PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION

APPENDIX J

ENVIRONMENTAL COMPLIANCE DOCUMENTATION

Integrated Feasibility Report and Environmental Impact Statement

US Army Corps of Engineers®
Seattle District

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ECOSYSTEMS, TRIBAL AND
PUBLIC AFFAIRS

December 10, 2009

Ms. Chemine Jackels
Environmental Resources Section
U.S. Army Corps of Engineers
P.O. Box 3755
Seattle, Washington 98124-3755

Ref: Puget Sound Nearshore Marine Habitat Restoration Project, Washington
EPA Project Number 09-061-COE

Dear Ms. Jackels:

The U.S. Environmental Protection Agency (EPA) has reviewed the Notice of Intent (NOI) to prepare a Draft Programmatic Environmental Impact Statement (PEIS) for the **Puget Sound Nearshore Marine Habitat Restoration Project**, Washington. We are submitting scoping comments in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act.

Puget Sound recovery is a priority for EPA. We fully support efforts to restore Puget Sound nearshore habitats and ecological processes that have been degraded and interrupted over time by various human influences. Considering our mutual interest in Puget Sound restoration, the Corps of Engineers (Corps) has expressed interest in working jointly with EPA to develop the Programmatic EIS. In response, we think it would be helpful to explore the potential benefit of EPA serving as a cooperating agency for the development of the PEIS. We invite further discussion on this topic in the near future with both the Corps and the Washington Department of Fish and Wildlife (WDFW). For the present, we would like to offer the following brief scoping comments:

Use Valued Ecosystem Components. Valued Ecosystem Components (VECs), such as, specific vegetation communities, forage fish, juvenile salmon, native shellfish, and nearshore birds have been selected to communicate to both managers and the public the value of Puget Sound nearshore restoration. VECs are a means to bridge both ecological and societal values, including economic, cultural, spiritual, and aesthetic values. We support their use to identify key outcome objectives for nearshore restoration, realizing that the specific VECs and environmental outcomes may differ substantially across different subareas of Puget Sound.

Optimize benefits at multiple scales. In developing priorities and assessing benefits we believe the nearshore restoration project should be designed to achieve optimal benefits at the scale of basins, sub-basins, and local deltas or nearshore drift cells.

Consider climate change. Planning for climate change is critical for a coastal restoration program of this magnitude. We advocate consideration of climate change with respect to both mitigation and adaptation actions over the proposed project period as well as in anticipation of future change and environmental needs beyond the project period.

Benefit from lessons learned. We recommend that project planners and implementers be mindful, articulate, and demonstrative in sharing the lessons learned from other regional coastal restoration initiatives.

Thank you for the opportunity to offer comment. We look forward to working with the lead agencies, whether formally or informally, to maximize the environmental and social benefits of nearshore restoration in Puget Sound. If you would like to discuss these comments or other aspects of the NEPA process, please contact me at (206) 553-2966 or at somers.elaine@epa.gov, or Michael Rylko, our National Estuary Program Lead for Puget Sound, at (206) 553-4014 or at rylko.michael@epa.gov.

Sincerely,

/s/

Elaine L. Somers
Environmental Review and Sediment Management Unit

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OFFICE OF
ECOSYSTEMS, TRIBAL AND
PUBLIC AFFAIRS

December 30, 2014

Ms. Nancy C. Gleason
U.S. Army Corps of Engineers
CENWS-EN-ER
P.O. Box 3755
Seattle, Washington 98124

Re: U.S. Environmental Protection Agency Comments on the U.S. Army Corps of Engineers Puget Sound Nearshore Ecosystem Restoration Study Draft Integrated Feasibility Report and Environmental Impact Statement. EPA Project Number 09-061-COE.

Dear Ms. Gleason:

We have reviewed the Corps' Puget Sound Nearshore Ecosystem Restoration Study Draft Integrated Feasibility Report and Environmental Impact Statement (draft FR/EIS). This review was conducted in accordance with the EPA's responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act. Section 309 specifically directs the EPA to review and comment in writing on the environmental impacts associated with all major Federal actions. Our review of the draft FR/EIS considers the expected environmental impacts of the proposed action and the adequacy of the EIS in meeting the procedural and public disclosure requirements of NEPA.

Our interest in this draft FR/EIS is also informed by the EPA's recognition of Puget Sound as an estuary of national significance and approval of the Puget Sound Partnership's Action Agenda as the Comprehensive Conservation and Management Plan of the Puget Sound National Estuary Program.

Project summary

The draft FR/EIS documents the planning process for ecosystem restoration of the Puget Sound nearshore zone. The purpose of the proposed action is to restore the natural processes in the nearshore zone that sustain the biological, economic, and aesthetic resources important to the people of the Puget Sound region and the nation in a cost-effective and socially feasible manner with minimal risks, and to facilitate effective monitoring and adaptive management to maximize attainment of restoration objectives. The need for the proposed action comes from recognizing that valuable natural resources in Puget Sound have declined to a point that the ecosystem may no longer be self-sustaining without immediate intervention to curtail significant ecological degradation.[1]

There are two alternatives, Alternative 2 – the preferred alternative and Tentatively Selected Plan, and Alternative 3. Alternative 2 includes 11 sites that, taken together, would remove 75,172 feet of stressors

[1] draft FR/EIS, p. 6

from the nearshore zone (most of which are tidal barriers, nearshore fill, and shoreline armoring) and restore 5,354 acres of tidally influenced wetlands in river deltas and shallow embayments. Alternative 3 includes 18 sites that would remove 113,094 linear feet of shoreline stressors and restore 5,517 acres of tidally influenced wetlands. Alternative 2's average annual cost over the 50-year period of analysis is $48,268,000; the average annual cost for Alternative 3 is $57,071,000.

Problems and opportunities
Based on a series of white papers available at *www.pugetsoundnearshore.org*, and according to the draft FR/EIS, there have been major direct and widespread changes to Puget Sound nearshore ecosystems. We agree that these observations support a science-based problem statement and provide a focus for evaluating alternatives and formulating a restoration plan. Past physical changes and stressors of particular concern to the EPA include the following: [2]

- 55.5% of the historical wetlands (57,823 acres) in the 16 largest deltas of Puget Sound have been eliminated.
- 93.1% of the tidal freshwater and oligohaline transitional wetlands have been lost.
- Embayments historically accounted for 689 miles of Puget Sound shoreline (23.2%) but now account for 375 miles of shoreline (15.0%); this represents a decline in length of 45.5%.
- Changes to beaches and bluffs have resulted in the loss of sediment supply and the interruption of sediment transport processes. Armoring occurs along 33.4% of bluff-backed beaches and 27.2% of barrier beaches.
- The current shoreline is about 15% shorter than the historical length of the shoreline. Artificial shoreline now represents about 9.5% of the shoreline of Puget Sound.

These physical changes, which continue today, have contributed to significant degradation of Puget Sound's natural resources. For example, the diking, draining and filling of freshwater and estuarine wetlands have contributed to a situation where most Puget Sound Chinook Salmon populations are at a small fraction of their historic levels. Several populations within the Nooksack, Lake Washington, mid-Hood Canal, Puyallup, and Dungeness basins have returns of fewer than 200 adult fish, signifying extinction risk.[3]

While these problems are significant, we agree with the draft FR/EIS that opportunities exist to restore Puget Sound nearshore ecosystem processes and, thereby, contribute to the health of species that depend on that habitat, directly or indirectly, for survival. We applaud the Corps and Washington Department of Fish and Wildlife for your efforts on this project and note that restoring nearshore ecosystems is consistent with the Puget Sound Action Agenda, the EPA's mission to protect human health and the environment, and the purpose of the NEPA.

> The purposes of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.[4]

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[2] draft FR/EIS, chapter 2
[3] draft FR/EIS, p. 69
[4] Sec. 2 [42 USC § 4321]

Responsiveness to EPA's scoping comments
The draft FR/EIS is responsive to EPA's December 2009 scoping comments. In our 2009 scoping comments, we recommended that the Nearshore Study team: optimize benefits at multiple scales while developing priorities, consider climate change in project planning, use Valued Ecosystem Components to identify objectives, and benefit from lessons learned from other regional coastal restoration initiatives. The draft FR/EIS addresses each of these recommendations. Moving forward, we believe there are additional opportunities to make changes to the final FR/EIS that would more fully protect the environment and assess environmental impacts. Our recommendations are detailed below.

Valued Ecosystem Components
We believe that the draft FR/EIS has positively identified relevant Valued Ecosystem Components (VEC). We agree that coastal forests, beaches and bluffs, eelgrass and kelp, forage fish, great blue heron, juvenile salmon, killer whales, native shellfish, and nearshore birds are VECs that are likely to be enhanced by nearshore restoration, have direct or indirect value to humans socially, culturally, or environmentally, and are recognized as emblematic of a healthy Puget Sound.

To more fully assess environmental impacts in the final FR/EIS, consider including additional information relating project benefits to ecological outcomes for identified VECs. For example, the draft FR/EIS clearly states that Hood Canal summer chum populations have been declining since 1978.[5] The draft FR/EIS also describes how three proposed restoration sites (in Alternative 3) would benefit Hood Canal summer chum salmon by providing rearing habitat for juveniles and restoring shoreline processes that sustain beaches and kelp and eelgrass beds for forage fish spawning (a preferred prey item).[6] What is less clear is the extent or likelihood that project benefits would reverse or contribute to reversing the recent and ongoing declining trend for Hood Canal summer chum populations.

To address our interest in additional information relating project benefits to ecological outcomes for identified VECs, we recommend that the final FR/EIS include a discussion of the influence of project actions on trend predictions. We understand that relating project benefits to trend predictions for all VECs may not be possible. Where possible, however, we believe influence on trend predictions could help decision makers better understand the scale of this project's potential long-term benefits relative to ongoing problems. For example, are project benefits in Hood Canal likely to reduce or reverse Hood Canal summer chum population decline? Or, for example, how would project actions influence Bolte and Vache's[7] predictions for tidal wetland loss by 2060?

Optimize benefits at multiple scales
We believe it is important to address all four Nearshore Study restoration strategies (river delta, barrier embayment, coastal inlet and beach) and appreciate that both alternatives meet this criterion. While we agree that both alternatives include at least one restoration site to address each of the four strategies, we do not agree that both alternatives are geographically representative of the entire study area. At the basin scale, we are concerned that the preferred alternative, Alternative 2, only includes restoration sites in

[5] draft FR/EIS, p. 69
[6] draft FR/EIS, p. 152
[7] See draft FR/EIS, p. 36

four of the Study's seven delineated sub-basins for Puget Sound. Alternative 3 is more geographically representative at the basin scale because it has restoration sites in all seven sub-basins – including: the Strait of Juan de Fuca, Hood Canal and South Puget Sound. We believe it would be more geographically comprehensive to select Alternative 3 as the preferred alternative.

Benefits which are unique to Alternative 3 and which we would highlight include:

- taking the opportunity to produce the rare condition of a Puget Sound watershed with minimal development impacts in Hood Canal's Big Beef Estuary – home to three species of salmon;
- improving an especially diverse area by restoring the Duckabush Estuary, home to herons, eelgrass, herring spawning areas, shellfish beds, seal haulouts and pupping areas, trumpeter swan feeding areas, waterfowl concentrations and winter range for Roosevelt Elk, as well as six salmonid populations;
- providing at Harper Estuary at least one site on the west side of Puget Sound for habitat connectivity between altered shorelines;
- addressing spawning habitat for forage fish species in the Strait of Juan de Fuca at Snow Creek and Salmon Creek Estuary, and in the southernmost inlet of Puget Sound at Budd Inlet Beach.

To address our interest in optimizing benefits for the entire study area, we recommend that the Corps identify Alternative 3 as the preferred alternative.

Benefit from lessons learned

In our 2009 scoping comments we recommended that the project planners and implementers be mindful, articulate, and demonstrative in sharing the lessons learned from other regional coastal restoration initiatives. Draft FR/EIS section 1.7, Prior Studies, Reports, and Existing Water Projects is partially responsive to our recommendation. Section 1.7 is responsive because it lists the Corps Seattle District's experience with studies and restoration projects in the Puget Sound area. Based on this experience - and the Corps' expertise in water-related resource problems - we agree that the Corps is well suited to take the lead on this large-scale restoration effort.

While Section 1.7's list is helpful, and we agree that the Corps is well suited to this task, we recommend that the final FR/EIS include additional information on actual lessons learned from other coastal restoration projects – both within the Seattle District and elsewhere in the country. What are key characteristics of restoration proposals within the Seattle District and elsewhere in the country that have been successfully funded and implemented? What large scale restoration project in the U.S. is analogous to this Study, how has the Seattle District learned from this experience? What are some examples of nearshore restoration techniques, such as dike breaching, which have been especially successful? How have lessons learned from other projects across the country been integrated into planning for this Study?

Linking protection and restoration

We agree with the draft FR/EIS that protection of healthy functioning portions of the nearshore zone is often a more cost-effective approach to ensuring delivery of ecosystem functions, goods, and services.[8] We also understand that protection is not a Corps mission and that protection-focused actions will need to be addressed outside of the Corps authority by local, State or tribal organizations. Because protection is a key component of improving Puget Sound, we believe the final FR/EIS should include additional information on the link between protection and restoration. Describe, in the final FR/EIS, how ongoing

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[8] draft FR/EIS, p. 39

and predicted protection efforts are likely to support and work in sync with this project's restoration efforts. The final FR/EIS should – to the extent possible - improve decision-makers' confidence that restoration investments in Puget Sound will result in a net improvement – as opposed to a mitigating effect on ongoing adverse trends resulting from inadequate protections.

Climate change

We appreciate the draft FR/EIS's information on sea-level change (SLC) and vertical land movement (VLM). We also appreciate that the Study team will continue to evaluate sea-level change models, and further resolve VLM rates for site-specific project planning during the preconstruction engineering and design phase. What is less clear is whether SLC, VLM, or other climate impacts influenced the selection of restoration sites. Some restoration sites may be more inherently climate resilient than others - such as having relatively more flexibility to shift landward. In order to address our interest in inherent climate resiliency, we recommend that the final FR/EIS discuss how climate resiliency factored into the formulation of the final array of alternatives. If the analysis suggests that changes to the suite of restoration sites based on climate information would result in greater overall benefits, consider making changes to the final array of alternatives.

EPA rating

We are rating the draft FR/EIS Environmental Concerns – Insufficient Information (EC-2). A copy of our rating system is enclosed. Our "EC" rating relates to our concern regarding the limited geographic approach of Alternative 2 and our preference for a more geographically comprehensive alternative. Our "2" rating relates to our recommendations to provide additional information on VECs, lessons learned, protection opportunities and climate change.

Thank you for this opportunity to comment and if you have any questions, please contact me at (206) 553-1601 or by electronic mail at reichgott.christine@epa.gov, or Erik Peterson, the lead reviewer for this project. Erik can be reached at (206) 553-6382 or peterson.erik@epa.gov.

Sincerely,

Christine B. Reichgott

Christine Reichgott, Unit Manager
Environmental Review and Sediment Management Unit

Enclosure:

1. EPA Rating System for Draft Environmental Impact Statements

U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements Definitions and Follow-Up Action*

Environmental Impact of the Action

LO – Lack of Objections
The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns
EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections
EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory
EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 – Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public

comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Western Washington Fish and Wildlife Office
510 Desmond Drive SE, Suite 102
Lacey, Washington 98503

RECEIVED
SEP 05 2006

Bernard L. Hargrave, Federal Project Manager
Puget Sound Nearshore Ecosystem Restoration Project
U.S. Army Corps of Engineers, Seattle District
P.O. Box 3755
Seattle, Washington 98124-3755

Dear Mr. Hargrave:

Attached is the summary of U.S. Fish and Wildlife Service (USFWS) participation in the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) for federal fiscal year (FY) 2005. This Planning Aid Letter is being submitted to fulfill commitments under the Fish and Wildlife Coordination Act (16 U.S.C. 661 et.seq.) for FY 2005. This Planning Aid Letter was prepared for the USFWS's Western Washington Fish and Wildlife Office by Curtis Tanner who provided the majority of USFWS support for PSNERP in FY 2005.

In general, USFWS remains satisfied with the direction of PSNERP. Federal funding for the GI Study has been lower than originally anticipated during the initial scoping the General Investigation Study. Despite this, good progress has been made towards study completion, and the release of interim work products has provided information that is useful in on-going coastal habitat restoration activities in Puget Sound and has helped define the direction and progress of the Study.

The key USFWS conclusions of this report are:

- We support the investment that PSNERP has made towards advancing early action projects.
- We are eager to see the results of Stage 2 and delivery of the Strategic Needs Assessment Report.
- We anticipate that emerging PSNERP work product will help inform our own restoration programs and endangered species recovery efforts.

We look forward to continued involvement in PSNERP, and to the opportunity to help contribute to this effort and benefit from its results. Please contact Curtis Tanner at (360) 902-2815 or Tom McDowell (360 753-9426) if you have any questions related to this Planning Aid Letter or our Fish and Wildlife Coordination Act activities for this project.

