Biological Evaluation
Regional General Permit for
Modification and Construction of Residential Overwater Structures in Inland Marine Waters of Washington State

Prepared for:

U.S. Army Corps of Engineers
Seattle District
Seattle, Washington

Prepared by:

Jones & Stokes

April 2004

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1 Background and Project History

1.1 Regional General Permits

The Regional General Permit (RGP) is an alternative permitting procedure available to the District Engineer in accordance with the Department of the Army permitting regulations [33 CFR 325.2(e)(2)]. The RGP may be used to authorize construction activities that are "similar in nature and cause only minimal individual and cumulative environmental impacts" [33 CFR 323.2(h)(1)].

The U.S. Army Corps of Engineers, Seattle District, Regulatory Branch (Corps) is proposing a series of RGPs in Washington State as a means of providing incentives to the public for more fish-friendly construction activities. For those projects that would meet the parameters of the RGP, the amount of paperwork and time required to authorize the projects is greatly minimized from those of the standard permitting procedures. In addition, if the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) approve the programmatic biological evaluation for this RGP, Endangered Species Act (ESA) consultation procedures will be pre-approved, speeding up the overall application review process.

1.1.1 Corps Review

In order to be authorized by this RGP, an applicant will be required to meet the parameters of the project description (Section 2.2), the conservation measures (Section 7) and any additional requirements requested by USFWS and/or NMFS and agreed to by the Corps. The applicant will be required to submit an "Application and Specific Project Information Form" and drawings to the Corps in order for the Corps to confirm that the project meets the RGP. A proposed form is included in Appendix A. The Corps will review the application and confirm in writing if the project is authorized by the RGP.

In the Corps Seattle District, Regulatory Branch, there are two primary application reviewers – the project manager and the Environmental Analyst. The project manager, a generalist in background, oversees the application review process, coordinating with the applicant and state and federal agencies as necessary. The Environmental Analyst – a technical expert – reviews the permit decisions, jurisdictional determinations, and biological assessments for scientific accuracy and consistency with Corps regulations. With workload separated by geographic assignment, the Environmental Analyst works with the project manager in a team leader role and reviews the project manager's assessments and evaluations.

The Corps project manager and Environmental Analyst will review the proposed activity to determine if it meets the RGP and if the activity may be authorized under the RGP programmatic consultation. The project manager will review the Conservation Measures and Construction Specifications for each activity as outlined in the RGP programmatic consultation. The Environmental Analyst will sign off the project manager's review.

1.1.2 Monitoring and Tracking

The Corps will submit regular tracking and monitoring reports to USFWS and NMFS on the use of the RGP. If the USFWS and NMFS approve this programmatic biological evaluation for this RGP, the monitoring reports will be submitted 3 months after approval, 6 months after approval, and then annually for a period of 5 years. The RGP is valid for 5 years.

The monitoring report will include copies of all permit applications submitted for the period covered, a summary of all projects authorized, a discussion of any compliance or enforcement issues associated with the RGP and how these issues were resolved, and proposals for any revisions to the consultation. Revisions may include, but are not limited to, changes in general conservation measures, changes in approved work windows, changes in specific project parameters, changes related to additional activities, and/or changes due to new scientific information.

1.1.3 Compliance and Enforcement

When an activity is approved under the RGP programmatic consultation and authorized, the Corps will ensure that all conditions of the completed RGP programmatic consultation are implemented in their entirety.

To ensure compliance with the RGP programmatic consultation conditions, the Corps will conduct random site evaluations of activities authorized under the RGP programmatic consultation. Through notification by anonymous complainants, the Corps may specifically target an individual activity to determine if it is in compliance with the conditions as authorized under the RGP programmatic consultation. If the Corps determines that a permittee is in violation of the RGP programmatic consultation conditions or has deviated from the authorization, the Corps will proceed with an enforcement action against the permittee per Corps enforcement regulations and in coordination with USFWS and NMFS. In some instances, the Corps, in coordination with USFWS and NMFS, may cite the contractor with a violation, if the contractor is repeatedly involved in deviations of permit conditions or violations. Enforcement actions may include, but are not limited to, revisions to the activity construction and/or design, implementation of mitigation measures to compensate for unacceptable adverse impacts, revocation of the Department of the Army Regional General Permit authorization, removal of the constructed activity, and/or fines.

If a permittee is in violation of the RGP programmatic consultation conditions or has caused unauthorized take of a listed species, USFWS and NMFS may implement enforcement actions against the permittee as per their regulations and procedures.

1.1.4 Consultation History with the Services

The USFWS, NMFS and Washington Department of Fish and Wildlife (WDFW) were involved in the development of the RGP Construction Specifications and Conservation Measures. Meetings between the Corps and these agencies were held on: October 16, October 24, November 6, November 20, and December 19, 2002; July 21, August 21, 2003; and January 21, 2004. The Corps initiated these meetings to get input from the Services to facilitate the programmatic consultation process. The Services provided crucial input on construction activities and mitigation measures to develop activities which would result in a “may affect, not likely to adversely affect” determination.

1.2 Residential Structures in Inland Marine Waters (Puget Sound)

A large number of overwater structures are proposed in inland marine waters. Currently, individual ESA consultation is required for each project even though many of the project descriptions and mitigation measures are very similar. To streamline the consultation process, a programmatic consultation utilizing an RGP would be more efficient.

1.3 Activity History

Table 1-1 shows issued Corps permits in the years 1997 through 2001.

Table 1-1. Authorized Residential Piers/Floats By Action Code

	1997			1998			1999			2000			2001			TOTAL
County	**IP**	**LOP**	**NWP**	**IP**	**LOP**	**NWP**	**IP**	**LOP**	**NWP**	**IP**	**LOP**	**NWP**	**IP**	**LOP**	**NWP**	
Clallam	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2
Island	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Jefferson	1	2	0	0	2	0	0	0	0	0	0	0	0	1	0	6
King	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2
Kitsap	2	10	1	1	9	1	0	5	0	0	1	1	0	0	1	32
Mason	0	6	1	0	7	0	0	1	0	1	0	0	2	1	1	20
Pierce	1	8	0	4	21	0	0	4	0	0	0	0	0	0	0	38
San Juan	0	10	0	0	15	2	1	3	0	0	0	2	0	0	4	37
Skagit	0	1	1	0	1	0	0	0	0	0	0	2	0	1	0	6
Snohomish	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Thurston	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Whatcom	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
TOTAL	4	40	4	6	56	4	2	13	1	1	1	5	2	3	6	**148**

IP = Individual Permit (new larger structures, greater than minimal impact)

LOP = Letter of Permission (smaller new structures, additions, reconfigurations)

NWP = Nationwide Permit (NWP 3, maintenance or replacement of existing structures)

The “pre-ESA” numbers in 1997 and 1998 are a more accurate representation of the number of proposed overwater structures than the “post-ESA” numbers in 1999-2001. Therefore, the Corps estimates that the RGP will be used between 40-56 times a year. Based on previously issued permits for overwater structures, the Corps anticipates that the RGP will likely be used the most in Pierce (Tidal Reference Areas (TRA) 3 and 4), San Juan (TRA10), Kitsap (TRA 5,6, and 13), and Mason (TRA11 and 12) Counties.

Table lists number and type of permits authorized for residential pier/ramp/float type structures for each year listed. Data obtained by RAMS queries for "Finalized Actions by Work Type and Location." The work type "Pier" and "Float" were used for the queries. Those activities that did not appear residential were not included (e.g. commercial, governmental).

2 Description of the Action and Action Area

2.1 Description of the Project Purpose and Objectives

The purpose of this RGP is to expedite the authorization of recurring activities that are similar in nature and have minor individual and cumulative adverse impact on the aquatic environment. Activities authorized by this RGP would have specific construction measures which would help to minimize impacts to the aquatic environment. This RGP would minimize the amount of paperwork and time required to authorize qualifying projects by making available for public use an already issued Department of the Army general permit that includes a concluded ESA Section 7 consultation, Essential Fish Habitat consultation, water quality certification, and coastal zone management consistency concurrence.

2.2 Project Activities

Work authorized by this RGP is limited to the categories of activities described below. Activities authorized include the modification of existing residential overwater structures and construction of new residential overwater structures[1] including piers, floats, ramps, and other associated structures in inland marine waters within Washington State for the purpose of private watercraft moorage and water recreational use. Once work is authorized by the RGP, any proposed modifications beyond the limitations of the RGP must be approved by a Department of Army Individual Permit. This RGP only authorizes one pier/ramp/float structure per property. There are further limitations for joint use piers.

This RGP authorizes any fill material placed for the purpose of fish habitat enhancement, as required by the Hydraulic Project Approval from the WDFW for maintenance or construction of structures authorized by this RGP. Also, any required mitigation measures for the overwater structure are also authorized by this RGP.

Activities not authorized by this RGP include the repair, replacement, or installation of buoys, bank armoring, and boat, jet ski, and other watercraft lifts. The replacement, repair, modification, and construction of any *commercial structures or marinas* are not authorized by this RGP. The maintenance or installation of watercraft lifts could be authorized by the Corps' RGP-1. The maintenance and repair of an existing pier will likely be processed as a Nationwide Permit 3; maintenance, is therefore, not authorized by this RGP.

2.3 Discussion of Interdependent / Interrelated Actions

No interdependent or interrelated actions will be associated with the permitted activities within the RGP. All permitted activities will be single and complete actions.

[1] "*Overwater structures*" include piers, ramps, floats, and their associated structures. Associated structures include piling, chain and anchors, ladders, hand rails, steps, and swim steps. Overwater structures, for the purposes of this RGP, do not include watercraft lifts, buoys, or swim floats.

2.4 "Project Area" and "Action Area" Defined

The action area (Figure 1) includes all areas that could potentially be affected by the activities authorized by the RGP, including the implementation of the required conservation measures described in Section 7. The impact area within the action area will vary based on each species under consideration. The RGP is intended to cover the specified activities in Puget Sound.

For wildlife species, marine mammals, and fish, the limits of the action area for individual projects would include all areas within 1 mile of the project area boundary. Within the action area, project impacts to air and water quality, terrestrial and aquatic noise, hydrodynamics, erosion, bathymetry, and terrestrial and marine habitat are reasonably expected to occur, potentially affecting listed species. Beyond the 1-mile action area, impacts associated with the project would not be expected occur or affect listed species.

2.5 Maps of the Project and Action Area

A map of the Puget Sound project area is shown in Figure 1.

3 Status of the Species and Critical Habitat

Table 3-1 indicates federally listed species covered under this programmatic biological evaluation (BE) that may occur or are likely to occur in the action areas of residential overwater structures. Each species is discussed following the table.

Table 3-1. Federally Listed Species that May Occur within the Action Areas of Residential Overwater Structures

	Designated Critical Habitat	Effects Determination	Justification
NMFS			
Chum salmon, Hood Canal Summer Run ESU	None designated	May affect, not likely to adversely affect	Chum salmon migrate and rear in Puget Sound
Humpback whale	None designated	May affect, not likely to adversely affect	Lack of appropriate habitat & lack of documented occurrences
Leatherback sea turtle	None designated	May affect, not likely to adversely affect	Lack of appropriate habitat & lack of documented occurrences
Chinook salmon, Puget Sound ESU	None designated	May affect, not likely to adversely affect	Chinook salmon migrate and rear in Puget Sound
Steller sea lion	Designated, but none within action area	May affect, not likely to adversely affect	Lack of appropriate habitat & lack of documented occurrences
USFWS			
Bald eagles	None designated	May affect, not likely to adversely affect	Bald eagles nest and forage along Puget Sound
Bull trout, Coastal-Puget	None designated	May affect, not likely to	Bull trout migrate and rear

Sound DPS		adversely affect	in Puget Sound
Marbled murrelet	Designated	May affect, not likely to adversely affect	Marbled murrelets nest and forage along Puget Sound
Northern spotted owl	Designated	May affect, not likely to adversely affect	A small amount northern spotted owl habitat occurs near Puget Sound

3.1 Bull Trout, Coastal-Puget Sound DPS (*Salvelinus confluentus*)

3.1.1 Status

The Puget Sound/Coastal DPS (Distinct Population Segment) of bull trout was listed as threatened in November 1999. Bull trout presently occur in 45% of the estimated historical range (Quigley and Arbelbide, 1997). Bull trout are threatened by habitat degradation and fragmentation from past and ongoing land management activities such as mining, road construction and maintenance, timber harvest, hydropower, water diversions/withdrawals, agriculture, and grazing. Bull trout are also threatened by interactions with introduced non-native fishes such as brook trout *(Salvelinus fontinalis)* and lake trout (*Salvelinus namaycush*). Bull trout have declined in overall range and numbers of fish.

3.1.2 Range

Bull trout, members of the family Salmonidae, are char native to the Pacific Northwest and western Canada. Bull trout historically occurred in major river drainages in the Pacific Northwest from about 41^{o}N to 60^{o}N latitude, from the southern limits in the McCloud River in northern California and the Jarbidge River in Nevada to the headwaters of the Yukon River in Northwest Territories, Canada (Cavender, 1978; Bond, 1992). To the west, bull trout range includes Puget Sound, various coastal rivers of Washington, British Columbia, and southeast Alaska (Bond, 1992; McPhail and Carveth, 1992; Leary and Allendorf, 1997). Bull trout are widespread throughout tributaries of the Columbia River basin in Washington, Oregon, and Idaho, including its headwaters in Montana and Canada. Bull trout also occur in the Klamath River basin of south-central Oregon. East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta, and the MacKenzie River system in Alberta and British Columbia (Cavender, 1978; McPhail and Baxter, 1996; Brewin and Brewin, 1997).

The Coastal-Puget Sound bull trout DPS encompasses all Pacific Coast drainages within the coterminous United States north of the Columbia River in Washington, including those flowing into Puget Sound. This population segment is discrete because the Pacific Ocean and the crest of the Cascade Mountain Range geographically segregate it from other subpopulations. The population segment is significant to the species as a whole because it is thought to contain the only anadromous forms of bull trout in the coterminous United States, thus occurring in a unique ecological setting. In addition, the loss of this population segment would significantly reduce the overall range of the taxon (USDI, 1999a).

3.1.3 Habitat Requirements

Bull trout exhibit resident and migratory life-history strategies through much of their current range (Rieman and McIntyre, 1993). Resident bull trout complete their life cycles in the tributary streams in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear from 1 to 4 years before migrating to either a lake (adfluvial), river (fluvial), or in certain coastal areas, to saltwater (anadromous), where maturity is reached in one of the three habitats (Fraley and Shepard, 1989; Goetz, 1989).

Bull trout have relatively specific habitat requirements compared to other salmonids (Rieman and McIntyre, 1993). Habitat components that appear to influence bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrates, and migratory corridors (Oliver, 1979; Pratt, 1984, 1992; Fraley and Shepard, 1989; Goetz, 1989; Hoelscher and Bjornn, 1989; Bedell and Everest, 1991; Howell and Buchanan, 1992; Rieman and McIntyre, 1993, 1995; Rich, 1996; Watson and Hillman, 1997). Watson and Hillman (1997) concluded that watersheds must have specific physical characteristics to provide the necessary habitat requirements for bull trout to successfully spawn and rear, and that the characteristics are not necessarily ubiquitous throughout watersheds in which bull trout occur. Because bull trout exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre, 1993), they should not be expected to simultaneously occupy all available habitats (Rieman et al., 1997).

Bull trout are found primarily in colder streams, although individual fish are often found in larger river systems. (Fraley and Shepard, 1989; Rieman and McIntyre, 1993, 1995; Buchanan and Gregory, 1997; Rieman et al., 1997). Water temperature above 15^{o}C (59^{o}F) is believed to limit bull trout distribution, which partially explains their generally patchy distribution within a watershed (Fraley and Shepard, 1989, Rieman and McIntyre, 1995). Spawning areas are often associated with cold-water springs, groundwater infiltration, and the coldest streams in a given watershed (Pratt, 1992; Rieman and McIntyre, 1993; Rieman et al., 1997).

All life history stages of bull trout are closely associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Oliver, 1979; Fraley and Shepard, 1989; Goetz, 1989; Hoelscher and Bjornn, 1989; Sedell and Everest, 1991; Pratt, 1992; Thomas, 1992; Rich, 1996; Sexauer and James, 1997; Watson and Hillman, 1997). Jakober (1995) observed bull trout over-wintering in deep beaver ponds or pools containing complex large woody debris in the Bitterroot River drainage, Montana, and suggested that suitable winter habitat may be more restrictive than summer habitat. Maintaining bull trout populations requires high stream channel stability and relatively stable stream flows (Rieman and McIntyre, 1993). Juvenile and adult bull trout frequently inhabit complex cover associated with side channels, stream margins, and pools (Sexauer and James, 1997). These areas are sensitive to activities that directly or indirectly affect stream channel stability and alter natural flow patterns. For example, altered stream flow in the fall may disrupt bull trout during the spawning period and channel instability may decrease survival of eggs and young juveniles in the gravel during winter through spring (Fraley and Shepard, 1989; Pratt, 1992; Pratt and Huston, 1993).

Preferred spawning habitat consists of low gradient stream reaches with loose, clean gravel (Fraley and Shepard, 1989) and water temperatures of 5 to 9^{o}C (41 to 48^{o}F) in late summer to early fall (Goetz, 1989). Pratt (1992) summarized information indicating that increases in fine sediments are related to reduced egg survival and emergence. High juvenile densities were observed in Swan River, Montana, and tributaries with diverse cobble substrate and low percentage of fine sediments (Shepard et al., 1984). Juvenile bull trout in four streams in central

Washington occupied slow-moving water less than 0.5 m/sec (1.6 ft/sec) over a variety of sand to boulder size substrates (Sexauer and James, 1997).

The size and age of maturity for bull trout vary depending upon life-history strategy. Growth of resident fish is generally slower than migratory fish; resident fish tend to be smaller at maturity and less fecund (Fraley and Shepard, 1989; Goetz, 1989). Individuals normally reach sexual maturity in 4 to 7 years. Bull trout are known to live as long as 12 years. Repeat and alternate year spawning has been reported, although repeat spawning frequency and post-spawning mortality are not well known (Leathe and Graham, 1982; Fraley and Shepard, 1989; Pratt, 1992; Rieman and McIntyre, 1996).

Bull trout typically spawn from August to November during periods of decreasing water temperatures. However, adult migratory bull trout frequently begin spawning migrations as early as April, and have been known to move upstream as far as 250 kilometers (km) (155 miles (mi)) to spawning grounds (Fraley and Shepard, 1989). In the Blackfoot River, Montana, bull trout began migrations to spawning areas in response to increasing temperatures (Swanberg, 1997). Temperatures during spawning generally range from 4 to 10^{o}C (39 to 51^{o}F), with redds often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz, 1989; Pratt, 1992; Rieman and McIntyre, 1996). Depending on water temperature, incubation is normally 100 to 145 days (Pratt, 1992), and after hatching, juveniles remain in the substrate. Time from egg deposition to emergence may surpass 200 days. Fry normally emerge from early April through May depending upon water temperatures and increasing stream flows (Pratt, 1992; Ratliff and Howell, 1992).

Growth varies depending upon life-history strategy. Resident adults range from 150 to 300 millimeters (mm) (6 to 12 inches) total length and migratory adults commonly reach 600 mm (24 inches) or more (Pratt, 1985; Goetz, 1989).

Bull trout are opportunistic feeders with food habits primarily a function of size and life-history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macrozooplankton, amphipods, mysids, crayfish and small fish (Wyman, 1975; Rieman and Lukens, 1979 in Rieman and McIntyre, 1993; Boag, 1987; Goetz, 1989; Donald and Alger, 1993). Adult migratory bull trout are primarily piscivorous, feeding on fish such as trout, salmon, whitefish, yellow perch, and sculpin (Fraley and Shepard, 1989; Donald and Alger, 1993).

3.1.4 Stocks in Project Vicinity

In the Puget Sound region bull trout have a wide distribution with 35 subpopulations in the Coastal/Puget Sound area. Nineteen of these are found in the Puget Sound basin (King County 2002). Bull trout should be expected to occur anywhere within the Puget Sound region.

3.2 Chinook Salmon, Puget Sound ESU (*Oncorhynchus tshawytscha*)

3.2.1 Status

Puget Sound chinook were listed as threatened in March 1999. Threats to the chinook salmon include watershed development, such as forest practices, mining, agricultural land use, urbanization, hydropower development and water manipulation and withdrawal. Over-fishing, artificial propagation and introduction of nonnative species have also impacted chinook salmon. Forest practices, mining, agricultural land use, urbanization, hydro power development and water withdrawal have resulted in increased sedimentation, altered flow regimes and channel morphology, decreased water quality and quantity, loss of riparian habitat, loss of large woody debris, loss of large woody debris recruitment, elevated water temperatures, decreased gravel recruitment, reduced pools and spawning and rearing areas, rerouted stream channels, degraded streambanks, and loss of estuarine rearing areas (Bishop and Morgan, 1996; Myers et al., 1998). These changes have impacted the spawning and rearing environment of chinook salmon. Harvest, hatchery practices and the introduction of nonnative species have also impacted the expression of the varied life history strategies of chinook salmon within these ESUs.

3.2.2 Range

The ESU encompasses all naturally spawned spring, summer and fall chinook salmon in the Puget Sound region from the North Fork Nooksack River to the Elwha River on the Olympic Peninsula, inclusive. Chinook salmon in this area all exhibit ocean-type life history. Puget Sound stocks all tend to mature at ages 3 to 4 and exhibit similar, coastally-oriented ocean migration patterns (NMFS, 1998a). The boundaries of the Puget Sound ESU correspond generally with the boundaries of the Puget Lowland Ecoregion. The Elwha River, which is in the Coastal Ecoregion, is the only system in this ESU that lies outside the Puget Sound Ecoregion. In life history and genetic attributes, the Elwha River chinook salmon appear to be transitional between populations from Puget Sound and the Washington Coast ESU (NMFS, 1998a). Only naturally spawned chinook salmon are listed at this time (NMFS, 1998a).

3.2.3 Habitat Requirements

The generalized life history of Pacific salmon involves incubation, hatching and emergence in freshwater, migration to the ocean, and subsequent initiation of maturation and return to freshwater for completion of maturation and spawning (Myers et al., 1998). Chinook salmon exhibit two generalized freshwater life history types, stream-type and ocean-type (Gilbert 1912). There is further life history variation within each type, which allows full utilization of freshwater, estuarine and ocean environments (Spence et al., 1996).

In order to complete these life history strategies successfully, chinook salmon need access to freshwater, estuarine, coastal and open ocean environments. In these environments they require adequate water quantity, quality, temperature, and velocity; substrate, cover and shelter, food resources, riparian vegetation, space, and safe passage conditions. The range of ocean residence for chinook salmon is from 1 to 6 years. A small proportion of yearling males, called jacks, mature in freshwater or return after 2 to 3 months in saltwater (Myers et al., 1998; Spence et al., 1996). In general, chinook salmon spawn in small to medium-sized rivers; however they may also spawn in larger river systems such as the mainstem Columbia River (Spence et al., 1996).

Ocean-type chinook salmon, which is typical of fall-run chinook from the Puget Sound ESU, (Spence et al., 1996), migrate to sea normally within a few months after emergence. Ocean-type chinook salmon reside in estuaries for longer periods as fry and fingerlings than do stream-type chinook salmon (Reimers, 1973; Kjelson et al., 1982; Healey, 1991). Juvenile chinook and chum salmon utilize estuaries for rearing, physiological transition and refugia and are the most estuarine dependent anadromous salmonids in the Pacific Northwest (Aitkin, 1998). Ocean-type chinook salmon spend most of their ocean life in coastal waters, and return to their natal river during the spring, summer, fall, late fall and winter (NMFS, 1998a). Ocean-type chinook salmon enter freshwater at an advanced stage of maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of rivers, and spawn within a few days or weeks of freshwater entry (Healey, 1991).

For ocean-type chinook salmon, estuarine rearing environments may be more important than the freshwater environment, as these salmon can rear between 3 to 6 months in freshwater and estuarine environments (Healey, 1991; Meehan and Bjornn, 1991). For ocean-type chinook salmon, estuarine environments provide staging, physiological transition, refugia from high water flows and predation; and neustonic, pelagic and benthic prey food bases. In Washington estuaries, chinook salmon fry feed on emergent insects and epibenthic crustaceans (gammarid amphipods, mysids, and cumaceans) in salt marsh habitat (Simenstad et al., 1982). As the chinook salmon grow, their position and food base in estuaries changes. Larger fish move to deeper and more saline water (Healey, 1982; Macdonald, 1987; Wissmar and Simenstad, 1988; cited in Aitkin, 1998), and their prey base changes to include decapod larvae, larval and juvenile fish, drift insects and euphausiids (Simenstad et al., 1982). Both of these benthic prey bases are dependent on detritus (Sibert et al., 1977; Sibert, 1979 in Aitkin, 1998). Juvenile salmonids tend to congregate in areas where estuary morphology favors detritus retention, such as weed beds, braided or meandering channels, and salt marshes (Healey, 1982). Estuaries with a variety of water salinity gradients, microhabitats created by large wood, boulders, channel morphology and vegetation provide cover from predation, a good prey base and low water velocity refugia at low tide (Aitkin, 1998).

3.2.4 Stocks in Project Vicinity

Chinook salmon are found in most of the rivers in the Puget Sound. WDF et al. (1993) recognizes 27 distinct stocks of chinook salmon: 8 spring-run, 4 summer-, and 15 summer/fall- and fall-run stocks. The Skagit River and its tributaries, the Baker, Sauk, Suiattle, and Cascade Rivers, constitute what was historically the predominant system in Puget Sound containing naturally spawning populations (WDF et al. 1993). Spring-run chinook salmon are present in the North and South Fork Nooksack Rivers, the Skagit River Basin, the White, and the Dungeness Rivers (WDF et al. 1993). Summer-run chinook salmon are present in the Upper Skagit and Lower Sauk Rivers in addition to the Stillaguamish and Snohomish Rivers (WDF et al. 1993). Fall-run stocks (also identified by management agencies as summer/fall runs in Puget Sound) are found throughout the region in all major river systems. (Myers et al. 1998).

3.3 Chum Salmon, Hood Canal Summer Run ESU (*Oncorhynchus keta*)

3.3.1 Status

In March 1999, Hood Canal summer chum were listed as threatened. Threats to the chum salmon include impacts from forest practices, mining, agricultural land use, urbanization and water manipulation and withdrawal. These developments have resulted in loss and degradation of freshwater and estuarine habitat; water withdrawal conveyance, storage and flood control (resulting in insufficient flows, stranding, juvenile entrainment, degradation of spawning habitat and instream temperature increases); logging and agriculture (loss of large woody debris, sedimentation, loss of riparian vegetation, habitat simplification); mining (gravel removal, dredging, pollution); urbanization (stream channelization, increased runoff, pollution, habitat simplification) (NMFS, 1998b). Incidental harvest in salmon fisheries in the Strait of Juan de Fuca and coho salmon fisheries in Hood Canal are a significant threat to the Hood Canal summer chum salmon (NMFS, 1998b). This threat has been decreased with changes in harvest management, but may arise in the future with any rebound of coho salmon stocks to harvestable levels.

3.3.2 Range

Chum salmon have the largest range of natural geographic and spawning distribution of all the Pacific salmon species (Bakkala, 1970). Historically, in North America, chum salmon occurred from Monterey, California to the Arctic coast of Alaska and east to the Mackenzie River which flows into the Beaufort Sea. Present spawning populations are found as far south as Tillamook Bay on the northern Oregon coast (Johnson et al., 1997). In Asia, chum salmon occur from Korea to the Arctic coast of the Russian Far East and west to the Lena River which flows into the Laptev Sea (Salo, 1991). Historically, chum salmon in the Columbia River Basin may have spawned in the Umatilla and Walla Walla Rivers, more than 500 km from the ocean (Nehlsen et al., 1991). These fish would have had to pass Celilo Falls, which was probably only passable at high water flows (Johnson et al., 1997). Currently, chum salmon are present in the lower Columbia River Basin, with more runs on the Washington side than the Oregon side (Salo, 1991). Chum salmon runs occur in the Washougal, Lewis, Kalama, and Cowlitz watersheds in Washington.

