income and/or minority populations. For example, for this analysis, Grant County is considered to have elevated proportions of both low-income and minority populations because the poverty rate is more than 120 percent of the statewide rate and the Hispanic proportion of the county's population is 26 percentage points above the statewide average.

Table A-5 Counties at risk of disproportionate effects on low-income and/or minority populations**.**

County[1]	Elevated Poverty Rate[2]	Elevated Unemployment Rate[3]	Low Resiliency Rating[4]	Minority Population Proportion[5] Hispanic or Latino Origin	Other Race
Adams	X		X	46	25
Clark		X			
Columbia	X	X	X		
Cowlitz	X	X			
Ferry	X	X	X		
Franklin	X			40	29
Garfield	X		X		
Grant	X			26	(<20)
Grays Harbor	X	X			
Kittitas	X				
Klickitat	X	X	X		
Lewis		X			
Lincoln			X		
Mason	X	X			
Okanogan	X		X		
Pacific	X	X	X		
Pend Oreille	X	X	X		
Skamania		X	X		
Stevens	X	X	X		
Wahkiakum		X	X		
Walla Walla	X				
Whatcom	X				
Whitman	X				
Yakima	X			33	(<20)

[1] Names in *italics* indicate counties where there are no existing authorizations for uses that are considered likely to be affected by the action alternatives (see Table 3-5 in Subsection 3.13, Social and Economic Environment).
[2] Based on Table A-1. "X" indicates poverty rate equal to or greater than 120 percent of the statewide rate.
[3] Based on Table A-2. "X" indicates 3-year average unemployment rate equal to or greater than 120 percent of the statewide rate.
[4] Based on Table A-3.
[5] Percentage points above state average for the minority group (U.S. Census Bureau 2012a); only values greater than 20 are shown.

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