Sincerely,

Mary L Mahaffy
for Ken S. Berg, Manager
Western Washington Fish and Wildlife Office

Enclosures

Planning Aid Letter Attachment One:

Summary of FY 2005 Fish and Wildlife Coordination Act Activities for the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP)

Project Background

PSNERP General Investigation Study

The Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) is a large-scale, comprehensive initiative that affords a unique opportunity to tackle some of the foremost habitat restoration needs in Washington State's Puget Sound basin. Project goals are to identify significant ecosystem problems, evaluate potential solutions, and restore and preserve critical nearshore habitat. PSNERP is a partnership between the U.S. Army Corps of Engineers (Corps) and local sponsors. The Washington Department of Fish and Wildlife represents the local project sponsors. Other major project partners contributing to this effort with direct and in-kind support include other state and federal government agencies, Indian tribes, industries and environmental organizations.

In 2001, PSNERP initiated a Corps General Investigations Study (GI) designed to proceed through three stages, culminating with a final report to Congress in Fall 2009 (Figure 1). In the first stage of the project, PSNERP partners have worked to develop tools and information necessary to complete the study, including a nearshore conceptual model, guidance for implementing restoration projects, and historic (c.a. 1850) shoreline maps. PSNERP is currently working to apply concepts and tools developed during Stage I to improve understanding of where and how important nearshore ecosystem processes have been altered by human activity in the Puget Sound basin. The outcome of Stage II will be a strategic needs assessment to identify “what is broken” in Puget Sound nearshore ecosystems. This characterization will examine evidence of changes in ecosystem processes at various scales; this assessment is essential to the formulation of a restoration plan in Stage III. It is anticipated that the GI will results in justification for implementation of specific large scale restoration projects, and possibly an Ecosystem Restoration Program authority for implementation by the Corps and others.

By assessing the most pressing restoration needs for different parts of Puget Sound, PSNERP hopes to provide guidance for other public and private entities such as Native American tribal governments, local governments, regional fisheries enhancement groups, salmon recovery lead entities, marine resource committees, non-profit conservation and advocacy groups, and local “friends” groups. The Corps and other PSNERP partners can then focus their efforts on those identified projects and other needs that are beyond the capacity of local partners and existing restoration programs.

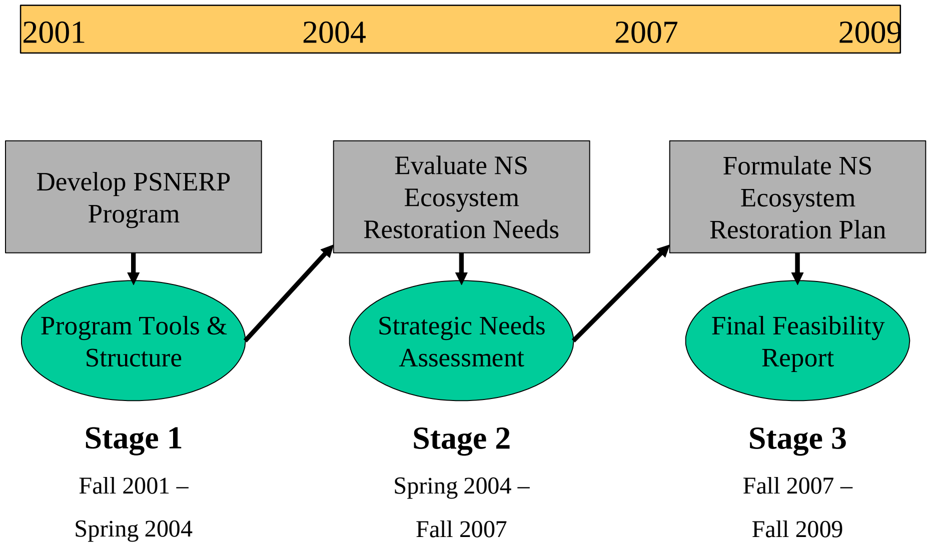

Figure 1: PSNERP Major Program Stages and Milestones

PSNERP and the Nearshore Partnership

Since initiation of the GI, PSNERP has attracted considerable attention and support from a diverse group of individuals and organizations interested and involved in improving the health of Puget Sound nearshore ecosystems and the biological, cultural, and economic resources they support. To recognize this broadening interest and mission, the name “Puget Sound Nearshore Partnership” was adopted by the program in 2004, and a program logo was commissioned (Figure 2). The intent of the PSNERP Steering Committee in doing so was to describe a growing and diverse group, and the work being undertaken which ultimately supports the goals of PSNERP, but is beyond the scope of the GI Study. Collaborating with the Puget Sound Action Team, the Nearshore Partnership seeks to implement portions of the PSAT Work Plan pertaining to nearshore habitat restoration issues. While the mission of PSNERP remains at the core of the Nearshore Partnership, restoration projects, information transfer, scientific studies and other activities can and should occur to advance understanding, and ultimately, the health of the Puget Sound nearshore beyond the original focus and scope of the on-going GI Study.

Current participants in the Puget Sound Nearshore Partnership include:

Interagency Committee for Outdoor Recreation
King Conservation District
King County
National Wildlife Federation
NOAA/National Marine Fisheries Service
NOAA Fisheries – Restoration Center

Northwest Indian Fisheries Commission
Pacific Northwest National Laboratory
People for Puget Sound
Pierce County
Puget Sound Action Team
Salmon Recovery Funding Board
Taylor Shellfish Company
The Nature Conservancy
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Geological Survey
U.S. Fish and Wildlife Service
U.S. Navy
University of Washington
Washington Department of Ecology
Washington Department of Fish and Wildlife
Washington Department of Natural Resources
Washington Public Ports Association
Washington Sea Grant
WRIA 9

Figure 2: Puget Sound Nearshore Partnership Logo

USFWS Participation

The U.S. Fish and Wildlife Service (USFWS) Western Washington Fish and Wildlife Office has been an active participant in PSNERP from the start of Phase I. Our involvement largely falls under two USFWS activities, the Coastal Program and Federal Activities. Our role through the Coastal Program has been provision of technical expertise, largely through participation in PSNERP Nearshore Science Team. Our role under Federal Activities is primarily the completion of responsibilities associated with the Fish and Wildlife Coordination Act.

Historical Involvement

Nearshore Science Team

USFWS involvement in PSNERP was initiated in FY 2002 when the Coastal Program accepted an invitation from the Steering Committee to fill a position on the Nearshore Science Team (NST). The specific request was for Curtis Tanner to provide expertise in the field of habitat restoration to the interdisciplinary team. According to PSNERP Policies and Procedures, full-member participation in the NST is estimated to require 0.25 FTE, or one-quarter (25%) of a full-time work position. USFWS has consistently renewed this commitment, and we continue to provide technical expertise on issues of coastal habitat restoration on the NST. To date, this contribution has been cost-shared equally between the Coastal Program and the U.S. Army Corps of Engineers.

Implementation Team

In FY 2003 the PSNERP Steering Committee initiated activities of the Implementation Team. Initial members were Curtis Tanner and Jacques White, then representing People for Puget Sound on the PSNERP Steering Committee. The initial tasks of the Implementation Team focused on outreach to other programs and organizations in the Puget Sound region involved in habitat restoration and protection. Presentation materials were developed and delivered to a wide range of audiences, including all Puget Sound lead entities, marine resource committees, and numerous other groups including Puget Sound Action Team local liaisons, WDFW watershed stewards, and regional fishery enhancement groups. Other early IT activities focused on development of a list of “management measures” or restoration and conservation actions that are appropriate for implementation by PSNERP. In December 2004, IT activities greatly diminished when Dr. White left People for Puget Sound to establish a Marine Program for The Nature Conservancy of Washington, and Mr. Tanner assumed local project manager responsibilities for PSNERP. In 2005, the IT was reconstituted with new leadership and members, and a focus on identification and implementation of “early action projects”.

Steering Committee

During the period of FY 2002-04, USFWS was represented on the PSNERP Steering Committee by Lynn Childers, Manager of the Division of Federal Activities for WWFWO. In FY 05, Mr. Childers accepted a detail assignment to the Washington Department of Transportation to improve coordination between the two agencies. At the same time, Curtis Tanner assumed local project manager responsibilities for PSNERP, including co-chair of the Steering Committee. It was determined that this involvement was sufficient to insure effective USFWS participation in PSNERP program guidance, and Mr. Childer’s position was not replaced. Currently, USFWS does not have direct representation on the PSNERP Steering Committee, and this issue is periodically revisited by USFWS management.

Executive Committee

USFWS has been consistently represented on the PSNERP Executive Committee by the WWFWO Manager, Ken Berg. Mr. Berg brings his perspective on the wide range of USFWS functions and activities under his direction, as well as his participation in other regional initiatives and partnerships to the Executive Committee. He has also worked to focus attention of USFWS upper management on the importance of PSNERP activities, and has offered it as an example of regional collaboration that should be the focus of agency activities.

Other USFWS Support

FY 2005 Early Action Project Funds

In addition to in-kind support provided by agency staff participation in various PSNERP work groups, teams, and committees, USFWS has provided other support to the program. In FY 2005, $25,000 of Coastal Program discretionary funds were granted to the Washington Department of Fish and Wildlife to support implementation of early action projects. These funds were provided to supplement other "on-the-ground" project implementation funds, with the intent of improving understanding of restoration actions anticipated on larger scales by PSNERP. To date, a small portion of these funds have been used to assist development of a comprehensive monitoring plan for the Skokomish dike removal project in southern Hood Canal. Remaining funds are currently planned to be used to assist project construction activities, including possible improvements to plans for restoration of hydrologic connections between the project area, Hood Canal, and the Skokomish River.

Current Involvement

USFWS staff are currently extensively involved in PSNERP, participating in all levels of the program, including management and technical work groups. In addition to the participation described above, USFWS Coastal Program member Curtis Tanner is currently devoting 0.70 FTE to Local Project Management under an agreement between USFWS and the Washington Department of Fish and Wildlife. Curtis has been in this position since December 2004. The scope of his duties as described by this agreement include:

1. Providing leadership for PSNERP Steering Committee
2. Participation as member of Project Management Team
3. Fulfillment of responsibilities of Local Project Manager
4. Represent PSNERP in external forums, conferences, etc.

FY 2005 PSNERP Activities

Fiscal year 2005 (October 2004 – September 2005) was a productive year for PSNERP. Important advances were made in completing Work Plan activities for the GI Study, and Nearshore Partnership activities, related to but not directly a part of the GI Study, served to expand program benefits to a wider audience.

Significant accomplishments

Ft. Worden Retreat

In May 2005, the PSNERP Project Management Team organized an "all-hands" program retreat at Ft. Worden. The primary topic discussed by 20 members in attendance from the Steering Committee, Implementation Team, and Nearshore Science Team were alternatives to address the "gap" between work plans and project accomplishments. This widening discrepancy between the original work plan for the GI and project completion is due to a lower than anticipated level of program funding. By the end of FY 2005, total project funding was $4.5 M, as compared to $10.5 M estimated by the work plan. Similarly, 40% of necessary tasks have been completed, as compared to 85% estimated by the end of this fourth year. Project Managers felt it important to check-in with team members, and work towards a report to the Executive Committee as requested for their July 2005 meeting. Four “general” options for addressing this gap were discussed in detail at Ft. Worden:

Alternative 1. Original Scope with a New Timeline (Take longer)
Alternative 2. Change to more Limited Scope (Do less)
Alternative 3. Phased Approach (Deliver Project in Increments)
Alternative 4. Continue the General Investigation study while implementation of Early Action Projects proceeds.

Meeting participants reached consensus around the idea that the project was properly scoped, and that scaling back to “do less” was inconsistent with the original intent of an ecosystem approach to Puget Sound restoration. The following summarizes the plan for action that emerged from the Ft. Worden retreat:

Phased Approach with Milestones

- Work with the existing Strategic Work Plan, and its projection of Stage 2 completion by April 2008.
  - The Project Management Team committed to reviewing the Work Plan to determine if this schedule can be reasonably compressed, especially with increased resources, to complete Stage 2 in FY 2007.
- Complete Stage 2 tasks leading to the delivery of a *Strategic Needs Assessment Report*, containing:
  - Our understanding of “where and how Puget Sound is broken” (i.e. restoration needs)
  - A statement of how much needs to be fixed to achieve desired levels of improvement in the health of Puget Sound (i.e. restoration goals)
  - A description of the tools available to the Nearshore Partnership to address these restoration needs and goals (i.e. management measure list)
  - A working list of the potential project opportunities that might address identified needs (i.e. restoration opportunities list)
  - A list of specific early action projects for construction by the Corps
- Steering Committee and Project Management Team would establish priorities given limitations of time and resources – establish schedule and stick to it.
- Establish completion of Stage 2 as a major Program milestone with key decisions to be made following completion Strategic Needs Assessment Report of the of how to proceed with the remainder of the GI:
  - Is there sufficient level of uncertainty (unknown problems/unknown solutions) to continue “study” part of GI?
  - Is there sufficient list of justified “Corps projects” to advance an interim feasibility report of:
    - demonstration (learning experiences,)
    - urgent and obvious (medium size projects, high certainty of benefits)

- Is there a sufficient gap in capability of existing restoration programs/authorities (e.g. SRFB, PSAW, §206/1135) to warrant advancing major projects (large, complex) into a Puget Sound Nearshore Restoration Program Construction General Authority (new Corps authority)?

These recommendations were reported to the Executive Committee in July 2005, and approved. The Ft. Worden retreat provided PSNERP team members a useful "check-in", helped to confirm the direction and schedule of the project, and served to refocus efforts on completion of Stage 2 and delivery of the Strategic Needs Assessment Report.

Technical Reports

In 2005, PSNERP began widespread distribution of its technical reports. While completed primarily to advance the GI, Steering Committee members believed that the work of those not directly involved in PSNERP would benefit from this information. Enhancements necessary to facilitate "web publishing" were completed on the program website, and the first three reports posted:

1. Application of "Best Available Science" in Ecosystem Restoration: Lessons Learned from Large-Scale Restoration Efforts
2. Guidance for Protection Guidance for Protection and Restoration of the Nearshore Ecosystems of Puget Sound
3. Guiding Restoration Principles

These Technical Reports have been well-received by a wide audience. The information is being used to help inform restoration project activities, and has served to reinforce the credibility and relevance of the program.

Typology/Historic Conditions Characterization

Using funds provided by WRIA 9/King Conservation District, an important pilot study of the project's technical approach was completed. Historic shoreline data (c.a. 1850-70) were used in combination with the NST Typology (shoreline geomorphic classification) to characterize historic nearshore conditions. An effective collaborative approach was adopted by the Nearshore Science Team and the contractor selected for this project, CommEn Space. The outcome of this effort was an important successful "proof of concept" applying the analytical methods developed by the NST to real-world data. The Project Management Team is now working to implement next steps identified by the pilot study.

Potential Nearshore Projects List

Implementation Team co-lead Elaine Kleckner worked with Interagency Committee for Outdoor Recreation (IAC) staff to develop a database for managing a list of potential nearshore projects. IAC's PRISM database structure was adopted for future migration of the Nearshore Project database into a PRISM "nearshore module." Elaine contacted lead entities, marine resource committees, and tribes for their lists of potential nearshore projects, generating over 500 entries in the database.

This accomplishment serves a variety of important functions. First, it helps build the data management infrastructure that will be necessary in Stage 3 for identifying and evaluating potential projects for formulation of a ecosystem restoration plan and completion of the Final Feasiblity Report. Second, it identifies potential “early action projects” which could be advanced by the Nearshore Partnership or others. Implementing and monitoring early action projects will help inform future project development activities, while contributing to improvements to the overall health of the Puget Sound nearshore ecosystem.

Observations and Recommendations

The Puget Sound Nearshore Ecosystem Restoration Project continues to make significant progress towards completion of the General Investigation Study and delivery of a Final Feasibility Report. As evidenced by the results of the Ft. Worden retreat, program managers and team members have a long-term vision for the project, choosing an ambitious work plan with the potential for substantial benefits associated with a new ecosystem restoration authority for Puget Sound. Funding has clearly limited progress, and delayed delivery of anticipated program benefits. However in a period of tightening federal resources, PSNERP has continued to garner the support of both Congress and the Administration, as evidenced by modest annual increases in federal funding. Some of this success is likely due to the Seattle District’s choice to highlight PSNERP as a District priority, and to the personal support and involvement of the District Engineer.

Federal project managers have done an excellent job of maintaining progress towards completion of the GI study despite lower than anticipated levels of funding. Simultaneously, Corps leadership, including the Project Manager and the District Engineer, have been responsive to the interests of the local sponsor and their partners. They have recognized the importance of using PSNERP information, technical reports, project lists, and other resources to support on-going restoration activities. This willingness to demonstrate flexibility in promoting ancillary Nearshore Partnership activities is insuring that the lessons of PSNERP are being translated to improved on-the-ground project results, and a more strategic approach to identification of restoration priorities.