This ESU includes summer chum salmon populations in Hood Canal in Puget Sound and in Discovery and Sequim Bays on the Strait of Juan de Fuca. It may also include summer chum salmon in the Dungeness River, however the existence of that run is uncertain (NMFS, 1998b). Summer chum salmon spawn from mid-September to mid-October (WDF et al., 1993). Fall chum salmon spawn from November through December or January (WDF et al., 1993). Data on run timing from as early as 1913 indicated temporal separation between summer and fall chum salmon in Hood Canal, and recent spawning surveys show this separation still exists (NMFS, 1998b). Summer chum salmon generally spawn in the lower mainstem reaches of rivers, with redds typically dug in the mainstem or side channels, from just above tidal influence upriver approximately 16 km (NMFS, 1998b).

3.3.3 Habitat Requirements

Chum salmon spawn in streams and rivers of various sizes, and the fry migrate to sea soon after emergence. They spend more of their life history in estuaries and marine waters than the other Pacific salmon species with the exception of ocean-type chinook salmon. Chum salmon spawning runs can be grouped into three seasonal runs: summer, fall and winter. The chum salmon of the Columbia River chum salmon ESU enter freshwater to spawn from early October to mid-November, with a peak return in early November (Johnson et al., 1997). Peak spawning occurs in late November and is usually complete by early December (WDF et al., 1993). The chum salmon of the Hood Canal summer chum salmon ESU enter freshwater to spawn from

August to mid-September (Cook-Tabor, 1995). Hood Canal summer chum salmon spawning periods vary from August 15 through early October, dependent upon the watershed (Cook-Tabor, 1995).

Chum salmon primarily spawn in the lower reaches of rivers, extending from just above tidal influence up to 100 km of the ocean (Johnson et al., 1997). Some chum salmon may spawn in intertidal areas, with the presence of upwelling groundwater potentially being a preferred spawning location (Johnson et al., 1997). Salo (1991) reported that chum salmon prefer to spawn immediately above turbulent areas or where there was upwelling. WDFW biologists reported that chum salmon in Washington do not preferentially choose areas of upwelling groundwater for redd construction; rather they suggest that chum salmon in Washington most commonly use areas at the head of riffles (Crawford 1997; in Johnson et al., 1997). Generally, chum salmon spawn in shallower, lower gradient, lower velocity streams and side channels (Salo, 1991). The chum salmon shows little persistence in successfully passing falls or blockages. However, in some low gradient systems such as the Yukon River in Alaska or the Amur River in the Russian Federation, they have been documented to migrate up to 2,500 km inland (Johnson et al., 1997).

Egg hatching periods can range widely (from about 1.5 to 4.5 months), due to a large amount of variability in incubation environments (Meehan and Bjornn, 1991; Johnson et al., 1997). Fry typically emerge from the gravel at night and immediately migrate downstream to estuarine waters (Salo, 1991). Cues influencing the timing of downstream migration include: time of adult spawning; stream temperature during egg incubation and after hatching; fry size and nutritional condition; population density; food availability; stream discharge volume and turbidity; physiological changes in the fry; tidal cycles, and day length (Salo 1991). In some populations, fry may spend a few days to several weeks in the stream and then move downstream to the ocean (Salo, 1991; Johnson et al., 1997). Fry out-migration may take only a few hours or days where spawning sites are close to the mouths of rivers (Johnson et al., 1997). In Washington, Oregon and British Columbia, migration to the estuary occurs from February through May with earlier migrations occurring to the south (Johnson et al., 1997). Chum salmon do not have the clearly defined smolt stages that occur in other salmonids, however they are capable of adapting to seawater soon after emergence from the gravel (Johnson et al., 1997).

Juvenile chum salmon use estuaries to feed before starting their long-distance oceanic migrations. Chum and ocean-type chinook salmon exhibit longer residence times in estuaries than do other anadromous salmonids (Healey, 1982). Juvenile chum and pink salmon appear to occupy shallow sublittoral habitats before moving into neritic habitats (Johnson et al.1997). In a summarization of the diets of juvenile chum salmon from 16 estuaries, Simenstad et al. (1982) concluded that juvenile chum salmon less than 60 mm fork length fed on epibenthic food resources such as harpacticoid copepods, gammarid amphipods and isopods, while juveniles greater than 60 mm fork length in neritic habitats fed on drift insects and calanoid copepods, larvaceans, and hyperiid amphipods. Migration within and out of estuaries appears to be related to the availability of prey (Johnson et al., 1997). As time passes and juvenile chum salmon get larger, they move into deeper habitats in the estuary or move offshore as they reach a size that allows them to feed on larger neritic plankton (Salo, 1991). This movement occurs as inshore prey resources decline (Salo, 1991).

Juvenile chum, sockeye and pink salmon occur together along the coast of North America and Alaska in a band that extends out to 36 km (Hartt, 1980). The chum and sockeye salmon juveniles migrate northerly, westerly and southwesterly along the coastal belt of the Gulf of Alaska, and tend to remain near shore (Salo, 1991). As the chum salmon grow larger, they move offshore into the Gulf of Alaska and remain and migrate through the gulf until they reach maturity and head back towards their watershed of origin (Salo, 1991). Chum salmon age at maturity appears to follow a latitudinal trend where a greater number of older fish occur in the northern section of the species' range (NMFS, 1998b). Mature adults return to watersheds of origin at various ages, usually at 3 to 5 years of age, with a majority maturing at 4 years of age (NMFS, 1998b).

3.3.4 Stocks in Project Vicinity

This ESU includes summer-run chum salmon populations in Hood Canal in Puget Sound and in Discovery and Sequim Bays on the Strait of Juan de Fuca. It may also include summer-run fish in the Dungeness River, but the existence of that run is uncertain. (Johnson et al. 1997).

A total of 11 streams in Hood Canal have been identified as recently having indigenous summer chum populations: Big Quilcene River, Little Quilcene River, Dosewallips River, Duckabush River, Hamma Hamma River, Lilliwaup River, Union River, Tahuya River, Dewatto River, Anderson Creek, and Big Beef Creek. Summer chum are occasionally observed in other Hood Canal drainages, including the Skokomish River which once supported a large summer chum population. Summer chum salmon populations in the eastern Strait of Juan de Fuca occur in Snow and Salmon creeks in Discovery Bay, in Jimmycomelately Creek in Sequim Bay, and have been reported in Chimacum Creek. Recent stock assessment data indicate that summer chum also return to the Dungeness River, but the magnitude of returns is unknown. (WDFW 2000).

3.4 Bald Eagle (*Haliaeetus leucocephalus*)

3.4.1 Status

In 1978, the bald eagle was federally listed throughout the lower 48 states as endangered except in Michigan, Minnesota, Wisconsin, Washington, and Oregon, where it was designated as threatened (USDI, 1978). In July, 1995, the USFWS reclassified the bald eagle to threatened throughout the lower 48 states. Bald eagle populations have increased in number and expanded their range. The improvement is a direct result of recovery efforts including habitat protection and the banning of DDT and other persistent organochlorines. The 1996 information provided by the WDFW (unpub. data) indicates that 589 nests were known to be occupied and 0.93 young/nest were produced. This is well above the recovery goal of 276 pairs for Washington, but below the recovery criteria of an average of 1.00 young/nest.

Habitat loss continues to be a long-term threat to the bald eagle in the Pacific Recovery Area of Washington, Idaho, Nevada, California, Oregon, Montana, and Wyoming. Urban and recreational development, logging, mineral exploration and extraction, and other forms of human activities are adversely affecting the suitability of breeding, wintering, and foraging areas.

In July 1999, the USFWS proposed to de-list the bald eagle.

3.4.2 Range

The bald eagle is found throughout North America. The largest breeding populations in the contiguous United States occur in the Pacific Northwest states, the Great Lakes states, Chesapeake Bay and Florida. The bald eagle winters over most of the breeding range, but is most concentrated from southern Alaska and southern Canada southward.

3.4.3 Habitat Requirements

In Washington, bald eagles are most common along the coasts, major rivers, lakes and reservoirs (USFWS, 1986). Bald eagles require accessible prey and trees for suitable nesting and roosting habitat (Stalmaster, 1987). Food availability, such as aggregations of waterfowl or salmon runs, is a primary factor attracting bald eagles to wintering areas and influences the distribution of nests and territories (Stalmaster, 1987; Keister et al., 1987).

Bald eagle nests in the Pacific Recovery Area are usually located in uneven-aged stands of coniferous trees with old-growth forest components that are located within 1 mile of large bodies of water. Factors such as relative tree height, diameter, species, form, position on the surrounding topography, distance from the water, and distance from disturbance appear to influence nest site selection. Nests are most commonly constructed in Douglas fir or Sitka spruce trees, with average heights of 116 feet and size of 50 inches dbh (Anthony et al., 1982 in Stalmaster, 1987). Bald eagles usually nest in the same territories each year and often use the same nest repeatedly. Availability of suitable trees for nesting and perching is critical for maintaining bald eagle populations. Nest sites are generally within 1 mile of water (USFWS, 1986). The average territory radius ranges from 1.55 miles in western Washington to 4.41 miles along the lower Columbia River (Grubb, 1976; Garrett et al.,1988). In Washington, courtship and nest building activities normally begin in January, with eaglets hatching in mid-April or early May. Eaglets usually fledge in mid-July (Anderson et al., 1986).

A number of habitat features are desirable for wintering bald eagles. During the winter months, bald eagles are known to band together in large aggregations where food is most easily acquired. The quality of wintering habitat is tied to food sources and characteristics of the area that promote bald eagle foraging. Key contributing factors are available fish spawning habitat with exposed gravel bars in areas close to bald eagle perching habitat. Bald eagles select perches that provide a good view of the surrounding territory, typically the tallest perch tree available within close proximity to a feeding area (Stalmaster, 1987). Tree species commonly used as perches are black cottonwood, big leaf maple, or Sitka spruce (Stalmaster and Newman, 1979).

Wintering bald eagles may roost communally in a single tree or large forest stands of uneven ages that have some old-growth forest characteristics (Anthony et al., 1982 in Stalmaster, 1987). Some bald eagles may remain at their daytime perches through the night but bald eagles often gather at large communal roosts during the evening. Communal night roosting sites are traditionally used year after year and are characterized by more favorable microclimatic conditions. Roost trees are usually the most dominant trees of the site and provide unobstructed views of the surrounding landscape (Anthony et al., 1982 in Stalmaster, 1987). They are often in ravines or draws that offer shelter from inclement weather (Hansen et al., 1980; Keister, 1987). A communal night roost can consist of two birds together in one tree, or more than 500 in a large stand of trees. Roosts can be located near a river, lake, or seashore and are normally within a few miles of day-use areas but can be located as far away from water as 17 miles or more. Prey sources may be available in the general vicinity, but close proximity to food is not as critical as the need for shelter that a roost affords (Stalmaster, 1987).

Bald eagles utilize a wide variety of prey items, although they primarily feed on fish**,** birds and mammals. Diet can vary seasonally, depending on prey availability. Given a choice of food, however, they typically select fish. Many species of fish are eaten, but they tend to be species that are easily captured or available as carrion. In the Pacific Northwest, salmon form an important food supply, particularly in the winter and fall. Birds taken for food are associated with aquatic habitats. Ducks, gulls and seabirds are typically of greatest importance in coastal environments. Mammals are less preferred than birds and fish, but form an important part of the diet in some areas. Deer and elk carcasses are scavenged, and in coastal areas, eagles feed on whale, seal, sea lion and porpoise carcasses (Stalmaster, 1987).

3.4.4 Populations in Project Vicinity

Bald eagles are known to occur within the vicinity of Puget Sound. In order to document local occurrence and assess the potential for impacts, relevant agencies and databases should be consulted to identify potential habitat and nest sites, including USFWS and WDFW Priority Habitats and Species maps.

3.5 Marbled Murrelet (*Brachyramphus marmoratus*)

3.5.1 Status

The Washington, Oregon, and California marbled murrelet populations were listed as threatened by USFWS in 1992. Critical habitat was designated for the species in May 1996 (USDI, 1996). Six geographic zones for marbled murrelets were identified in the Marbled Murrelet Recovery Plan (USFWS, 1997b). Two of these zones, Puget Sound (Zone 1) and Western Washington Coast Range (Zone 2), are in Washington.

In the past, marbled murrelets in Puget Sound were considered common (Rathbun, 1915), abundant (Edson, 1908), or numerous (Miller et al. 1935), as summarized in Speich et al. (1992). The most recent estimate of the total breeding population of Washington marbled murrelets is approximately 5,000 birds (Speich et al., 1992; Speich and Wahl, 1995). These estimates were based on counts of birds on the water during the spring-summer breeding period. Based on boat surveys conducted in 1978, 1979, and 1985, Speich et al. (1992) estimated the total population (adults, subadults, and juveniles) of marbled murrelets on the outer coast of Washington to be less than 2,400 birds. Using 2-day aerial surveys in September 1993 and in 1994, Varoujean and Williams (1994) estimated the outer coast Washington population of marbled murrelets to be 1,700 to 2,400. Because Speich et al. (1992) and Varoujean and Williams (1994) used different methods to estimate the murrelet population in Washington, their data cannot be compared, and no conclusion should be drawn about the trend of the marbled murrelet population from these data.

As part of the recovery planning process, a demographic model was developed to help better understand marbled murrelet population dynamics (Beissinger and Nur in Appendix B, USFWS, 1997b). The demographic model predicted that murrelet populations are likely to be declining at an estimated rate that varied from 1 to 14% per year, depending on the parameter estimates used. The authors estimated that the most likely rate of decline would be around 4 to 7% per pear. Predicting or estimating population trends for marbled murrelets is difficult because their population dynamics and demography have not been well described. Ralph et al. (1995) summarized some of the reasons for the variability in population estimates among researchers, including differences in methodology, assumptions, spatial coverage, and survey and model errors. Nevertheless, both Ralph et al. (1995) and the Marbled Murrelet Recovery Team (USFWS, 1997b) have concluded that the listed population appears to be in a long-term downward trend.

3.5.2 Range

The North American subspecies *(B. m. marmoratus)* ranges from Alaska south to California. In Washington State, occupied stands have been found as far as 52 miles (84 km) inland.

3.5.3 Habitat Requirements

Marbled murrelets are semi-colonial seabirds and are dependent upon old-growth forests, or forests with an older tree component, for nesting habitat (Hamer and Nelson, 1995b; Ralph et al., 1995). Booth (1991) concluded that 82 to 87% of the old-growth forests that existed in western Washington and Oregon prior to the 1840's is now gone. Sites occupied by murrelets tend to have a higher proportion of mature forest classes than do unoccupied sites (Raphael et al., 1995). These forests are characterized by multi-layered canopies and high composition of low elevation conifer trees, and typically occur on the lower two-thirds of forested slopes (Hamer and Nelson, 1995b).

Nests are located on large branches and platforms such as mistletoe brooms. Nesting occurs over an extended period from late March to late September (Carter and Sealy, 1987; Hamer and Nelson, 1995a). Attendance at breeding sites during the non-breeding season may enhance pair bond maintenance, facilitate earlier breeding, or reinforce familiarity with flight paths to breeding sites (Naslund and O'Donnell, 1995; O'Donnell et al., 1995).

Marbled murrelets are directly affected by the loss of nesting habitat resulting from cutting of old growth forests. Fragmentation of old-growth forest resulting from this cutting also has an indirect effect on the health of marbled murrelet populations by creating more edges to the forest. Increased fragmentation provides more favorable conditions for predation by birds that use the forest edge, such as jays, crows, ravens, and great-horned owls. A compilation of records of 65 marbled murrelet nests studied in the past 20 years revealed that 72% of the nests were unsuccessful. The major cause of nest failure (57%) was predation (Nelson and Hamer, 1995).

Marbled murrelets forage predominantly within 1.25 mile (2 km) of shore (Strachan et al., 1995), although the species can be found further offshore (Piatt and Naslund, 1995; Ralph and Miller, 1995). Ainley et al. (1995) reported that most marbled murrelets sighted in central California occurred within 7 km of shore with a median value of less than 5 km, but with one individual bird being sighted 24 km offshore. Thompson (1996) found that in Washington State, murrelets were most numerous within 200 meters of shore, and rarely found at or beyond 1,200 meters from shore. Speich and Wahl (1995) observed that murrelets tend to be most abundant over eelgrass and substrate, on shorelines with broad shelves, and along shorelines with narrow shelves where kelp is present in the Strait of Juan de Fuca and Puget Sound. They reported that significant numbers of murrelets may also be found in areas of tidal activity. Murrelets feed primarily on fish and invertebrates (Burkett, 1995).

3.5.4 Populations in Project Vicinity

Marbled murrelets are known to occur within the vicinity of Puget Sound. In order to document local occurrence and assess the potential for impacts, relevant agencies and databases should be consulted to identify potential habitat and nest sites, including USFWS and WDFW Priority Habitats and Species maps.

3.5.5 Designated Critical Habitat for Marbled Murrelet

Critical habitat for the marbled murrelet was designated on May 24, 1996 (USFWS 1996). Critical habitat was only identified in the terrestrial environment and not in the marine environment. Designated lands are in areas identified as essential to the conservation of the species. The USFWS identified 32 critical habitat units in Washington, Oregon and California, with 11 units in Washington.

Approximately 1,631,300 acres (660,180 hectares) of habitat were designated as critical habitat in Washington, with approximately 74% of the area on federal lands, primarily in Late Successional Reserves as established in the Northwest Forest Plan (USFWS, 1997 Appendix A).

Within areas essential for successful marbled murrelet nesting, only those areas that contain one or more primary constituent elements are, by definition, critical habitat. The primary constituent elements are: (1) individual trees with potential nesting platforms, and (2) forested areas within 0.8 kilometers (0.5 miles) of individual trees with potential nesting platforms, and with a canopy height of at least one-half the site-potential tree height[2]. This includes all such forest, regardless of contiguity. These primary constituent elements are essential to provide and support suitable nesting habitat for successful reproduction of the marbled murrelet. (USFWS, 1996).

3.6 Northern Spotted Owl (*Strix occidentalis caurina*)

3.6.1 Status

The northern spotted owl was listed as federally threatened in June 1990. The Northern Spotted Owl Recovery Team reported a total of about 3,602 known pairs of spotted owls in Washington, Oregon, and California, with 671 pairs in Washington (USDI, 1992b). Based on two sets of assumptions to develop estimates, Holthausen et al. (1994 in WDNR, 1997) estimated 282 or 321 pairs of spotted owls on the Olympic Peninsula, which was higher than previous estimates.

A demographic analysis of results from five sites distributed throughout the spotted owls range indicated that female territorial spotted owls were declining between 6 and 16% per year (an

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[2] The site-potential tree height is the average maximum height for trees given the local growing conditions, and is based on species-specific site index tables.

average of 10%) at individual study sites (Anderson and Burnham, 1992 in WDNR, 1997). Burnham et al. (1994 in WDNR, 1997) estimated an annual loss of 3 to 8% of the resident female owls on the Olympic Peninsula using unadjusted estimates of juvenile survival. Using an adjusted estimate of juvenile survival, they estimated an annual loss of 1% of the resident females. Threats to existing populations of spotted owls include declining habitat, low populations, limited and highly fragmented habitat, isolation of populations, predation and competition (USDI, 1992b).

3.6.2 Range

The northern spotted owl is one of three subspecies (northern, California, and Mexican). The northern subspecies occurs from British Columbia to northern California and is associated with late successional and old-growth forest habitats. The owl also occurs in some younger forest types where the structural attributes of old-growth forests are present (WDNR 1997). The present range of the northern spotted owl is similar to the limits of its historic range (USDI, 1992a).

3.6.3 Habitat Requirements

Detailed accounts of the taxonomy, range, and habitat requirements of northern spotted owls may be found in the 1990 Fish and Wildlife Service status review (USFWS, 1990), the 1987 and 1989 status review supplements (USFWS, 1987, 1989), and the Interagency Scientific Committee Report (Thomas et al., 1990).

Spotted owls nest, roost and feed in a wide variety of habitat types and forest stand conditions throughout their distribution, with most observations in areas having a component of old-growth and mature forests. Owls in managed forests usually occupy areas with structural diversity and a high degree of canopy closure, containing large diameter or residual old trees, in stands more than 60 years old (USDI, 1992b).

Nesting habitat is generally found in mature and old-growth stands and contains a high degree of structural complexity (WDNR, 1997a). Cavities or broken-top trees are more frequently selected in older forests. Platforms (mistletoe brooms, abandoned raptor and gray squirrel nests, and debris accumulations) tend to be selected more frequently in younger forests (Foresman et al., 1984; LaHaye, 1988; Buchanan, 1991). Roosting habitat has characteristics similar to nesting habitat, i.e., high canopy closure, a multi-layered canopy, and large diameter trees (WDNR 1997a). Spotted owls roost in shady spots near streams in the summer (WDNR 1997a). Spotted owls begin their annual breeding cycle in late winter (February or March) and dispersal of juvenile owls begins in early fall (USDI, 1992b).

Feeding habitat appears to be the most variable of the major habitat categories (Thomas et al., 1990); however it is characterized by high canopy closure and complex structure (USDI, 1992b). Spotted owls feed on a variety of small forest animals, birds, and insects. Spotted owls on the Olympic Peninsula depend primarily on flying squirrels (Carey et al., 1992).

Although habitat that allows spotted owls to disperse may be unsuitable for nesting, roosting, or foraging, it provides an important linkage among blocks of nesting habitat both locally and over the range of the northern spotted owl. This linkage is essential to the conservation of the spotted owl. Dispersal habitat, at minimum, consists of forest stands with adequate tree size and canopy closure to protect spotted owls from avian predators and to allow the owls to forage at least occasionally (USDI, 1995).

3.6.4 Populations in Project Vicinity

In order to document local occurrence and assess the potential for impacts, relevant agencies and databases should be consulted to identify potential habitat and nest sites, including USFWS and WDFW Priority Habitats and Species maps.

3.6.5 Designated Critical Habitat for Northern Spotted Owl

On January 15, 1992, approximately 6.88 million acres (2.8 million hectares) was designated as critical habitat for the northern spotted owl in Washington, Oregon, and California. These critical habitat areas included most of the Habitat Conservation Areas defined in the Interagency Scientific Committee Report (Thomas et al., 1990) and added areas around and between them. Fifty-three critical habitat units were identified in Washington.

The USFWS primary objective in designating critical habitat was to identify existing spotted owl habitat and to highlight specific areas where management consideration should be given highest priority to manage habitat (USDI, 1992a). To assist in these determinations, the USFWS relied on the following principles identified in Thomas et al. (1990): (1) develop and maintain large contiguous blocks of habitat to support multiple reproducing pairs of owls; (2) fragmentation and edge effect to improve habitat quality; (3) minimize distance to facilitate dispersal among blocks of breeding habitat; and, (4) maintain range-wide distribution of habitat to facilitate recovery (USDI, 1992a).

The following qualitative criteria were considered when determining whether to select specific areas as critical: (1) presently suitable habitat emphasized; (2) large contiguous blocks of habitat emphasized; (3) quality of habitat; (4) dispersal distances minimized; (5) occupied habitat emphasized; (6) maintain range wide distribution; (7) need for special management or protection; and, (8) adequacy of existing regulatory mechanisms (USDI, 1992a).

3.7 Leatherback Sea Turtle *(Dermochelys coriacea)*

3.7.1 Status

The leatherback sea turtle was listed as endangered in 1970. Leatherback sea turtles are endangered by overexploitation, habitat loss, irresponsible fishing, and pollution. Sea turtle eggs are prized food for both humans and animals alike. In addition, humans have long hunted sea turtles for food and for their shells and other parts. They prefer the same beaches for nesting as humans do for recreational activities. Sunbathing, swimming, and beach driving frighten females, and can alter their reproductive behavior. In addition, eggs can be easily crushed from such recreational activities. Turtles that hatch and migrate to sea face additional threats from commercial fishing and pollution. Fishing nets can trap and drown sea turtles by preventing them from being able to surface for air and clear plastic trash can mimic their main food source (jellyfish) (WSDOT 2001).

3.7.2 Range

Leatherback sea turtles forage off the coast of Oregon and Washington and may enter bays and estuaries during the summer months. Leatherback sea turtles nest in the tropics and subtropics and do not nest on the west coast of the U.S. (NMFS and USFWS, 1996b).

3.7.3 Habitat Requirements

Little information is available on the migratory habits of this species. Sightings of leatherback turtles off the coast of Washington have occurred during the summer months (Bowlby et al., 1994). Leatherback sea turtles feed on cnidarians (jellyfish) and tunicates (NMFS and USFWS, 1996b).

3.7.4 Populations in Project Vicinity

Bowlby et al. (1994) observed 16 leatherback turtles off the Oregon and Washington coast in 1989 and 1990, and three more in 1992. No other sea turtles were observed during the study. The majority of these turtle sightings occurred off the Washington coast with a mean offshore location of 33 nautical miles (range: 4.5 to 80 nautical miles). The leatherback turtle is found off the coast of Washington only during the summer and early fall (September) when sea surface temperatures are highest. Since these turtles typically only occur offshore, their presence in the action area during construction activities is highly unlikely.

3.8 Humpback Whale (*Megaptera novaeangliae*)

3.8.1 Status

In 1970, the humpback whale was listed as an endangered species throughout its entire range. By the 1960's, humpback whale populations were considerably reduced and endangered as a result of mechanized commercial whaling. Because of this, commercial harvesting of whales was banned in the North Pacific in 1966 (Klinowska 1991). Despite this effort, humpback whales continue to face many threats that are harmful to their existence. Some of these threats include entanglement in commercial fishing gear, marine pollution, overexploitation of fish resources that deplete their food source, ship collisions, and acoustic disturbances from shipping traffic and other industrial-related noises.

3.8.2 Range

Humpback whales inhabit all major ocean basins from the equator to sub-polar latitudes. They generally follow a predictable migratory pattern in both hemispheres, feeding during the summer in the higher near-polar latitudes and then during the winter migrating to the lower latitudes where calving and breeding take place. The International Whaling Commission has designated one stock of humpback whales in the North Pacific Ocean (Donovan, 1991). These whales range widely across the entire North Pacific during the summer months—south to Point Conception, California, and north into the Bering Sea (Johnson and Wolman, 1984). Known feeding grounds exist off California, Oregon, and Washington, in the Bering Sea, along the Aleutian Islands, and in southeastern Alaska.

3.8.3 Habitat Requirements

Humpback whales in the Northern Hemisphere could be classified as generalists when it comes to their diet. They have been known to prey upon krill (eupausiids), copepods, juvenile salmonids, Arctic cod, pollocks, pteropods, and some cephalopods (Johnson and Wolman, 1984). In New England waters of the North Atlantic, 95% of their diets consist of fish species. The most common prey item is the Atlantic herring, capelin, Atlantic mackerel, and other schooling species (Kenney et al., 1985). On the Alaska feeding grounds in the North Pacific, krill, herring, and capelin make up the majority of prey items in the stomachs of humpback whales (Bryant et al., 1981; Dolphin and McSweeney, 1983). Humpback whales generally do not feed when on their wintering grounds (Slijper, 1962; Lockyer, 1981).

Humpback whales utilize a wide range of feeding techniques, at times involving more than one individual and resembling a form of cooperative participation. The two most observable techniques are lob-tail feeding (Weinrich et al., 1992) and bubble-cloud feeding (Ingebrigtsen, 1929; Jurasz and Jurasz, 1979; Hain et al., 1982). Recently, there has been documentation of bottom-feeding by humpback whales on Stellwagen Bank off Massachusetts and near the mouth of Chesapeake Bay (Swingle et al., 1993; Hain et al., 1995).

3.8.4 Populations in Project Vicinity

Documented occurrences of humpback whales in Puget Sound are rare and the Sound is not part of their known migration route. The Puget Sound basin does not provide habitat suited to supporting populations of humpback whale.

3.9 Steller Sea Lion (*Eumetopias jubatus*)

3.9.1 Status

In April, 1990, the western population (located west of 144^{o}W long.) of Steller sea lions was designated as endangered. The eastern population (located east of 144^{o}W long., which includes those sea lions found along the western U.S. coastline) was designated as threatened. The causes of Steller sea lion decline are largely unknown. Scientists believe that their decline could be caused by several factors including poor recruitment, nutritional stress, predation by sharks and killer whales, commercial fisheries, pollution, and parasites and disease.

3.9.2 Range

The range of the Steller sea lion extends from California and associated waters to Alaska, including the Gulf of Alaska and Aleutian Islands, and then into the Bering Sea and North Pacific and into Russian waters and territory.

3.9.3 Habitat Requirements

Steller sea lions breed, pup, and seek rest and refuge on relatively remote islands and points of land along the Alaska coastline. Steller sea lions are opportunistic feeders, which feed primarily on schooling demersal fish, such as walleye pollock, Atka mackerel, herring, and capelin. Declines in sea lion abundance may be related to changes in the availability of sea lion prey.

In California, the reason for the decline of Steller sea lions is not known. Former rookery habitat has been abandoned (San Miguel Island), and some other rookeries (Año Nuevo Island, Farallon Islands) are at lower than historical abundance levels. The availability of suitable terrestrial habitat does not appear to be a factor in the sea lion decline in parts of California.

3.9.4 Populations in Project Vicinity

The greatest abundance of Steller sea lions in Washington State is on the outer coast from Cape Flattery to the mouth of the Columbia River, occurring on Jagged Island and Split Rock during summer months, and Umatilla Reef during the winter (NMFS 1992). Cape Flattery is occasionally used for hauling out (NMFS 1992). In the Puget Sound however, fewer Steller sea lions have been documented, likely a result of lack of appropriate habitat (Chumbley 1993). While NMFS does not recognize any Steller haul-outs in Puget Sound and the Strait of Juan de Fuca, haul-outs have been historically identified on Dungeness Spit; Sucia Island and Patos Island north of Orcas Island; Long Island to the southwest of Lopez Island; and near Andrews Bay on San Juan Island (Evans-Hamilton, Inc. 1987).

3.9.5 Designated Critical Habitat for Steller Sea Lions

Critical habitat for Steller sea lions was designated on August 27, 1993. Critical habitat includes areas surrounding rookeries and major haul-out areas in California, Oregon, and Alaska. In Alaska, some foraging areas within the core of the geographic range of Steller sea lions are also designated critical habitat. There is no designated Steller sea lion critical habitat, including designated rookeries or haul-outs, located in the State of Washington.

4 Existing Environmental Baseline

4.1 Description of Project and Action Area

Puget Sound is a glacially carved estuary located in northwest Washington State and covers an area ranging from 2,632 km^2 to 2,329 km^2, dependant on tidal elevation, including 3,700 km of coastline. It is subdivided into five basins or regions: (1) North Puget Sound, (2) Main Basin, (3) Whidbey Basin, (4) South Puget Sound, and (5) Hood Canal (Figure 1). Tides, gravitational forces and freshwater inflows drive estuarine circulation in Puget Sound. Mixing of oceanic and estuarine waters at the sill in Admiralty Inlet substantially reduces the flushing rate of nutrients and contaminants.

Of the habitats that occur in Puget Sound, kelp beds (macroalgae) and eelgrass meadows cover the largest area at almost 1,000 km^2. Other major habitats include intertidal wetlands, mudflats, and sandflats. The extent of some of these habitats has markedly declined over the last century. These habitats provide a myriad of critical functions such as primary production; support of invertebrates and juvenile and adult fishes (including juvenile salmonids); and foraging and refuge opportunities for birds and other wildlife. The human population in the Puget Sound region is estimated to be about 3.6 million.

4.2 Description of Environmental Baseline by Region

4.2.1 South Puget Sound

The Southern Basin is partially separated from the Main Basin by a prominent sill at the Tacoma Narrows. The relatively shallow depth in the Southern Basin yields large areas of tidelands. These tidal areas are the result of a varied topography consisting of islands and inlets with extensive shorelines. The Southern Basin includes all waterbodies south of Tacoma Narrows. The largest river entering the basin is the Nisqually River. Subtidal areas have a diversity of surface sediments, with shallower areas consisting of mixtures of mud and sand, and deeper areas consisting of mud (PSWQA 1987). Sediments in Tacoma Narrows and Dana Passage consist primarily of gravel and sand. Among the five basins of Puget Sound, the Southern Basin has the least amount of vegetation in its intertidal area (12.7 ± 15.5% coverage), with salt marsh (9.7 ± 14.7% coverage) and green algae (2.1 ± 1.9% coverage) being the most common types (Bailey et al. 1998).

4.2.2 Main Basin (Central Puget Sound)

The largest subdivision, by volume, is the Main Basin. It holds 60% of the water in the whole system. The 75 km-long Main Basin is bordered to the north by a line between Point Wilson (near Port Townsend) and Partridge Point on Whidbey Island, to the south by Tacoma Narrows, and to the east by a line between Possession Point on Whidbey Island and Meadowdale (near Everett) (Figure 1). Freshwater flows into Elliott Bay through the Duwamish-Green River System, and into Commencement Bay through the Puyallup River.

Subtidal surface sediments in Admiralty Inlet tend to consist largely of sand and gravel, whereas sediments just south of the inlet and southwest of Whidbey Island are primarily sand (PSWQA 1987). Sediments in the deeper areas of the central portion of the Main Basin generally consist of mud or sandy mud (PSWQA 1987, Washington Department of Ecology 1998). Sediments in the shallower and intertidal areas of the Main Basin are mixed mud, sand, and gravel. The Main Basin has a relatively small amount of intertidal vegetation, with 28.3 ± 10.4% of the intertidal area containing vegetation (Bailey et al. 1998). The predominant types are green algae (12.0 ± 4.4%) and eelgrass (11.4 ± 6.6%). Most eelgrass is located on the western shores of Whidbey Island and the eastern shores of the Kitsap Peninsula (PSWQA 1987). Only 8% of the eastern shoreline has a continuous distribution of eelgrass beds and 40% of the shoreline has a patchy distribution (PSWQAT 2000).

4.2.3 Whidbey Basin

Whidbey Basin, the second largest of the four subdivisions comprising Puget Sound, contains the waters east of Whidbey Island and north of the Main Basin (Figure 1). The northern boundary is Deception Pass at the northern tip of Whidbey Island. There is no sill across the entrance to the Whidbey Basin, therefore, it is more a geographically than geologically defined region. The relative shallowness of the basin is complemented by a much higher percentage of tidelands than any of the other Puget Sound basins. The Skagit River (the largest single source of freshwater in Puget Sound) enters the northeastern corner of the Basin, forming a delta and the shallow waters (<20 m) of Skagit Bay. Port Susan is located east of Camano Island and receives freshwater from the Stillaguamish River at the northern end and from the Snohomish River (the second largest of Puget Sound's rivers) at southeastern corner. The most common sediment type in the intertidal zone of the Whidbey Basin is sand. Similarly, subtidal areas near the mouths of the three major river systems are largely sand. However, the deeper areas of Port Susan, Port Gardner and Saratoga Passage have surface sediments composed of mixtures of mud and sand (PSWQA 1987, WDOE 1998). Deception Pass sediments consist largely of gravel.

Vegetation covers 23.6 ± 8.8% of the intertidal area of the Whidbey Basin (Bailey et al. 1998). The three predominant types of cover include green algae (6.8 ± 6.2%), eelgrass (6.5 ± 5.8%), and salt marsh (9.0 ± 9.4%). Eelgrass beds are most abundant in Skagit Bay and in the northern portion of Port Susan (Figure 1) (PSWQA 1987). About 43% of Puget Sound's tideland is located in the Whidbey Island Basin. This reflects the strong influence of the Skagit River, which is the largest river in the Puget Sound system. Skagit River sediments are responsible for the extensive mudflats and tidelands backing the east side of Skagit Bay.

4.2.4 Northern Puget Sound

The North Puget Sound region is demarcated to the north by the U.S.-Canadian border, to the west by a line due north of the Sekiu River, to the south by the Olympic Peninsula, and to the east by a line between Point Wilson (near Port Townsend) and Partridge Point on Whidbey Island and the mainland between Anacortes and Blaine, Washington (Figure 1). Subtidal depths range from 20 m to 60 m in most of the northwest part of the region. Deeper areas near the entrance to the Main Basin north of Admiralty Inlet range from 120 m to 180 m in depth (PSWQA 1987). Most of the rocky-reef habitat in Puget Sound is located in this region. The surface sediment of the Strait of Juan de Fuca is composed primarily of sand. Many of the bays and sounds in the eastern portion of the North Sound have subtidal surface sediments consisting of mud or mixtures of mud and sand (PSWQA 1987, WDOE 1998). The area just north of Admiralty Inlet is primarily gravel in its deeper portions, and a mixture of sand and gravel in its shallower portions, whereas the shallow areas north of the inlet on the western side of Whidbey Island and east of Protection Island consist of muddy sand (Roberts 1979). The majority of the subtidal surface sediments among the San Juan Islands consist of mixtures of mud and sand. Within the intertidal zone, the area also has mixed fine sediment and sandy sediment (Bailey et al. 1998).

Eelgrass is the primary vegetation in the intertidal areas of the Strait of Juan de Fuca, covering 42.2 ± 27.2% of the intertidal area, and green algae is the second most common covering 4.4 ± 3.7% of the intertidal area (Bailey et al. 1998). About 45% of the shoreline of this region consists of kelp habitat, compared to only 11% of the shoreline of the other four Puget Sound basins (Shaffer 1998). Nevertheless, both intertidal areas each have approximately 50% of the total kelp resource. Most species of kelp are associated with shoreline exposed to wave action, whereas eelgrass is found in protected areas, such as Samish and Padilla Bays. Some of the densest kelp beds in Puget Sound are found in the Strait of Juan de Fuca. Kelp beds at the north end of Protection Island declined drastically between 1989 and 1997, decreasing from about 181 acres to nothing (Sewell 1999). The cause of this decline is currently unknown.

4.2.5 Hood Canal

The Hood Canal Basin is the simplest and smallest of Puget Sound's subdivisions. The entrance to Hood Canal lies between Tala Point and Foulweather Bluff, however the entrance sill to this basin lies considerably south, located between South Point and Lofall. Hood Canal branches off the northwest part of the Main Basin near Admiralty Inlet (Figure 1). Like many of the other basins, it is partially isolated by a sill (50 m deep) near its entrance that limits the transport of deep marine waters in and out of Hood Canal (Burns 1985). Sediment in the intertidal zone consists mostly of mud, with similar amounts of mixed fine sediment and sand (Bailey et al. 1998). Surface sediments in the subtidal areas also consist primarily of mud, with the exception of the entrance, which consists of mixed sand and mud. The Great Bend and Lynch Cove have patchy distributions of sand, gravelly sand, and mud (PSWQA 1987, WDOE 1998).

Vegetation covers 27.8 ± 22.3% of the intertidal areas of the Hood Canal Basin. Salt marsh (18.0 ± 8.8%) and eelgrass (5.4 ± 6.3%) are the two most abundant plants (Bailey et al. 1998). Eelgrass is found along most of the Hood Canal nearshore, especially in the Great Bend and Dabob Bay.

4.3 General Habitat Characteristics

4.3.1 Eelgrass Meadows

Eelgrass (*Zostera marina* L.) is one of six species of seagrass in the Pacific Northwest (*Zostera asiatica, Z. japonica, Phyllospadix scouleri, P. serrulatus, P. torreyi*). It forms small patches to large meadows in the low intertidal and shallow subtidal zone in Puget Sound. Organic carbon produced by eelgrass can enter the food web through the microbial decomposition and processing of both particulate and dissolved eelgrass materials. This organic matter is incorporated in the diet of fish and other marine animals including juvenile salmon (Simenstad et al. 1988). Large mats of eelgrass produced from very dense beds are important in the diet of fish and birds. It is believed that the meadows affect sediment deposition. It has been found that eelgrass increases the organic matter in sediments in Puget Sound. Eelgrass mediates nutrient fluxes into and out of the sediment (Thom et al. 1994).

Eelgrass commonly occurs in shallow soft-bottom tideflats, along channels, and in the shallow subtidal fringe. Factors that affect its distribution and growth along with the ranges that are optimal for eelgrass are shown in Table 4-1.

Table 4-1. Factors Controlling Eelgrass Growth

Factor	Optimal Conditions
Light	4.4% to 29.4% of light available at surface
Temperature	7-13ºC
Salinity	10-13‰
Substrata	Fine sand to mud
Nutrient Soil	Nutrients present moderate to low water column

Source: Thom et al. 1988; Phillips 1984; Dennison et al. 1993.

Eelgrass occurs from about +1 m to -5 m MLLW (Mean Lower Low Water) in the central Puget Sound area (Bulthuis 1994; Thom et al. 1998). The primary factor controlling distribution at the upper boundary is desiccation stress, and at the lower boundary is light penetration (Thom et al. 1998). Competition for light and nutrients with macroalgae species can also affect eelgrass distribution. Eelgrass density is highly variable but can reach in excess of 800 shoots m^2 in central Puget Sound (Thom et al. 1998). Mean densities that have been reported from specific studies range from about 50-400 shoots m^2 (Thom 1988; Thom and Hallum 1989; Thom 1990; Thom and Albright 1990).

Juvenile chum and chinook salmon are believed to use eelgrass for feeding and rearing during spring. Herring are known to lay eggs on eelgrass. Other fish that use eelgrass habitat for refuge or feeding areas are the bay pipefish, crescent gunnel, kelp perch, lingcod, penpoint gunnel, shiner perch, snake prickleback, striped seaperch, and tube-snout (Simenstad et al. 1991). Birds associated with eelgrass habitat feed on the plants, invertebrates, and fish found among the eelgrass. They include the black brant, bufflehead, Canada goose, common snipe, glaucous-winged gull, great blue heron, greater yellowlegs, and spotted and least sandpipers. Dungeness crab, Pacific harbor seals, and river otters are also associated with eelgrass (Simenstad et al. 1991). Among the few direct grazers on eelgrass are the black brant goose and isopods (*Idotea resecata*) (Thom et al. 1995). A rich epiphytic flora and associated small invertebrate fauna form seasonally on eelgrass leaves. Eelgrass beds provide a multitude of functions including habitat structure, refuge, prey resources, and reproduction.

4.3.2 Kelp Forests

Bull kelp, *Nereocystis luetkeana*, is the largest brown algae found in the Pacific Northwest. It forms small patches to large forests in the shallow subtidal zone in Puget Sound. Other large brown algal species common in the study region include *Costaria costata*, *Laminaria saccharina*, and *Sargassum muticum*. These latter species are often found associated with bull kelp forests. *S. muticum* is a non-native species that was introduced by the Japanese (Pacific) oyster mariculture industry to the Northwest in the 1930s (Anderson 1998).

A kelp forest provides a three-dimensional habitat. Invertebrates such as crabs, snails, bryozoans, sponges, tunicates, anemones, and shrimp use the blades as living habitat (Foster and Schiel 1985). Bull kelp can grow at rates up to approximately 2.4 cm/day during the spring and early summer (Duncan 1973). Growth rates of other kelp species are slower than bull kelp (Thom 1978).

Kelp grows attached to bedrock or rocks (pebble to larger sized gravel) in the very low intertidal and shallow subtidal zone. Growth is dependent on light and temperature (Vadas 1972; Druehl and Hsiao 1977). Limited experimental evidence indicates that *N. luetkeana* photosynthesis is limited by carbon during summer (Thom 1996). Because of this, all of the kelps exhibit a dynamic seasonal cycle with a period of maximum growth rate in spring and early summer. Winter is a period of low biomass. The stipe and fronds of bull kelp die completely in winter, and the plant exists as a microscopic phase until spring. None of the kelps are resistant to drying. Hence, plants that colonize the intertidal zone early in spring are generally lost to desiccation later in spring. Because it forms a dense canopy, bull kelp can exhibit major control over the abundance of the other kelp and algal species (Thom 1978).

Kelp forests are subject to herbivory. Sea urchins graze on kelp, generally feeding on drift material, but sometimes removing entire plants by grazing through their holdfasts (Foster and Schiel 1985). Gastropods graze on the plant tissue, but do not remove entire kelp plants. Variations in the amount of rocky substrata can result in gains and losses of kelp. Landslides can affect early spring development of kelp through excess siltation (Shaffer and Parks 1994).

4.4 Forage Fish

4.4.1 Pacific Herring (*Clupea harenus pallasi*)

Pacific herring (*Clupea harenus pallasi*) typically utilize shallow subtidal habitats for spawning and juvenile rearing. Although there is variation region-wide in spawning times specific to particular beaches, Pacific herring generally spawn in early spring from January through early April. Typically females deposit eggs on nearshore vegetation, such as kelp and eelgrass, between the mean higher high tide line (MHHW) and out to depths of -40 feet below (MLLW) (Penttila 2000a). However, there are variations in spawning behavior. Some populations spawn on vegetation found in upper intertidal regions along the outer edges of salt marshes, on exotic cordgrass (*Spartina spp*.) and native macroalgae (*Fucus sp.* and *Ulva sp.*). These spawnings in the upper intertidal upon *Fucus* and *Spartina*, typically at +1m above MLLW, demonstrate a larger spatial range for herring spawning habitat than previous descriptions.

Following metamorphosis, Puget Sound stocks of young herring spend their first year in Puget Sound. Some stocks of herring spend their entire lives within Puget Sound (resident stocks) while other stocks (migratory stocks) summer in the coastal areas of Washington and southern British Columbia (Trumble 1983). Studies in Northern Puget Sound (Simenstad et al. 1979) have found juvenile Pacific herring to be feeding principally on epibenthic organisms, with harpacticoid copepods comprising 82% of their diet.

Pacific herring are an important prey item for many marine organisms. Pacific herring have been found to comprise the following diet percentages of specific fish species: Pacific cod (42%), walleye pollock (32%), lingcod (71%), Pacific halibut (53%), coho and chinook salmon (58%) (Environment Canada 1994).

Following the attainment of sexual maturity at age two to four, the herring migrate back to the spawning grounds. Like salmon, herring generally return to their natal spawning area. However, straying rates between spawning grounds can be high, approximately 20%. Unlike salmon, herring do not all die following spawning, and individual fish can spawn annually for several years. Herring historically lived to ages in excess of 10 years in Puget Sound.

4.4.2 Surf Smelt (*Hypomesus pretiousus*)

Surf smelt (*Hypomesus pretiousus*) spawn at the highest tide lines at high slack tide near the water's edge on coarse sand or pea gravel. Egg development is temperature dependent with marine riparian vegetation serving to maintain lower temperatures during high temperature periods (Penttila 2000a). The smelt life span is thought to be 5 years (Penttila 2000b). The adults feed primarily on planktonic organisms but their movements between spawning seasons are basically unknown. However, they are known to be a significant part of the Puget Sound food web for larger predators. Inside Puget Sound, they spawn at the higher high water line, while on the coast, they spawn at lower tidal elevations corresponding to access to fine gravel substrates. In Washington, smelt spawning grounds are geographically distinct with significant differences in temporal use. Spawning in northern Puget Sound occurs year-round, while spawning in central and southern Puget Sound occurs in fall and winter. For populations along the Coast and Straits, spawning occurs in summer months. As 80% of all Washington spawning has been found to occur in coarse sand and pea gravel, it is likely that substrate type and size may be the primary factor in spawning location.

The limited extent of surf smelt spawning grounds makes them quite vulnerable to shoreline development and construction activities with some spawning grounds being mere remnants of their historical extent (Penttila 2000a). Their spawning grounds have been mapped and are protected by the Washington Administrative Code HPA rules.

4.4.3 Pacific Sand Lance (*Ammodytes hexapterus*)

Pacific sand lance (*Ammodytes hexapterus*) spawn at high tide in the upper intertidal area on sandy gravel beach material. Their ability to spawn at a given location is determined by the availability of sandy material. The fine sandy beach material coats the eggs and likely serves to assist in moisture retention when they are exposed during low tides. It also serves to conceal the eggs from predators. In Puget Sound, the spawning season is October 15 through March 1 (WAC 220-110-271) with larvae commonly found between January and April in the Puget Sound area (Garrison and Miller 1982). Upon hatching, larvae and young-of-the-year rear in bays and nearshore waters. They feed in open water in daylight and burrow into the bottom substrate at night to avoid predation.

Pacific sand lance are a significant dietary component of many economically important resources in Washington, such as juvenile salmon. It has been found that 35% of juvenile salmon diets are known to be Pacific sand lance (Environment Canada 1994). They are particularly important to juvenile chinook with 60% of the juvenile chinook diet represented by Pacific sand lance. Their habit of spawning in upper intertidal zones of protected sand and gravel beaches makes them particularly vulnerable to the direct and cumulative effects of shoreline development. Their spawning habitat is protected by the HPA rules. Loss of spawning habitat likely limits their net total stock recruitment success (Penttila 2000a). Approximately 140 miles of potential sand lance spawning beaches are known in Puget Sound. Many potential areas remain to be surveyed.

4.5 Discussion of Historical Trend of Environmental Baseline

Hutchinson (1988) indicated that overall losses since European settlement, by area, of intertidal habitat were 58% for Puget Sound in general and 18% for the Strait of Georgia. At least 76% of the wetlands around Puget Sound have been eliminated, especially in urbanized estuaries. In the past decade, many of the stream corridors and shorelines in the Sound have experienced considerable residential, commercial, and industrial development. Development is expected to continue at a high rate in the counties containing the major drainage areas of the Sound (i.e., Thurston, Mason, Pierce, King, Snohomish, Skagit, Island, and Kitsap Counties). As a result of increases in human activities, nutrient loading, intertidal shading, sedimentation, and habitat loss in the Sound are likely greater today than they have been in the past, and will likely be even greater in the future.

No data were available regarding sand lance spawning habitats in Puget Sound before 1989 (Penttila 1995). Historical abundance and habitat distribution and use are virtually unknown. No reliable estimates of historical surf smelt distribution and habitat use exist for Puget Sound since spawning beach surveys were begun in 1972 (Penttila 1978; Lemberg et al. 1997). Pacific herring stocks in Puget Sound have undergone significant fluctuations, and some stocks have declined over the past 20 years. The general trend in the sound shows an overall increase in herring stocks, but stocks in the northern portions of Puget Sound and the Strait of Juan de Fuca have shown a decrease. The Cherry Creek stock has declined 94% since 1975.

It is likely that kelp distribution has changed in the study area based on maps produced by the Department of Agriculture in 1911-1912 and maps produced for the Coastal Zone Atlas in the mid-1970s (Thom and Hallum 1990). Historical records indicate that kelp ringed Vashon Island (Thom and Hallum 1990). It is not known whether this meant that kelp was more or less evenly distributed around the island or that kelp was frequent around most of the island. Hence, historical records may overestimate kelp distribution. Thom and Hallum (1990) also reported a change from 0 to 450 linear ft of kelp forest in Elliott Bay according to surveys conducted in 1911, 1912, and 1978, but did not know whether the earlier surveys evaluated the same areas of Elliott Bay as the later one did. The 1978 study did find that the main Puget Sound basin and South Sound recorded large increases in kelp forests compared to 1911 and 1912. Generally, eelgrass information comes from site-specific studies, which are incomplete in terms of providing a historical picture of distribution.

In an attempt to document changes in eelgrass, Thom and Hallum (1990) compiled all known records of eelgrass. The oldest records came from marks on U.S. Coast and Geodetic Survey navigation charts that were developed for several bays in Puget Sound, including Padilla Bay. These charts date back in some cases to the period of 1850-1890. No records on these charts showed eelgrass in any portion of Water Resource Inventory Areas (WRIA) 8 and 9 which form the eastern half of the Central Puget Sound Basin. Other site-specific records on eelgrass include dive work done by Ron Phillips in 1962 at about 100 locations throughout Puget Sound and Hood Canal.

Even though comprehensive historical records are limited, anecdotal observations indicate that the Duwamish Head eelgrass meadow has been declining in size since the 1960s (Thom and Hallum 1990). The historical data show eelgrass north of Shilshole Bay to the King County line, whereas the Washington Department of Natural Resources (WDNR) maps show no eelgrass. WDNR records eelgrass from very shallow water to intertidal areas. Subtidal eelgrass appears to remain in this area, however. Eelgrass may have increased, although it remains patchy near West Point. Patchy intertidal eelgrass may also have increased in Seahurst Bay and Poverty Bay based on a comparison of the records of Thom and Hallum (1990) and WDNR maps.

5 Effects of the Action

The following sections discuss anticipated effects from the activities proposed for authorization under this RGP. The Endangered Species Act requires that federal agencies consider several types of effects, as defined below.

Direct effects are effects from actions that would immediately remove or destroy habitat, harm (injure or kill) species, or adversely modify designated critical habitat. Direct effects include actions that would potentially remove or destroy habitat, or displace or otherwise influence the species, either positively (beneficial effects) or negatively (adverse effects).

Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Indirect effects may include impacts to food resources, or foraging areas, and impacts from increased long-term human access.

Effects from interdependent and/or interrelated actions. These include effects from actions that (1) have no independent utility apart from the primary action, or (2) are part of a larger action and depend on the larger action for their justification, and/or (3) are required as part of the action, including maintenance and/or use of the project, as well as other actions that would be carried out to implement, maintain, and/or operate the project.

Conservation measures (or mitigation) are measures proposed to minimize or compensate for project effects on the species under review. Unless stated otherwise, the effects determinations, as defined below, are based on the assumption that conservation measures would be incorporated into the project.

The effects determinations are the specific conclusions of the biological evaluation concerning the overall effect of the project on each species and/or critical habitat type. Possible categories for listed species and designated critical habitat are (1) no effect; (2) may affect, not likely to adversely affect; or (3) may affect, likely to adversely affect.

This RGP proposes to expedite the authorization of recurring activities that are similar in nature and have minor individual and cumulative adverse impact on the aquatic environment. Table 5-1 lists each of the activities to be authorized through this RGP, their associated construction and operation components, and their direct and indirect effects. In the following sections, each of the listed direct and indirect effects is discussed in greater detail. Please refer to Section 2 for detailed descriptions of each of the listed activities.

Table 5-1. Regional General Permit Categories of Activity and Their Direct and Indirect Effects

Category of Activity	Construction and Operation Impact Mechanisms	Direct Effects	Indirect Effects
1. *Modification of existing residential overwater structures*	Operation of Heavy Equipment Pile Driving Boat Use	Noise Water Quality Habitat Loss	Increased Use Shading Water Quality Habitat Alteration
2. *Construction of new residential single or joint-use piers, ramps, floats, and their associated structures*	Operation of Heavy Equipment Pile Driving Boat Use	Noise Water Quality Habitat Loss	Increased Use Shading Water Quality Habitat Alteration
3. *Implementation of*	Operation of Heavy	Noise	Water Quality

mitigation measures (e.g.placement of gravel per HPA, planting of shrubs and trees, removal of inwater structure, etc.)	Equipment Gravel Placement Soil Distrubance	Water Quality Short Term Habitat Loss	Improvement Habitat Improvement

5.1 Direct Effects

The primary direct effects of activities authorized by this RGP include

- noise generated from pile driving and operation of construction equipment,
- temporary impacts to water quality from increases in turbidity and potential minor fuel and oil spills from construction equipment,
- habitat loss or damage from installation of piling and the use of construction vessels (propwash and anchorage), and
- habitat improvement from the incorporation of mitigation measures including the removal of inwater structure, planting of native vegetation, etc.

The following sections describe these direct effects in detail.

5.1.1 Noise

One of the primary mechanisms for potential direct effects to listed species is from noise generated by the operation of heavy machinery (i.e., construction equipment) and from pile driving. Heavy machinery and other noise producing equipment associated with work to be conducted under this RGP include barges/tugs, generators, cranes, backhoes, and a variety of power hand tools (e.g. saws, drills, etc.). Pile driving would typically occur either with a vibratory hammer or impact hammer attached to a crane.

Noise generated by construction activities can be divided into two forms: airborne noise and underwater noise. The interface between water and air does not effectively transfer sound waves, in large part due to the difference in density of the two mediums. Therefore, sound waves generated in air do not produce strong sound waves underwater and vice versa. Because of the lack of transmission of sound between air and water, each will be considered separately.

The issues surrounding potential effects from noise are relatively complex; therefore the following background on noise and sound waves is provided (as described in USFWS 2003).