It is also evident that the Corps is also beginning to employ PSNERP “lessons” in other programs, including the Puget Sound and Adjacent Waters Program. Connections are also being established between the program and Corps regulatory functions. Corps District staff continue to seek creative solutions to include monitoring and adaptive management as project elements, despite resistance from headquarters and national-level guidance documents.

Conclusions

In general, USFWS remains satisfied with the direction of PSNERP, as evidenced by our continued support for the program. We understand that project managers have made good progress in the face of limited resources. While we are eager to see additional results from the program, and successful completion of the Feasibility Report, we concur with the decision to maintain the original scope of the program, despite the delay in delivery schedule.

We also support the investment in program resources that has gone towards advancing early action projects, and other activities not directly associated with the GI work plan. Project managers are striking a good balance in this area, helping to advance on-going restoration efforts without significant detriment to completion of the GI. It is anticipated that the advances in nearshore restoration, improvement in nearshore condition, and understanding and acceptance of a process-based approach to restoration far outweigh any diminution in project progress.

We are eager to see the results of Stage 2, and delivery of the Strategic Needs Assessment Report. The WWFWO anticipates that this PSNERP work product will help inform our own restoration programs and endangered species recovery efforts. If the product emerges as described in the project Work Plan, we are committed to its use in aligning the restoration work of our programs and our partners to be consistent with the PSNERP strategic restoration approach.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Western Washington Fish and Wildlife Office
510 Desmond Drive SE, Suite 102
Lacey, Washington 98503

DEC 17 2008

Bernard L. Hargrave, Project Manager
Puget Sound Nearshore Ecosystem Restoration Project
U.S. Army Corps of Engineers, Seattle District
P.O. Box 3755
Seattle, Washington 98124-3755

Dear Mr. Hargrave:

Enclosed is a Planning Aid letter summarizing the U.S. Fish and Wildlife Service's (USFWS) participation in the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) for federal fiscal year 2007. This Planning Aid Letter is being submitted to fulfill commitments under the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) for FY 2007. The Planning Aid Letter was prepared for the USFWS Western Washington Fish and Wildlife Office by Curtis Tanner who provided the majority of USFWS support for PSNERP in FY 2007

In summary, USFWS supports PSNERP and is satisfied with its progress and direction. Recent increases in federal and state funding for PSNERP have allowed for a substantial increase in program activity and progress towards completion of the PSNERP General Investigation study. Early program pilot study methods have been refined and are now being scaled up to application at a Puget Sound wide scale. These analytical methods will inform the large scale restoration and protection actions of federal agencies and will also help guide actions at more local scales.

Key USFWS conclusions of this Planning Aid letter include:

- Implementation of the Estuary and Salmon Restoration Program by PSNERP as an early action program benefits fish and wildlife resources and improves understanding of nearshore ecosystems.
- The emphasis on science to inform the PSNERP GI study is consistent with USFWS guidance. Implementation of product and programmatic peer review will insure the integrity of PSNERP developed and applied science.
- We strongly encourage PSNERP to continue its cooperation with the Puget Sound Partnership

We look forward to continued USFWS involvement in, and support for the activities of PSNERP. Please contact Curtis Tanner at (360) 902-2815 or Tom McDowell at (360) 753-9426 if you have any questions related to this Planning Aid letter or our Fish and Wildlife Coordination Act activities for this project.

Sincerely,

Thomas L McDowell

for Ken S. Berg, Manager
Western Washington Fish and Wildlife Office

Planning Aid Letter Attachment One:

Summary of FY 2007 Fish and Wildlife Coordination Act Activities for the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP)

Project Background

PSNERP General Investigation Study

The Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) is a large-scale, comprehensive initiative that affords a unique opportunity to tackle some of the foremost habitat restoration needs in Washington State's Puget Sound basin. Project goals are to identify significant ecosystem problems, evaluate potential solutions, and restore and preserve critical nearshore habitat. PSNERP is a partnership between the U.S. Army Corps of Engineers (Corps) and local sponsors. The Washington Department of Fish and Wildlife represents the local project sponsors. Other major project partners contributing to this effort with direct and in-kind support include other state and federal government agencies, Indian tribes, industries and environmental organizations.

It is anticipated that this General Investigation Study (GI) will result in the identification of a portfolio of multiple, large-scale ecosystem restoration actions. These projects would form the basis for a request to Congress for Corps authority to undertake an ecosystem restoration program in Puget Sound. As the Corps and its partners work towards completion of the GI, information being developed as part of the study is being delivered to assist on-going restoration programs and projects. This dual focus of initiating large-scale strategic restoration actions and the support of more local scale projects makes PSNERP of particular interest to the U.S. Fish and Wildlife Service (USFWS).

Puget Sound Nearshore Partnership

In 2004, the PSNERP Steering Committee recognized that the scope of the GI study, while central to the issue of restoring the health of Puget Sound, was too limited to address some current areas of interest for its members. Specifically, the implementation of on-the-ground projects is not typically part of a GI study and beyond the scope of PSNERP. "Coastal Habitats in Puget Sound" (CHiPS), the U.S. Geological Survey (USGS) initiative devoted to applied research in Puget Sound, began in fiscal year 2006. CHiPS was a result of collaboration between the PSNERP Nearshore Science and USGS scientists to develop a research plan in support of PSNERP[1]. This initiative has allowed USGS research scientists to focus on key information

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[1] Coastal Habitats in Puget Sound: A Research Plan in Support of the Puget Sound Nearshore Partnership. Available at: http://www.pugetsoundnearshore.org/techical_papers/coastal_habitats.pdf

gaps critical to improved coastal ecosystem management and restoration. As pressure on the program from the Steering Committee and other stakeholders to "learn by doing" and provide more direct support to projects mounted, the program needed to expand. The Steering Committee adopted a new more inclusive name of "Puget Sound Nearshore Partnership" to represent an expanding, diverse group of stakeholders involved in nearshore ecosystem protection and restoration, and those tasks beyond the scope of this GI study.

Estuary and Salmon Restoration Program (ESRP)

Perhaps the most significant outcome of an expanded mission beyond the PSNERP GI study is the implementation of the Estuary and Salmon Restoration Program (ESRP). As part of Governor Gregoire's new focus on Puget Sound, the Washington State legislature created ESRP in state fiscal year 2007 (July 1, 2006 thru June 30, 2007). The legislature charged the Washington Department of Fish and Wildlife with the implementation of ESRP, in coordination with the Nearshore Partnership. In its first year, ESRP allocated $2.5 million in state funding to nine high-priority projects. ESRP funds were matched with an additional $5.3 million in other state, federal, and local resources. According to WDFW's report to the legislature and Governor[2], in its first year the program advanced "actions on the ground" that will result in:

- Restoration of 808 acres of estuary
- Re-established access to 22 miles of stream
- Acquistion of 300 feet of shoreline
- Protection for 3 acres of riparian buffer
- Removal of 56,250 feet of levee and dikes

USFWS Participation

The USFWS Western Washington Fish and Wildlife Office (WWFWO) continues its active involvement in, and support for, PSNERP. Our involvement carries out responsibilities of two WWFWO program areas, the Watershed Protection & Restoration Branch's Puget Sound Coastal Program and the Division of Consultation & Technical Assistance's Branch of Federal Activities. This Planning Aid Letter has been prepared as part of our Federal Activities duties as defined by the Fish and Wildlife Coordination Act (16 U.S.C. 661-667).

Nearshore Science Team

As with previous years dating back to the origins of the program, USFWS has continued participation in PSNERP largely thru the Nearshore Science Team. Curtis Tanner, a USFWS Coastal Program biologist, is a member of the NST, providing expertise in the field of habitat restoration to this interdisciplinary team. He has served in this role since FY 2002. During this time his involvement has been cost-shared by the USFWS and the Corps. Corps support is provided thru an agreement under the Fish and Wildlife Coordination Act, USFWS funding is provided by the Coastal Program. In addition to full participation in monthly meetings of the NST and associated responsibilities, Mr. Tanner also has an active role in two NST workgroups, the Change Analysis workgroup and Future Without Project workgroup.

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[2] 2006 Estuary and Salmon Restoration Program Report. Available at: http://www.pugetsoundnearshore.org/program_documents/esrp_nov0106.pdf

Implementation Team

During federal Fiscal Years 2006-07, PSNERP Project Managers reinitiated the activities of the program's Implementation Team (IT). Originally convened to focus on outreach of program activities to restoration community partners, the revised IT's expanded areas of responsibilities now include:

- Leading cross-program development of the PSNERP Stage 2 deliverable: Strategic Needs Assessment Report (SNAR)
- Development of technical memo series defining categories of potential PSNERP restoration activities: Management Measures
- Technical review of proposals submitted for funding under the Estuary and Salmon Restoration Program

A member of the previous IT, Curtis Tanner continued his active involvement as a member of this expanded team.

In FY 2006, Mr. Tanner also served as the Interim Program Manager for ESRP. Working with the IT, he facilitated review of 24 proposals, the selection of 9 projects for funding, and the enhancement of 4 projects with additional resources for monitoring and outreach activities. In 2007, Mr. Tanner worked with NOAA to provide the services of Paul Cereghino to assume ESRP program management. Mr. Tanner and Mr. Cereghino work closely to insure coordination between the PSNERP GI study and implementation of ESRP.

Steering Committee

In addition to his PSNERP activities supported by the Corps and USFWS, Curtis Tanner also serves as PSNERP Local Project Manager, under an agreement between USFWS and WDFW. This agreement is currently supported through June 30, 2009. The Local Project Manager and the Federal Project Manager (Bernie Hargrave, Seattle District Corps of Engineers) serve as co-chairs of the Nearshore Partnership Steering Committee.

Executive Committee

During FY 2006-07, the USFWS continued its representation on the PSNERP Executive Committee by the WWFWO Manager, Ken Berg. Mr. Berg brings his perspective on the wide range of USFWS functions and activities under his direction, as well as his participation in other regional initiatives and partnerships to the Executive Committee. He has highlighted the program during his discussions with other federal agency leaders, suggesting it provides an example for interagency cooperation for the emerging Puget Sound Partnership and other collaborative initiatives.

Other USFWS Involvement

In addition to the formal areas of direct PSNERP involvement identified above, other informal coordination has insured a prominent role for USFWS in the work of the Nearshore Partnership. In FY 2007, this included improved coordination with the USFWS Coastal Program on ESRP and National Coastal Wetland Conservation Grant program. The Skokomish dike removal project, resulting in over 100 acres of restored estuary habitat at the mouth of the Skokomish River, is an example of both program coordination and joint funding between USFWS and ESRP. Coastal Program staff from the USFWS Western Washington Fish and Wildlife Office have also participated in the most recent (state FY 2008) ESRP review process.

FY 2007 PSNERP Activities

PSNERP has made steady progress towards completion of the General Investigation study since the last USFWS Planning Aid Letter, which summarized activities through federal fiscal year 2005 (September 30, 2005). This timeframe has been characterized by increased funding for the GI from both federal (Corps) and non-federal sources. At the end of FY 2007, the federal cumulative total expended on the program since FY 2002 ($4.1 million) surpassed non-federal spending ($4.0 million), for the first time. This was due to a significant increase in Congressional support for PSNERP, which began in FY 2006 ($0.75 million), and was carried through in FY 2007 ($1.4 million). This increase in program funding has led to much improved progress towards completion of the GI study, and the ultimate goal of an ecosystem restoration authority for Puget Sound.

Technical Reports

One measure of program performance is the emergence of the Nearshore Partnership's technical report series.[3] Sixteen technical reports have been peer-reviewed and published, and a variety of other less-formal materials are also available from the program website. These technical report provide ready access to the emerging science of PSNERP, and are being used throughout the Puget Sound region to improve restoration project implementation.

One of the more significant program accomplishments is the completion of the "Valued Ecosystem Component" (VEC) white paper series. These 10 technical reports provide an objective summary of the literature relating nine PSNERP defined VECs to the nearshore ecosystems which provide support. A tenth paper describes human values associated with the VECs. In addition to publication and distribution via the program website, PSNERP has also distributed electronic copies of technical reports on mini-CD's at regional and national conferences, workshops, and meetings.

[3] Technial reports are available at: http://www.pugetsoundnearshore.org/technical_reports.htm

WRIA 9 Pilot Studies

In FY 2007, PSNERP completed pilot studies intended to develop and evaluate analytical methods. Using data available for all of Puget Sound, the Nearshore Science Team, in collaboration with Contractors, has developed a method for organizing historic and current conditions data, and conducting a "change analysis" on several metrics of nearshore ecosystem condition. In August 2007, the program released the final WRIA 9 Change Analysis report, including appendices and delivery of spatial data and data derivatives.

Sound-wide Analysis

Completion of pilot studies and the evaluation of results has allowed the program to advance to Sound-wide analysis. Recent collaboration with other organizations involved in similar analysis at more local scales, including the Northwest Indian Fisheries Commission and the Skagit River Systems Cooperative, has led to further refinements in methods. This collaboration includes use of a common current conditions data set, to be developed jointly by PSNERP and NWIFC.

Contractor Selection

To support Sound-wide change analysis and other tasks necessary to complete the GI study and produce a Final Feasibility Report, the Corps selected a consultant team to be "on-call" for the program. This specific contracting mechanism, referred to as "Indefinite Delivery/Indefinite Quantity" (IDIQ) provides PSNERP ready access to a diverse team of national and regional experts, as well as journeyman-level "production" staff. The selection process was highly competitive. Corps project managers exercised their discretion in allowing non-Corps PSNERP Project Management Team representatives to participate in the selection process. This served to broaden the perspective of the review team, enhancing the process, and sharing responsibility beyond the Corps. A consultant team lead by Anchor Environmental, and supported by over 20 sub-consultants, was selected as the PSNERP IDIQ contractor. The first task order was awarded to Anchor late in FY 2007, and authorizes their acquisition and organization of data required to complete Sound-wide Change Analysis. Preliminary results of the Anchor team, including a "data dictionary" have been favorable, demonstrating a capacity by the Contractor to successfully complete the complex analysis required by PSNERP.

Coordination With Other Initiatives

While making steady progress towards completion of the General Investigation study, and applying emerging science to on-the-ground projects, another important area of focus for PSNERP and the Nearshore Partnership has been coordination with other initiatives. This deliberate focus on collaboration has helped improve program support, and kept the work of the GI "relevant" to the larger restoration community.

Puget Sound Partnership

Perhaps the most significant development in efforts to protect and restore Puget Sound has been the emergence of the Puget Sound Partnership. Established by Governor Gregoire as an intitative in 2005, the Puget Sound Partnership (PSP) was ratified by the Washington State legislature as a new state agency beginning July 1, 2007[4]. The Puget Sound Partnership combines the previous work of the Puget Sound Action Team and the Shared Strategy for Puget Sound. It is the intent of the legislature that this new agency will define the actions necessary to restore and protect the health of Puget Sound. These actions are to become part of the agency's "Action Agenda", and are to be carried out by the year 2020. The Puget Sound Partnership is also charged with holding federal, state, and local agencies accountable for their commitments under the Action Agenda.

Recognizing the opportunity afforded by this new level of focus and coordination on Puget Sound issues, the Nearshore Partnership has pledged its support. A series of specific commitments were laid out by PSNERP in its response to the request of PSP staff for a scoping paper on nearshore issues. These include delivery of PSNERP technical products (change analysis, strategic needs assessment report) to help inform the Action Agenda. The goal of delivering an ecosystem restoration authority to the Puget Sound region via the GI study process is the most significant of potential contributions to the work of the Puget Sound Partnership.

The role of the Puget Sound Partnership in defining Washington state agency contributions and commitments is clearly described in its authorizing legislation. WDFW's has indicated appropriate response and support for PSP. PSP's relationship to federal agencies is emerging through a caucus of federal agencies aligned to support PSP (Puget Sound Federal Caucus). An MOU developed by the Federal Caucus outlines this support, signatories include USFWS and the Corps of Engineers.[5]

FWCA Consultation

Observations and Recommendations

Even as the program the mission and its integration expands, PSNERP continues to make good progress towards completion of the GI study. Program managers are striving to strike a balance towards long-term strategic planning and the immediate needs of the broad community of restoration practitioners working to protect and restore Puget Sound. During a period of tightening federal funding, the PSNERP GI continues to receive strong support from Congress and Corps of Engineers management.

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[4] Engrossed Substitute Senate Bill 5372

[5] Federal Caucus signatories to the MOU are the Environmental Protection Agency, the National Oceanographic and Atmospheric Administration, U.S. Fish and Wildlife, U.S. Geological Survey, the National Park Service, the Forest Service, Army Corp of Engineers, US Navy, US Army (Fort Lewis), Coast Guard, Natural Resource Conservation Service (USDA), Federal Highway Administration.

The success of the program continues to derive from its focus on using the best available science. Analytical methods have been tested as pilot studies, evaluated by regional experts, and refined for Sound-wide application. PSNERP technical reports have been peer-reviewed prior to their publication. The Steering Committee and Project Management Team have responded affirmatively to the advice of the Nearshore Science Team in developing program peer review, which will be implemented by a panel of external science experts in FY 2008.