> *Frequency is the rate of oscillation or vibration of sound measured in cycles per second, or hertz. Ultrasonic frequencies are those that are too high to be heard by humans (>20,000 Hz); and infrasonic sounds are too low to be heard (<20 Hz). Many animals can detect ultrasound, and some animals, including pigeons, can detect infrasounds (Richardson et al. 1995).*
>
> *Sound is usually measured in decibels. A decibel (dB) is a relative measure that must be accompanied by a reference scale. When describing underwater sound*

pressure, the reference scale is usually 1 micro-pascal (μPa) and is expressed as "dB re: 1 μPa". For in-air sound pressure, the reference amplitude is usually 20 μPa. One pascal is the pressure resulting from a force of one Newton exerted over an area of one square meter. In this document, underwater sound is referred to in units of decibels re: 1 μPa and will be denoted as dB. In air sound, measured on an A-weighted scale (which approximates human hearing), will always be re: 20 μPa in this document and be denoted dBA.
In air, the peak sound emitted from a source is referred to as L_{max}, while sound averaged over a measured period of time is referred to as L_{eq}.
Root-mean-squared (rms) sound pressure level is often used in the context of discussing behavioral effects, in part because behavioral effects, that often result from auditory cues, and effects on hearing may be better expressed through averaged units rather than by peak pressures. RMS is the root square of the energy divided by the duration.

5.1.1.1 Underwater Noise

<u>Noise effects on salmonids</u>

Impact driving of steel piling can cause injury and death in fishes (Longmuir and Lively 2002; Stotz and Colby 2001; Stadler pers. obs. 2002; Blomberg pers. comm. 2003; Carman pers. comm.. 2003; Desjardin pers. comm.. 2003 as cited in NMFS 2003c). Injuries reported include barotraumas (e.g., hemorrhage, rupture of internal organs, damage to auditory system) and death (instantaneous or delayed). The mechanisms of injury include pneumatic pounding resulting in capillary rupture and/or maceration of internal organs (Caltrans 2002) and rectified diffusion, which is the formation and growth of bubbles in the tissues leading to inflammation, cellular damage, and/or blockage of arteries and veins (Vlahakis and Hubmayr 2000; Stroetz et al. 2001; Crum and Mao 1996; as cited in NMFS 2003c). Impact driving of large diameter (24 to 36-inch) hollow steel piling can produce sound pressure levels as high as 210 dB_{peak} at a distance of 10 meters (Woodbury pers. comm. 2003; Desjardin pers. comm. 2003; as cited in NMFS 2003c). Fiest (1992) reported sound pressure levels of 105 dB_{peak} in his studies evaluating pile driving of smaller diameter piling with an impact hammer.

A study examining the effects of pile driving on fish indicated that no physical damage would be expected at peak sound pressures below 190 dB (Hastings 2002), as this is the threshold for rectified diffusion (Crum and Mao 1996). Due to uncertainty over the level of adverse effect to fish exposed to sound pressure levels between 180 and 190dB, NMFS and USFWS have established the threshold for physical harm at 180 dB_{peak} for several projects in the Puget Sound region (e.g. Hood Canal Bridge Retrofit 2003).

Temporary behavioral changes have been reported from sound pressure levels in excess of 150 dB_{rms}. Behavioral changes include elicitation of a startle response (Popper and Carson 1998); desensitization to startle response (Carlson et al. 2001); disruption of migratory behavior (Feist et al. 1992); and agitation with changed swimming behavior (Shin 1995). Temporary changes in behavior may result in a decrease in a fish's ability to avoid predators (NMFS 2003c).

Under this RGP, the maximum allowable diameter for steel piling is 12 inches. Furthermore, if an impact hammer pile driver for steel piling is utilized, a sound attenuation device or system must be implemented during pile driving. For piling with a diameter of 10 inches or less, the sound attenuation device must include one of the following: the placement of a block of wood (minimum of 6 inches thick) between the hammer and the piling during pile driving or use a bubble curtain that distributes air bubbles around 100% of the perimeter of the piling over the full depth of the water column or any other Corps approved sound attenuation device.

For piling with a diameter greater than 10 inches, up to 12 inches, the sound attenuation device must include the placement of a block of wood (minimum of 6 inches thick) between the hammer and the piling during pile driving and use a bubble curtain that distributes air bubbles around 100% of the perimeter of the piling over the full depth of the water column or any other Corps approved sound attenuation device.

Vibratory hammers produce sound pressure levels approximately 17 dB below those produced by impact hammers (Nedwell and Edwards 2002). The frequency of sound produced by vibratory hammers (20 to 30 Hz) is also different than that produced by impact hammers (100-800 Hz). Fish have been shown to avoid infrasound (Knudsen et al. 1997). Since the frequency of sound produced by vibratory hammers is near the range of infrasound, an avoidance response may occur (Carlson et al. 2001). Carlson (1996) concluded that the vibratory hammer is unlikely to cause an avoidance response in juvenile salmonids beyond the immediate vicinity of the pile driving activity.

The maximum sized pier, ramp and float project authorized under this RGP would likely require approximately 16 piles. Small fixed piers typically require at least four piles. The average time necessary to drive a pile is about half an hour (steel slightly less depending on soil conditions), allowing most projects approved under this consultation to complete pile driving in one working day. Most structures approved under this consultation will allow completion of the entire pier within one working week (five days).

As mentioned above the diameter of steel piling authorized by this RGP is limited to 12 inches and sound attenuation devices must be used if an impact hammer is proposed for driving the steel piling. Given the limited pile diameter and the inclusion of the sound attenuation devices, peak sound pressure levels are not expected to exceed 150 dB (the NMFS threshold for behavioral disruption). Fish mortality is unlikely and other avoidance and hearing effects will be reduced but not precluded. The incorporation of timing restrictions (work windows) will further minimize the potential for adverse effects to listed species because the species are least likely to be present in the action area during this time period.

Underwater noise effects on marbeled murrelets

Elevated underwater sound pressure levels associated with pile driving have the potential to affect diving marbled murrelets. Behaviors indicative of disturbance may include: aborted feeding attempts; multiple delayed feeding attempts within a single day, or across multiple days, multiple interrupted resting attempts; and preclusion of access to suitable foraging habitat (USFWS 2003). USFWS has identified sound pressure levels in excess of 180 dB_{peak} as potentially physically harmful to diving marbeled murrelets (USFWS 2003). As described above, design requirements and conservation measures will reduce the sound pressure levels associated with activities authorized under this RGP; however, some minor behavioral effects may remain.

5.1.1.2 Airborne Noise

Airborne noise will result from the operation of heavy equipment, pile driving, and the use of other power tools during construction of overwater structures and required mitigation. Airborne noise generated during pile driving could be above ambient background noise levels and therefore affect listed wildlife species up to 1 mile away from the project location. Loud noises can flush bald eagles from foraging and nesting activities. Flushing foraging eagles has the potential to limit food intake, increase activity level and associated energy costs, and force eagles to use areas where resources may be less than adequate (Stalmaster and Kaiser 1998). Flushing nesting adults may cause abandonment or reduced reproductive success (Rodrick and Milner 1991). Similarly, the noise associated with construction equipment and activities could disrupt marbled murrelet foraging activities and cause murrelets to temporarily avoid the project area. To reduce the impact of construction-related noise on eagles and murrelets, pile driving and the operation of heavy machinery will be restricted to work windows appropriate for the species, kinds of equipment, and distance from nests, wintering concentrations, communal roosts, perch trees and foraging areas. Given the application of appropriate work windows, the short duration of pile driving activities (generally completed in one day) and heavy equipment use (generally one week or less), and the relatively small piling installed for these types of projects (typically 12-inch diameter), the effects on bald eagles and marbled murrelets are expected to be minimal.

5.1.1.3 Other Species

Noise from the operation of heavy equipment, especially pile drivers, may have an effect on humpback whales, Steller sea lions, and leatherback sea turtles in the project area. Underwater noise impacts on whales can include confusion, disruption of social cohesion, separation, alteration of travel, and/or stranding (IWC 2002). Noise impacts on sea turtles include interference with travel and foraging. However, sound disturbance impacts related to construction activities would likely be short-term and result in temporary displacement of animals rather than injury.

For the listed activities proposed for authorization by this RGP, noise generated by pile driving and the operation of heavy equipment is expected to have a minor impact on listed fish, marine species, and terrestrial species. The duration of pile driving sound and the probability of impact to listed species would be minimized by implementing timing restrictions designed to avoid or minimize contact with listed fishes and terrestrial species during critical spawning periods, migration periods, and nesting periods. (Please refer to Section 7 for detailed conservation measures.)

5.1.2 Water Quality

During construction, proposed activities may affect water quality by the production of suspended sediments and by release of hazardous materials (i.e., leaks of fuel, oil, etc. by construction equipment; leaching of chemical preservatives from treated wood). Disturbance and relocation of bottom sediments during pile driving and pile removal can increase turbidity in the water column and result in covering benthic substrate. Some sedimentation may also be caused during construction of mitigation activities such as the removal of shoreline armoring. A variety of species (including listed species) may be attracted to construction sites due to benthic organisms suspended in the water by work activities.

Temporary increases in turbidity are likely to occur from the following work actions that would be authorized by this RGP: pile driving and removal; shoreline planting; removal of shoreline armoring, manmade debris, groins, boat ramps, or marine railways; gravel placement required by the WDFW Hydraulic Project Approval; and propwash associated with construction watercraft vessels. The duration and intensity of turbidity depends upon the quantity of materials in suspension, the particle size of suspended sediments, the volume and velocity of the receiving water in affected area, and the physical and chemical properties of the suspended sediments (NMFS 2001). Most RGP-authorized projects would require about one week to complete with pile driving taking approximately one day.

Turbidity[3] within the immediate vicinity of the construction activity (several meters) would likely temporarily exceed the background levels. In salmonids, turbidity has been linked to a number of behavioral and physiological responses (e.g., gill flaring, coughing, avoidance and increase in blood sugar levels), indicating some level of stress (Berg and Northcote 1985; Servizi and Martens 1992). Other potential effects of turbidity include reducing the levels of dissolved oxygen in the affected area, altering the suitability of spawning areas (e.g. surf smelt and sand lance) and smothering benthic organisms and communities (Martin et al. 1977, Carrasquero 2001, Mulvihill et al. 1980).

Much of the scientific literature evaluating the effects of turbidity on fish is discussed in relation to turbidity concentrations associated with dredging. No dredging is permitted under this RGP, and turbidity associated with pile driving, pile removal, and other construction activities will typically be substantially lower than those associated with dredging. Several studies indicate that suspended sediment concentrations occurring near dredging activity does not cause gill damage in salmonids. Servizi and Martens (1992) found that gill damage was absent in underyearling coho salmon exposed to concentrations of suspended sediments lower than 3,143 mg/l. A negligible risk of gill tissue damage is also expected for adult and sub-adult salmonids exposed to dredging turbidity. This assumption is based on the fact that salmonids in these life stages are generally more tolerant of elevated suspended sediment levels (Stober et al. 1981).

Suspended sediments have been shown to cause stress in salmonids, but at concentrations higher than those typically measured during dredging. Underyearling coho salmon exposed to suspended sediment concentrations above 2,000 mg/l were physiologically stressed as indicated

[3] Turbidity is the result of suspended particles; suspended particles undergo oxidation (chemical and biological), which consumes dissolved oxygen, resulting in reduced dissolved oxygen levels. In addition, turbidity reduces light penetration and photosynthesis, which can contribute to reducing dissolved oxygen levels.

by elevated blood plasma cortisol levels (Redding et al. 1987). Although turbidity may cause stress to salmonid species, studies by Redding et al. (1987) found that relatively high-suspended sediment loads (2,000 to 2,500 mg/l) did not appear to be severely stressful to yearling salmon.

While it is difficult to determine exactly how much of an increase in turbidity would result from these projects, suspended sediments are expected to be short-term and would not result in chronic sediment delivery to adjacent waters. Specific conservation measures (see Section 7 for complete listing) have been developed to reduce the potential for elevated turbidity and include:

- Work that involves the excavation of the substrate, bank, or shore of a water of the United States (e.g., removal of bank protection as a mitigation measure) shall occur in the dry (e.g., at low tide) whenever practicable (13a).
- Use of equipment on the beach shall be held to a minimum, confined to a single access point, and limited to a 25-foot work corridor on either side of the proposed work. To the maximum extent practicable, equipment shall be operated from the top of the bank, temporary work platform, barge, or similar out-of-water location (14a).
- Equipment shall be operated in a manner that minimizes suspended particulates from entering the water column (14b).
- If barges are needed, barges may not ground on the substrate at any time (14d).

In addition, work will only occur during the allowable work window when protected species are least likely to be present. Those fish that are present in the construction area when the effects are manifest are likely to be able to avoid the area until the effects dissipate. Hence, short-term, localized turbidity associated with project construction would not be expected to result in take or to have any significant physiological effects on salmonids or their prey.

Machinery required for the construction would operate near the water, either from the shoreline or from floating barges. No machinery would operate directly within waters other than to place or remove materials via an extension of an excavator arm or other similar device. Typical machinery associated with proposed projects would include barge/tug, crane, backhoe or “bobcat”, etc. Although no machinery would operate directly within waters, there is a risk that petroleum products (i.e., fuel, oil, hydraulic fluid) may leak or spill into the water. The risk to listed species depends on the type of contaminant spilled, time of the year, spill amount, and success of containment efforts.

Petroleum based products contain polycyclic aromatic hydrocarbons (PAHs) which can cause acute toxicity to salmonids at high levels of exposure and can also cause chronic lethal and acute and chronic sublethal effects to aquatic organisms (Neff 1985 as cited in USFWS 2003). An additional conservation measure (see Section 7 for complete listing) includes:

- Equipment with any identified problems, including leaks or accumulations of oil or grease, must be fixed and cleaned, away from the water, before its use as part of the project. Fuel hoses, oil drums, or fuel transfer valves and fittings, etc. shall be checked daily for drips or leaks, and shall be maintained and stored properly to prevent accidental spills (14c).

The use of concrete (wet or dry) in ambient water or the accidental spill of concrete may result in a short-term, localized increase in pH levels. In general the construction of residential overwater structures that qualify under this RGP does not require the use of wet concrete. One exception might be the stabilization of existing piling by encasing the piling in a plastic sleeve and pouring concrete into the sleeve. In this case, wet concrete would be contained by the plastic sleeve and would not come into contact with the water. Use of dry concrete may include installation of concrete piles or removal of concrete shoreline structure such as bulkheads or marine rail footings. In marine waters, changes to pH will likely be extremely limited due to the high buffering capacity of saltwater (Clarke, pers. comm.). It is expected that impacts from increased pH would be negligible because the projects authorized by this RGP will be small in scale and are required to meet water quality standards.

Water quality can also be affected through the leaching of chemical preservatives from treated wood used for construction. In order to minimize this risk no creosote, pentachlorphenol, CCA, or comparably toxic compounds not approved for marine use can be used for any portion of the overwater structures permitted under this RGP. For any ACZA treated wood, the wood must be treated by the manufacturer per the Post Treatment Procedures outlined in "BMP Amendment #1 - Amendment to the Best Management Practices (BMPs) for the Use of Treated Wood in Aquatic Environments; USA Version - Revised July 1996", by the Western Wood Preservers Institute, as amended April 17, 2002 or the most current BMPs. This information is available on www.WWPInstitute.org. Additionally, third party certification that the material was produced according to these BMPs will need be provided to the Corps before any work can commence. The BMPs developed by the Western Wood Preservers Institute will reduce the potential for leaching of any harmful chemicals into the water.

Although project activities may result in short-term and localized effects to water quality, effects to listed species will be minor. Projects authorized by this RGP will be small in scale. No dredging would be permitted. All work would have timing restrictions to minimize contact with and effects on listed species.

5.1.3 Habitat Loss

Shoreline vegetation is an important nutrient and habitat source for the aquatic environment. Decomposition of vegetation that falls into the water provides an important food source for invertebrates and fish. Through the natural process of trees falling into the water, the trees, particularly the branches and roots, provide complex habitat and refuge for fish and other aquatic species. Bald eagles use trees adjacent to the Puget Sound for nesting, roosting, and perching (Rodrick and Milner 1991). Loss of shoreline vegetation as a result of pier construction authorized by this RGP is expected to be minimal because disturbance of such vegetation is limited to a work strip two times the width of the pier (i.e., no greater than 12' wide); removal of woody vegetation with a diameter at breast height of 4" or more requires justification by the applicant and approval by the Corps; and disturbed or removed vegetation requires replacement with equivalent native species. In addition, one of the mitigation options includes the planting of trees and shrubs along the shoreline.

Minor habitat loss will result from the placement of piles or "helical screws" into the substrate. However, a standard 12-inch-diameter pile would only result in an impact area of 0.79 square feet per pile, while "helical screws" would impact approximately 0.07 square feet per screw. The maximum number of piles expected for a residential structure would be approximately 16 piles and the maximum number of helical screws associated with floats would be 4 per single use and 6 for a joint use float, resulting in a minimal surface area impact to benthic communities. Floats and anchor lines would not be allowed to rest on the substrate at any time. Additionally, no overwater structure or piling can be located within 25 feet horizontally or within a 4 foot depth elevation of eelgrass or macroalgae beds (see conservation measures for full description). In many cases, benthic habitat loss would be offset through the incorporation of optional mitigation measures (see Table 7-1), which includes the removal of existing structures and materials (e.g. piling, overwater structure, anchor lines, man made debris, boat ramps, groins, marine railways).

The placement of piles and removal of structures (associated with optional mitigation measures) may result in short term impacts to benthic communities in the areas surrounding construction activity (~25' radius). Primarily, this would include smothering of sessile organisms as suspended sediments settle out of the water column. It is anticipated that there would only be a limited amount of suspended sediments associated with the proposed construction activities. Specific conservations measures require the equipment to be operated in a manner that minimizes suspended particles from entering the water. Disturbance to benthic habitats is expected to be temporary and natural recovery should occur rapidly (days to months) for most organisms.

5.2 Indirect Effects

The mere presence of piers and their associated structures would have some long-term effect on the ecology of the nearshore environment in which they are placed. Overwater structures may result in increased use (i.e., boating activity), overwater shading, changes in fish predation, degraded shoreline and aquatic habitat, and altered currents and sediment transport. Conservation measures and mitigation activities would act to offset or reduce many of the impacts of pier construction and operation. The following sections describe these indirect effects in detail.

5.2.1 Increased Use

Installation of residential overwater structures may result in increased levels of boating in shallow waters surrounding the structure. Potential impacts from boating in shallow water include increased turbidity from propwash; release of pollutants from exhaust, fuel spills and oil leaks; temporary salmonid displacement from the physical presence of the boat hull; and salmonid entrainment in the propeller (NMFS 2001, Thom et al. 1996). Wave action from boating can also increase erosion of the shoreline and uproot emergent vegetation, thus degrading salmonid habitat along the shoreline. Increased shoreline armoring to prevent continued erosion from boat wakes further degrades the shoreline aquatic habitat. In addition, disturbing sediments (i.e., prop scour) can reduce habitat suitability and diversity and smother benthic organisms and communities (Martin et al. 1977, Carrasquero 2001, Mulvihill et al. 1980).

Installation of piers could result in variable boating activities ranging from direct boat use to boat lift and refueling operations at some piers. Since this RGP authorizes only residential piers, it is anticipated that pier activity will be recreational and likely to occur from May through September when increased daylight and favorable weather conditions occur.

Boat use can result in damage or mortality of aquatic vegetation by propeller cutting or by its uprooting from boat wakes. The growth and vigor of aquatic vegetation can be impacted if turbidity in the water column from propwash reduces photosynthesis (see Section 5.2.2.1). The introduction of pollutants in the water column by boats (through exhaust, fuel spills, petroleum lubricants and septic waste) may also have a deleterious effect on aquatic vegetation. The reduction or loss of aquatic vegetation may increase the exposure of salmonids to predators, decrease littoral productivity, or alter local species assemblages and trophic interactions (NMFS 2003b). To reduce the potential of boating damage to aquatic vegetation, no overwater structures authorized by this RGP will be installed within 25 horizontal feet, measured in all directions, of macroalgae beds or eelgrass. In addition, no floats will be installed within a 4-foot depth between the top of the float stop and a macroalgae bed or eelgrass.

Boating activities can diminish water quality, injuring or stressing fish and their prey by interfering with respiration, introducing pollutants, increasing turbidity, and reducing dissolved oxygen (Mulvihill et al. 1980). Pollutants introduced into the water column from boating may cause short-term injury, physiological stress, decreased reproductive success, cancer or death to fishes in general (NMFS 2003b). It is not known to what extent installation of structures authorized by this RGP will increase the introduction of pollutants from boats because some or many of the potential permit applicants may already be operating or mooring boats within the project vicinity.

Turbidity caused by boating (i.e., propwash) may affect salmonids and their prey by interfering with respiration. The effects of turbidity on salmonids and their prey were discussed in Section 5.1.2. The amount of sediment resuspended by propwash is expected to be relatively minor and is not likely to result in physiological effects or mortality to salmonids or their prey.

Increased levels of boating activity may result from installation of structures authorized by this RGP and this increase in boating activity may result in disturbances to bald eagles. Boat use, especially motor boat use, may flush wintering bald eagles from feeding or perching activities (Stalmaster and Kaiser 1998). In the Stalmaster and Kaiser (1998) study, the average flushing distance for perching and feeding/standing bald eagles from boat traffic was 126 and 218 m, respectively. Flushing distance was defined as the distance between eagles and the boat. Flushing disturbance has the potential to limit food intake, increase activity level and associated energy costs, and force eagles to use areas where resources may be less than adequate.

Recreational boating and shipping operations are already quite common in much of the action area, which could mean that eagles in these inland marine waters are more tolerant of boat traffic than the eagles studied by Stalmaster and Kaiser (1998). Nonethless, it is anticipated that boat use associated with installation of piers authorized by this RGP may result in some amount of flushing disturbance to bald eagles. Given the abundant food resources in the action area, it is expected that the impact to bald eagles will be minimal.

Similarly, increased boating activity may disturb marbled murrelets, leading to reduced foraging success and increased energy costs. Observers conducting boat surveys for marbled murrelets have noted that the birds will dive more often than fly when a boat approaches, but that if approached slowly, and from an angle, they will paddle away from the boat (Neatherlin pers. Comm. as cited in USFWS 2003c). This limited disturbance in unlikely to appreciably affect marbled murrelets.

5.2.2 Shading

Overwater structures and pilings reduce the amount of light entering the water. This reduction in light can result in changes to aquatic vegetation (e.g., eelgrass and macroalgae), which in turn can change the type of habitat and species assemblage under or near overwater structures. In addition to the shading resulting from the overwater structure itself, turbidity from prop scour could also contribute to reduced light levels.

5.2.2.1 Vegetation Responses

Shading from overwater structures could result in reduced health and density or mortality of aquatic vegetation such as macroalgae and eelgrass. For example, in response to shading, eelgrass has been shown to experience decreases in biomass and shoot density (Backman and Barilotti 1976). Changes in plant morphology, such as longer blade length, have also been shown to occur as a result of extended periods of shading (Short 1991). Shading would be expected to have similar detrimental effects to kelp, but to a lesser extent because kelp is generally hardier and more tolerant of lower light levels. Overwater structures associated with this RGP are not permitted in areas with eelgrass (See conservation measures Section 7).

Light regimes and the associated biological impacts from shading under fixed piers vary greatly depending upon the design of the pier. Increased pier height diminishes the intensity of shading by providing a greater distance for light to diffuse and refract around the pier surface before reaching aquatic vegetation. A north-south pier orientation has been shown to increase underwater light availability by allowing varying shadow periods as the sun moves across the sky. This movement of the shade footprint decreases the stress imposed on eelgrass (Burdick and Short 1995; Olson et al.1996, 1997; Fresh et al 1995).

In studies at ferry terminals in Puget Sound, the level of photosynthetically active radiation (PAR) was substantially reduced under terminal docks and PAR levels increased rapidly in locations away from the terminals (WSDOT 1997). Other studies of ferry docks have shown east/west dock orientation to decrease light availability to the bottom of the water column to an extent that precluded the light requirements for eelgrass survival (Blanton et al. 2001). Studies also suggest that at sites where light is diminished or where eelgrass has been impacted, macroalgae outcompetes eelgrass resulting in greater macroalgae density and further shading of eelgrass until the eelgrass is eliminated. PAR variations have also been shown to affect epiphyte production (Thom and Sheffler 1996).

Piling density and construction materials may also regulate the extent of light penetration underneath piers and subsequent impacts to plant production. Increased numbers of piling used to support a given pier increase the shade cast by piling on the underwater environment. An open-pile structure offers greater light passage, whereas a filled structure intrudes on more habitat area and produces a darker underwater light environment that limits plant growth, which will likely alter fish distribution and migratory behavior (see Section 5.2.2.2). Adequate spacing between piles is important to prevent interference with water and sediment transport (Fresh et al. 1998). Changes to sediment transport can result in altered substrate conditions (e.g. removal or accumulation of fines), which can ultimately reduce the ability of the substrate to support aquatic vegetation. Minimizing the number of pilings, using construction materials that reflect light, and increasing the space between pilings can reduce habitat impacts.

Several conservation and mitigation measures of this RGP will limit the impact of shading to aquatic vegetation under and near the authorized overwater structures and minimize the potential for interference with water flow and sediment transport. These measures include:

- a limited width for piers (6' wide), ramps (4' wide) and floats (8' wide);
- the incorporation of grating into piers (at least 30% of surface area), ramps (100% of surface area), and floats (at least 30% of surface area);
- greater areas of grating on structures that are oriented in a generally east-to-west direction;
- orientation of grating to maximize the amount of light penetration;
- storage of seasonally removed floats in uplands or at a storage facility approved by the Corps;
- spacing between new pier piling at least 20' apart;
- prohibition of skirting on new or existing structures;
- prohibition of repair, maintenance, replacement or construction of new structure such as planters, sheds, storage boxes, etc. on overwater structures;
- prohibition of overwater structures within 25 horizontal feet, measured in all directions, of macroalgae beds and eelgrass; and
- prohibition of floats within a 4' depth of macroalgae beds and eelgrass.

Optional mitigation measures could reduce the impact of shading further. These mitigation measures include the installation of functional grating on an existing overwater structure, and the installation of functional grating on an existing or proposed overwater structure beyond what is required by the RGP.

5.2.2.2 Animal Responses

Salmonids including juvenile chinook salmon and sub-adult bull trout use the nearshore areas of Puget Sound for feeding, rearing, and as a migratory corridor. As small individuals, they stay in shallow waters and eelgrass beds to avoid large fish predators found in deeper water. As these fish grow larger, they feed on forage fish, such as herring, sand lance, and surf smelt, that spawn and rear in shallow intertidal areas. Forage fish use eelgrass and kelp beds as refuge areas, nurseries, or spawning and rearing areas.

Light attenuation can impact both fish migration and prey capture. Many studies have indicated that overwater structures can affect fish migration pattern; however, the reported effects are not consistent between studies with results indicating that some individuals pass under the dock, some pause and go around the dock, schools break up upon encountering docks, and some pause and eventually go under the dock (Heiser and Finn 1970; Pentec 1997;Weitkamp 1979, 1982; Shreffler and Moursund 1999). These studies also indicate that juvenile salmon may use shadow edges for cover during migration (Shreffler and Moursund 1999; Taylor and Willey 1997; Pentec 1997). Simenstad et al. (1999) noted that salmon tend to migrate along the edges of shadows rather than penetrate them.

The underwater light environment also impacts the ability of fishes to see and capture their prey. These interactions are discussed in Section 5.2.3 below.

Several conservation and mitigation measures of this RGP will limit the impact of shading by minimizing the intensity of the light-dark interface created by overwater structures and by reducing the potential for impacts to aquatic vegetation and forage fish spawning habitat. In addition to the measures described in the bulleted paragraph of Section 5.2.2.1, the following measures will reduce the effect of shading: a prohibition of floats within a 4' depth of documented Pacific herring spawning habitat and a prohibition of floats, float support piling, helical anchors, watercraft lifts or watercraft grids in documented forage fish habitat.

5.2.3 Predation

While no studies have quantified the effects of overwater structures on predator-prey interactions, the Corps, NMFS, and the USFWS believe overwater structures may impact juvenile salmonid migration and may introduce artificial structure that provides habitat for juvenile salmonid predators (USACE 2002b). The shadow cast by overwater structures may discourage the passage of small fish, forcing these fish to deeper waters and potentially increasing their chance of being preyed upon.

The following discussion is taken from Nightingale and Simenstad (2001); relevant references to this document have been added.

Overwater structures can increase the exposure of juvenile salmon to potential predators by

- providing rearing and ambush habitat for fish species that prey on juvenile salmonids,
- reducing refugia areas, such as eelgrass, due to shading, prop cutting and uprooting by boat wakes (see Sections 5.1.3 and 5.2.2.1),
- diverting juveniles into deeper waters upon encountering overwater structures (i.e., migration alteration) (see Section 5.2.2.2), or

- altering prey detection through alterations of light and turbidity.

However, there is very little empirical evidence to support the above possibilities of increased predation. Lists of potential predators have been cited through the literature of the past 30 years with very little empirical validation. Simenstad et al. (1999) reports that the significance of predation to migrating populations has never been empirically assessed. No studies have examined mortality due to predation much less that mortality is attributable to overwater structures. Upon narrowing down the list of predators to only those empirically validated and implicated with overwater structures, only cormorants, cutthroat, and Pacific staghorn sculpin remain on the validated predator list without any indication that there were aggregations of these predators. In contrast, inference from existing literature suggests piscivorous fishes, birds, or marine mammals do not aggregate around docks. A more comprehensive evaluation of the issue of predation requires further exploration of predator responses to dock structures and effects, such as nighttime artificial lighting. In ferry terminal studies in Puget Sound, Simenstad et al. (1999) reported the most common and abundant species under terminals to be such species as pile perch (*Damalichthys vacca*), sanddabs (*Citharichthys* spp.) unidentified flatfish (*Bothidae and Pleuronectidae*), identified sculpins (*Cottidae*), English sole (*Pleuronectes vetulus*), and saddleback gunnels (*Pholisornata*). Species common but only moderately abundant included striped perch (*Embiotoca lateralis)*, copper rockfish (*Sebastes caurinus*), chinook salmon smolts (*Oncorhynchus tshwaytscha*), and ratfish (*Hydrolagus colliei*).

Fresh and Cardwell (1978) listed 17 potential predators of juvenile salmon in the southern Puget Sound region finding only three (maturing chinook, copper rockfish, and staghorn sculpins) to prey extensively on nearshore fishes. Their analysis of food habits by stomach contents showed only staghorn sculpins having juvenile salmon in their stomach contents. Their study around the dock did not show staghorn sculpins in greater abundance than elsewhere in the study area. Ratte (1985) found sea perch and pile perch to be the most abundant fish under docks. These fish are not potential predators of juvenile salmon. Ratte's data suggested that there was no indication that predatory fish aggregated in under-pier habitat. In fact, the most often reported predators were other salmonids. Ratte's data indicates predators to be less abundant in shaded habitat. There was no evidence of predatory fish targeting juvenile salmonids during the spring outmigration period and gut contents of potential predators did not show a single juvenile salmonid prey item. Similarly, Heiser and Finn (1970) noted that predation in marina areas was less than expected. Weitkamp (1982) also observed no fish preying on juvenile salmon at Pier 91 at Port of Seattle. Similarly, Salo et al (1980) found less than 4% of the total diet of suspected predatory species (i.e., cutthroat, trout, staghorn sculpins and Pacific cod) to be juvenile salmon.

Several conservation and mitigation measures of this RGP will reduce the impact of predation on listed fish by minimizing the amount of in-water structure, minimizing the light-dark interface, and protecting aquatic vegetation. These measures include:

- the incorporation of grating into piers (at least 30% of surface area), ramps (100% of surface area), and floats (at least 30% of surface area);

- orientation of grating to maximize the amount of light penetration;

- greater areas of grating on structures that are oriented in a generally east-to-west direction;

- minimum spacing between new pier piling (at least 20' along the length);
- prohibition of skirting on new or existing structures;
- prohibition of repair, maintenance, replacement or construction of new structure such as planters, sheds, storage boxes, etc. on overwater structures;
- prohibition of overwater structures within 25 horizontal feet, measured in all directions, of macroalgae beds and eelgrass; and
- prohibition of floats within a 4' depth of macroalgae beds, eelgrass or documented Pacific herring spawning habitat.

Optional mitigation measures could reduce the impact of shading further. These mitigation measures include the installation of functional grating on an existing overwater structure, and the installation of functional grating on an existing or proposed overwater structure beyond what is required by the RGP.

5.2.4 Habitat

Piers and bulkheads introduce artificial habitat to the nearshore environment that may result in both detrimental and beneficial effects. While piers could potentially provide habitat for fish species that can prey on juvenile salmonids, this has not been empirically supported by research in marine environments (see discussion in Section5.2.3).

The tidal substrates often support aquatic vegetation and benthic invertebrate species and are very important habitat features and food sources of forage fish and salmonid species. No structures (e.g., floats) will be allowed to ground out under the conditions of this RGP. Only piling and helical screws would be allowed to be placed in the substrate (discussed in Section 5.1.3).

Piers can reduce habitat quality in the vicinity of the pier by the leaching of chemicals used to preserve wood. These chemicals may be harmful to fish, shellfish, and humans, resulting in potential injury and stress of organisms (Mulvihill et al. 1980). The presence of harmful chemicals in the aquatic environment diminishes water quality and contaminates sediments resulting in reduced habitat quality. No creosote, pentachlorphenol, CCA, or comparably toxic compounds not approved for marine use shall be used for any portion of the overwater structure. For any ACZA treated wood, the wood must be treated by the manufacturer per the Post Treatment Procedures outlined in "BMP Amendment #1 - Amendment to the Best Management Practices (BMPs) for the Use of Treated Wood in Aquatic Environments; USA Version - Revised July 1996", by the Western Wood Preservers Institute, as amended April 17, 2002 or the most current BMPs. This information is available on www.WWPInstitute.org. Third party certification that the material was produced according to these BMPs must be provided to the Corps before authorized work can commence.

Piling provides surface area for encrusting communities of mussels and other sessile organisms, such as seastars, that prey upon the shellfish attached to the dock. Such changes in substrate result in large depositions of shellhash on the adjacent substrates and changes in the biologic communities associated with those substrates (Nightingale and Simenstad 2001). The introduction of piling communities also impacts eelgrass production. The reef effect of docks enhances seastar and Dungeness crab populations. As shellhash accumulates at the piling base due to seastar predation on piling shellfish populations, the substrate becomes piled high with shellhash. It also becomes a prime settling habitat for Dungeness crab. Both crab and seastar foraging activity can disrupt eelgrass and retard recruitment. In the presence of large crab populations, crabs burrowing into the substrate to avoid predation may significantly inhibit eelgrass recruitment (Thom and Shreffler 1996). Such disturbance of seagrass meadows by animal foraging is also reported elsewhere (Camp et al. 1973; Orth 1975; Williams 1988; Baldwin and Lovvorn 1994). No structures will be allowed within 25 feet of eelgrass beds or macroalgae communities under the conditions of this RGP. (Please refer to Section 7 for detailed conservation measures.)

5.2.5 Currents and Sediment Transport

Overwater structures and associated piling can change the flow of water around piling and over the substrate, thereby changing the bathymetry of the substrate and the flow of water in the immediate area (Ratte 1985, Penttila and Doty 1990). Also, if piling are installed close together, the piling could result in the accumulation of floating debris between the piling, which could impede fish migration in shallow water. However, structures authorized by this RGP are required to have piling spaced at least 20 feet apart and have a diameter no greater than 12 inches. No “skirting” (i.e., vertical boards along the edge of a pier extending downward) is allowed to be installed under this RGP. Therefore, it is unlikely that this structure will have any appreciable effect on sediment transport or result in debris accumulation. Furthermore, optional mitigation measures associated with this RGP include the removal of shoreline structures such as bulkheads, groins, boat ramps, and marine rails, all of which have the potential to interfere with sediment transport.

5.3 Effects from Interdependent and Interrelated Actions

No interdependent or interrelated actions will be associated with the permitted activities within the RGP. All permitted activities will be single and complete actions; therefore no effects from interdependent or interrelated actions will occur.

5.4 Conservation Measures and Impact Reduction Measures

The activities authorized by this RGP would incorporate conservation measures into their design criteria to greatly reduce impacts to shoreline and aquatic habitats. Mitigation measures will also contribute to the improvement of habitat conditions. The conservation measures will minimize the degradation of the existing environmental baseline through

- protecting and enhancing shoreline riparian habitat,
- minimizing the creation of potential salmonid predator habitat (e.g., piling) and shading impacts to aquatic habitat by use of conservative design guidelines,
- promoting boat moorage and use away from shallow littoral habitat,

- restricting activities to work windows for the protection of ESA-protected species, and
- establishing construction restrictions near documented forage fish habitat.

These conservation measures become required conditions of each permit issued by the Corps under this RGP. Each of the above-mentioned conservation measures is described in detail in Section 7.

5.5 Description of How the Environmental Baseline Would Be Affected

Historical alterations to the environmental baseline from the impoundment of waters and intensive agricultural and timber harvest have greatly altered and degraded aquatic and shoreline habitats in the action area. Implementation of conservation measures (Sections 7.1 through 7.15) and mitigation measures (Section 7.16) would improve habitat conditions through the enhancement of riparian and nearshore areas. The establishment of construction windows would serve to protect aquatic and terrestrial species during critical nesting, spawning, and foraging life stages.

5.6 Modified Matrix Approach

The intent of the matrix approach is to provide a linear reasoning between the proposed action and the effects of that action on the environmental baseline. The first column of Table 5-2 presents three major "factors" (eelgrass/macroalgae, forage fish, and physical shoreline). Column 2 describes the environmental baseline for each factor. Columns 3, 4, and 5 present the action, the effect of the action, and the associated conservation measure respectively. The intent is to provide a representation of the potential effects of the action on the environmental baseline and the associated conservation measure intended to avoid or minimize the potential effects.

Table 5-2. Matrix of Actions and Effect on the Environment and Conservations Designed to Minimize Impacts

Factor	Environmental Baseline	Action	Effect	Conservation Measures[1]

Eelgrass/ Macroalgae	- Primary productivity for the Sound. Both eelgrass and kelp highly productive environments
	- Provides habitat and refuge for juvenile salmonids
	- Forage fish refuge and habitat
	- Herring spawn over and eggs settle in
	- ESA listed species use includes juvenile chum and chinook
	- Avoid predation and maximize foraging
	- Development of residential piers has caused localized loss
	- Patchy distribution common in developed portions of the Sound
	- Conflicting distribution records
	- Perceived loss from anecdotal records. No documented quantitative losses for eelgrass
	- Significant documented loss of kelp habitat in Northern Sound
		Construction
		- Pile driving and removal
		  - Acoustic shock
		  - Pile impact
		  - Turbidity
		- Barge and tug usage
		  - Propwash turbidity
		  - Grounding
		  - Shading
		- Construction staging
		  - Petrochemicals
		  - Direct equipment impacts
		- Habitat mitigation
			Construction
			- Pile driving and removal
			  - Direct mortality
			  - Turbidity induced stress (non-lethal)
			- Barge and tug usage
			  - Direct mortality
			  - Turbidity stress
			  - Decreased stem density and biomass
			- Construction staging
			  - Direct mortality
			  - Potential source of bioaccumulation
			- Habitat benefits
				Construction
				- The required fish work window will be met.
				- No overwater structures can be constructed within 25 feet (horizontally) of an eelgrass or macroalgae bed
				- No overwater structures can be constructed within a 4-foot depth (vertically) from a macroalgae or eelgrass bed.
				- Piling must be spaced no closer than 20 feet apart.
				- Barges may not ground on the substrate.
				- Equipment shall be operated from the top of the bank, temporary work platform, barge, or similar out-of-water location whenever possible.
				- Equipment shall not be operated on the beach area.

[1] See Section 7 for detailed descriptions of the conservation measures

Table 5-2, page 2

Factor	Environmental Baseline	Action	Effect	Conservation Measures[1]

Eelgrass/ Macroalgae		<u>Operation</u>
		- Pier existence
		  - Shading
		  - Predator habitat
		  - Float impacts/ grounding
		  - Changes to currents
		- Boat usage (Recreation)
		  - Propwash
		  - Grounding
		  - Shading
		- Refueling/treated wood
		- Petrochemicals
			<u>Operation</u>
			- Pier existence
			  - Photosynthetic stress (Potential indirect mortality)
			  - Direct mortality (float)
			- Boat usage (Recreation)
			  - Turbidity stress
			  - Direct mortality (boat at low tide)
			  - Photosynthetic stress
			- Refueling/treated wood
			  - Direct mortality
			  - Potential source of bioaccumulation
				<u>Operation</u>
				- Promote joint use piers
				- Floats
				  - Install temporary floats
				  - The floats cannot rest on the tidal substrate. Stoppers of float support piling must be used such that the bottom of the floatation device is at least 1 (one) foot above the level of the substrate.
				  - The floatation for the float shall be fully enclosed and contained in a shell. Do not use Styrofoam floats
				- Pier width must not exceed 6 feet
				- Grating must have at least 60% open area.
				- No new or replacement skirting can be installed.
				- Pier orientation and elevation must meet criteria as described in Section 7.1.
				- Piling must be spaced no closer than 20 feet apart.
				- No new sheds or other buildings can be constructed on the overwater structure.
				- Piling must be untreated wood, concrete, steel, or plastic. If ACZA treated wood is used, it must be treated as described in Section 7.6

[1] See Section 7 for a detailed description of the conservation measures

Table 5-2, page 3

Factor	Environmental Baseline	Action	Effect	Conservation Measures[1]

Forage Fish	Herring
	- Spawn January to April
	- Deposit eggs in nearshore vegetation from MHHW to –40 below MLLW
	- Migratory and resident stocks
	- Part of ESA listed and EFH species diet
	- Overall increase in Sound. Severe decrease in Northern stocks
	Surf Smelt
	- Spawn in coarse sand to pea size gravels. Substrate is primary factor
	- Northern Sound year round spawn
	- Central and South winter/fall spawn
	- Grounds mapped and protected via HPA
	- Numbers show anecdotal decrease, but undocumented
	Sand Lance
	- Spawn at high tide in sandy gravel
	- Spawn October 15 through March 1
	- Rearing between January and April
	- 60% of juvenile chinook diet. Important to all juvenile salmonids
	- Spawning habitat protected via HPA
	- Vulnerable to shoreline development
	- Numbers undocumented
		Construction
		- Pile driving and removal
		  - Acoustic shock
		  - Pile impact
		  - Turbidity
		- Barge and tug usage
		  - Propwash turbidity
		  - Grounding
		- Construction staging
		  - Petrochemicals
		  - Direct equipment impacts
		- Habitat mitigation
			Construction
			- Pile driving and removal
			  - Habitat displacement (Acoustic shock)
			  - Increased predation risk and decreased foraging potential
			- Barge and tug usage
			  - Habitat displacement (turbidity)
			  - Potential direct mortality
			- Construction staging
			  - Direct mortality
			  - Potential source of bioaccumulation
			- Habitat benefits
				Construction
				- The required fish work window will be met
				- No overwater structures can be constructed within 25 feet (horizontally) of an eelgrass or macroalgae bed
				- No overwater structures can be constructed within a 4-foot depth (vertically) from a macroalgae or eelgrass bed.
				- No floats, watercraft grids, or piling can be installed or driven within a 4 foot depth (vertically) of documented pacific herring spawning habitat
				- Piling must be spaced no closer than 20 feet apart
				- Equipment shall be operated from the top of the bank, temporary work platform, barge, or similar out-of-water location whenever possible.
				- Barges may not ground.

[1] See Section 7 for a detailed description of the conservation measures

Table 5-2, page 4

Factor	Environmental Baseline	Action	Effect	Conservation Measures[1]

Forage Fish		Operation
		- Pier existence
		  - Shading
		  - Predator habitat
		  - Float impacts/ grounding
		  - Changes to currents
		- Boat usage (Recreation)
		  - Propwash
		  - Grounding
		  - Shading
		- Refueling/treated wood
		- Petrochemicals
			Operation
			- Pier existence
			  - Loss of spawning and rearing habitat
			  - Increased predation risk and decreased foraging potential
			- Boat usage (Recreation)
			  - Stress from turbidity and sound
			  - Sub-optimal habitat
			- Refueling/treated wood
			  - Direct mortality and egg damage
			  - Potential source of bioaccumulation
				Operation
				- Promote joint use piers
				- Floats
				  - Install temporary floats
				  - The floats cannot rest on the tidal substrate. Stoppers of float support piling must be used such that the bottom of the floatation device is at least 1 (one) foot above the level of the substrate
				  - The floatation for the float shall be fully enclosed and contained in a shell. Do not use Styrofoam floats
				- Pilings must be spaced no more than 20 feet apart
				- Piling must be untreated wood, concrete, steel, or plastic. If ACZA treated wood is used, it must be treated as detailed iin Section 7.6.
				- Disturbed bank vegetation shall be replaced with native, indigenous species appropriate for the site. A planting plan must be provided

[1] See Section 7 for a detailed description of the conservation measures

Table 5-2, page 5

Factor	Environmental Baseline	Action	Effect	Conservation Measures[1]

Physical Shoreline	- Sound has fjord-like geomorphology
	- Southern Sound dominated by inlets and islands. Large intertidal areas
	- Whidbey Basin has large freshwater input and large tidal estuaries
	- Central basin deep with large coastal intertidal zones. Significant historical dredging and filling associated with Elliott Bay and developed areas
	- North basin/Strait of Georgia mostly rocky reef habitat. Greater kelp potential habitat than other basins
	- Shoreline development extensive in coastal areas of Sound. Shoreline modification and armoring common in port areas
	- Sediment and depositional changes due to development
		Construction
		- Pile driving and removal
		  - Acoustic shock
		  - Pile impact
		  - Turbidity
		- Barge and tug usage
		  - Propwash turbidity
		  - Grounding
		- Construction staging
		  - Petrochemicals
		  - Direct equipment impacts
			Construction
			- Pile driving and removal
			  - Turbidity/altered sediment regime
			- Barge and tug usage
			  - Propwash
			  - Grounding
			- Construction staging
			  - Petrochemicals
			  - Direct equipment impacts
				Construction
				- No floats, watercraft grids, or piling can be installed or driven within 4 foot depth (vertically) of documented pacific herring spawning habitat
				- Piling must be spaced no closer than 20 feet apart
				- Barges may not ground

		Operation
		- Pier existence/bulkheads
		  - Float impacts/ grounding
		  - Changes to currents
		- Boat usage (Recreation)
		  - Propwash
		  - Grounding
		- Refueling/treated wood
		- Petrochemicals
			Operation
			- Pier existence
			  - Altered depositional/erosional environment around pier
			  - Altered sediment load and changes to substrate
			  - Increased mass wasting potential
			- Boat usage (Recreation)
			  - Turbidity
			  - Refueling/treated wood
			- Sediment pollutant load. Degraded spawning sediments
				Operation
				- Promote joint use piers
				- Floats
				  - Install temporary floats
				  - Grating must be installed in a strip down the length of the float
				  - The floats cannot rest on the tidal substrate. Stoppers of float support piling must be used such that the bottom of the floatation device is at least 1 (one) foot above the level of the substrate
				  - The floatation for the float shall be fully enclosed and contained in a shell. Do not use Styrofoam floats
				- Pier width must not exceed 6 feet
				- Piling must be spaced no closer than 20 feet apart
				- No new sheds or other buildings can be constructed on the overwater structure
				- Piling must be untreated wood, concrete, steel, or plastic

[1] See Section 7 for a detailed description of the conservation measures

5.7 Determination of Effects

5.7.1 Bull Trout

The proposed actions "may affect, not likely to adversely affect" bull trout. Adult bull trout utilize the action area for rearing and as a migratory corridor to freshwater spawning areas. Juvenile bull trout utilize the action area for rearing and as a migratory corridor to the ocean. Within the vicinity of a project, the proposed actions may result in temporary increases in suspended sediment during construction and future use; however, turbidity is expected to be short-term. The required conservation measures will improve the baseline conditions of the nearshore and/or riparian habitat. New structures are designed to minimize impacts to littoral habitats and designed to provide minimal shading and cover to predatory fish. In-water work windows will minimize the chance that juveniles are present during project construction.

5.7.2 Chinook Salmon

The proposed actions "may affect, not likely to adversely affect" chinook salmon. Adult chinook salmon utilize the action area as a migratory corridor to freshwater spawning areas. Juvenile chinook salmon utilize the action area for rearing and as a migratory corridor to the ocean. Within the vicinity of a project, the proposed actions may result in temporary increases in suspended sediment during construction and future use; however, turbidity is expected to be short-term. The required conservation measures will improve the baseline conditions of the nearshore and/or riparian habitat. New structures are designed to minimize impacts to littoral habitats and designed to provide minimal shading and cover to predatory fish. In-water work windows will minimize the chance that migrating adults and juveniles are present during project construction.

5.7.3 Chum Salmon

The proposed actions "may affect, not likely to adversely affect" chum salmon for the same reasons discussed for chinook salmon above.

5.7.4 Humpback Whale

The proposed actions "may affect, not likely to adversely affect" humpback whales. Documented occurrences of humpback whales in Puget Sound are rare and the Sound is not part of their known migration route. The Puget Sound basin does not provide habitat suited to supporting populations of humpback whale.

5.7.5 Leatherback Sea Turtle

The proposed actions "may affect, not likely to adversely affect" leatherback sea turtles. Documented occurrences of the species in Puget Sound are rare and the Sound is not known to be part of their migration route. The Puget Sound basin does not provide habitat preferred by leatherback sea turtle.

5.7.6 Steller Sea Lion

The proposed actions "may affect, not likely to adversely affect" Steller sea lions. Documented occurrences in Puget Sound are rare. There are no recently active haul-out sites for Stellers in Puget Sound. The Puget Sound basin does not provide habitat suited to supporting populations of the species. There is no Steller sea lion critical habitat in Puget Sound.

5.7.7 Bald Eagle

The proposed actions "may affect, not likely to adversely affect" bald eagles. The project will result in increased noise during construction activities. Construction adjacent to nesting or foraging areas will be seasonally restricted through the appropriate work windows. Eagles are likely to occur in the action area. In developed areas they are most likely adapted to the increased noise and visual activity. Conversely, in undeveloped areas they are more susceptible to noise and visual disturbances. The critical period for bald eagle winter foraging is October 31 to March 31. Work will not occur during this critical time. The proposed actions will not affect bald eagle winter foraging in the area.

5.7.8 Marbled Murrelet

The proposed actions "may affect, not likely to adversely affect" marbled murrelets. The project will result in increased noise during construction activities. Construction adjacent to nesting or foraging areas will be seasonally restricted through the appropriate work windows.

5.7.9 Marbled Murrelet Critical Habitat

The proposed actions would have "no effect" on marbled murrelet critical habitat. No construction is expected to occur that would impact critical habitat.

5.7.10 Northern Spotted Owl

The proposed actions "may affect, not likely to adversely affect" northern spotted owls. The project will result in increased noise during construction activities. Construction adjacent to nest sites will be seasonally restricted through the appropriate work windows and proximity buffers.

5.7.11 Northern Spotted Owl Critical Habitat

The proposed actions would have "no effect" on northern spotted owl critical habitat. No construction is expected to occur that would impact critical habitat.

6 Cumulative Effects

6.1 Scope

In the context of the Endangered Species Act (ESA), cumulative effects encompass the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area. Future federal actions, including those that are unrelated to the proposed action, are not considered in the cumulative effects analysis because they require separate consultation pursuant to Section 7 of the ESA.

This cumulative effects analysis addresses impacts in the context of general trends in population and land use within Washington State, with a focus on the counties in western Washington that include or are adjacent to the Puget Sound basin and the Strait of Juan de Fuca.

6.2 Population

Washington's current population of about 5.8 million people has increased by about 1 million since 1990. Based on 2000 Census data, recent population growth in the Puget Sound area, on a percentage basis, has been greatest in San Juan County (40 % increase). King, Pierce, and Snohomish Counties each gained more than 100,000 people in the 1990s. Population densities in the state are among the highest in the lowland areas surrounding the Puget Sound and the northern edge of the Olympic Peninsula. Statewide, average population density is about 89 people per square mile with a maximum of 817 people per square mile in King County.

Forecasts for population growth predict an additional 1.2 to 2.5 million people residing in Washington by 2020 (OFM 1999). In the shorter term, between 6 and 6.5 million are predicted to call Washington home by 2005. Future growth patterns should mirror historical patterns, with most growth in the Puget Sound area, along the I-5 corridor.

6.3 Residential, Commercial, and Infrastructure Development

Intuitively, population growth results in increasing residential and commercial development. Improvements and upgrades to infrastructure (including highways, other transportation facilities, pipelines, power lines, and power plants) will likely track closely with increased residential and commercial development. Primary pathways of potential effects of land development include direct habitat loss, decreased water quality, contamination of waterways and uplands, changes to runoff patterns, habitat fragmentation, isolation of populations, and loss of habitat diversity. As development increases, the general quantity and quality of habitat suitable for threatened and endangered species will most likely decrease. Any amount of build-out associated with population growth will likely lead to further habitat degradation. Actions taken to mitigate for the potential impacts of development, such as avoidance of habitat critical to species survival and strong urban/rural boundaries, may help slow the rate of habitat degradation.

6.4 Agriculture

Trends in agricultural lands are dependent upon a wide variety of factors. The acreage of agricultural land in Washington has remained essentially constant since 1945. Types of agricultural activities vary over time based on availability of water, crop markets, and technological innovation.

Assuming future trends mirror the historical pattern, substantial additional impacts to fish and wildlife due to agriculture are not expected. However, in many areas of the state, certain ongoing agricultural practices (such as irrigation, chemical application, and regular habitat disturbance in agricultural areas) are likely to prevent habitat from reaching properly functioning conditions for listed species.

6.5 Fisheries

Fishing activities result in direct take of listed fish species and decreased forage base for other listed mammal and bird species. In Washington, salmon catches have steadily declined since the early 1970s (DNR 2000). For example, in 1975, about 1.3 million pounds of chinook salmon were caught by commercial, tribal, and sport fisheries. In 1995, the total weight of the chinook salmon catch was about 240,000 pounds. Other fish stocks have also experienced substantial population declines. Herring stocks in Puget Sound have decreased from a high of about 25,000 tons in 1979 to less than 10,000 tons in 1999 (DNR 2000). Rockfish stocks have decreased by 75% from peak spawning levels in the 1970s (DNR 2000). Lingcod populations in the northern Puget Sound and the Strait of Georgia are estimated at approximately 2% of that in 1950 (DNR 2000). Imperiled fish populations have led to decreased fishing pressure. For example, the number of licensed commercial fishing boats in Washington has steadily decreased from 7,889 vessels in 1980 to 2,494 vessels in 1998 (DNR 2000).

Even if fish catches level off, impacts to listed species, particularly listed salmonids, from fishing activities are expected to continue. Catch targeted on fish produced at hatcheries inevitably results in some by-catch of co-occurring wild fish, including wild fish that are now listed as threatened or endangered. Even catch-and-release fisheries may cause lethal or sub-lethal adverse effects to listed fish. Harvest of forage species may imperil other listed species. Assuming that fisheries continue to catch listed species or their forage base, adverse effects of such harvest will continue.

6.6 Forestry

Timber harvest in Washington State is lower than any period since the late 1970s (OFM 1999). Concentrated mainly in western Washington, an annual total of just over 4 billion board feet was produced by Washington forests from 1993-96, compared with a high of slightly more than 7 billion board feet in each 1987 and 1988 (OFM 1999). Of the total timber harvest, between 75 and 90% of the harvest is produced from non-federal lands for any given year. Taking just non-federal lands into consideration, timber harvest has fluctuated fairly tightly around an average of about 4.6 billion board feet.

In Washington, timber harvest typically involves clear-cutting techniques. Impacts due to clear-cutting and forest roads have been well documented (Beechie et al. 1997; Kiffney et al. in review; Pess et al. 1999). Clear-cutting impacts are long lasting and additive. Although the rate of harvest appears to be slowing and improved best forestry practices have been implemented, the collective impacts of past and reasonably foreseeable future forestry activities are likely to result in additional future degradation of habitat for listed species.

6.7 Pollutant Discharge

Air and water pollution can degrade habitat and have lethal and sub-lethal effects on fish and wildlife. Increased population typically causes increased air and water pollution. Developed areas also generate effluent and runoff is often polluted with a variety of substances. In the early 1990s, Washington led the nation in the weight of pollutants discharged directly to surface waters (DNR 2000). As of 1999, nearly 60% of the lakes, steams, and estuaries for which data exists, failed to meet water quality standards (DNR 2000). Extremely high concentrations of polychlorinated biphenyls (PCBs) in the blubber of orca whales in Puget Sound make them among the most contaminated marine mammals on earth (DNR 2000). Clearly, pollutant loads in Washington waters have reached levels of concern.