PSNERP also has an emerging focus on monitoring and adaptive management. In FY 2007, the program contracted with Battelle Marine Science Laboratory for the development of project-level monitoring guidance. This guidance will assist ESRP project proponents in developing monitoring programs that help advance the state of our restoration knowledge. The NST has defined this project-level guidance as its first step in developing broader programmatic level guidance and to the implementation of an adaptive management program for PSNERP.

While outside of the strict scope of the General Investigation study, USFWS appreciates the investment of program leadership in the effective implementation of ESRP. The program has made substantial investment in large-scale on-the-ground projects, including the Skokomish dike removal project, and more recently, the Nisqually National Wildlife Refuge restoration actions. This commitment to "learning by doing" while assisting regional salmon recovery and coastal ecosystem restoration efforts is strongly supported by USFWS.

Conclusions

The USFWS remains satisfied with the direction and progress of PSNERP. We continue to support the work of the Puget Sound Nearshore Partnership, as evidenced by our direct and in-kind contributions.

We are especially supportive of the emphasis placed on use of science in informing the GI and other Nearshore Partnership activities. Use of independent peer-review is particularly important to insure a strong technical approach and broad program credibility. Establishing an external science review panel consistent with NST recommendations should a primary area of focus for Project Managers in FY 2008. Next steps should include advancements in project monitoring associated with ESRP investments, and the development of an adaptive management framework for the entire program.

Finally, we strongly encourage the Nearshore Partnership to continue its cooperation with the emerging Puget Sound Partnership. The USFWS has committed its support to PSP, participating in the Puget Sound federal caucus, and representing Interior agencies on the PSP Ecosystem Coordination Board. This new state agency with a broad mandate of accountability represents a significant opportunity for improved coordination of agency activities, with measurable improvements in the health of Puget Sound.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

JAN 18 2011

Colonel Anthony Wright, District Commander
U.S. Army Corps of Engineers, Seattle District
P.O. Box 3755
Seattle, WA 98124-3755

Dear Colonel Wright:

Enclosed is a Planning Aid letter summarizing the U.S. Fish and Wildlife Service's (USFWS) participation in the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) for Federal fiscal years 2009-2010. This Planning Aid letter is being submitted to fulfill commitments under the Fish and Wildlife Coordination Act (16 U.S.C. 661-667). This letter was prepared for the USFWS' Washington Fish and Wildlife Office by Curtis Tanner who coordinated USFWS support for PSNERP in FY 2009-2010.

The USFWS continues to support PSNERP as an activity that advances our Agency Mission. Successful completion of the PSNERP General Investigation (GI) is a priority for the USFWS, as evidenced by our on-going participation and in-kind contributions to the study. We encourage Program Managers to continue the strong emphasis on advancing a strategic, science-based approach to nearshore restoration and protection. The PSNERP results should be used to help inform both the large scale restoration and protection actions of Federal agencies, including the U.S. Army Corps of Engineers, as well as guidance for actions at more local scales.

Primary conclusions of this Planning Aid letter include:

- The importance of planning for integration of a Construction General into larger Puget Sound recovery efforts.
- Strong encouragement for continued collaboration with the Puget Sound Partnership, and support for Action Agenda implementation and revision.
- The need to continue to advance on-the-ground restoration efforts, including the Estuary and Salmon Restoration Program and Puget Sound and Adjacent Waters as the GI moves towards a Construction General authority.
- The broad applicability of PSNERP data and analytical methods, and the importance of their use beyond the GI.

We look forward to continued USFWS involvement in, and support for the activies of PSNERP. Please contact Curtis Tanner at (360) 902-2815 or Mary Mahaffy at (360) 753-7763 if you have any questions related to this Planning Aid letter.

Sincerely,

for Mary A. Mahaffy
Ken S. Berg, Manager
Washington Fish and Wildlife Office

cc:
Phil Anderson, Director
Washington Department of Fish and Wildlife

Bernard J. Hargrave, PSNERP Program Manager
Seattle District Corps of Engineers

Planning Aid Letter Attachment One:

Summary of FY 2009 – 2010 Fish and Wildlife Coordination Act Activities for the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP)

Contents

Project Background

PSNERP General Investigation Study

The Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) is a large-scale, comprehensive initiative that affords a unique opportunity to tackle some of the foremost habitat restoration needs in Washington State's Puget Sound basin. Project goals are to identify significant ecosystem problems, evaluate potential solutions, and restore and preserve critical nearshore habitat. The PSNERP is a partnership between the U.S. Army Corps of Engineers (Corps) and local sponsors. The Washington Department of Fish and Wildlife (WDFW) represents the local project sponsors. Other major project partners contributing to this effort with direct and in-kind support include other state and Federal government agencies, Native American tribal governments, industries and environmental organizations.

The General Investigation Study (GI) will result in the identification of a portfolio of multiple large-scale ecosystem restoration actions. In completing the GI, the Corps is evaluating a broad range of alternative actions. Projects that best meet the Corps' criteria for implementation under an anticipated ecosystem restoration Construction General authority will form the basis for a request to Congress for authorization to implement priority actions. This will greatly enhance the combined capacity of Federal and State agencies, Tribal governments and others to protect and restore Puget Sound nearshore ecosystems.

As the Corps and its partners work towards completion of the GI, information being developed as part of the study is being delivered to assist on-going restoration programs and projects. This includes potential projects identified and evaluated by the GI, but not carried forward as part of the preferred alternative for implementation by the Corps. These actions will be shared with PSNERP partners for implementation through other programs and authorities to complement the work of the Corps. This dual focus of initiating large-scale strategic restoration actions and the support of more local scale projects makes PSNERP of particular interest to the U.S. Fish and Wildlife Service (USFWS).

U.S. Fish & Wildlife Service Participation

The USFWS Washington Fish and Wildlife Office (WFWO) continues its active involvement in, and support for, PSNERP. Our involvement carries out responsibilities of several WFWO program areas, including the Puget Sound Coastal Program, the Landscape Conservation Partnership Program and Division of Consultation & Technical Assistance Branch of Federal Activities. This Planning Aid Letter has been prepared as part of our Federal Activities duties as defined by the Fish and Wildlife Coordination Act (16 U.S.C. 661-667).

USFWS Involvement in PSNERP Technical Teams and Governance

Nearshore Science Team

As with previous years dating back to the origins of the program, the USFWS has continued participation in PSNERP largely through the Nearshore Science Team (NST). Curtis Tanner, USFWS Coastal Program biologist, is a member of the NST, providing expertise in the field of habitat restoration to this interdisciplinary team. He has served in this role since Fiscal Year (FY) 2002. During this time his involvement has been cost-shared by the USFWS and the Corps. U.S. Army Corps of Engineers support is provided through an agreement under the Fish and Wildlife Coordination Act, USFWS funding is provided by the Coastal Program. This includes full participation in NST monthly meetings and associated responsibilities. During FY 2009-10, Curtis also had an active role in two PSNERP technical workgroups, the Strategic Needs Assessment Team and the Ecosystem Output Workgroup.

Implementation Team

In FY 2009, Ginger Phalen, USFWS Coastal Program Coordinator began to serve on the Implementation Team. In this capacity, Ginger has helped review Estuary and Salmon Restoration Program (ESRP) proposals. She has also contributed to other Implementation Team tasks, including the Management Measures Technical Report, and the evaluation of candidate actions for the PSNERP GI.

Steering Committee

In addition to his PSNERP activities supported by the Corps and the USFWS, Curtis Tanner also serves as PSNERP Local Project Manager under an agreement between USFWS and WDFW. The Local Project Manager and the Federal Project Manager (Bernie Hargrave, Seattle District Corps of Engineers) serve as co-chairs of the Nearshore PSNERP Steering Committee. While not directly represented on the Steering Committee, USFWS has determined that Curtis' involvement insures effective involvement in PSNERP program guidance. This issue is periodically revisited by USFWS management. Curtis' role as Local Project Manager is currently supported by an agreement between USFWS and WDFW through June 2011.

Executive Committee

During FY 2009-10, the USFWS continued its representation on the PSNERP Executive Committee by the WFWO Manager, Ken Berg. During this period, the Executive Committee did not meet. However, Mr. Berg has highlighted PSNERP during his discussions with other Federal agency leaders in the Puget Sound Federal Caucus. Mr. Berg also served on the Puget Sound Partnership (PSP) Ecosystem Coordination Board through FY 2010. In this role, he continued to advocate for PSNERP as a PSP Action Agenda priority.

Other U.S. Fish & Wildlife Service Support

Environmental Protection Agency Funding

In FY 2010, WFWO staff, led by Coastal Program Coordinator Ginger Phalen, prepared a proposal in response to an Environmental Protection Agency Request for Proposals for Puget Sound Scientific Studies and Technical Investigations. Through this process, the USFWS received funding to support PSNERP, providing its experience in coastal habitat restoration. For each of the candidate actions being evaluated by the PSNERP, the USFWS will complete Level 1 Contaminant Surveys and develop preliminary information to meet required compliance with Section 106 of the National Historic Preservation Act. For species listed under the Endangered Species Act, the USFWS will create and collate species lists, timing restrictions and best management practices for each candidate action. Funding for this work was received in September 2010, and the work is expected to be complete in March 2011.

Estuary and Salmon Restoration Project

The USFWS provided technical expertise and funding from both the Puget Sound Coastal Program and the National Coastal Wetland Conservation Grant Program. The USFWS Coastal Program staff coordinated with Washington State's Estuary and Salmon Restoration Program (ESRP) and other project partners on multiple nearshore conservation and restoration projects. Coastal Program staff participated in the ESRP project review and ranking team, provided Coastal Program funding and technical expertise and worked with local applicants to submit successful applications to the National Coastal Wetland Conservation Grant Program, which provides matching funds to ESRP. Examples of this successful partnership between the USFWS Coastal Program and ESRP include coordination, technical expertise, review and funding provided to the following large scale nearshore conservation and restoration projects: Smuggler's Slough Tidal Reconnection, Tarboo/Dabob Bay Acquisition, Fisher Slough Restoration, Nisqually Estuary Restoration, and the Lily Point Phase II Acquisition. The result is a partnership that supports conservation and restoration of over 1,560 acres of priority nearshore ecosystems and provided $4.2M of USFWS funding to support PSNERP and PSP goals and objectives. This partnership will continue in FY 2011, with Coastal program funding provided directly to 2010 ESRP ranked, priority projects.

FY 2009 –2010 PSNERP Activities

Over the past two FYs (FY 2009-2010), the PSNERP Team of Project Managers, policy advisors, technical experts, and consultants have made considerable progress towards completion of the GI and delivery of a draft Feasibility Report. Numerous analyses referenced in earlier Planning Aid Letters have been completed, with technical reports either published, or near final. During this period, the project managers and staff have also successfully coordinated with the PSP, emerging as a priority action for the recovery of Puget Sound. In May 2010, the PSNERP successfully completed a formal review by Corps headquarters. This "Feasibility Scoping Meeting" is a significant milestone in the completion of a Corps GI, and marks the transition from evaluation of conditions and defining a problem of National significance, to the development of a feasible, cost-effective solution for potential implementation by the Corps. During this period, the PSNERP continued to maintain high standards of scientific integrity and quality of technical products.

External Peer Review and Stakeholder Involvement

Strategic Science Peer Review Panel

Consistent with the Nearshore Science Team's (NST) Peer Review Plan, Project Managers, in collaboration with the NST, convened a formal external peer review body. The Strategic Science Peer Review Panel (SSPRP) is comprised of six individuals from across the U.S. and Canada with a diversity of scientific expertise, and relevant experience in coastal/nearshore restoration. Members include:

- Denise Reed (SSPRP Chair). Professor, Department of Earth and Environmental Sciences, University of New Orleans.
- Maggi Kelly. Faculty Director for the Geospatial Imaging & Informatics Facility, College of Natural Resources, University of California, Berkeley
- Colin Levings. Scientist Emeritus Canada Department of Fisheries and Oceans and Adjunct Faculty, Institute for Resources, Environment, and Sustainability, University of British Columbia
- David Marmorek. President of ESSA Technologies Ltd, and Adjunct Professor, School of Resource and Environmental Management, Simon Fraser University
- Susan Peterson. Teal Partners, Rochester, MA.
- John Wells. Professor of Marine Geology, Director of the Virginia Institute of Marine Science and Dean of the School of Marine Science at the College of William and Mary.

The SSPRP convened its first meeting in June 2008. Following review of background materials and presentations on program research methods and results, particularly Change Analysis, the panel provided recommendations in five areas:

- Problem Identification
- Program Vision
- Scientific Foundation
- Incorporation of Best-Available Science
- Gaps in Logic or Process

After reviewing these recommendations, the NST and the Project Management Team determined an appropriate response and responsible entity for addressing identified issues.

A second meeting of the SSPRP was held in May 2009. The second review meeting focused more directly on emerging PSNERP technical products and "in-progress" tasks. These included the Future Risk Assessment Project, Strategic Needs Assessment, Management Measures Technical Report, Science and Adaptive Management Plan, and Stakeholder Involvement Strategy. The SSPRP's second report organized recommendations in the following five areas:

- Identifying the Problem with Puget Sound Nearshore
- Strategic Restoration Portfolio Development
- Science, Technology, Monitoring and Adaptive Management
- Relationship to other Puget Sound Programs
- SSPRP Reporting and Feedback

The Project Management Team and NST members developed a response document to the second report, working with the SSPRP Chair to insure an appropriate approach to addressing issues raised by the Panel.

As a result of recommendations in the second SSPRP report, the NST prepared a science based problem statement based on Change Analysis and Strategic Needs Assessment conclusions. In October 2009, the SSPRP provided external peer review for the draft PSNERP Problem Statement.

In 2010, the SSPRP did not hold a "face to face" meeting, but collaborated via conference call and email to provide a review of the Draft Feasibility Report in December 2009/January 2011. The SSPRP reviewed the Draft Adaptive Science and Technology Plan in August 2010. Future SSPRP review tasks include the Strategic Needs Assessment Report (January 2011), Benefits Metrics (February 2011), and Puget Sound Nearshore Restoration and Conservation Strategies.

Stakeholder Involvement Strategy

A recognized need for a more strategic and organized approach to stakeholder involvement, prompted in part by the SSPRP first Review, led to development of a formal plan. In December 2008, the Stakeholder Involvement Strategy was produced by a PSNERP Workgroup formed for this purpose. Development of the plan required close coordination with the PSP, which maintains a strong interest in public outreach. Major elements of the PSNERP Stakeholder Involvement Strategy include:

- Fostering Broad Program Understanding and Support
- Developing and Reviewing Restoration and Protection Goals and Objectives
- Involving Stakeholders in National Environmental Policy Act (NEPA)
- Developing and Advancing a PSNERP GI Project List

Associated tasks and budget were included in revising the PSNERP Project Management Plan. The Stakeholder Involvement Team has remained active, assisting in implementation of information meetings, fact sheet production, developing a standardized presentation for use by all PSNERP team members, and in NEPA Scoping Meetings.

National Environment Policy Act Scoping

In October 2009, activities to comply with NEPA were initiated by Program Managers. A formal Notice of Intent to prepare a Draft Programmatic Environmental Impact Statement was published in the Federal Register on October 2, 2009. The Notice of Intent established a written comment period from October 26 through December 10, 2009. Public notices were placed in 14 Puget Sound newspapers.

The PSNERP Stakeholder Involvement Team organized and facilitated NEPA Scoping meetings; all were sparsely attended despite email and print notifications:

- Des Moines, WA – 14 people in attendance
- Port Townsend, WA – 7 people in attendance
- Lacey, WA – 15 people in attendance
- Mount Vernon, WA – 24 people in attendance

Less than 40 comments were received, either in writing or verbally at the scoping meetings. In summary, NEPA Scoping generated limited public interest, and no controversial issues were identified.

Program Management and Interagency Coordination

Project Management Plan Revisions

In January 2009 PSNERP Project Managers completed an extensive revision of the Project Management Plan (http://www.pugetsoundnearshore.org/program_documents/psnp_management-plan_vol1.pdf). Tasks defined generally in the original Project Management Plan were more completely described based on progress to date and an improved understanding of deliverables necessary to meet the Corps' feasibility study/decision document requirements. This increased level of detail allowed for an updated project budget and schedule.

Cost-Share Agreement Update

The Corps and WDFW Executives signed an amendment to the PSNERP Cost-Share Agreement in March 2009. Based on Project Management Plan revisions, it was agreed to increase the total cost of the GI Study from the original estimate of $12M to a revised estimate of $19.1M. Each party agreed to contribute up to $9.55M towards the cost of the study. Revision of the cost-share agreement insured continued progress towards completion of the GI as the original cost ceiling was approached by the parties.