Ongoing state cleanup activities will help to mitigate the more acute pollutant sinks and sources in some parts of the state (federal cleanup activities are intentionally excluded from the ESA cumulative effects analysis). While it is difficult to estimate future trends in pollutant discharge, discharges will likely continue in the future and are very likely to degrade habitat for listed species.

6.8 Other Activities

Other non-federal activities (recreation, poaching, waste disposal, etc.) also have the potential to affect listed species in the future. Taken individually, any given activity may have an inconsequential effect on listed species. However, when viewed as a whole and in the context of past trends, continued degradation of the status of listed species and their habitats is likely.

Analysis is based on extrapolation of past trends into the future. Recent concern about declining populations of salmonids in the Puget Sound basin has fostered efforts to change past trends. The State of Washington and local agencies are actively pursuing recovery of salmonid stocks via a comprehensive program of habitat protection, education, policy analysis and modification, and public outreach. The efforts of Washington State, along with initiatives by private and local entities, may help reverse some of the trends discussed above.

6.9 Conclusion

The ESA listings of a variety of fish and wildlife species in the Puget Sound basin have been based, in part, on the additive impacts of growth, development, and other human activities. At this point, the trends discussed above indicate that future impacts will progress similarly, leading to additional adverse impacts on all fish and wildlife and their habitats. Changes to past development practices provide hope that past trends are not predictive of the future circumstances.

7 Conservation Measures

The following construction specifications and conservation measures must be implemented for the work to be authorized by this RGP.

7.1 Piers

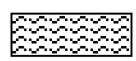
A "pier" is defined as the structure that is supported above the water by pilings and connects the overwater structure to shore. In order to reduce potential impacts, the amount of shade created by piers needs to be minimized. This can be accomplished several ways, including minimizing the width of the pier, elevating the pier, and orienting the pier in the north-south direction which will reduce the amount and duration of shading. The following conditions apply for residential piers in the action area.

- The width of the modified portion of the pier or the proposed new pier must not exceed 6 feet (1a).

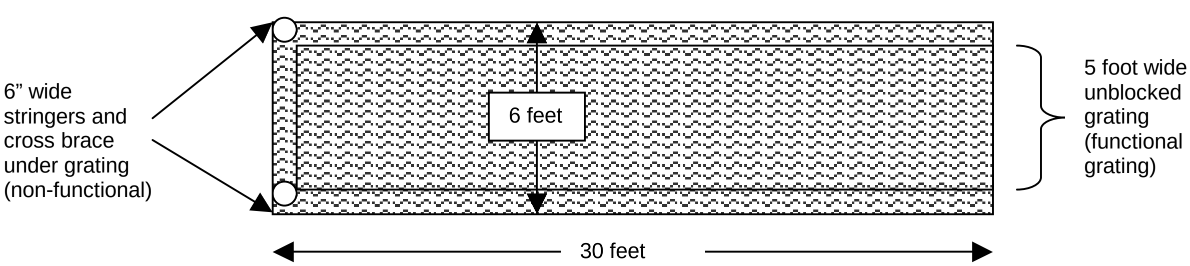
- The following grating options are available to comply with Construction Specifications of the pier to minimize shading impacts taking into account the amount and location of grating and compass orientation. Refer to Specification 4 for additional grating requirements. Note: The permit application drawings must clearly and correctly show a north arrow with True and Magnetic North (1b).

General Compass Orientation of Pier and Pier Width	Specific Degrees (North = 0) True North	% of Functional Grating on the Pier	Location of Grating on the Pier
N/S Only if width is greater than 4 feet	338 to 22 158 to 202	30	Along the length of the pier for the entire length of the pier
NE/SW And E/W Required for all piers irregardless of width	23 to 157 203 to 337	50	Along the width of the pier, interspersed along the entire length of the pier

"Functional grating" is grating which is not covered or blocked underneath by any objects. The percent of "functional grating" is in relation to the surface area of the pier.

See figures below to further explain these options:  = grating

Functional Grating:



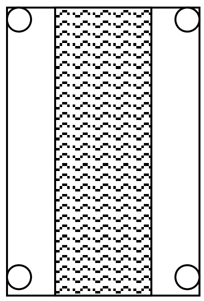
Example: For this portion of a pier:

The total surface area of the pier is 6- by 30- feet = 180 square feet
The total functional grated surface area is 5- by 29.5-feet = 147.5 square feet

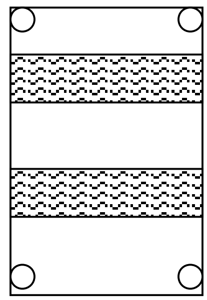
The percent of functional grating: 147.5 divided by 180 = 82%

Location of Grating:

Along the length of the pier



Along the width of the pier



- Pier Configuration: The pier must be linear in a straight line. New, repair, or replacement of finger, "ell", and "T" shaped piers are not authorized by this RGP (1c).

7.2 Floats

A "float" is defined as the floating part of the overwater structure to which boats tie up. Impacts from floats can be minimized by grating the float surface, reducing the width of the float, preventing damage to substrate, and removing floats during the migration season for forage fish and salmonids. Therefore, the following conditions apply for residential floats in the action area.

- For a single residential use overwater structure the float width cannot exceed 8 feet, the length cannot exceed 20 feet, and the floatation can only be under solid decked areas; the following options regarding Construction Specifications are available to minimize shading impacts taking into account float width and amount of grating.

  Option 1: A float with a width of 6 feet or less must have functional grating installed on at least 30 percent of the surface area of the float.
  Option 2: A float with a width greater than 6 feet (up to 8 feet) must have functional grating installed on at least 50 percent of the surface area of the float.

- For a joint use structure, the float width must not exceed 8 feet and the float length cannot exceed 40 feet, functional grating must be installed on at least 50 percent of the surface area of the float, and floatation can only be under solid decked areas (2b).

- The applicant must demonstrate to the Corps, in writing, as part of the permit application, that to the maximum extent practicable, the float will be installed with the length in the north-south direction (2c).
- If the float is removed seasonally, then it should be removed from the water and placed in unvegetated uplands or paved areas . If the float is moved to a marina or other in-water facility for storage, the permittee must identify the area as part of their permit application so that the Corps can verify that the facility has Corps authorization to store floats (2d).
- Floatation for the float shall be fully enclosed and contained in a shell (i.e., polystyrene tubs not shrink wrapped or sprayed coatings) that prevents breakup or loss of the floatation material into the water and is not readily subject to damage by ultraviolet radiation and abrasion caused by rubbing against piling and/or waterborne debris (2e).
- The floats cannot rest on the tidal substrate at any time. Stoppers on the piling anchoring the floats or stub piling must be installed such that the bottom of the floatation device is at least 1 (one) foot above the level of the substrate. The stoppers must be able to fully support the entire float (2f).
- Floats can be held in place with lines anchored with a helical screw anchor, piling, piling with stoppers and/or float support/stub pilings. For a single, residential use, 20-foot float, a maximum of 4 piling or helical screw anchors can be installed to hold the float in place. For a joint use 40-foot float, a maximum of 6 piling or helical screw anchors can be installed to hold the float in place. If anchors and anchor lines need to be utilized, the anchor lines shall not rest on the substrate at any time 2g).

7.3 Ramps

A "ramp" is defined as the structure that connects the pier to the floating portion of the overwater structure. Like piers and floats, ramps inhibit light from entering the water. By grating the ramp and using a greater length, the ramp can span the shallow intertidal area, minimizing shading impacts to vegetation in the intertidal area. Therefore, the following conditions apply for ramps in the action area.

- The width of the ramp connecting the pier and the float must not exceed 4 feet (3a).
- Grating shall cover the entire surface area of the ramp (3b).

7.4 Grating

The grating must have at least 60 percent open area. The grating must be oriented to maximize the amount of light passage. This can be accomplished by orienting the lengthwise direction of the grating openings in the east-west direction. To ensure that light transmission is not impeded, grating must not be covered or blocked (on the surface or underneath) with any objects , such as, but not limited to, buildings, planters, storage sheds or boxes, nets, carpets, boards, tables, lawn furniture, or traction devices. Electrical boxes are permitted and must be shown on the plan drawings (4).

7.5 Piling

"Piling" are defined as the wood, metal, plastic, or concrete cylinders which are driven into the waterbody substrate and serve to stabilize other components of the overwater structure. In addition to potential impacts from the physical presence of pilings in the aquatic environment, the vibratory energy and noise of piling driving can adversely impact fish and bird species in the project vicinity. To minimize the impacts to the tidal substrate, the number of piling must be minimized by maximizing the spacing between piling. The following conditions apply for piling in the action area.

- Replacement or proposed new piling must be steel, concrete, plastic, or untreated or treated wood. Any piling subject to abrasion (and subsequently deposition of material into the water) must incorporate design features (e.g., plastic or metal bands) to minimize abrasion from the contact between the piling and the float(s) or attachments to the float(s) (5a).

- New piling associated with a new pier must be spaced at least 20 feet apart (lengthwise along the structure) unless the length of structure itself is less than 20 feet. If the structure itself is less than 20 feet in length, piling can only be placed at the ends of the structure (5b).

- If the activity is only the replacement of existing piling on an existing pier: the piling can be replaced in the same general location and must not extend beyond the footprint of the existing structure (e.g., pier). The 20-foot spacing between piling is not required. Existing piling can be partially cut with a new piling secured directly on top, fully extracted, or cut 2-feet below the mudline. If treated piling are fully extracted or cut 2-feet below the mudline, the holes or piling must be capped with appropriate material. Hydraulic water jets cannot be used to remove piling (5c).

- A maximum of two moorage piling may be installed to accommodate the moorage of boats exceeding the length of the floats (5d).

- The diameter of steel piling cannot exceed 12 inches. If a drop hammer pile driver for steel piling is utilized, a sound attenuation device or system must be implemented during pile driving (5e).

    1. For piling with a diameter of 10 inches or less, the sound attenuation device must include <u>one</u> of the following: the placement of a block of wood (minimum of 6 inches thick) between the hammer and the piling during pile driving or use a bubble curtain that distributes air bubbles around 100% of the perimeter of the piling over the full depth of the water column or any other Corps approved sound attenuation device. Information on bubble curtain design is available on the Corps' website.

    2. For piling with a diameter greater than 10 inches, up to 12 inches, the sound attenuation device must include the placement of a block of wood (minimum of 6 inches thick) between the hammer and the piling during pile driving <u>and</u> use a bubble curtain that distributes air bubbles around 100% of the perimeter of the piling over the full depth of the water column or any other Corps approved sound attenuation device. Information on bubble curtain design is available on the Corps' website.

7.6 Wood Treatment

No creosote, pentachlorphenol, CCA, or comparably toxic compounds not approved for marine use shall be used for any portion of the overwater structure. For any ACZA treated wood, the wood must be treated by the manufacturer per the Post Treatment Procedures outlined in "BMP Amendment #1 - Amendment to the Best Management Practices (BMPs) for the Use of Treated Wood in Aquatic Environments; USA Version - Revised July 1996", by the Western Wood Preservers Institute, as amended April 17, 2002 or the most current BMPs. This information is available on www.WWPInstitute.org. Third party certification that the material was produced according to these BMPs must be provided to the Corps before authorized work can commence (6a).

7.7 Skirting

"Skirting" is vertical boards along the edge of a pier extending downward. Skirting contributes to the shading, trapping, and accumulation of floating debris associated with overwater structures. To minimize potential impacts from overwater structures no new or replacement skirting can be installed (7a).

7.8 Other Structures

Structures (i.e., sheds, planters) on top of overwater structures can cover grating or cause additional shading impacts. To minimize shading impacts, the following limitations on additional structures apply.

- The repair, maintenance, or replacement of existing structures, or the construction of new structures, such as, but not limited to, buildings, planters, storage sheds or boxes on overwater structures is not authorized by this RGP. Electrical ultility boxes can be repaired, maintained or replaced by this RGP (8a).

7.9 Watercraft Moorage at Structures Authorized by this RGP

In some areas, watercraft tied to an overwater structure may rest on the substrate during low tide. The grounded watercraft may scrape or compact the substrate that adversely affects benthic invertebrates, eelgrass, microalgae and macroalgae. Compacted substrate reduces the likelihood that burrowing organisms can penetrate the substrate. A watercraft grid or lift will prevent a watercraft from resting on the substrate at low tide. To minimize impacts from watercraft grounding while moored, the following conditions apply.

- Watercraft (e.g., motorized boats, jet skis, canoes, kayaks, or seaplanes) moored at modified or new structures cannot rest on the tidal substrate at any time. The applicant must demonstrate that the watercraft will not ground. If there is a potential for the watercraft to ground, the watercraft must either be placed on the overwater structure (but not on grated portion) or on an uncovered watercraft grid or uncovered watercraft lift or elevated above the water on a davit. (Note: For watercraft lifts, refer to the Corps' RGP-1 and relevant ESA requirements.) (9a)

- Only one uncovered watercraft grid or uncovered watercraft lift can be installed at a single use overwater structure. A maximum of two uncovered watercraft grids or uncovered watercraft lifts can be installed at a joint use overwater structure. Any additional lifts may be authorized under RGP-1 which has separate permitting and mitigation requirements (9b).

- A maximum of two additional pilings may be used to attach the uncovered watercraft grid to the piling used for anchoring the floats (9c).

- The bottom of the uncovered watercraft grid shall be at least 1 foot above the level of the substrate (9d).

- If a floating watercraft lift is installed, the lift cannot rest on the tidal substrate at any time (9e).

7.10 Eelgrass/Macroalgae

Overwater structure construction and use can adversely affect eelgrass and macroalgae. Therefore it is important to identify if these plants exist in the project area and the project must be designed to avoid impacting these areas. In order to properly assess potential impacts on eelgrass and macroalgae and to minimize potential impacts, the following conditions apply.

- No eelgrass/macroalgae survey is required for the replacement of decking or a ramp (10a).

- For all other activities, the applicant must submit a preliminary eelgrass/macroalgae survey with their permit application to qualitatively assess the vegetation in the "project area" (see Appendix I for definition). If the applicant believes there are no eelgrass/macroalgae beds in the project area, they must submit photographs of the site taken at low tide during June 1 through October 1 (to most accurately reflect eelgrass/macroalgae bed distribution), showing the entire project area, to the Corps for a determination regarding the need for a preliminary eelgrass/macroalgae bed survey (see Appendix F). "Macroalgae beds", for the purposes of this RGP, is defined as an area of the tidal substrate supporting attached macroalgae and covering 25% of the substrate.

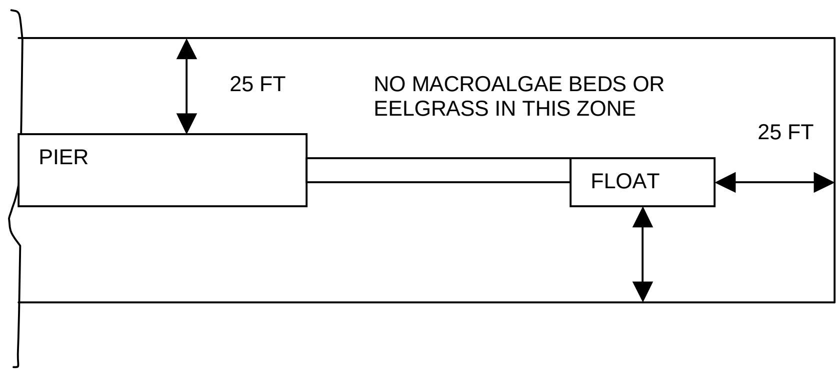
  If eelgrass/macroalgae is found within the project area, and the WDFW has not documented Pacific herring spawning habitat (e.g., eelgrass) at the project site, an intermediate survey may need to be performed to map the distribution of vegetation relative to the proposed overwater structure (see Appendix G). The Corps will make this determination based on the quality of the preliminary survey and the potential for the site to contain undocumented Pacific herring spawning habitat, and will inform the applicant of the need for any additional surveys.

  If there is documented Pacific herring spawning habitat (e.g., eelgrass) on the project site, the applicant must provide the Corps an intensive eelgrass/macroalgae survey to map the distribution of the spawning habitat relative to the proposed overwater structure (see Appendix H).

Note: As a condition to obtain a Hydraulic Project Approval (HPA) from the Washington Department of Fish and Wildlife, an eelgrass/macroalgae/forage fish survey is routinely required. If any of these reviews have been completed, and/or an HPA has been issued for the proposed work, this documentation can be submitted to the Corps to meet the requirements for an eelgrass/macroalgae/forage fish survey. If an HPA has been issued for the proposed work, the HPA should be submitted with the application to the Corps (10b).

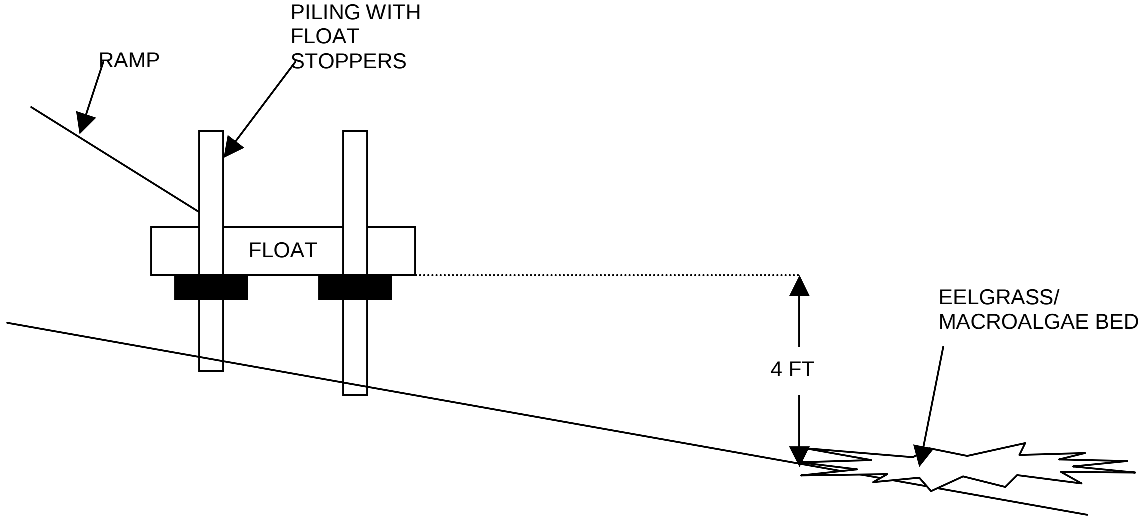
- No overwater structures or piling can be constructed or installed within 25 feet (horizontally), measured in all directcions of macroalgae beds or eelgrass (10c).

  Example (plan view)

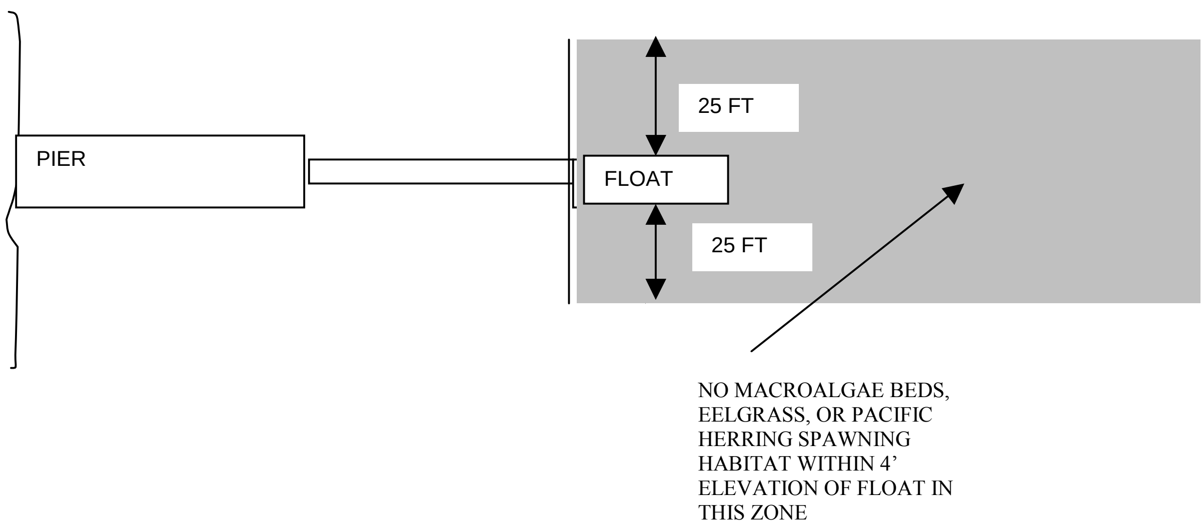


- No overwater floats or float support piling can be constructed or installed within a 4-foot depth elevation between the top of the float stopper and the elevation of the landward most edge of the macroalgae bed or eelgrass. This restriction applies to a zone 25 feet wide on both sides of the float projecting waterward from the float (see example plan view below). A drawing of depths and distance to macroalgae beds or eelgrass must beprovided as part of the application (10d).

Example (elevation view)



Example (plan view)



7.11 Forage Fish Habitat

Impacts to forage fish and their habitat can adversely affect salmon and bull trout by causing a reduction in the latter's food source. Forage fish, such as herring sand lance, and surf smelt, spawn and rear in shallow intertidal areas. The following conditions to reduce impacts to forage fish will apply.

- Piers and ramps which span documented surf smelt and/or sand lance spawning habitat is the preferred construction method, but is not required (11a).

- The number of piling in documented surf smelt and/or sand lance spawning habitat must be minimized, the spacing between pilings must be maximized, and the piling cannot consist of treated wood. Also, the piling diameter must not be more than 8 inches, to the maximum extent practicable. If pilings are to be placed in surf smelt and/or sand lance spawning habitat, the application must demonstrate why these impacts are not avoidable. (11b).

- Floats, float support piling, helical anchors, or watercraft grids or lifts cannot be installed in documented Pacific herring, surf smelt, and/or sand lance spawning habitat (11c).

- No floats, float support piling or watercraft grids or lifts can be constructed or installed within a 4 foot depth elevation between the top of the float stopper and the elevation of the landward edge of documented Pacific herring spawning habitat. This restriction applies to a zone 25 feet wide on both sides of the float projecting watereward from the float (see example, plan view in Section 7.10 above) (11d).

- Information on the substrate types in the project area must be submitted as part of the permit application. If the Corps determines that there is potentially undocumented surf smelt, Pacific herring, or sand lance spawning habitat, the Corps may request additional information from the applicant and the Corps will consult with the appropriate resource agencies. Project revisions may be required if undocumented surf smelt, Pacific herring, or sand lance spawning habitat is located in the project area. (11e).

7.12 Work Windows

Listed species (i.e., chinook and chum salmon, bull trout, bald eagles, marbled murrelets, spotted owls) have different periods of sensitivity (i.e., migration and spawning, nesting and wintering) to human activities. To minimize impacts to these species, in-water construction should occur when the fish are not migrating or spawning or when the birds are not wintering or nesting. Hence, the following conditions apply.

- To minimize impacts to salmonid species and their forage fish species, construction work shall be conducted only during approved fish work windows, and any subsequent revisions will be posted on the Regulatory Branch's website at www.nws.usace.army.mil/reg.html (12a).

- If there is documented or potential surf smelt or sand lance habitat at the project site and there is no approved work window for surf smelt or sand lance at the project site, the applicant must, prior to construction, have a qualified biologist or biologist certified by the Washington Department of Fish and Wildlife (WDFW) confirm, in writing, that no surf smelt or sand lance are spawning in the project area during the proposed project construction. This documentation must include the date of the inspection, the findings, and must be provided to the Corps, Seattle District, Regulatory Branch, FAX (206) 764-6602, prior to construction period. Address the letter or memorandum to the project manager and include the RGP authorization reference number. If the qualified or certified biologist confirms that no surf smelt or sand lance are spawning in the project area, the permittee has 48 hours from the date of the survey to begin the work and two weeks from the date of the survey to complete all work that contacts the substrate waterward of mean higher high water. (Note: This notification to the Corps will occur after the applicant has already received RGP verification.) (12b).

- To minimize impacts to wintering or nesting bald eagles specific work windows must be adhered to. Based on the distance to the nearest bald eagle nest, nesting chronology, wintering concentrations, roost sites, potential perch sites, and foraging habitat, the Corps will determine the appropriate work window. The prospective permittee must agree to abide by the required bald eagle work windows (the work windows, and any subsequent revisions, will be posted on the Regulatory Branch's website at www.nws.usace.army.mil/reg.html) (12c).

7.13 Work in Dry Conditions

In order to minimize potential impacts from turbidity associated with in-water work, the following conditions apply.

- Work that involves the excavation of the substrate, bank, or shore of a water of the United States (e.g., removal of bank protection as a mitigation measure) shall occur in the dry (e.g., at low tide) whenever practicable (13a).

7.14 Operation of Equipment

In order to minimize impacts to organisms living in the tidal substrate and the waterbody, the following conditions apply.

- Use of equipment on the beach shall be held to a minimum, confined to a single access point, and limited to a 25-foot work corridor on either side of the proposed work. To the maximum extent practicable, equipment shall be operated from the top of the bank, temporary work platform, barge, or similar out-of-water location (14a).

- Equipment shall be operated in a manner that minimizes suspended particulates from entering the water column (14b).

- Equipment with any identified problems, including leaks or accumulations of oil or grease, must be fixed and cleaned, away from the water, before its use as part of the project. Fuel hoses, oil drums, or fuel transfer valves and fittings, etc. shall be checked daily for drips or leaks, and shall be maintained and stored properly to prevent accidental spills (14c).

- If barges are needed, barges may not ground on the substrate at any time (14d).

- Depressions or trenches in beach areas, waterward of MHHW, created by construction equipment, shall be immediately restored to the original pre-project conditions (e.g., elevation and substrate material type) (14e).

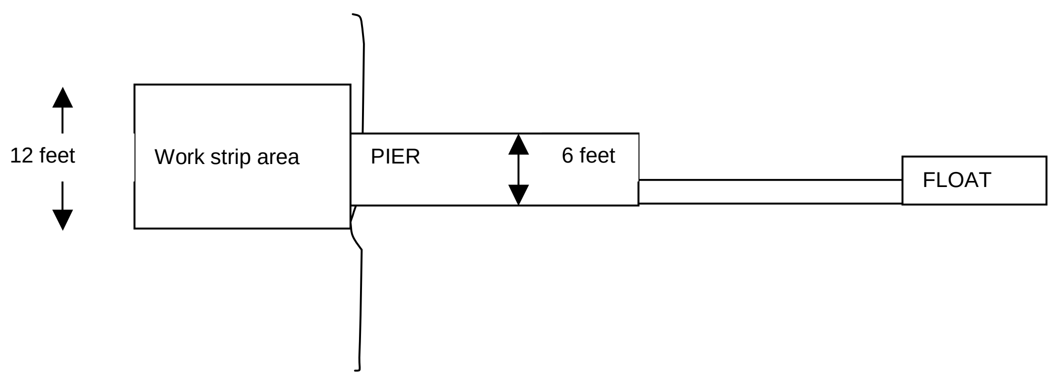
- Any disturbance of the beach area by construction activities or equipment, which leaves exposed hardpan or clay, shall be restored to the original pre-project conditions (e.g., elevation and substrate material type) upon the immediate completion of construction and mitigation work (14f).

7.15 Disturbance of Vegetation

Bank vegetation is an important nutrient and habitat source for the aquatic environment. In order to minimize disturbances to bank vegetation, the following conditions apply.

- Existing habitat features (e.g., large and small natural woody debris) shall not be removed from the aquatic environment (15a).

- Disturbance of bank vegetation shall be limited to a "work area strip" no wider than twice the width of the pier parallel to the pier (see figure below). There is no length requirement (15b).



- If woody bank vegetation with a diameter at breast height (dbh) of 4 inches or greater needs to be removed within the "work area strip", the applicant must submit photographs of the bank, work area strip, and areas immediately adjacent and a justification regarding the proposed removal to the Corps as part of the permit application. Approval for removal must be obtained from the Corps. Trees, to the maximum extent practicable, must be placed on the beach, onsite and anchored securely into place. If trees will not be placed on the beach, the applicant must explain why this in not practicable. (15c).