Puget Sound Partnership Memorandum Of Understanding

In September 2009, the WDFW and the PSP signed a Memorandum of Understanding (MOU) regarding PSNERP. While the Corps was not a party to this agreement between State agencies, the clarification of relationships, roles, and responsibilities has had an important positive effect on the General Investigation. This includes sustained support for PSNERP, and prioritization of funding due to the role PSNERP serves to implement PSP's Action Agenda. The MOU addressed:

- Completion of the PSNERP General Investigation
- Coordination with the Federal government
- Stakeholder outreach and communication
- Relationship between PSP and PSNERP advisory and governance entities

Items pertaining to completion of the GI clearly communicate a shared interest in delivery of a draft Feasibility Report by the end of the State 2009-11 biennium (June 30, 2011). This has lead State managers to press for timely completion of the GI. Discussion of coordination partially shifts the funding burden from WDFW to a shared responsibility with PSP. Communication issues include changing the name from "Puget Sound Nearshore Partnership" to the original "Puget Sound Nearshore Ecosystem Restoration Project (PSNERP)". Associated with this name change is direct affiliation of PSNERP with PSP as "the Nearshore Program of the Puget Sound Partnership". Sections pertaining to Advisory and Governance Entities establish an important role for PSNERP in providing on-going technical support to nearshore restoration in Puget Sound. In summary, the PSP/WDFW MOU articulates PSNERP's responsibility in Puget Sound recovery efforts through its role in implementation of nearshore restoration.

Technical Studies and Deliverables

Draft Change Analysis Report

In July 2009, a first draft of the Change Analysis Report was completed. In October 2009, the draft Change Analysis report was submitted for peer review. In September 2010, a final version addressing peer review comments was completed. The document is currently being prepared for publication. Complete geospatial data used to conduct the PSNERP Change Analysis are available for download through the program website. Data are already widely distributed, and in-use by numerous entities beyond PSNERP. In FY 2012, the USFWS Coastal Program staff will be completing a strategic plan revision, and anticipate using PSNERP information to inform identification of program priorities.

The PSNERP Change Analysis provides a comprehensive, spatially-explicit analysis of net changes to nearshore ecosystems of Puget Sound since the period of early industrial development (c.a. 1850 to present). These observations provide indicators of qualitative change to nearshore ecosystem processes. Conceptual Models document assumptions regarding the relationship among nearshore ecosystem processes, structures and functions.

The PSNERP Change Analysis is intended to support the GI by informing restoration and preservation planning experts about the types, extent and consequences of changes to Puget Sound's shoreline. Additionally, the spatial geodatabase has been designed to accommodate future updates or expansions to datasets, providing a valuable tool to the Puget Sound nearshore management and restoration community.

Draft Strategic Needs Assessment Report

In September 2009, an initial draft of the Strategic Needs Assessment Report (SNAR) was completed by a team of NST, Implementation Team, and Contractors. The goal of this analysis was to characterize the impacts of shoreline and watershed alterations on nearshore ecosystem processes, identify the major problems contributing to the observed ecosystem degradation, and assess which of the causes are important to address through restoration and protection actions. The SNAR provides a more detailed evaluation of Change Analysis results, characterizing observed alterations of shoreline and watershed attributes to impacts on nearshore ecosystem processes. Stressors impacting nearshore ecosystem processes (e.g. tidal barriers, shoreline armoring, roads, and railroads) were evaluated in detail. Spatial distribution across Puget Sound, patterns of co-occurrence, and impacts on valued ecosystem components were described. Conceptual models documenting assumed relationships between stressors and ecosystem processes, structure, and function were developed. The SNAR established an analytical framework using shoreline stressors to calculate metrics of process degradation. The information on degradation of ecosystem processes, as well as distribution of alterations documented in the Change Analysis Report, was used to identify major problems in Puget Sound nearshore ecosystems.

The Strategic Needs Assessment was revised following internal PSNERP team review, and a revised draft produced in January 2010. It was revised further to incorporate the results of the Future Risk Assessment Project, and to address comments raised by statisticians regarding the degradation metric calculation methods. A final draft for peer review was completed in December 2010.

Draft Future Risk Assessment Report

In October 2009, researchers at Oregon State University submitted the draft report "Envisioning Puget Sound Alternative Futures." Following PSNERP Nearshore Science Team review, a revised final report was completed in May 2010. The Future Risk Assessment Project (FRAP) was intended to help inform PSNERP project selection by identifying risk associated with future population growth in the Puget Sound region. The FRAP developed three scenarios of change:

1. Status Quo, reflecting a continuation of current trends in the region,
2. Managed Growth, reflecting the adoption of an aggressive set of land use management policies focusing on protecting and restoring ecosystem function and concentrating growth with Urban Growth Areas and near regional growth centers, and
3. Unmanaged Growth, reflecting a relaxation of land use restrictions with limited protection of ecosystem functions.

Analyses assumed a fixed population growth rate across all three scenarios, defined by the Washington Office of Financial Management. Using these population projections and rules defined by the three scenarios, the project modeled land use/land cover, shoreline modifications, and population projections over the next 50 years (2060). The project provided summary statistics describing landscape change variables for each sub-basin in Puget Sound, and was aggregated to provide Sound-wide results.

Information from FRAP has been used to develop indicators of future risk that inform restoration and protection strategies. As part of the Corps planning process, information from FRAP has also been used to define the "future without project" condition. Modeling of future land use changes, driven by projections of population growth, is used to evaluate changes in watershed conditions. A subset of nearshore stressors, were also modeled, allowing PSNERP to forecast patterns of continued nearshore ecosystem degradation.

Problem Statement and Restoration Objectives

One of the primary recommendations of the second SSPRP report was development of a science based problem statement based on Change Analysis and Strategic Needs Assessment conclusions. In October 2009, the NST submitted a draft PSNERP Problem Statement for review to the SSPRP. A revised version addressing their comments was produced in August 2010, and received SSPRP support. A final version titled "*Degradation of Nearshore Ecosystem Processes in Puget Sound: Challenges for Restoration*" is now being prepared for layout and publication. A summary of the Problem Statement is also presented in the conclusion of the Strategic Needs Assessment Report.

The PSNERP Problem statement identified four major physical changes to Puget Sound's nearshore ecosystems:

1. There has been a dramatic loss of large river delta area, due primarily to barriers such as dikes that alter tidal hydrology. Much of the remaining large river delta area has been altered by shoreline armoring and other changes.
2. Many small, coastal embayments have been eliminated throughout Puget Sound or their connections to the Sound have been severed.
3. Impacts to beaches and bluffs, primarily as a result of shoreline armoring, have resulted in the loss of sediment supply and the interruption of sediment transport processes.
4. Estuarine wetlands have been extensively lost throughout Puget Sound. In particular, oligohaline and freshwater tidal wetlands have almost been completely eliminated.

This assessment also identified two major types of cumulative impacts associated with the interplay of these physical changes:

1. Puget Sound's shoreline has become shorter, simpler, and significantly more artificial since Europeans began settling the region.
2. Many places have experienced widespread, multiple, and compound changes. For example, armoring and roads often co-occur in the same place while some places that have experienced changes to the adjacent upland also experience changes directly on the shoreline.

These conclusions are documented through reference to Change Analysis and Strategic Needs Assessment results. The implications to biological resources are also documented where supported by empirical data.

These six major problems form the basis for defining PSNERP restoration and protection objectives. Definition of "planning objectives" is an essential step in the Corps planning process, by describing the desired results, and setting the stage for "plan formulation" and the identification of a preferred alternative for addressing the problems identified.

The PSNERP restoration objectives, sub-objectives and associated metrics are described in detail in the draft Feasibility Report:

1. Restore connectivity and size of large river deltas
    a. Restore tidal flow in river deltas
    b. Restore wetland quality and quantity with emphasis on oligohaline and tidal freshwater
    c. Improve connectivity between the nearshore and adjacent uplands/watershed
    d. Increase the shoreline length of large river deltas

2. Restore sediment input, transport, and accretion processes
    a. Rehabilitate sediment input by reducing degradation of divergence zones and bluff-backed beaches

3. Restore shoreline complexity and length
    a. Restore shoreline length
    b. Restore embayments that have transitioned to artificial or have been lost
    c. Restore existing embayments

4. Enhance landscape heterogeneity and connectivity
    a. Restore richness of shoreforms
    b. Reduce fragmentation of the shoreline
    c. Improve connectivity between adjacent uplands and the nearshore

5. Protect relatively undegraded processes in large river deltas
    a. Preserve relatively intact deltas including adjacent upland areas
    b. Prevent further degradation of delta processes

6. Protect relatively undegraded sources of sediment
    a. Prevent degradation of divergence zones and bluff-backed beaches
    b. Protect bluff-backed beaches and divergent zones with minimal shoreline alterations

7. Protect relatively undegraded embayments
    a. Conserve areas of intact tidal flow
    b. Conserve areas of fewest shoreline alterations and least wetland area loss

8. Increase understanding of natural process restoration to improve effectiveness of project actions

In framing these restoration and protection objectives, the PSNERP Team has effectively linked observed changes in nearshore ecosystems, degradation of nearshore processes, major problems, and proposed solutions.

Management Measures Technical Report

A technical report describing 21 management measures available to restore and protect nearshore ecosystems was published in December 2009 following peer review. By relating actions to effects on nearshore processes, the Management Measures Technical Report (http://www.pugetsoundnearshore.org/technical_papers/management_measures.pdf) helps determine how to most effectively use the measures to accomplish process-based restoration in Puget Sound. The report:

- Provides an understanding of each measure's strengths, weaknesses and constraints.
- Provides the basis for describing proposed restoration actions for a development of a programmatic Environmental Impact Statement.
- Provides a systematic organizational framework for describing management measures that can be used to develop and evaluate site-specific restoration alternatives.

Appendices to the report pertaining to sea-level rise evaluate suitability of alternative sea-level rise scenarios for use by PSNERP, and provide a qualitative assessment of management measure vulnerability to sea-level rise.

Draft Feasibility Report

In December 2009, the PSNERP study team completed their first draft of a Feasibility Report for the General Investigation. This partial draft, prepared in advance of the Feasibility Scoping Meeting, describes the results of analysis to understand the magnitude and significance of nearshore ecosystem loss and degradation in Puget Sound, establishment of restoration objectives appropriate for the nature of the problem, and an approach to formulating a solution addressing these objectives. In short, this version provides the background necessary to describe a problem of National significance, stopping just short of defining a preferred alternative – this to be addressed in the final Feasibility Report.

In adherence to new Corps guidance for General Investigations, an Agency Technical Review was completed for the draft report by Corps subject matter experts outside of the Seattle District. The draft report was also reviewed by the PSNERP team, the Strategic Science Peer Review Panel, Seattle District Corps of Engineers staff outside of PSNERP, and Corps Regional Division staff. Following these reviews and subsequent revisions, the Draft Feasibility Report was submitted to Corps headquarters in March 2010.

Feasibility Scoping Meeting

The U.S. Army Corps of Engineers Headquarters review of the Draft Feasibility Report culminated in May 2010 with the completion of a Feasibility Scoping Meeting. The focus of this review and the Feasibility Scoping Meeting was policy compliance and technical sufficiency of the draft report. This review was successful, and in September 2010, the Seattle District received a Policy Guidance Memorandum from Corps headquarters. The memo documented compliance with Corps policy for the Draft Feasibility Report, and commended the PSNERP Team on the completeness of materials submitted for review. The Feasibility Scoping Meeting is a significant milestone in the completion of a Corps GI, and marks the transition from evaluation of conditions and defining a problem of National significance, to the development of a feasible, cost-effective solution for potential implementation by the Corps.

Candidate Projects List

In July 2010, the PSNERP Team completed an assessment of over 700 potential actions ("projects") identified by the Puget Sound restoration community – Lead Entities, Marine Resource Committees, non-governmental conservation organizations, state agencies and local governments, tribal governments, and others. This assessment of actions in the Nearshore Project Database focused on whether the collection of actions within a site, typically a process unit at the scale of drift cell or river delta, addresses the site needs defined by PSNERP analyses. For each site, the team evaluated all actions located within the site that employed the prescribed management measures. Actions were evaluated based on:

- Ability to restore target ecosystem process (e.g. tidal flow): was it the "right action/right place"?
- Appropriate spatial scale: taken together, were the proposed actions sufficient to address the identified sources of nearshore ecosystem process degradation?
- Landowner issues: did the action likely involve willing landowners and/or public ownership?

Initial results identified approximately 200 individual actions. In order to further refine the project list and complete the site selection process, a series of "Site Conversations" were arranged with sponsors of projects. The objective of site conversations was to collaborate with sponsors to identify candidate actions suitable to advance to development of conceptual design. In August 2010, the initial screening was completed, and a list of 52 actions was advanced for more detailed evaluation.

Conceptual restoration designs are currently being completed for these candidate actions. This information, anticipated in January 2011, will allow the PSNERP Team to assess cost-effectiveness of these potential restoration actions, and ultimately identify a tentatively selected plan (project list) to advance through the GI, seeking authority for Corps implementation.

Principles for Strategic Conservation and Restoration

In September 2010, following peer review and final revisions, PSNERP published "Principles for Strategic Conservation and Restoration" (http://www.pugetsoundnearshore.org/technical_papers/conservation_and_restoration_principles.pdf). This report summarizes principles of landscape ecology and conservation biology that are applicable to the conservation and restoration of nearshore ecosystems in Puget Sound. Principles were drawn from a scientific literature review of landscape ecology and conservation biology and are intended to guide the prioritization of sites and actions by PSNERP and others. The result is eleven principles derived from the literature organized into three hierarchical scales:

- Overarching Principles
- Landscape Level Principles
- Site-Specific Principles

These principles, available earlier in final draft form prior to publication, were used to help define strategies used for evaluation and selection of candidate actions.

Draft Adaptive Science and Technology Plan

The Strategic Science Peer Review Panel's second Report provided specific guidance in completing an Adaptive Management plan for the anticipated implementation phase of the Nearshore Project. In October 2010, a draft Adaptive Science and Technology Plan (ASTP) was submitted to the Strategic Science Peer Review Panel for their review and feedback. The Nearshore Science Team has received their comments, and is in the process of revising the ASTP to address this feedback.

The ASTP anticipates that an adaptive management framework will help to achieve maximum effectiveness of ecosystem restoration. Implementing this plan will benefit the broad community of restoration practitioners across the Puget Sound region by supporting a science partnership among Federal, State, local, and tribal governments that incorporates information gained through monitoring and adaptive management. It proposes to use both monitoring data and scientific investigation in collaboration among the non-Federal project sponsors and the Corps. Execution of the ASTP is intended to support the Construction General phase, including engineering and design of restoration actions, and to serve as a bridge between the planning of the GI and the implementation of the Construction General. A final version of the ASTP is anticipated in 2011.

FWCA Consultation

Observations and Recommendations

The Corps and their project partners continue to make good progress towards completion of the GI study. Concurrent with this progress are more immediate benefits of PSNERP data, technical reports, and other tools to on-going restoration and protection efforts in Puget Sound. Program managers are succeeding in balancing long-term strategic planning, and the pressing needs of the broad community of restoration practitioners working to protect and restore Puget Sound. The PSNERP GI continues to receive strong support at the National level from Corps headquarters, and at the State level through its association with the PSP.

The success of the program continues to derive from its focus on using the best available science. Analytical methods have been substantially advanced and effectively applied over the past two years. The Program's commitment to both product-specific and programmatic peer-review helps insure on-going scientific integrity. This includes the establishment of the Strategic Science Peer Review Panel which has provided critical assessment of NST analyses and technical products.

As the GI moves towards successful delivery of a final Feasibility Report, the USFWS strongly encourages the Corps to plan for integration of a Construction General into larger Puget Sound recovery efforts. In particular, continued coordination with the PSP is essential to insure integration with regional efforts. Recently, the Seattle District Commander assumed a position on the PSP Ecosystem Coordination Board as one of three Federal agencies on this representative body. We anticipate that the Corps' new position on the Ecosystem Coordination Board will provide an opportunity for necessary coordination with on-going and future Puget Sound nearshore/coastal restoration and protection efforts.

The USFWS also encourages PSNERP partners, including the Corps, to apply emerging information and tools from PSNERP into other areas of nearshore restoration and protection. Recent discussions by the Puget Sound Federal Caucus on shoreline regulation and protection provide an example of forums where the use of PSNERP science and tools can be advanced.

While outside of the strict scope of the General Investigation study, USFWS appreciates the involvement of PSNERP technical and policy representatives in the effective implementation of Washington State's Estuary and Salmon Restoration Program. The application of PSNERP science in implementing on-the-ground restoration actions through the Estuary and Salmon Restoration Program serves to both advance strategic restoration in Puget Sound and to improve conditions benefitting fish and wildlife. This commitment to "learning by doing" while assisting Puget Sound recovery efforts is strongly supported by USFWS.