- Disturbed bank vegetation shall be replaced with the equivalent (i.e., if shrubs are removed, shrubs need to be planted) native, indigenous species appropriate for the site. A planting plan must be provided. See Table 7-3 for list of approved plant species and alternative species can be planted, with approval from the Corps (15d).

7.16 Mitigation Measures

7.16.1 Overwater Structure Mitigation

While the above described construction measures will minimize impacts to the aquatic environment due to the individual structures, impacts from these structures will not be fully avoided. Also, because of cumulative impacts of numerous structures authorized under this RGP, mitigation measures must be implemented. The purpose of mitigation is to offset losses to the aquatic environment resulting from installation of an overwater structure. Overwater structures have the potential to degrade or destroy important habitat for threatened or endangered fish species. These mitigation measures will restore or create important fish habitat to offset the impact of the project.

Table 7-1 lists different types of mitigation measures the applicant can select from to mitigate for the proposed overwater structure(s). Each mitigation measure is given a mitigation point value.

Table 7-2 describes the formula and method to be used to calculate how many mitigation points are required to mitigate for the impacts of the proposed project. The first priority for mitigation work is onsite; however, if mitigation work cannot be completed onsite, the mitigation work may occur at a Corps approved offsite location. If mitigation must be completed at an offsite location, justification must be provided as part of the permit application. The amount of mitigation may be increased if an offsite location is utilized to fully compensate for the impacts of the project.

The first priority for mitigation work is onsite; however, if mitigation work cannot be completed onsite, the mitigation work may occur at a Corps' approved offsite location. If mitigation must be completed at an offsite location, justification must be provided as part of the permit application. The amount of mitigation may be increased if an offsite location is utilized to fully compensate for impacts of the project.

Note: Fractional numbers 0.5 or above are rounded up and fractional numbers below 0.5 are rounded down. Examples: The number 7.3 would be rounded down to 7. The number 6.5 would be rounded up to 7.

Table 7-1. Mitigation Measure Options (MMO) and Corresponding Mitigation Points (Note: The terms "remove" and "relocate" mean remove from the area waterward of MHHW and dispose of or place in an appropriate upland or disposal area.)

Mitigation Measure Option #	Number of Mitigation Points	Mitigation Measure Description
1	1	Plant 4 trees and 4 shrubs (from the planting list and per planting specifications in this RGP) within 15 feet landward of the MHHW and parallel to the shoreline
2	1	Remove 1 pile located in the tidal substate (if the pile is treated wood, use MMO #6 instead)
3	1	Permanently prevent an existing float from resting on the tidal substrate (at least 1 foot above the tidal substrate)
4	1	Install 9 square feet of functional grating on the proposed or existing structure beyond the requirements of this RGP
5	1	Permanently prevent an existing anchor line from scouring the tidal substrate
6	2	Remove 1 treated wood pile located in the tidal substrate
7	2	Remove 9 square feet of an existing overwater structure
8	3	Relocate 3 linear feet of hardened shoreline
9	4	Remove 3 linear feet of hardened shoreline and plant removal area with native vegetation (see Table 7-3)
10	4	Remove manmade debris (e.g., concrete rubble, tires, etc.) covering 9 square feet, from the tidal substrate
11	Varies	Removal of an existing manmade groin, in its entirety. The number of mitigation points varies depending on the size of the groin. One mitigation point = 9 square feet (footprint) of groin removed. For example: The groin to be removed is 9 feet long and 3 feet wide. This structure has a footprint of 27 square feet. 27 divided by 9 equals 3 mitigation points.
12	Varies	Removal of an existing boat ramp, in its entirety. The number of mitigation points varies depending on the size of the boat ramp. One mitigation point = 9 square feet (footprint) of boat ramp removed. For example: The boat ramp to be removed is 12 feet long and 8 feet wide. This structure has a footprint of 96 square feet. 96 divided by 9 = 10.7 → 11 mitigation points.
13	Varies	Removal of an existing marine railway (two rails and support structures), in its entirety. The number of mitigation points varies depending on the length of the marine railway. One mitigation point = 3 linear feet of a pair of rails removed. Note: each rail is not counted separately. For example: The marine railway to be removed is 14 feet long. 14 divided by 3 = 4.6 → 5 mitigation points.

Table 7-2. Number of Required Mitigation Points for Certain Projects and Habitats

Specific Size and Location of Proposed Overwater Structure ⇓	Habitat Categories		
	A	B	C
	Project is greater than 50 feet away from eelgrass, macroalgae, spawning and forage fish habitat	Project is 26 – 50 feet away from macroalgae beds and/or forage fish habitat	Project is 26-50 feet away from eelgrass
	# Required Mitigation Points	# Required Mitigation Points	# Required Mitigation Points
Structure size and/or number of piling is reduced or the same (and project meets RGP conditions)	0	0	0
Per every ninety (90) square feet of pier, ramp, float, and the footprint of piling located in water shallower than –20 feet below MLLW for a **single** residential use overwater structure	1	1.5	2
Per every ninety (90) square feet of pier, ramp, float, and the footprint of piling located in water shallower than –20 feet below MLLW for a **joint** residential use overwater structure	0.5	0.75	1
Float located waterward of a water depth of –20 feet below MLLW	0	0	0

Note: If the proposed structure is in Category B and C, the number of required mitigation points is the number in Category C.

The following examples are provided to illustrate how to use Tables 7-1 and 7-2 for a proposed project.

Example #1: A new **single** use overwater structure is proposed with the following components and corresponding footprint (in square feet). Note that even though some of the piling is located under the footprint of the pier, the surface area is counted separately because of the additional impact to the substrate.

10 piling (each 0.5 foot radius) 10x (π x radius^2) = 10x (3.14 x 0.5^2) = 7.85 s.f.
Pier 80' by 4' = 320 s.f.
Ramp 36' by 4'= 144 s.f.
Float 20' by 6' = 120 s.f.
TOTAL size of proposed footprint= 592 s.f.
592 divided by 90 = 6.5→7 mitigation points

If the project site is in Habitat Category A: 7 x 1 = 7 mitigation points required.
As mitigation, the applicant will implement MMO #12 -- remove an existing
12- by 8-foot boat ramp = 96 s.f.
96 divided by 9 = 10.7 rounded up to 11 mitigation points. No additional mitigation is required for this project as the mitigation needs are exceeded.

If the project site is in Habitat Category B: 7 x 1.5 = 10.5 rounded up to 11 mitigation points required.

As mitigation, the applicant will implement MMO # 9 -- remove 9 linear feet of hardened bank protection and plant removal area with native vegetation (3 linear feet = 4 mitigation points => 9 linear feet = 12 mitigation points). No additional mitigation is required for this project as the mitigation needs are exceeded.

Example #2: An existing **single** use overwater structure is modified. The existing pier, ramp, float and 16 piling have a footprint of 920 square feet. All structures are located landward of a water depth of –20 feet below MLLW

The new structure will be lengthened and widened for a total overwater coverage of 1,000 square feet which includes the removal of 4 piling. The size of the additional work will be: 1,000 - 920 = 80 s.f., which needs to be mitigated.

80 divided by 90 = 0.89 rounded up to 1 mitigation point required.

If the project site is in Habitat Category A: 1 x 1 = 1 mitigation point required. As mitigation, the applicant will implement MMO# 2, one mitigation point is given per each of the 4 piling removed for a total of 4 mitigation points. No additional mitigation is required for this project as the mitigation needs are exceeded.

If the project site is in Habitat Category C: 1 x 2 = 2 mitigation points required. As mitigation, the applicant will implement MMO# 2, one mitigation point is given per each of the 4 piling removed for a total of 4 mitigation points. No additional mitigation is required for this project as the mitigation needs are exceeded.

Example #3: An existing single use overwater structure is being modified and will be reduced in size. The existing pier, ramp, and float have a footprint of 1200 square feet and have 20 piling. All structures are located landward of a water depth of –20 feet below MLLW. The new structure will have a footprint of 950 square feet and will include the removal of 5 piling. No mitigation points are required.

Note: No "credit" is given for constructed mitigation points exceeding the required amount of required mitigation points. "Excess" mitigation cannot be traded, banked, or saved.

7.16.2 Mitigation Timing

The selected and Corps approved mitigation measures, except plantings, must be complete within 6 months from the date of project construction. Plantings must be installed during the appropriate time of year for the selected species within on year of project construction.

7.16.3 Mitigation Planting

The purpose of mitigation planting is to offset losses to the aquatic environment resulting from the installation of an overwater structure. The mitigation planting establishes a plant community and associated food web that can be utilized by foraging and migrating salmonids as they pass through the project area and provides complex shade for upper intertidal spawning forage fish.

If plantings are selected as a mitigation option, the applicant must submit a planting plan, with their permit application, to be reviewed and approved by the Corps. See example planting plan below.

The prospective permittee is required to establish and preserve the planting plot(s) at the project site for the duration that the overwater structure is in place. A drawing of the proposed planting area must be recorded with the Registrar of Deeds per General Condition 3.

The planting plot(s) will be planted (cuttings, burlapped roots or 1 – 5 gallon pots) with native shrubs and trees. The plantings must be located within 15 feet landward of the MHHW, planted in an alignment nearest to the water parallel to the shoreline. The shrubs will be planted at intervals of 3-feet on center, and the trees will be planted at intervals of 10-feet on center. At least 2 trees must be planted in the mitigation unit. The Corps must approve a planting plan submitted by the prospective permittee prior to issuance of an RGP to the permittee. The plant species must be from the plant list in Table 7-3, or the applicant can suggest other species but the Corps must approve the species before work commences.

EXAMPLE OF A PLANTING PLAN for 2 mitigation points

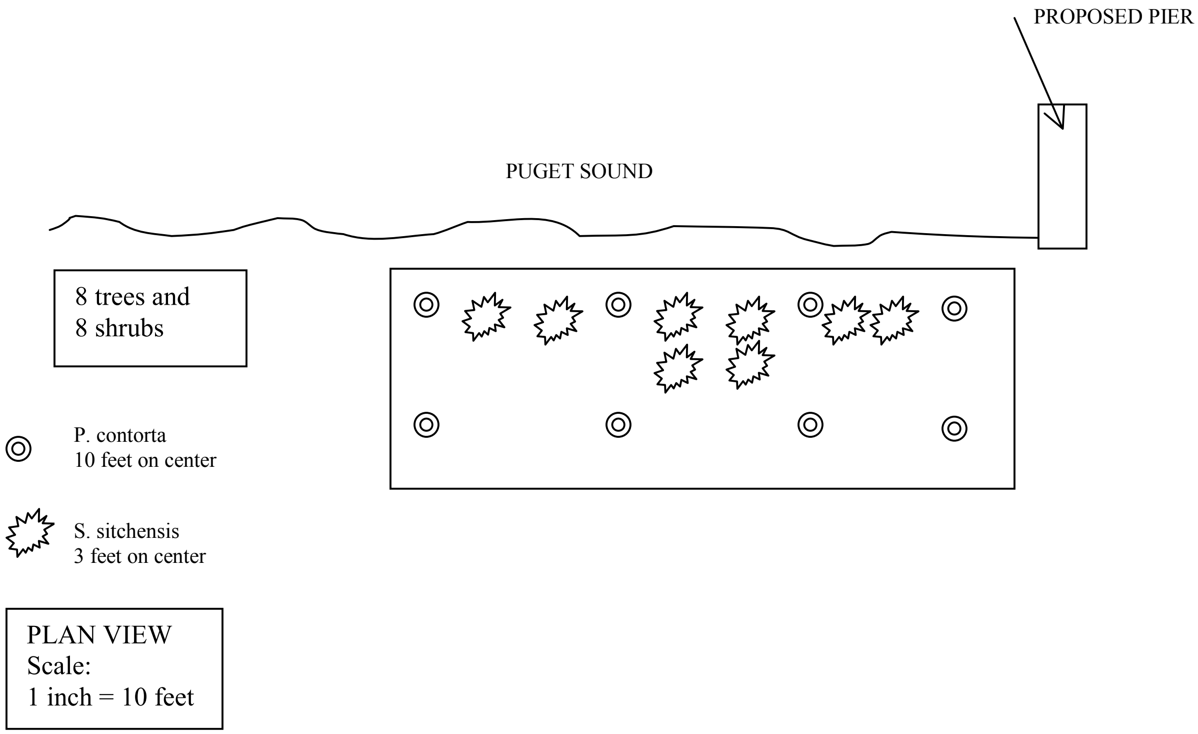


Table 7-3. List of Approved Plant Species (or the applicant can suggest other species but the Corps must approve the species before work commences)

Common Name	Scientific Name
Shrubs:	
Sitka willow	*Salix sitchensis*
Souler willow	*S. scouleriana*
Sandbar willow	*S. exigua*
Pacific willow	*S. lasiandra*
Hooker willow	*S. hookeriana*
Red osier dogwood	*Cornus stolonifera*
Trees:	
Black cottonwood	*Populus trichocarpa*
Douglas fir	*Pseudotsuga menzeisii*
Sitka spruce	*Picea sitchensis*
Shore pine	*Pinus contorta*

7.16.3.1 Mitigation Planting Performance Standards

One hundred percent survival of all planted trees and shrubs is required during the first and second years after planting the plot(s). During the third through fifth years after planting, 80 percent survival is required. The permittee must protect the planting plot(s) against predation (e.g., beavers)—the Corps recommends fencing. Individual plants that die must be replaced with native shrubs and trees taken from the species list above. Maintenance of the mitigation area includes removal and replacement of dead or dying plants and removal of invasive and/or noxious weeds. Maintenance does not include trimming or mowing of the plants. The plants must be allowed to develop naturally. During the 5 years of monitoring, the permittee must implement any Corps required contingency plans (e.g., additional plantings, planting different species) if the performance standards were not met.

7.16.3.2 Mitigation Reports

Mitigation reports must be submitted to the Corps for all projects as follows:

- A report on mitigation completion or a status report on the project and mitigation, including as-built drawings, must be submitted to the Corps within 12 months from the date the Corps issues an RGP to the permittee. The permittee can meet this reporting requirement by submitting to the Corps a completed *Report for Mitigation Work Completion*, Appendix C.

- **If plantings are implemented:** Mitigation planting monitoring reports will be due annually for 5 years from the date the Corps accepts the as-built drawings. The mitigation monitoring report will include written and photographic documentation on tree and shrub mortality and replanting efforts. Photographs must be taken between June – August (the best time of year to show plant growth). Photographs must show a panoramic view of the entire mitigation planting area. A set point from where photos are taken must be established and used repeatedly for each monitoring year. The date of the photos must be noted on the monitoring report. The permittee can meet this reporting requirement by submitting to the Corps a completed *Mitigation Planting Monitoring Report*, Appendix D.

7.17 Mitigation Required by Washington Department of Fish and Wildlife (WDFW)

WDFW will often issue an Hydraulic Project Approval (HPA) for an overwater structure with a requirement for the placement of 25 cubic yards of gravel for fish habitat enhancement. The construction description and effects of the action are described in detail in the Programmatic Biological Evaluation for Nearshore Fills for State HPA Mitigation Requirements.

8 Essential Fish Habitat

8.1 Background

Public Law 104-297, the Sustainable Fisheries Act of 1996, amended the Magnuson-Stevens Fishery Conservation and Management Act to establish new requirements for Essential Fish Habitat (EFH) descriptions in Federal fishery management plans and to require federal agencies to consult with NMFS on activities that may adversely affect EFH.

The Magnuson-Stevens Act requires all fishery management councils to amend their fishery management plans to describe and identify EFH for each managed fishery. The Pacific Fishery Management Council (1999) has issued such an amendment in the form of Amendment 14 to the Pacific Coast Salmon Plan, and this amendment covers EFH for all fisheries under NMFS jurisdiction that would potentially be affected by the proposed action. Specifically, these are the chinook, coho and pink salmon fisheries. EFH includes all streams, lakes, ponds, wetlands, and other currently viable water bodies and most of the habitat historically accessible to salmon. Activities occurring above impassable barriers that are likely to adversely affect EFH below impassable barriers are subject to the consultation provisions of the Magnuson-Stevens Act.

The Magnuson-Stevens Act requires consultation for all federal agency actions that may adversely affect EFH. EFH consultation with NMFS is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of its location. Under Section 305(b)(4) of the Magnuson-Stevens Act, NMFS is required to provide EFH conservation and enhancement recommendations to federal and state agencies for actions that adversely affect EFH. Wherever possible, NMFS utilizes existing interagency coordination processes to fulfill EFH consultations with federal agencies. For the proposed action, this goal is being met by incorporating EFH consultation to the Endangered Species Act Section 7 consultation, as represented by this biological evaluation.

8.2 Location

The location of activities covered by this assessment has been described in detail earlier in this document (see Section 2.4).

8.3 Description of Proposed Activities

The activities covered by this assessment have been described in detail earlier in this document (see Section 2).

8.4 Potential Adverse Effects of the Proposed Project

EFH for ground fish (Table 8-1) and salmonids (Table 8-2) could be affected by construction and/or modification of residential overwater structures.

Projects would occur in or along the edges of estuarine waters. Coastal pelagic species occur in offshore marine waters within Washington State and are unlikely to occur in the vicinity of the proposed activities. We do not expect the proposed activities to adversely affect EFH for coastal pelagic species.

Table 8-1. Ground Fish Species with Designated EFH and the Life History Stages that May Occur in the Action Area (PFMC, 1998a).

GROUND FISH SPECIES	Adults	Spawning/ Mating	Large Juvenile	Small Juvenile	Larvae	Eggs/ Parturition
Leopard Shark	X	X	N/A	X	N/A	X
Soupfin Shark	X	X	N/A	X	N/A	X
Spiny Dogfish	X		X	X	N/A	X
California Skate	X	X	N/A	X	N/A	X
Ratfish	X	X	N/A	X	N/A	
Lingcod	X	X	X	X	X	X
Cabezon	X	X	X	X	X	X
Kelp Greenling	X	X	X	X	X	X
Pacific Cod	X	X	N/A	X	X	X
Pacific Whiting (Hake)	X	X	N/A	X	X	X
Sablefish				X		
Jack Mackerel	X		N/A		X	
Black Rockfish	X			X		
Bocaccio				X	X	
Brown Rockfish	X	X	N/A	X		X
Calico Rockfish	X		N/A	X		
California Scorpionfish						X
Copper Rockfish	X		X	X		X
Kelp Rockfish				X		
Quillback Rockfish	X		X	X	X	X
English Sole	X	X	N/A	X	X	X
Pacific Sanddab			N/A	X	X	X
Rex Sole	X		N/A			
Starry Flounder	X	X	N/A	X	X	X

N/A - Not Applicable. Either the species does not have a particular life stage in its life history, or when EFH of juveniles is not identified separately for small juvenile and large juvenile stages. For many species, habitats occupied by juveniles differ substantially, depending on the size (or age) of the fish. Frequently, small juveniles are pelagic and large juveniles live on or near the bottom; these life stages are identified separately in the table when sufficient information is available to do so. When juvenile habitats do not differ so substantially or when information is insufficient to identify differences, EFH is identified only for the juvenile stage (small and large juveniles combined), and N/A is listed in the column for the large juvenile stage in the table (PFMC, 1998a).

Table 8-2. Salmonid Species with Designated EFH and the Life History Stages that May Occur in the Action Area (PFMC, 1998a).

PACIFIC SALMON	Egg	Larvae	Young Juvenile	Juvenile	Adult	Spawning
Chinook salmon	X	X	X	X	X	X
Coho salmon	X	X	X	X	X	X
Pink salmon	X	X	X	X	X	X

8.5 Groundfish EFH

Effects to the environmental baseline that would impact groundfish species are discussed in detail in Section 5.

8.6 Salmon EFH

Effects to the environmental baseline that would impact salmon species are discussed in detail in Section 5.

8.7 EFH Conservation Measure

Conservation measures designed to protect listed species and those proposed as threatened or endangered will also help avoid and minimize impacts of the proposed activities on salmonid and groundfish EFH. A complete list of conservation measures is described earlier in Section 7.

8.8 Conclusions

In accordance with EFH requirements of the Magnuson-Stevens Fishery Conservation and Management Act, the Corps has determined that the proposal would not adversely impact EFH utilized by Pacific salmon and groundfish. It has been determined that the proposed action will not adversely affect EFH for federally managed fisheries in Washington waters.

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Appendix A

Application and Specific Project Information Form For RGP

APPENDIX A
Application Form For RGP-6

Please fully complete this form and attach vicinity, plan, and elevation drawings and any other relevant information. Submit the information to: U.S. Army Corps of Engineers, Regulatory Branch, P.O. Box 3755, Seattle, WA 98124-3755

1. Applicant's name, address, telephone and fax number, and email:
   Single or Joint Use: ______________________ If joint use, you must list the other waterfront property owners: name, address, and telephone number, as co-applicants. You must also provide a joint use agreement (Agreement) signed by all involved property owners; the Agreement must state that each property owner voluntarily agrees to build no overwater structures on their property except for the maintenance or modification of the authorized joint use overwater structure (Note: upon issuance of the permit for the joint use overwater structure, all property owners must record this Agreement on their deeds.)

2. Authorized agent's name, address, telephone and fax number, and email:

3. Contractor name, address, telephone and fax number, and email, and point of contact:

4. Specific location of project area:
   Name of Waterway ____
   Street Address ____
   Section ______________Township _____________Range_____________
   Latitude _____________________Longitude ______________________________
   City/County________________________________(with Shoreline jurisdiction) Washington State
   Parcel Number ________________________________

5. Description of work and drawings (attach drawings on 8 ½- by 11-inch sheets, including a vicinity map, a plan view, and an elevation view; the drawings must include information as detailed on Appendix E – Drawing Checklist). The drawings must clearly show the factors detailed in the project description section of this RGP. If joint use, the location of the other waterfront property(ies) must be shown on a map submitted to the Corps as part of the application.

Endangered Species Act (ESA) Information: Special Project Information

Conservation Measures and Construction Specifications: In order to meet all ESA requirements for authorization under this Regional General Permit (RGP), all applicable Conservation Measures and Construction Specifications summarized below must be implemented. The entire text of the Conservation Measures and Construction Specifications are listed in the RGP document. Check each item that you agree to implement. Check each item "not applicable" if they do not apply to your project. For example, if you will not install piling, check "not applicable" next to the item listing the piling requirements. You must also complete the column on the right with your specific project information.

<table>
<tr><th>I (We) Will Implement</th><th>I (We) Will Not Implement</th><th>Not Applicable</th><th>Conservation Measure and Construction Specification</th><th>Specific Project Information</th></tr>
<tr><td></td><td></td><td></td><td>1.a. Piers: Pier width must not exceed 6 feet.</td><td>Width of proposed pier:
_________ feet</td></tr>
<tr><td></td><td></td><td></td><td>b. Compass orientation of pier and the required % of functional grating, and location of grating on the pier:
<table>
<tr><th>General Compass Orientation of Pier and Pier Width</th><th>Specific Degrees (North = 0) True North</th><th>% of Functional Grating on the Pier</th><th>Location of Grating on the Pier</th></tr>
<tr><td>N/S

Only if width is greater than 4 feet</td><td>338 to 22
158 to 202</td><td>30</td><td>Along the length of the pier for the entire length of the pier</td></tr>
<tr><td>NE/SW
And E/W

Required for all piers irregardless of width</td><td>23 to 157
203 to 337</td><td>50</td><td>Along the width of the pier, interspersed along the entire length of the pier</td></tr>
</table></td><td>General compass orientation of pier: __________

Specific Degrees of compass orientation of pier based on true north:
____

% functional grating to be installed: _________
(attach calculations)

________ square feet of functional grating

Location of grating on pier:
____________________</td></tr>
<tr><td></td><td></td><td></td><td>c. The pier must be linear. New finger piers and "ell" and "T" piers are not authorized</td><td></td></tr>
<tr><td></td><td></td><td></td><td>2.a. Floats: For a single use residential structure – the float width must not exceed 8 feet and the length cannot exceed 20 feet.</td><td>Width of proposed float:
_______ feet
Length of proposed float:
_______ feet</td></tr>
</table>

I (We) Will Implement	I (We) Will Not Implement	Not Applicable	Conservation Measure and Construction Specification	Specific Project Information
			a. Option 1: Float width is 6 feet or less. Functional grating on at least 30% of surface.	________ square feet of functional grating Percent cover of surface with functional grating: ______ %
			Option 2: Float width greater than 6 feet. Functional grating on at least 50% of the surface.	________ square feet of functional grating Percent cover of surface with functional grating: ______ %
			b. For a joint use residential structure – the float width must not exceed 8 feet and the length cannot exceed 40 feet. Grating must be installed on 50 percent of the surface area of the float.	________ square feet of functional grating Percent cover of surface with functional grating: ______ %
			c. The float will be installed in a north-south direction, to the maximum extent practicable.	If float is not installed, lengthwise in a north-south direction, please attach reasons why.
			d. If the float is seasonally removed, it must be stored at a Corps approved location.	Will float be removed seasonally? Yes – No If yes, where will it be stored? _____________ _____________________
			e. The floatation for the float shall be fully enclosed and contained in a shell.	
			f. The floats cannot rest on the tidal substrate. Stoppers or float support piling must be used such that the bottom of the floatation device is at least 1 (one) foot above the level of the substrate.	Float stoppers will be installed such that the bottom of the flotation device will be _____ feet above the level of the substrate.
			g Floats can be held in place with lines anchored with a helical screw anchor, piling, piling with stoppers and/or float support/stub pilings. For a single, residential use, 20-foot float, a maximum of 4 piling or helical screw anchors can be installed to hold the float in place. For a joint use 40-foot float, a maximum of 6 piling or helical screw anchors can be installed to hold the float in place. If anchors and anchor lines need to be utilized, the anchor lines shall not rest on the substrate at any time.	Number of proposed piling to hold float in place _____ A helical screw anchor will be used: Yes-No If Yes, describe the method used to prevent the line from resting on the substrate: ________________________

I (We) Will Implement	I (We) Will Not Implement	Not Applicable	Conservation Measure and Construction Specification	Specific Project Information
			3.a. Ramps: The width of the ramp cannot exceed 4 feet.	Width of ramp _____ feet
			b. Grating shall cover the entire surface area of the ramp.	
			4. Grating must have at least 60% open area. Grating must be oriented to maximize the amount of light penetration and cannot be blocked by any objects above or below the grating.	Proposed grating has _______% open area
			5.a. Piling: Replacement or proposed new piling must be steel, concrete, plastic or treated wood. Treated wood pilings associated with the float(s) must incorporate design features (e.g., plastic or metal bands) to minimize abrasion from the contact between the treated wood and the float(s) or attachments to the float(s).	Type of material for piling: _____________________
			b. Piling supporting a new pier must be spaced no closer than 20 feet apart.	Number of proposed piling supporting the new pier: ____________
			c. If the activity is only the replacement of existing piling on an existing pier: the piling can be replaced in the same general location and must not extend beyond the footprint of the existing structure (e.g., pier). The 20 foot spacing between piling is not required. Existing piling can be partially cut with a new piling secured directly on top, fully extracted, or cut 2-feet below the mudline. If treated piling are fully extracted or cut 2-feet below the mudline, the holes or piling must be capped with appropriate material. Hydraulic water jets cannot be used to remove piling.	Number of existing piling to be replaced: ________
			d. A maximum of 2 (two) moorage piling may be installed to accommodate the moorage of boats exceeding the length of the floats.	Number of proposed mooring piling: ______
			e. If a drop hammer pile driver for steel piling is utilized, a sound attenuation device or system must be implemented during pile driving. Steel piling cannot exceed a 12-inch diameter.	Diameter of steel piling: ________ feet
			1. Piling with diameter of 10 inches or less – one sound attenuation device	Type of sound attenuation device: _______________ ______________________
			2. For piling with a diameter greater than 10 inches, up to 12 inches, the sound attenuation device must include the placement of a block of wood, minimum of 6 inches thick) between the hammer and the piling during pile driving <u>and</u> use a bubble curtain that distributes air bubbles around	Type of sound attenuation devices: _______________ ______________________ ______________________

I (We) Will Implement	I (We) Will Not Implement	Not Applicable	Conservation Measure and Construction Specification	Specific Project Information
			100% of the perimeter of the piling over the full depth of the water column or any other Corps approved sound attenuation device.	
			6. Treated Wood: No creosote, pentachlorophenol, CCA, or comparably toxic compounds not approved for marine use, shall be used for any portion of the over water structure. Treated wood must meet Post-Treatment Procedures.	If treated wood will be used, list type of treatment: ______________________ You must also submit certification that the wood was treated by the appropriate and approved Post Treatment Procedures.
			7.a. Skirting: New or replacement skirting is not authorized by this RGP.	
			8.a. The repair, maintenance, or replacement of existing structures, or the construction of new structures, such as, but not limited to, buildings, planters, storage sheds or boxes on over water structures is not authorized by this RGP. Electrical utility boxes can be repaired, maintained or replaced by this RGP.	
			9.a. Watercraft Moorage: Watercraft cannot rest on the tidal substrate at any time. If watercraft is placed on overwater structure, it must be placed on non-grated areas	At what water depth would moored watercraft ground out? ______ feet MLLW
			b. Under this RGP, only one uncovered watercraft grid or lift can be installed at a single use overwater structure and a maximum of two uncovered watercraft grids or lifts can be installed at a joint use overwater structure.	Number of proposed watercraft grid(s): _____ Number of proposed water craft lift(s): _______
			c. A maximum of 2 additional piling may be used to attach the grid to the piling used for the floats.	Number of proposed piling to attach grid: _______
			d. The bottom of the watercraft grid shall be at least one foot above the level of the substrate.	The bottom of the watercraft grid will be ______ feet above the level of the substrate.
			e. If a floating watercraft lift is installed, the lift cannot rest on the tidal substrate at any time.	
			10.a. No eelgrass/macroalgae survey is required for the replacement of decking or a ramp.	
			b. For all other activities, the applicant must submit a preliminary/intermediate/intensive eelgrass/macroalgae survey. (As appropriate.)	Attach appropriate survey results to this application form.