Similarly, the past two years has seen increased activity through the Corps §544 Puget Sound and Adjacent Waters authority. Qwuloolt Estuary Restoration is currently in advanced stages of planning, and anticipated for construction in 2011. The USFWS has had a long-term investment in this site, providing acquisition funds through the National Coastal Wetland Conservation Funds, and technical assistance through our Coastal Program. A Phase II project for Seahurst Park is also being advanced through the Puget Sound and Adjacent Waters authority, and would add an additional 1,200 feet of restored shoreline to the 1,400 feet restored here in 2005. We encourage the Corps to continue to work with local sponsors to implement these projects in a timely manner, and to include monitoring and adaptive management as an essential element of project implementation.

Conclusions

The USFWS continues to support PSNERP as an activity that advances our Agency Mission. Successful completion of the PSNERP GI is a priority for the USFWS, as evidenced by our on-going participation and in-kind contributions to the study. We encourage Program Managers to continue the strong emphasis on advancing a strategic, science-based approach to nearshore restoration and protection for Puget Sound.

The USFWS stresses the importance of planning for integration of a Construction General into larger Puget Sound recovery efforts. An essential component of successful integration will involve continued collaboration with the PSP. Completion of the PSNERP GI has been identified in the PSP Action Agenda as a priority task. PSNERP can also provide information valuable in future revisions of the Action Agenda, and must transition from planning to implementation in the near future.

As the PSNERP continues to progress towards delivery of a Draft Feasibility Report, it is equally important to continue to advance on-the-ground restoration efforts. For PSNERP and the Corps, this includes the Estuary and Salmon Restoration Program and Puget Sound and Adjacent Waters. Finally, all PSNERP partners should recognize the broad applicability of PSNERP data and analytical methods, and the importance of their use beyond the GI. The Corps' other authorities for shoreline regulation, protection, and restoration, will benefit from applying the results of the GI.

DRAFT
Fish and Wildlife Coordination Act
Section 2(b) Report

Puget Sound Nearshore Ecosystem Restoration Project

Submitted to:
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Seattle, Washington

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LIST OF ACRONYMS

APA	Agency Preferred Alternative
CAP	Continuing Authority Program
DPS	Distinct Population Segment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FR/EIS	Integrated Feasibility Report / Environmental Impact Statement
FWCA	Fish and Wildlife Coordination Act
GI	General Investigation
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Acte
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PA	Preferred Alternative
PDT	Project Delivery Team
PMP	Project Management Plan
PSAW	Puget Sound and Adjacent Waters Restoration Program
PSNERP	Puget Sound Nearshore Ecosystem Restoration Project
RP	Recommended Plan
Service	United States Fish and Wildlife Service
USACE	United States Army Corps of Engineers
VEC	Valued Ecosystem Component

WDFW	Washington Department of Fish and Wildlife
WDE	Washington State Department of Ecology
WRDA	Water Resources Development Act

I. INTRODUCTION

The U.S. Army Corps of Engineers, Seattle District (USACE) is proposing to implement the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) in Puget Sound, Washington. Nearshore ecosystems have been severely degraded throughout Puget Sound and have been the focus of significant attention by federal, state, local, tribal, and private entities. Numerous species of anadromous fish, migratory birds, and other trust resources are dependent upon habitats provided by nearshore ecosystems. Western Washington tribes have asserted that habitat loss, including impacts to nearshore ecosystems, threatens salmon recovery efforts and the treaty protected rights that depend upon healthy salmon populations (NWIFC 2011). USACE proposes to implement a suite of actions to be delivered through PSNERP intended to restore ecosystem structure, function, and processes in Puget Sound for the benefit of native salmonids and other aquatic species.

USACE in coordination with local cost-share sponsors (State of Washington, represented by the Washington Department of Fish and Wildlife), stakeholders, and the U.S. Fish and Wildlife Service (Service), identified numerous potential restoration activities throughout the General Investigation (GI) study area. The study area encompasses the entirety of lower watersheds draining into Puget Sound including floodplains and river deltas (see Section II.B. for more detail) as well as the intertidal and nearshore subtidal shoreline of Puget Sound. USACE and their partners in the GI completed a comprehensive assessment of ecosystem conditions and nearshore habitat loss throughout the approximately 2,466 miles of Puget Sound shoreline (USACE 2014). This analysis informed the articulation of a problem statement and associated planning objectives to address observed patterns of ecosystem degradation. Approximately 700 restoration project concepts were evaluated against project objectives and ultimately 36 projects were carried through preliminary design and engineering. Subsets of these projects were used to define alternatives that are the subject of a Draft Integrated Feasibility Report / Environmental Impact Statement (FR/EIS) intended to represent the range of alternatives of a National Environmental Policy Act (NEPA) assessment. USACE in conjunction with local sponsors identified a recommended plan (RP) intended to represent the agency's preferred alternative (APA) of a NEPA assessment.

The purpose of this Fish and Wildlife Coordination Act (FWCA) Report is to evaluate possible effects to fish and wildlife of proposed PSNERP projects identified as the APA/RP. The report includes recommended actions for minimizing deleterious consequences and maximizing benefits. In doing so, this report broadly evaluates effects within the study area of each alternative in the FR/EIS in order to concur with or dispute selection of the APA/RP. The report concludes with an overall recommendation from the Service supporting the tiered approach to implementation of restoration projects proposed by USACE.

Our comments and recommendations have been prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) (FWCA). This is a draft report and does not constitute the final report of the Secretary of the Interior required under Section 2(b) of the FWCA.

A. Coordination with Federal and State Agencies and Tribal Governments

Since the initiation of the GI in 2001 by USACE and the Washington Department of Fish and Wildlife (WDFW) stakeholder involvement and agency coordination have been vital components of PSNERP. A multi-disciplinary, multi-agency Project Delivery Team (PDT) has supported USACE and WDFW with development and execution of all aspects of the GI. The PDT comprises six standing teams with agency, non-governmental organization and other representatives serving on the Executive Committee (EC), Steering Committee (StC), Project Management Team (PMT), Nearshore Science Team (NST), Implementation Team (IT), and Stakeholder Involvement Team (SIT). A comprehensive list of PDT composition and affiliation, including Service participation, is provided in the FR/EIS (USACE 2014).

USACE has engaged in formal and informal coordination with the federally recognized tribes of the Puget Sound throughout the feasibility phase. In addition to direct tribal coordination the PDT has also included representation from the Northwest Indian Fisheries Commission. Coordination with tribes is ongoing and USACE will continue to offer opportunities to meet informally or through government-to-government meetings. Most recently USACE has met with tribes most directly affected by proposed projects. Tribal coordination will continue throughout the feasibility phase, preconstruction engineering and design, and construction.

Many project partners, the Washington State Governor, and five members of Congress have provided letters that express their support for PSNERP.

B. Project Authority, Purpose, and Scope

Proposed actions are the outcome of the Puget Sound Nearshore Ecosystem Restoration Study, which USACE is conducting under the authority of the River and Harbor Act of 1962 (Public Law 87-874). USACE initiated the reconnaissance phase in September 1999 and determined that there was sufficient federal interest to advance to the next stage of conducting GI. WDFW, as the non-Federal sponsor, and USACE initiated the feasibility phase of the study on September 25, 2001.

The purpose of the GI was to evaluate ecosystem degradation in the Puget Sound Basin; to formulate, evaluate, and screen potential solutions to these problems; and to recommend sites that have a Federal interest and the support of a local entity willing to provide necessary local cooperation. The Puget Sound Nearshore Study aims to address the continuing degradation of nearshore ecosystems through restoration of natural processes (e.g. sediment movement and tidal hydrodynamics) and restoration of coastal wetlands, embayments, and beaches.

The PDT identified three goals for restoration of the Puget Sound nearshore zone:

- Restore and protect nearshore processes that sustain the ecological health of Puget Sound;
- Restore and protect ecosystem functions and structures that support valued ecosystem components (VECs); and
- Increase understanding of the Puget Sound nearshore zone to improve restoration and protection actions.

C. Prior Efforts and Coordination with the Service

USACE initiated consultation with the Service under FWCA in 2002, shortly after the start of the GI Feasibility Phase. The Service has provided three Planning Aid Letters (2005, 2007, and 2011) and provided a Service biologist to be a member of the NST and the StC. The Service has been supportive of Nearshore Study efforts and USACE has been incorporating Service technical advice into project planning, strategies, objectives, site screening, and conceptual designs.

A Service report (USFWS 2011) supporting the formulation of a Nearshore Study preferred alternative includes information on federally listed threatened or endangered species under the Endangered Species Act (ESA) for each of the 18 sites evaluated. In our report the Service provided a species list and a species-specific and general conservation measures from the Programmatic Biological Assessment and Biological Opinion for Fish Passage and Restoration Actions in Washington State (NMFS and USFWS 2008). USACE, NMFS, and the Service are revising this programmatic consultation to cover all types of actions proposed by the Nearshore Study team with expected completion in 2016.

D. Prior Studies and Reports

USACE has conducted other GIs and has implemented other ecosystem restoration projects around Puget Sound prior to initiating the Puget Sound Nearshore Study (see Tables 1.7.1 and 1.7.2 from USACE 2014). These include the Puget Sound and Adjacent Waters Restoration Program (PSAW) which was authorized by §544 of the Water Resources Development Act (WRDA) of 2000. While this authority has not been fully utilized due to the lack of a supporting GI, directed funds have been used to implement several nearshore restoration projects. Projects implemented under PSAW include the Qwuloolt ecosystem restoration project and Seahurst Beach restoration Phases 1 and 2. PSAW authorization includes an upper limit of $40M in federal funding available through the life of the authority and per-project caps ($5M federal funding). Projects proposed under PSNERP would exceed these limits thus rendering PSAW insufficient to meet the needs identified by the PSNERP GI. Similarly, Corps of Engineers Continuing Authorities Programs (CAPs), including §1135 of WRDA 1986 and §206 of WRDA 1996, have been used to implement smaller restoration projects in Puget Sound and contributing watersheds. These programs are also constrained in their ability to deliver large-scale restoration actions proposed by PSNERP with limits on per-project federal funding.

In support of the GI PSNERP produced 24 peer reviewed technical reports. These reports documented study approach and results as well as establishing the conceptual framework upon which this ecosystem approach to restoration was based. Documents can be accessed on the program's website: http://www.pugetsoundnearshore.org/technical_reports.html.
A subset of these technical reports forms the basis for the USACE definition of planning objectives and project selection strategy, and is highlighted in the Chapter 12 of the FR/EIS (Annotated Bibliography). These principal PSNERP technical reports include:

> *Principles for Strategic Conservation and Restoration*. This report summarizes principles of landscape ecology and conservation biology that are applicable to the conservation and restoration of nearshore ecosystems in the Puget Sound and are

intended to guide the prioritization of sites and actions by the PDT and others (Greiner 2010).

Historical Change and Impairment of Puget Sound Shorelines: Atlas and Interpretation of Puget Sound Nearshore Ecosystem Restoration Project Change Analysis. This report is a comprehensive, spatially-explicit analysis (Change Analysis) of net changes to nearshore ecosystems of Puget Sound—its beaches, estuaries, and deltas—since its earliest industrial development. This Change Analysis report provides the spatially explicit analysis that identifies impacts to Puget Sound. These data were used to both quantify Sound-wide conditions and identify site-specific restoration needs and opportunities (Simenstad *et al.*, 2011).

Implications of Observed Anthropogenic Changes to the Nearshore Ecosystems in Puget Sound. This report presents a synthesis of the most significant physical changes to the nearshore ecosystems of Puget Sound and implications of these changes to ecosystem functions, goods, and services. This document served as the basis for definition of the Problem Statement for PSNERP and the rationale for ecosystem restoration objectives (Fresh *et al.*, 2011).

Strategies for Nearshore Protection and Restoration in Puget Sound. This report presents a model for integrating change analysis and estimating ecosystem degradation. This model is applied to evaluate potential delta, beach, barrier embayment, and coastal inlet restoration sites (Cereghino *et al.*, 2012)

The basis for design concepts and initial engineering for a suite of 36 potential nearshore restoration projects is presented in a contractor's report to the study: *Strategic Restoration Conceptual Engineering — Final Design Report* (ESA 2011), also available on the program website: http://www.pugetsoundnearshore.org/cdr.html

There is also a series of four documents produced by the Service with contractor support to supplement Nearshore Study conceptual design work and includes the following:

PSNERP Strategic Restoration Conceptual Design Preliminary Environmental Contaminants, Cultural Resource, and Endangered Species Site Evaluations. This report provides baseline information on environmental contaminants, cultural resources, endangered species, and conservation measures for 36 candidate restoration sites under consideration by the Nearshore Study team. Environmental Site Assessment Level 1 Survey Checklists were also completed for each of the 36 sites (USFWS 2011).

A Cultural Resources Assessment of the Puget Sound Nearshore Ecosystem Restoration Projects (PSNERP) Area, NW Washington, Task - Literature and Data Review and Synthesis. This report presents the results of cultural resource record/literature searches for 36 candidate restoration sites under consideration by the Nearshore Study team. An assessment of the potential for cultural resources within each project area is made based on a review of the environmental, cultural, and archaeological data. Recommendations are provided on where future archaeological efforts should be made for each of the 36 areas of potential effect.

A Cultural Resources Assessment of the Puget Sound Nearshore Ecosystem Restoration Projects (PSNERP) Area, NW Washington - Task 2: Historic Context of Agricultural Dikes. This report is a regional-scale historic context of late nineteenth and early twentieth century agricultural development within the Puget Sound region of northwest Washington. This report documents the history of development of dikes built in the region, and proposed evaluation criteria to use as a management tool for Service and others to use for future compliance with Section 106 of the National Historic Preservation Act.

Cultural Resources Field Inventory for 15 Action Areas within the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) Area, NW Washington. This report presents the findings of both surface surveys and subsurface investigations concentrated on project components within areas previously determined to have high to moderate probabilities for cultural resources. The purpose of the inventory was to provide (1) descriptions of cultural resources in the area of potential effect (APE) for Nearshore Study undertakings, (2) determinations concerning the eligibility of cultural resources to the National Register of Historic Places (NHRP) and the Washington Heritage Register (WHR), and (3) recommendations on how to avoid or mitigate impacts to historic properties. This report was completed for subset of the 36 candidate restoration sites and only on lands where access had been granted by the landowner.

II. DESCRIPTION OF STUDY AREA AND ACTION AREA

A. Puget Sound Context

The waters of Puget Sound cover nearly 17,000 square miles, a watershed collectively referred to as the Puget Sound Basin. This basin is bordered on the east by the Cascade Mountains and on the west by the Olympic Mountains. The Puget Sound Nearshore Study area consists of the nearshore zone of the Puget Sound Basin including Puget Sound, the Strait of Juan de Fuca, and southern portions of the Strait of Georgia that occur within the borders of the United States (Figure 1). Headwaters for two of these basins originate just north of the border in Canada. The study area shoreline is approximately 2,466 miles in length. The basin is roughly 80 percent land and 20 percent water. The total water area covers nearly 3,090 square miles at mean high water. The region's soils are characterized as immature, being less than 10,000 years old. Typical of fjords, water depths in Puget Sound increase rapidly from shore, with an average depth of 200 feet and a maximum depth of more than 1,200 feet. (USACE 2014).

The structures and habitats of Puget Sound are a complex mixture of beaches and bluffs, estuaries, lagoons, river deltas, and rocky coastlines. Shipman (2008) defines a classification of Puget Sound nearshore landforms that reflects the primary role of geomorphic processes in shaping the landscape. This classification system identifies four geomorphic systems that form the foundation of this shoreline classification. Three of these systems (beaches, embayments, and river deltas) reflect differences in the roles of waves, tides, and rivers in transporting sediment and shaping the coastline. The most common Puget Sound shoreline type consists of mixed sand and gravel beaches backed by high coastal bluffs. Other sediment dominated shoreline environments include large river deltas, tidal flats, salt marshes, and estuaries. A fourth system, rocky coasts, is characterized primarily by the limited availability of mobile sediment and the lack of major depositional landforms. Rocky-bottom habitat is less common than soft-bottom habitat and is confined mostly to northern Puget Sound. The shorelines of the San Juan Islands exemplify rocky coast systems in Puget Sound (Shipman, 2008).

Widely varying fish communities utilize Puget Sound nearshore ecosystems where individuals spend all or portions of their lives. In general they are grouped as demersal/reef fish, forage fish, and anadromous fish. Fifteen native species of anadromous fish use marine and freshwater habitats of the Puget Sound area. These include all five species of Pacific salmon (pink - *Oncorhynchus gorbuscha*, coho – *O. kisutch*, chum – *O. keta*, Chinook – *O. tshawytscha*, and sockeye – *O. nerka*), two species of native char (bull trout - *Salvelinus confluentus* and Dolly Varden – *S. malma*), steelhead (*O. mykiss*) and coastal cutthroat trout (*Oncorhynchus clarkii clarkii*), longfin smelt (*Spirinchus thaleichthys*), eulachon (*Thaleichthys pacificus*), white (*Acipenser transmontanus*) and green sturgeon (*A. medirostris*), and Pacific lamprey (*Entosphenus tridentatus*) and river lamprey (*Lampetra ayresii*). Numerous anadromous fish populations are listed as threatened or endangered under the ESA in Puget Sound, with habitat loss cited as a threat limiting species recovery.

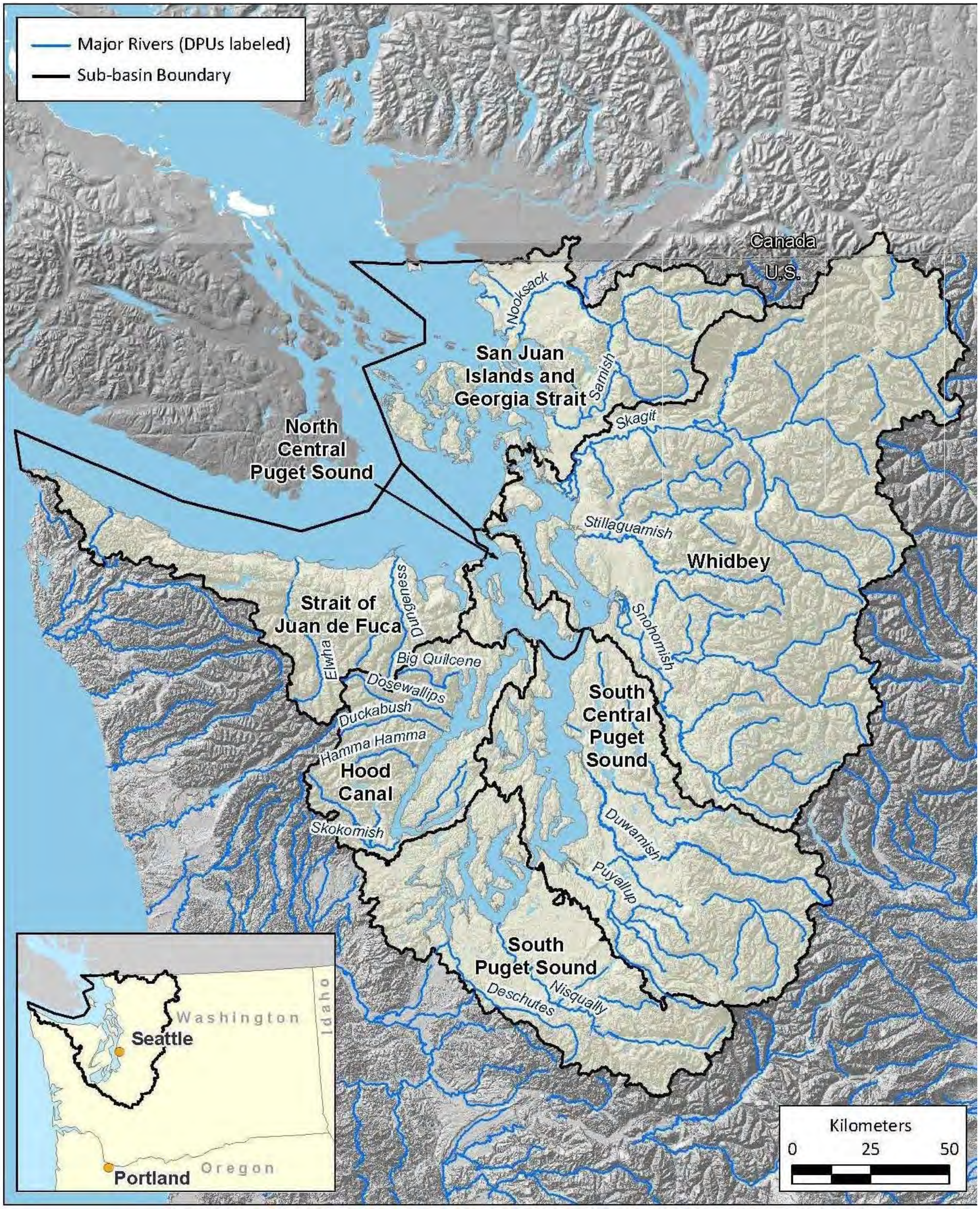


Figure 1: Puget Sound Nearshore Study Area and Oceanographic Sub-Basins (USACE 2014).

B. Study Area and Action Area

For the purpose of this project the study area has been divided into seven sub-basins based on geographic features including oceanographic sills and bathymetry, common issues and interests of the entities in these areas, and water flow patterns (Figure 1). Generally consistent with other delineations of greater Puget Sound, these sub-basins include:

- Strait of Juan de Fuca
- San Juan Islands – Georgia Strait
- Hood Canal
- North Central Puget Sound
- Whidbey
- South Central Puget Sound
- South Puget Sound

Five of these sub-basins are included within the watershed area of Puget Sound proper. The other two study area sub-basins include areas of the Strait of Juan de Fuca and the Georgia Strait seaward to the international boundary. Within these sub-basins, the study area consists of the entire extent of the nearshore zone, which includes beaches and the adjacent tops of coastal banks or bluffs, the shallow waters in estuarine deltas, and tidal waters from the head of tide to a depth of approximately 10 meters relative to the mean lower low water (MLLW) level (Figure 2). This contiguous band around the shoreline of the entire study area hosts diverse ecosystems that are shaped by coastal geomorphology and local environmental conditions, such as wave energy and salinity.

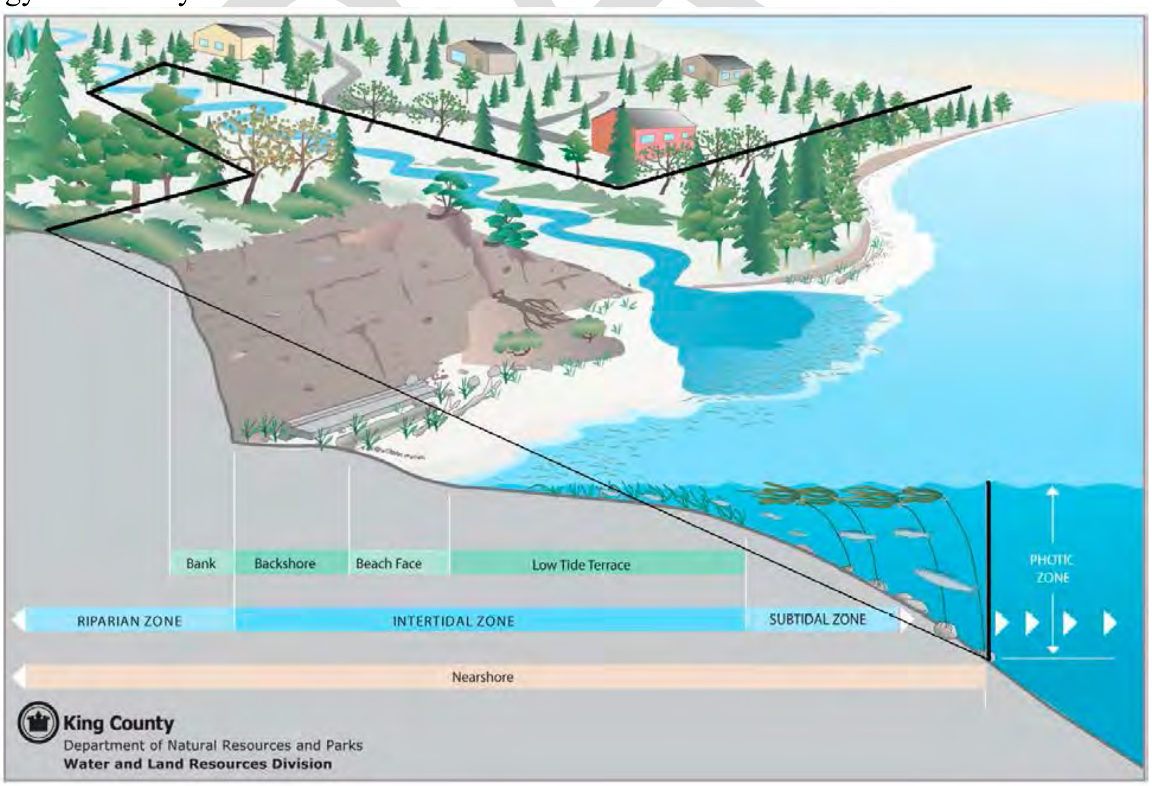


Figure 2: Generalized Extent of Nearshore Ecosystems in Puget Sound.

III. FISH AND WILDLIFE RESOURCES AND PLANNING OBJECTIVES

A. General Fish and Wildlife Concerns

Led by an interdisciplinary Nearshore Science Team, USACE, WDFW, and other project partners completed a comprehensive, spatially explicit assessment of the extent of change throughout Puget Sound's shorelines, estuaries, and deltas. This Change Analysis (Simenstad *et al.,* 2011) quantified structural and physical change between historical (ca. 1850s – 1890s) and current (ca. 2000 – 2006) conditions along the entire 2,466 miles of Puget Sound shoreline and corresponding 13,930 square miles of drainage area. Observed changes were subsequently analyzed to characterize the impacts of shoreline and watershed alterations on nearshore ecosystem processes, identify the fundamental causes of the observed ecosystem degradation, and assess which of the causes most need to be addressed in this feasibility study through restoration and protection alternatives (Schlenger *et al.,* 2011a). Conceptual models were used to connect alterations of critical ecosystem processes and the resulting habitat loss to a representative subset of socially relevant fish and wildlife resources referred to as "valued ecosystem components" (VEC's). A series of white papers authored by species experts summarized scientific literature documenting these species/habitat relationships for VEC's, including:

- Kelp and eelgrass (Mumford 2007)
- Marine riparian vegetation (Brennan 2007)
- Native shellfish (Dethier 2006)
- Forage fish (Penttila 2007)
- Juvenile salmon (Fresh 2006)
- Orca whales (Kriete 2007)
- Nearshore birds (Buchanan 2006)
- Great blue herons (Eissinger 2007)

Integration of these observed changes in nearshore ecosystem, identification of fundamental causes of degradation, and documented species/habitat relationship provided the technical basis for the definition of a problem statement. In the USACE planning process followed in the GI study, an understanding of ecosystem problems leads to establishment of planning objectives, against which restoration opportunities can be evaluated for effectiveness, efficiency, and feasibility. The problem statement defined by the Nearshore Science Team for the study is summarized by Fresh *et al.,* (2011):

1. Large river deltas have been widely impacted by multiple alterations that significantly limit the size of the estuaries and degrade the nearshore ecosystem processes that support them.
2. Many coastal embayments, including open coastal inlets, barrier estuaries, barrier lagoons, and closed lagoons/marshes, have been eliminated or disconnected from Puget Sound by the placement of fill, tidal barriers, and other stressors.
3. Stressors along beaches and bluffs have disconnected sediment inputs and altered sediment transport and accretion along long sections of the Puget Sound shoreline.

4. Estuarine wetlands have been extensively lost throughout Puget Sound including a loss of 56% in the 16 largest river deltas. In particular oligohaline and freshwater tidal wetlands have been almost completely eliminated (loss of 93%) in Puget Sound.
5. The shoreline of Puget Sound has become much shorter and simpler, as well as more artificial. Since Europeans began settling the region, Puget Sound's shoreline has had a net decline of 15% in length. Artificial landforms now represent 10% of the shoreline of Puget Sound.
6. Large portions of Puget Sound have been altered by multiple types of changes that may cumulatively combine to severely degrade nearshore ecosystem processes. Approximately 40% of the shoreline of Puget Sound has been altered by one or more stressor (e.g., overwater structures, roads, marinas, fill, armoring etc.).

1. Large River Deltas

PSNERP study documents conclude that barriers to tidal hydrology and shoreline armoring were the primary stressors impacting river delta ecosystems in Puget Sound. All of the 16 largest deltas of Puget Sound have been extensively modified with an estimated total loss of shoreline of 109 miles or 27% from historical conditions. Changes to the wetlands of the large deltas have been especially dramatic. In aggregate 56% of the historical wetlands (57,823 acres) of Puget Sound river deltas have been eliminated (Simenstad *et al.,* 2011).

USACE (2014) notes that these impacts have diminished the availability of habitat for numerous plant and animal species. Shorebirds that utilize estuarine tidal flats for feeding, roosting and reproduction have been adversely impacted by loss of river delta habitats (Buchanan 2006). Diking and filling of delta ecosystems has decreased tidal channel habitat, restricting fish and wildlife to less area. The Duwamish and Puyallup estuaries have been simplified to a single channel, concentrating fish, limiting ability to avoid predation, and reducing overall carrying capacity. While less severe than these urban estuaries, all large river deltas elsewhere in Puget Sound have been similarly degraded with the simplification of historically complex and dynamic tidal channel systems.

2. Coastal Embayments

Throughout Puget Sound small coastal embayments have been eliminated by filling or have been disconnected from the nearshore zone by fill causeways, tide gates, or diversions. PSNERP analysis mapped the location of 884 historical embayments. The current condition includes 579 mapped embayments, a net loss of 305 of these critical "pocket estuaries" in Puget Sound. Embayments historically accounted for 689 miles of Puget Sound shoreline (23%) but now account for 375 miles of shoreline (15%); this represents a decline in length of 46%. Many remnant embayments have been modified, reduced in area by encroaching fill or impacted by shoreline armoring. Approximately 18% of the remaining shoreline associated with coastal embayments is armored (Simenstad *et al.,* 2011).

The sheltered condition of embayments makes them important habitat for native shellfish, fish, and shorebirds. Embayments provide cover and a food-rich environment for several species of juvenile fish during their migration along the shore from natal streams to the Pacific Ocean. Recent evidence from the Whidbey Sub-basin shows that large numbers of post-larval and juvenile surf smelt rear in "pocket estuaries" (Beamer *et al.,* 2006). During late winter and early spring large numbers of juvenile Chinook and chum salmon rear in pocket estuaries of the Whidbey Sub-basin.

3. Beach and Bluff Systems

Puget Sound beaches have been broadly impacted by modifications with armoring (seawalls and revetments) observed as the most pervasive direct alteration. Armoring occurs along one-third of bluff-backed beaches and over a quarter of barrier beaches; 34% of all bluff-backed beaches are armored along more than half of their length. Only 25% of all bluff-backed beaches are completely unarmored. The distribution of armoring associated with beaches varies greatly among sub-basins with nearly 63% of the shoreline armored along the highly developed shores of south central Puget Sound between Tacoma and Everett. In addition to armoring, roads and nearshore fill are the most significant stressors affecting beaches in Puget Sound (Schlenger *et al.,* 2011a)

Shoreline armoring and other changes to beaches and bluffs have resulted in the loss of sediment supply (sand and gravel). The resulting interruption of sediment transport processes has impacted beaches and increased vulnerability to wave erosion and changes in sea level. Disruptions in sediment processes can also change the physical characteristics of a beach, including changes in sediment composition (e.g. coarsening), steepening of beach slopes, and narrowing of beach width (Shipman *et al.,* 2010). These changes decrease the quantity of beach habitat available, and sediment composition changes can lead to decreased availability of fine grained substrates needed for shellfish, probing shorebirds, and beach-spawning fish.

In addition to loss of fine-grained material that beach-spawning fish require, armoring can affect reproduction of forage fish in several ways. Armoring low in the intertidal zone can directly eliminate the spawning habitat of several species (e.g. surf smelt and sand lance) that spawn on the upper beach (Penttila, 2007). Armoring can also increase sediment temperatures on the upper beach where shading by natural shoreline vegetation has been removed; reducing survival of incubating embryos (Rice, 2006). In addition to effects on reproduction of forage fish armoring can affect feeding behavior of juvenile forage fish (as well as juvenile Pacific salmon) that often feed in shallow water at high tide. When shoreline modifications extend lower on the shore the truncation of intertidal shallow water habitat by armoring reduces foraging by juvenile fish on riparian insects (Toft *et al.,* 2007).

4. Estuarine Wetlands

Eighty percent of historic Puget Sound estuarine wetlands were associated with the 16 large deltas; the remainder were associated with embayments. Historically delta system wetlands supported nearly 103,000 acres of estuarine wetlands compared to the current 45,220 acres, a decline of 56%. Coastal embayments have been similarly impacted with a loss of 69% of historic wetlands; only 8,229 acres remain. Tidal freshwater and oligohaline transitional wetlands (i.e. tidal forests and swamps) have been nearly eliminated; over 90% of these two wetland types have been lost throughout Puget Sound (Simenstad *et al.,* 2011). Based on land cover projections from Bolte and Vache (2010) losses of tidal wetlands are expected to continue.

5. Shoreline Simplification

The shoreline of Puget Sound has become shorter and simpler (i.e. straighter, less complex) over the past 150 years. Throughout the Puget Sound basin the net loss of shoreline length has been 431 miles, resulting in a current shoreline that is about 15% shorter than it was historically. While more than 600 miles of natural shoreline was eliminated, 229 miles of artificial shoreline (i.e. seawalls backed by fill) was added. Although the length of shoreline classified as artificial was negligible historically artificial shoreline built by a modern industrial society now represents about 10% of the total length of shoreline in Puget Sound (Simenstad *et al.,* 2011).