I (We) Will Implement	I (We) Will Not Implement	Not Applicable	Conservation Measure and Construction Specification	Specific Project Information
			c. No overwater structures can be constructed within 25 feet (horizontally) measured in all directions of macroalgae beds or eelgrass.	Distance from proposed overwater structure to nearest surveyed macroalgae bed or eelgrass: ______ feet
			d. No floats or float support piling can be constructed within a 4-foot depth elevation between the top of the float stopper and macroalgae bed and eelgrass. This restriction applies only to a zone 25 feet wide on both sides of the float.	Elevation from float to nearest surveyed macroalgae bed or eelgrass: ______ feet
			11.a. Forage Fish Habitat - Piers and ramps can span documented sand lance and surf smelt spawning habitat.	
			b. The number of piling in documented sand lance and surf smelt spawning habitat must be minimized. The diameter of piling in this type of habitat must not be more than 8 inches and the piling cannot be treated wood.	If piling are placed in surf smelt and/or sand lance spawning habitat, explain why piling must be located in this area: ____________ ____________________ ____________________ ____________________
			c. Floats, float support piling, helical anchors and watercraft grids or lifts cannot be installed in documented Pacific herring, surf smelt and/or sand lance spawning habitat.	
			d. Floats, float support piling, and watercraft lifts cannot be installed within a 4-foot depth elevation of documented Pacific herring spawning habitat. This restriction applies only to a zone 25 feet wide on both sides of the float and waterward of the float.	
			e. Information on the substrate types in the project area must be submitted as part of the permit application. If the Corps determines that there is potential undocumented surf smelt, Pacific herring, or sand lance spawning habitat, the Corps may request additional information from the applicant and the Corps will consult with the appropriate resource agencies. Project revisions may be required if undocumented surf smelt, Pacific herring, or sand lance spawning habitat is located in the project area.	Describe substrate types and note the elevation (e.g. mud, sand, fine cobble, large rock; at +5 feet above MLLW, etc.) ____________________ ____________________ ____________________ ____________________

I (We) Will Implement	I (We) Will Not Implement	Not Applicable	Conservation Measure and Construction Specification	Specific Project Information
			12.a. Work Windows: The required fish work window will be met.	The required fish work window at this project location is (per Corps' website):
			b. If there is documented surf smelt or sand lance habitat at the project site and there is no approved work window for surf smelt or sand lance at the project site, prior to construction, the applicant must have a qualified biologist or biologist certified by the Washington Department of Fish and Wildlife (WDFW) confirm, in writing, that no surf smelt or sand lance are spawning in the project area during the proposed project construction. Address the letter or memorandum to the project manager and include the RGP authorization reference number. If the qualified or certified biologist confirms that no surf smelt or sand lance are spawning in the project area, the permittee has 48 hours to begin the work and two weeks from the date of the inspection to complete all work contacting the substrate waterward of mean higher high water.	Documented Surf Smelt or Sand Lance habitat: Yes-No
			c. The required bald eagle work window will be met.	The required bald eagle work window at this project location is (per Corps website):
			13. Work in the Dry: Work that involves the excavation of the substrate, bank, or shore shall occur in the dry whenever practicable.	
			14.a. Operation of Equipment: Use of equipment on the beach shall be held to a minimum, confined to a single access point, and limited to a 25-foot work corridor on either side of the proposed work. To the maximum extent practicable, equipment shall be operated from the top of the bank, temporary work platform, barge, or similar out-of-water location.	
			b. Equipment shall be operated in a manner that minimizes suspended particulates from entering the water column.	
			c. The required methods to identify problems and maintain and clean equipment will be implemented.	
			d. Barges may not ground on the substrate at any time.	

I (We) Will Implement	I (We) Will Not Implement	Not Applicable	Conservation Measure and Construction Specification	Specific Project Information
			e. Depressions or trenches in beach areas, waterward of MHHW, created by construction equipment, shall be immediately restored to the original pre-project conditions (e.g., elevation and substrate material type).	
			f. Any disturbance of the beach area by construction activities or equipment, which leaves exposed hardpan or clay, shall be restored to the original pre-project conditions (e.g., elevation and substrate material type) upon the immediate completion of construction and mitigation work.	
			15.a. Disturbance of Vegetation: Existing habitat features shall not be removed from the aquatic environment.	
			b. Disturbance of bank vegetation shall be limited to a work area strip no wider than twice the width of the pier and 15 feet. There is no length requirement.	If bank vegetation will be disturbed, what is the width of the disturbance area: ______ feet
			c. Removal of woody bank vegetation with a DBH of 4 -inches or greater within the work area strip must receive prior approval from the Corps. And material must be placed on the beach to the maximum extent practicable.	If woody bank vegetation with a DBH of 4 -inches or greater is planned to be removed, explain why it needs to be removed and describe where the cut woody vegetation will be placed: ________________________ ________________________ ________________________
			d. Disturbed bank vegetation shall be replaced with equivalent native, indigenous species appropriate for the site. A planting plan must be provided.	If bank vegetation will be disturbed, list the species name of the replacement vegetation: ________________________ ________________________ ________________________

I (We) Will Implement	I (We) Will Not Implement	Not Applicable	Conservation Measure and Construction Specification	Specific Project Information
			16. Mitigation Measures: Mitigation measures will be completed for the required amount of mitigation points.	Required number of Mitigation Points (see Table 2): (show your calculations) List selected Mitigation Measure Options(s) (see Table 1): Is the mitigation onsite/offsite? If offsite, provide a justification:
			Mitigation Timing: The selected and approved mitigation measures, except plantings, must be completed within 6 months from the date of construction of the approved overwater structure. Plantings will occur during the appropriate time of year for the selected species and within one year of project construction.	
			Mitigation Plantings: The authorized species, number of plants, and correct spacing of plants will be utilized.	If plantings are proposed, attach planting plan.
			Mitigation Planting Performance Standards: The required performance standards will be met for the 5-year monitoring period.	
			Mitigation Reports: A report on mitigation completion or a status report on the project and mitigation, including as-built drawings, must be submitted to the Corps within 12 months from the date the Corps issues an RGP to the permittee. **If plantings are implemented:** Mitigation planting monitoring reports will be due annually for 5 years from the date the Corps accepts the as-built drawings.	
			All applicable General Conditions will be met.	
			A copy of this permit, permit drawings, mitigation planting plan (if applicable), and final authorization letter shall be recorded with the Registrar of Deeds, within 60 days after final Corps authorization, to ensure that subsequent property owners are aware of the construction, use, and mitigation requirements. Proof of this must be provided to the Corps within 65 days after the date of the Corps' RGP verification letter to the permittee. **If the pier is joint use**, all co-applicants must voluntarily agree	

I (We) Will Implement	I (We) Will Not Implement	Not Applicable	Conservation Measure and Construction Specification	Specific Project Information
			to build no additional overwater structures on their property, except for the maintenance or modification of the proposed joint use overwater structure. This voluntary agreement and the documentation described above must be recorded on the deeds of all involved properties. (General Condition 3)	

APPLICATION IS HEREBY MADE FOR A PERMIT OR PERMITS TO AUTHORIZE THE ACTIVITIES DESCRIBED HEREIN. I CERTIFY THAT I AM FAMILIAR WITH THE INFORMATION CONTAINED IN THIS APPLICATION, AND THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF, SUCH INFORMATION IS TRUE, COMPLETE, AND ACCURATE. I FURTHER CERTIFY THAT I POSSESS THE AUTHORITY TO UNDERTAKE THE PROPOSED ACTIVITIES. I HEREBY GRANT TO THE AGENCIES TO WHICH THIS APPLICATION IS MADE, THE RIGHT TO ENTER THE ABOVE-DESCRIBED LOCATION TO INSPECT THE PROPOSED, IN-PROGRESS, OR COMPLETED WORK. I VOLUNTARILY AGREE TO MEET ALL REQUIREMENTS OF THIS RGP. I AGREE TO START WORK ONLY AFTER ALL NECESSARY PERMITS HAVE BEEN RECEIVED.

_______________________________________ _________________________

Signature of Applicant Date

_______________________________________ _________________________

Signature of Authorized Agent Date

_______________________________________ _________________________

Signature of Contractor (if Contractor is known) Date

Appendix B
Statement of Compliance Form

APPENDIX B

Statement of Compliance Form

Regional General Permit CENWS-OD-RG-RGP-6

You must fill out and sign this statement of compliance form and submit it to: U.S. Army Corps of Engineers, Regulatory Branch, P.O. Box 3755, Seattle, WA 98124-3755 within 30 days of completing the authorized work,

1. Corps' Reference Number:

2. Permittee name, address, telephone number, and email:

3. Contractor name, address, telephone number, email, and point of contact:

4. As-built drawings: attach

5. Dates of Work: The work was initiated on ________________ and completed on _______________.

I hereby certify that I have completed the work in compliance with the terms and conditions of this permit, including any project-specific conditions required by the District Engineer to ensure that this work would have no more than minimal adverse impact on the aquatic environment.

____ ____________________________

Signature of Permittee Date

____ ____________________________

Signature of Contractor Date

Appendix C

Status Report for Mitigation Work Completion on RGP

APPENDIX C
Status Report for Mitigation Work Completion on RGP - 6

Within one (1) year of the date your permit was issued, submit this completed form to: U.S. Army Corps of Engineers, Regulatory Branch, P.O. Box 3755, Seattle, WA 98124-3755.

Corps' Reference Number: ______________________________

Date the Corps Issued Your Permit: ________________________

Date this Report is Due: ________________________________

Number of Mitigation Points Required by Corps: ______________

Your Name: ____

Your Address: ____

Your City/State/Zip Code: _________________________________

Your Phone Number: _______________________________

Location of Mitigation: ___________________________________

You must attach to this form: ☒ As-built drawing(s) of planting areas (if installed), and
☒ Photographs of the mitigation area.

Describe mitigation activity performed: ______________________________

____

Date completed: ____________________________________

If plantings were installed:

Conditions of your Corps permit require at least two trees be planted in each planting plot. The vegetation you plant must be taken from this list of native species below or you can suggest other species but the Corps must approve the species before planting commences. Shrubs should be planted at 3-feet-on-center intervals and trees should be planted at 10-feet-on-center intervals. Be sure to protect your plantings—fencing is recommended.

Name of Species You Planted	Number Planted
Total Planted:	

Native tree list: *Populus trichocarpa, Pseudotsuga menziesii, Picea sitchensis, Pinus contorta*

Native shrub list: *Salix sitchensis, S. scouleriana, S. exigua, S. hookeriana, S. lasiandra, Cornus stolonifera*

Appendix D
Mitigation Planting Monitoring Report for RGP

APPENDIX D

Mitigation Planting Monitoring Report for RGP - 6

Submit this completed form to: U.S. Army Corps of Engineers, Regulatory Branch, P.O. Box 3755, Seattle, WA 98124-3755. A completed form must be submitted 1, 2, 3, 4 and 5 years after the Corps accepts your as-built drawing of the mitigation planting area.

Corps' Verification Reference Number: ____________________________

Date Your As-Builts Were Accepted by the Corps ___________________

Date This Report Is Due: ____

Number of Mitigation Points Required by the Corps: ________________

Your Name: ____

Your Address: ____

Your City/State/Zip Code: ____

Your Phone Number: ____

You must attach to this form: ☒ Photographs of the mitigation area taken within the last month.

Conditions of your Corps permit require 100% survival of all planted trees and shrubs during the first and second years after planting. During the third through fifth years after planting, 80% survival is required. Individual plants that die must be replaced with a species from the list below or you can suggest other species but the Corps must approve the species before planting commences. At least two trees must be planted in your mitigation area. You must protect your mitigation area—fencing is recommended.

Date of Inspection	Species name of Dead Plants	Number of Dead Plants	Name of Species Replanted	Number Replanted

Native tree list: *Populus trichocarpa, Pseudotsuga menziesii, Picea sitchensis, Pinus contorta*

Native shrub list: *Salix sitchensis, S. scouleriana, S. exigua, S. hookeriana, S. lasiandra, Cornus stolonifera*

Appendix E
Drawing Checklist

APPENDIX E
Drawing Checklist

1. GENERAL

( ) Use clear black lettering and fewest number of sheets possible; use 8 ½- by 11-inch sheets
( ) State the purpose of the proposed or existing work
( ) List property owners and indicate number by number on plan view drawing
( ) Show datum used in plan and elevation drawings
( ) Use a graphic scale on all drawings
( ) Use a north arrow; prepare drawing with north being directed to the top of the page
( ) Label all proposed and existing work as such (e.g., Proposed Pier, Proposed Fill…)

2. TITLE BLOCK

( ) A completed title block (first example) must be on every sheet; for subsequent sheets you can use the abbreviated form (second example)

PURPOSE: DATUM: ADJACENT PROPERTY OWNERS: 1. 2.	APPLICANT 2002- LOCATION ADDRESS	PROPOSED: IN: NEAR/AT: COUNTY: STATE: WA SHEET * OF * DATE:

Reference: 2002- Applicant: Proposed: At Washington Sheet * of * Date

3. VICINITY MAP

( ) Clearly show location of project (e.g., arrow, circle, etc.)
( ) List latitude, longitude, section, township, and range
( ) Name waterways
( ) Show roads, streets, and/or mileage to nearest town or city limits

4. PLAN VIEW

( ) Show shorelines:
Tidal: Show mean high water (MHW) line, mean higher high water (MHHW) line
Lakes or streams: Show the ordinary high water (OHW) line
( ) Show dimensions of proposed structures/fills; distance to property lines; encroachment beyond applicable shoreline; show wetland boundaries and specific impacts to wetlands
( ) Indicate location, quantity, and type of fill, if any
( ) Show all existing structures or fills on subject and adjacent properties
( ) Show direction of currents such as tidal ebb and flood
( ) Indicate adjacent property ownership

5. ELEVATION AND/OR SECTION VIEW

( ) Show shorelines, MHW line, MHHW line, OHW line, wetland boundary
( ) Show original and proposed elevations, water depths, dimensions of proposed structures or fills, and pertinent vertical dimensions to top and base of structure/fill; use the same vertical and horizontal scale, if possible

Appendix F

Preliminary Eelgrass/Macroalgae Habitat Survey Guidelines

APPENDIX F

Preliminary Eelgrass/Macroalgae Habitat Survey Guidelines

The following preliminary eelgrass/macroalgae habitat survey guidelines will be applied for all proposed projects where eelgrass or significant macroalgae habitats are suspected to be present in the vicinity of the proposed project.

The applicant shall contract a qualified diver/biologist to conduct the preliminary eelgrass/macroalgae survey. The diver/biologist must be able to demonstrate the ability to identify the predominant macroalgae species native to the project area.

The preliminary eelgrass/macroalgae survey shall include:

1. The diver/biologist will survey transects perpendicular to and/or parallel to the shoreline including the outer extremities of the proposed project site.

2. Survey transects will include the entire project site and will be spaced at a maximum of 40 foot intervals.

3. Transect locations will be referenced to a permanent physical feature within the project site.

4. The qualitative distribution of macroalgae species along each transect will be documented.

5. Substrate characterizations along each transect will be documented.

6. A project site map will be developed indicating the qualitative distribution of eelgrass/macroalgae species, substrate characterization, approximate depth contours and the approximate location of the proposed project features.

7. Approximate depth contours will be established for the project site based on mean lower low water equal to 0.00 (MLLW= 0.00). Tidal reference and correction should be noted.

8. Survey documentation will also include the time of survey, date of survey, turbidity/visibility, presence of invertebrate /vertebrate species and miscellaneous anecdotal observations pertinent to habitat characterization of the project site.

9. Preliminary surveys may be conducted at any time during the year. Surveys from June 1 through October 1 most accurately reflect macroalgae distribution and are therefore preferable.

Appendix G
Intermediate Eelgrass/Macroalgae Habitat Survey Guidelines

APPENDIX G

Intermediate Eelgrass/Macroalgae Habitat Survey Guidelines

Intermediate eelgrass/macroalgae habitat survey guidelines will be applied in those instances where a proposed project is to be located within an area of documented eelgrass/macroalgae habitats but where herring spawning has not been documented.

The applicant shall contract a qualified diver/biologist to conduct the intermediate eelgrass/macroalgae survey. The diver biologist must be able to demonstrate the ability to identify the predominant macroalgae species native to the project area.

The intermediate eelgrass/macroalgae survey shall include:

1. Through prior consultation with the Washington Department of Fish and Wildlife (WDFW) habitat manager, specific macroalgae species will be identified for quantitative distribution evaluation.

2. The diver/biologist will survey transects perpendicular to the shoreline. Transects will be referenced to a permanent physical feature within the project location.

3. Transect length and location will be determined by project and site specifics. Transects will include the landward margin of the macroalgae habitat and should extend waterward to include the outer margin of the macroalgae habitat. At a minimum, transects will extend 25 feet waterward of the most waterward project feature.

4. Transect locations will be specified based on specific project and project site features. For pier/ramp/float structures, transects will include at a minimum:

   (1) transect located at the center line of the proposed project.
   (2) transects located 10 feet to each side of the outer edge of the proposed project.
   (3) transects located 25 feet to each side of the outer edge of the proposed project.

5. For eelgrass, turion (shoot) counts shall be conducted along each transect at a maximum 20 foot intervals and shall include the inner and outer margins of the eelgrass bed. Eelgrass density counts will include three (3) 1/4 meter square counts as described by the corner of the 1/4 meter square pivoted around the 20 foot interval count point at approximately the 2, 6, 10 o'clock positions. The density count at each 20 foot count interval will be the average of the three (3) 1/4 meter square counts.

6. For non-eelgrass macroalgae species, percent cover estimates will be conducted along each transect at a maximum 20 foot interval and shall include the inner and outer margins of the macroalgae habitat. Percent cover estimates will include three (3) 1/4 meter square estimates as described by the corner of the 1/4 meter square pivoted around the 20 foot interval count point at approximately the 2, 6, and 10 o'clock positions. The percent cover estimate will be the average of the three (3) 1/4 meter square estimates.

7. Intermediate surveys will be conducted from June 1 through October 1.

8. Approximate depth contours will be established for the project site based on mean lower low water equal to 0.00 (MLLW= 0.00). Tidal reference and correction should be noted.

9. A site map will be developed indicating the qualitative distribution of eelgrass/macroalgae species, substrate characterization, approximate depth contours and the approximate location of the proposed project features.

10. Survey documentation will also include the time of survey, date of survey, turbidity/visibility, presence of invertebrate /vertebrate species and miscellaneous anecdotal observations pertinent to habitat characterization of the project site.

Appendix H
Intensive Eelgrass/Macroalgae Habitat Survey Guidelines

APPENDIX H

Intensive Eelgrass/Macroalgae Habitat Survey Guidelines

Intensive eelgrass/macro algae habitat survey guidelines will be applied in those instances where a proposed project is to be located within an area of documented herring spawn.

The applicant shall contract a qualified diver/biologist to conduct the intermediate eelgrass/macro algae survey. The diver biologist must be able to demonstrate the ability to identify the predominant macro algae species native to the project area.

The intensive eelgrass/macro algae survey shall include:

1. Through prior consultation with the WDFW Area Habitat Biologist, specific macro algae species will be identified for quantitative distribution evaluation.

2. The diver/biologist will survey transects perpendicular to and/or parallel to the shoreline.

3. Transects will be referenced to a permanent physical feature within the project location.

4. Transect length and location will be determined by project and site specifics. Transects will include the landward margin of the macro algae habitat and should extend waterward to include the outer margin of the macro algae habitat. At a minimum, transects will extend 25 feet waterward of the most waterward project feature.

5. Transect locations will be specified based on specific project and project site features. For pier/ramp/float structures, transects will include at a minimum:
    (1) transect located at the center line of the proposed project.
    (2) transects located 10 feet to each side of the outer edge of the proposed project.
    (3) transects located 20 feet to each side of the outer edge of the proposed project.
    (4) transects located 30 feet to each side of the outer edge of the proposed project.

Note: additional transects may be included at the discretion of the applicant.

6. For eelgrass, turion (shoot) counts shall be conducted along each transect at a maximum 20 foot interval and shall include the inner and outer margins of the eelgrass bed. Eelgrass density counts will include three (3) 1/4 meter square counts as described by the corner of the 1/4 meter square pivoted around the 20 foot interval count point at approximately the 2, 6, 10 o'clock positions. The density count at each 20 foot count interval will be the average of the three (3) 1/4 meter square counts.

7. For non-eelgrass macroalgae species, percent cover estimates will be conducted along each transect at a maximum 20 foot interval and shall include the inner and outer margins of the macro algae habitat. Percent cover estimates will include three (3) 1/4

meter square estimates as described by the corner of the 1/4 meter square pivoted around the 20 foot interval count point at approximately the 2, 6, and 10 o'clock positions. The percent cover estimate will be the average of the three (3) 1/4 meter square estimates.

8. Intensive surveys will only be conducted from June 1 through October 1.

9. Approximate depth contours will be established for the project site based on mean lower low water equal to 0.00 feet (MLLW = 0.00 feet). Tidal reference and correction should be noted.

10. A site map will be developed indicating the qualitative distribution of eelgrass/macro algae species, substrate characterization, approximate depth contours and the approximate location of the proposed project features.

11. Survey documentation will also include the time of survey, date of survey, turbidity/visibility, presence of invertebrate /vertebrate species and miscellaneous anecdotal observations pertinent to habitat characterization of the project site.

12. Results of the intensive level survey will be compiled and sent to the WDFW Area Habitat Biologist for review.

Note: Deviations from the intensive level survey guidelines will not be acceptable unless agreed to through prior consultation with the WDFW Area Habitat Biologist.

Appendix I
Glossary

APPENDIX I

Glossary
Definitions, descriptions, and/or examples of Terms

"*Bank*" is the rising ground bordering the waterbody forming an edge or steep slope

"*DBH*" (diameter at breast height) is the diameter of a tree at the point 4.5 feet above the ground, measured from the uphill side.

"*Davit*" is a crane or hoist which is attached to the pier and projects over the water and is used to lift boats out of the water

"*Eelgrass*" is a grass-like marine flowering vascular plant (*Zostera spp.*) with dark green, long, narrow, ribbon-shaped leaves which are typically 8 – 20 inches in length.

"*Float support piling*" is piling used to suspend the float above the tidal substrate. The float rests on top of the float support piling, not the tidal substrate.

"*Forage fish spawning habitat"* Detailed descriptions of forage fish habitat can be found at http://www.wa.gov/wdfw/fish/forage. Very generally, spawning habitat for the following forage fish are as follows: Pacific herring – eelgrass and macroalgae located between 0 to -10 feet tidal elevation; surf smelt – substrate consisting of pea gravel or coarse sand (gravel diameter 0.005 – 0.35 of an inch) between MHHW to +7 feet tidal elevation relative to the Seattle tide gauge; Pacific sand lance – substrate consists of pure fine grain sand beaches between MHHW to +5 feet tidal elevation, relative to the Seattle tide gauge.

"*Groin*" is a rigid structure (constructed of rock, wood, or other durable material) built out from the shore, usually perpendicular to the shoreline, to prevent erosion or to trap sand

"Hardened shoreline" is the area of shoreline that is no longer natural but has been replaced with structures, including but is not limited to concrete, rock or timber bulkheads, riprap, or concrete boat ramp access

"*Inland marine waters*" for the purposes of this RGP are defined as tidally influenced waters within the state of Washington limited to the marine waters ranging from South Puget Sound and Hood Canal to and including the Strait of Juan de Fuca and the Strait of Georgia. This does not include the outer coast adjoining the Pacific Ocean or tidally influenced rivers (above river mile "zero") draining into these waterbodies

"*Joint-use*" piers, floats, and ramps are constructed and utilized by more than one residential waterfront property owner or by a homeowner's association that owns waterfront property.

"Macroalgae" includes large red, green, or brown algae and what is commonly known as seaweed or kelp. For the purposes of this RGP only, any reference to macroalgae is a reference to macroalgae *attached to a substrate*, not drift macroalgae.

"*Macroalgae beds*", for the purposes of this RGP, is defined as an area of the tidal substrate supporting macroalgae attached and covering 25% of the substrate

"*Mean higher high water (MHHW)*" is the elevation on the shore of tidal waters reached by the plane of the average of the higher of the two daily high tides, generally averaged over a period of 19 years. This elevation has been established at set tide gauges throughout Washington State. The MHHW for these tide gauges may be obtained by checking the following website: http://www.nws.usace.army.mil/hh/tides/tides.htm

"*Mean high water (MHW)*" is the elevation on the shore of tidal waters reached by the plane of the average of the lower of the two daily high tides, generally averaged over a period of 19 years. This elevation has been established at set tide gauges throughout Washington State. The MHW for these tide gauges may be obtained by checking the following website: http://www.nws.usace.army.mil/hh/tides/tides.htm

"*Offsite*" means outside the property boundaries of the waterfront property owner(s) proposing the project. For the purpose of this RGP, the property boundary in the water, unless already shown on a deed or legal description, is a straight-line extension of the property line on the land, projected waterward, and perpendicular to the shoreline.

"*Onsite*" means within the property boundaries of the waterfront property owner(s) proposing the project. For the purpose of this RGP, the property boundary in the water, unless already shown on a deed or legal description, is a straight-line extension of the property line on the land, projected waterward, and perpendicular to the shoreline.

"*Opening size*" of grating is the area enclosed between the rectangular bars and cross rods in bar grating, or the area enclosed between the bonds and strands in expanded grating.

"*Overwater structures*" for this RGP, are defined as piers, ramps, floats, and their associated structures. Associated structures include piling, chain and anchors, ladders, hand rails, steps,davits, swim steps, watercraft grids or lifts, and fill placed for fish habitat enhancement

"*Percent open area*" is a relative measure of the degree which light can pass through grating. The manufacturer often provides this value. Otherwise, it can be calculated by dividing the opening size by the sum of the opening size and the surface area of the adjacent rectangular bars and cross rods.

"*Project area*" for the purposes of this RGP is defined as the area the overwater structure will cover and 25 feet on all sides of the structures.

"*Single residential use*" piers, floats, and ramps are constructed and utilized by only one residential waterfront property owner.

“*Skirting*” is vertical boards along the edge of a pier extending downward.

“*Uplands*” (for the purposes of this RGP) are non-wetland areas landward of the MHHW.

“*Watercraft grid*” is an open framework that may be supported by piling. The framework supports watercraft such that at low tide the watercraft rests on the grid instead of the tidal substrate.

“*Watercraft lift*” a floating, freestanding, or pier-affixed device which supports a watercraft and prevents the watercraft from resting on the tidal substrate