6. Cumulative Effects

Many of the altered shoreline segments around Puget Sound have not just one, but multiple types of human-caused alterations. Only 14% of the project area is not impacted by a shoreline stressor. Of the nine shoreline stressors considered in the Nearshore Study armoring is clearly the dominant stressor, occurring in 78% of all shoreline segments analyzed. Although no shoreline segment was impacted by all nine stressors, 81% of segments have more than one type of stressor. It is highly likely that cumulative effects are negatively affecting nearshore ecosystem functions (Simenstad *et al.,* 2011).

B. Planning Objectives

Based on the analysis described above and in direct response to the identified problems of observed nearshore ecosystem degradation, the study team developed four planning objectives with associated sub-objectives to guide the formulation of alternative plans (USACE 2014). The planning objectives articulate the goal of PSNERP to restore the physiographic processes that sustain the Puget Sound nearshore ecosystem and its broad array of nationally and regionally significant resources. Through process restoration the project aims to sustainably address impairment to the nearshore zone's ability to deliver ecosystem functions, goods, and services, and to support valued ecosystem components. Planning objectives most directly address the first three problem statements described above and indirectly address the others. The planning objectives are:

1. Restore connectivity and size of large river delta estuaries.
2. Restore the number and quality of coastal embayments.
3. Restore the size and quality of beaches.
4. Increase understanding of natural process restoration in order to improve effectiveness of project actions.

C. Current Status of Fish and Wildlife Resources

1. Federally Listed Species

In coordination with the Service, USACE has identified 13 fish and marine mammal within the study area listed as threatened or endangered under the Endangered Species Act. Information provided by the Service was used by USACE to analyze potential impacts for proposed restoration actions (USFWS 2011). Recovery plans for eight of the ESA-listed species have been or are being developed by the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Fish and Wildlife Service. Actions proposed by the Nearshore Study support salmon recovery consistent with NOAA's salmon recovery plans.

Federal ESA-listed species and/or the habitat suitable to support these species which may occur in the study area include the following:

- Bocaccio
- Canary rockfish
- Yelloweye rockfish
- Eulachon
- Hood Canal summer chum salmon
- Puget Sound Chinook salmon
- Coastal/Puget Sound bull trout
- Puget Sound steelhead trout
- Green sturgeon
- Southern resident killer whale (Orca)
- Humpback whale
- Marbled murrelet
- Golden paintbrush

Information on listing status, use of the nearshore zone of Puget Sound, and factors that have led to their decline is presented in the FR/EIS and discussed in further detail in supporting documents, including *Appendix F: Supplemental Information on the Affected Environment* (USACE 2014). Pertinent information for these ESA listed species is summarized below.

a. Boccacio, Canary, and Yelloweye Rockfish

Bocaccio (*Sebastes paucispinis*) are a rockfish species that range from northern British Columbia to central Baja California. Pelagic juveniles are known to occur along margins of nearshore ecosystems containing rocky substrate with kelp or sandy areas supporting eelgrass. Primary threats are associated with adult mortality from direct fishing and bycatch of this long-lived species. Overharvest led to recruitment failure in the early 1900s. Due to declining numbers and increased rarity, bocaccio is ESA-listed as endangered (NMFS 2009).

Canary rockfish (*Sebastes pinniger*) range from northern British Columbia to northern Baja California. Yelloweye rockfish (*Sebastes ruberrimus*) have an overlapping range with a slight northward shift in distribution from the eastern Aleutian Islands to Northern California. Both species can be very long-lived, with adult canary rockfish potentially living to be 80+ and yelloweye rockfish slightly longer. Adult canary rockfish occupy relatively deep marine environments, observed in depths of 250 to 650 meters in areas with considerable current around pinnacles and high relief rock. Yelloweye rockfish are associated with somewhat shallower, similar rocky marine areas with refuge such as crevices, caves, and boulder piles. Occasionally they will wander onto mudflats adjacent to rocky areas in shallower waters. As with boccacio, juveniles are pelagic drifting with coastal currents over nearshore areas. Both rockfish species are ESA-listed as threatened due to declining numbers and increased rarity. Threats to these species of rockfish are the same as those for bocaccio. There are no Federal recovery plans for these three species of rockfish. WDFW has a Rockfish Conservation Plan that focuses on managing fisheries, establishing marine conservation areas, reporting and removing fishing gear, and exploring hatchery program and artificial reefs. They also publish recommendations to limit bycatch and mortality from recreational angling (WDFW 2012).

b. Eulachon

Eulachon (*Thaleichthys pacificus*) are a small anadromous fish that range from California to Vancouver Island including northern Puget Sound. Threats to eulachon include habitat loss and degradation of spawning grounds via dams, siltation, and dredging, and potentially chemical pollution (Gustafson *et al.,* 2010). The southern Distinct Population Segment (DPS) of eulachon is ESA-listed as threatened (NMFS 2010). There are no formal recovery plans for eulachon.

Eulachon spend most of their lives in the nearshore zone before migrating into the major river systems along the west coast of North America to spawn in the early spring (late February to May). No spawning areas are documented in Puget Sound. The only documented eulachon spawning near the project area is the Elwha River in the Strait of Juan de Fuca (designated as critical habitat) (NMFS 2011). It is believed that eulachon return to the estuary of their birth but it is not known if they return to the same river from where they hatched. After hatching larvae are carried downstream and out into the estuary where they feed on zooplankton.

c. Hood Canal Summer Chum Salmon

Chum salmon (*Oncorhynchus keta*) range from Monterey, California to the Arctic coast and Beaufort Sea along the west coast of North America. While chum stocks in greater Puget Sound are relatively stable six of the eight summer chum salmon stocks within the Hood Canal Evolutionarily Significant Unit (ESU) were decreased in abundance with return stocks below viable replacement levels in the early 1990's (Fresh 2006). Threats to Hood Canal summer-run chum salmon include nearshore habitat loss and degradation, harvest, and low water flows in Hood Canal watersheds (Johnson *et al.,* 1997). Based on declining run sizes and threats to continued survival of this unique run the Hood Canal summer-run chum salmon Evolutionarily Significant Unit (ESU) was ESA-listed as threatened in 1999 (NMFS 2005a). Subsequent harvest rate declines and recovery action implementation have contributed to stabilized and increasing run sizes. Reintroduction programs also appear to be succeeding with natural-origin spawners returning to two streams where summer chum had been extirpated for more than 10 years (Adicks *et al.,* 2007).

Unlike other salmonids that rear in natal freshwater streams and rivers juvenile chum salmon migrate quickly to marine waters after hatching. When the fry first enter saltwater they assemble in small schools and reside close to shore where they can avoid predators and forage on epibenthic prey. Juvenile chum salmon often use small coastal embayments and eelgrass beds as foraging areas and refuge from predators. As the young fish grow they gradually move to deeper water and generally migrate towards open ocean. Some chum salmon juveniles will remain in the nearshore zone until late in their second year before migrating to the open ocean. These generalized life history characteristics make chum salmon relatively more dependent upon nearshore ecosystems for juvenile and adult growth and survival (Fresh 2006).

d. Puget Sound Chinook Salmon

Chinook salmon (*Oncorhynchus tshawytscha*) range from central California to Kotzebue Sound, Alaska along the coast of North America. Abundance estimates for the Puget Sound ESU east of the Elwha River indicate that most populations are at a small fraction of their historic levels; several populations within the Nooksack, Lake Washington, mid-Hood Canal, Puyallup, and Dungeness basins have returns of fewer than 200 adult fish signifying extinction risk. Only the upper-Skagit stocks have returns of native (non-hatchery) fish in excess of 10,000 adults. A 1998 status review of these populations indicated a decline of 1.1 percent per year; more recent calculations indicate a slower decline (Shared Strategy 2007). Identified threats to Puget Sound Chinook salmon include degradation and loss of estuarine wetlands utilized by juveniles, sedimentation of upper tributary spawning reaches from forest management, and fish passage barriers and altered hydraulic flows from dams that limit access to habitat (Good *et al.*, 2005). The Puget Sound Chinook salmon ESU is ESA-listed as threatened (NMFS 2005a). Critical habitat exists throughout Puget Sound and its tributaries.

Chinook within the range of the study area exhibit a wide range of variability in life history including duration of freshwater residence for juveniles following emergence, variation in age of downstream migration (both within and between watershed-specific stocks), ocean distribution and ocean migratory patterns, and variation in age of spawning migrations. Downstream migration of juveniles and associated relative importance of freshwater or estuarine habitats for rearing can be generalized as stream-type and ocean-type life histories (Healey 1982). Stream-type populations may rear as juveniles in freshwater streams for one to three years prior to migrating downstream to marine waters. Ocean-type populations migrate within their first year relying on estuarine and nearshore marine habitats for juvenile rearing, including foraging and refuge from predation. Among the ocean-type populations of the Skagit River, Beamer and Larsen (2004) found a density-dependent relationship and displacement of fry migrants due to lack of estuarine habitat capacity. Juveniles arriving later in the season were unable to access high quality tidal channel and marsh habitats because earlier migrants occupied these areas. These late arrivals were forced downstream into marine nearshore areas with lower prey resource availability and higher predation rates, decreasing survival rates for this segment of the population. Presumably greater abundance of estuarine habitats would have led to overall increases in juvenile survival, and by extrapolation, adult returns and run size.

The Shared Strategy for Puget Sound facilitated development of a plan for Puget Sound salmon recovery organized by local watershed planning areas. The recovery plan has been adopted by NMFS and focuses on habitat restoration, harvest regulations, and interaction with hatchery fish (Shared Strategy 2007). Responsibility for the oversight of Puget Sound Chinook recovery plan implementation transferred to the Puget Sound Partnership in 2008.

e. Coastal/Puget Sound Bull Trout

Bull trout (*Salvelinus confluentus*) are native char of Washington, Oregon, Idaho, Nevada, Montana, and western Canada. Combinations of factors including habitat degradation, expansion of exotic species, and exploitation have contributed to the decline and fragmentation of bull trout populations. Puget Sound bull trout are ESA-listed as threatened (USFWS 1999). Critical habitat exists throughout much of Puget Sound and its tributaries. The Federal Draft Recovery Plan for Puget Sound Bull Trout focuses primarily on habitat including water quality and temperature (USFWS, 2004).

Eight bull trout core areas have been defined for watersheds along the eastern side of Puget Sound (Chester Morse Lake, Upper Skagit, Lower Skagit, Nooksack, Puyallup, Snohomish/Skykomish, Stilliguamish, and Chilliwack). Six populations on the Olympic Peninsula are limited to the Strait of Juan de Fuca and Hood Canal (Dungeness, Elwha, Hoh, Queets, Quinault, and Skokomish). Each core area has associated populations within it that exhibit varying life history types and spawning areas. Currently, no bull trout populations are known to use tributaries or estuaries on the western side of Puget Sound.

Bull trout are a wide-ranging species with multiple life history forms and a complex population structure reflecting a high degree of local site fidelity (Kanda and Allendorf 2001) and substantial genetic divergence between populations (Dunham and Rieman 1999; Spruell and Maxwell 2002). This diversity makes generalizing bull trout use of nearshore areas difficult. Bull trout have migratory and resident life history strategies. Residents spend their entire life cycle in the tributary streams in which they spawn and rear, whereas migratory forms rear in freshwater and then migrate to either a lake (adfluvial), a river (fluvial), or to saltwater (anadromous) (USFWS 2004). Unlike Pacific salmon anadromous bull trout are year-round residents of the Puget Sound basin. In marine areas sub-adult and adult bull trout commonly forage in shallow nearshore habitat and natal and non-natal estuaries along the shoreline. Primary prey items include surf smelt, sand lance, Pacific herring and juvenile salmonids.

f. Puget Sound Steelhead

Steelhead (*Oncorhynchus mykiss*) range from Kamchatka in Asia, east to Alaska, and south along the Pacific Coast to southern California (Busby *et al.,* 1996). Rapid declines have been observed over the past 10-plus years in Puget Sound steelhead populations with marked decreases observed within the Strait of Juan de Fuca, Bellingham Bay, Hood Canal, and south Puget Sound. Speculated causes of these declines include climate change, hatchery production, harvesting, and increased UV radiation (Hard *et al.,* 2007). Puget Sound steelhead are ESA-listed as threatened (NMFS 2007b). There are currently no recovery plans for Puget Sound steelhead.

Relative to the longer nearshore rearing periods of other juvenile salmonids, juvenile steelhead smolts generally outmigrate from natal streams to offshore areas rapidly. Once in saltwater, they quickly move into deeper water, and the transit time through the Puget Sound to the ocean is brief (15 to 25 days). Their diet while in Puget Sound is largely unknown due to lack of samples, but they are thought to eat squid and small fish (Goetz, pers. comm. 2012) Few reference sources discuss estuarine use by steelhead adults.

g. Green Sturgeon

Green sturgeon (*Acipenser medirostris*) are broadly distributed from Mexico to Alaska along the coast of North America. After completion of a study of its status (Adams *et al.,* 2002) NMFS determined that the green sturgeon is comprised of two DPSs that qualify as species under the ESA. In 2002 NMFS determined that the Northern distinct population segment (DPS) was not warranted for listing as threatened or endangered (NMFS 2002). The Southern DPS of green sturgeon is ESA-listed as threatened (NMFS 2006a). Threats to the listed entity are primarily attributed to reduction in spawning area to a limited number of rivers including the Sacramento, Rogue, and Klamath; limiting factors are not closely tied to Puget Sound. In Washington, critical habitat was designated for green sturgeon along the outer coast, the Strait of Juan de Fuca, and the southern portions of the San Juan Islands. No critical habitat exists in Puget Sound proper (NMFS 2009a). There is currently no recovery plan for green sturgeon.

h. Southern Resident Killer Whale

Killer whales (*Orcinus orca*) are one of the most widely distributed marine mammals, found in all parts of the world's oceans. They are most abundant in colder waters including Antarctica, the North Atlantic, and Pacific Oceans. Southern Resident killer whales are one of four identified populations of killer whales in the North Pacific and the only known resident population to occur in the U.S. Southern residents are comprised of three pods: J, K, and L pods. The Southern Residents are considered one "stock" under the Marine Mammal Protection Act (MMPA) and one "distinct population segment" (therefore "species") under the ESA. The Southern Resident killer whale population is currently estimated at about 80 whales, a decline from its estimated historical level of about 200 during the late 1800s. Due to its small population size NMFS listed this segment of the population as endangered under the ESA in 2005 (NMFS 2005b) and designated critical habitat in 2006 (NMFS 2006b). A final recovery plan for the Southern Resident killer whale was published on January 24, 2008 (NMFS 2008).

Killer whales dependence on nearshore ecosystems can be tied to the importance of Chinook salmon in their diets. Chinook are a key prey item for resident killer whales (Ford *et al.,* 1998). Researchers in coastal British Columbia observed that 72.2% of the 396 salmon taken by killer whales were Chinook, despite the much higher abundance of the other species (Ford and Ellis 2005). Bioaccumulation of contaminants from prey resources originating from industrial areas has been identified as an on-going threat to killer whale survival (Ross *et al.,* 2000; Ross *et al.,* 2004).

i. Humpback Whale

The humpback whale (*Megaptera novaeangliae*) was globally listed as endangered in 1970 under the Endangered Species Conservation Act of 1969, the precursor to the ESA. In April 2015, NMFS completed a comprehensive status review and proposed revisions to the listing

(NMFS 2015). The currently single population would be divided into 14 distinct population segments (DPS) and listing status revised accordingly. The proposed western North Pacific DPS would be classified as threatened under the ESA. The public comment period has closed and NMFS has not yet issued a final rule. Until a final rule is issued the current status of humpback whale as ESA-listed endangered remains effective.

The humpback whale is at best an infrequent transient of inland Puget Sound waters, more commonly observed along the outer Washington coast (Calambokidis and Steiger 1990). USACE has determined that the PSNERP project will have no effect on humpback whales.

j. Marbled Murrelet

Marbled murrelet (*Brachyramphus marmoratus*) is a small marine diving bird that occurs from southern California to Alaska. Few data are available to interpret trends in population; however, there was an estimated 51% decline in north Puget Sound between 1978 and 2003 (Huff *et al.,* 2006). Recent trends indicate a continued steady decline of marbled murrelets, with a decrease in population of 7.9% from 2000 to 2009 in Puget Sound and the Strait of Juan de Fuca (USFWS 2009). Threats include habitat loss from timber harvest in their terrestrial environment, and harmful algal blooms, declining prey availability (forage fish), and catastrophic events such as oil spills in their marine environment. Due to rapid declines in population and on-going threats to their continued existence marbled murrelet were ESA-listed as threatened in 1992 (USFWS 1992).

Murrelets are common winter residents in northern portions of Puget Sound. Forage habitat is deeper water in entrance channels of rocky shores, estuaries, and protected bays (Angell and Balcomb 1982). Common prey items are forage fish like sand lance, smelt, and herring (USFWS 1997). Critical habitat includes upland forested stands used for nesting but does not include marine water used for foraging.

A Federal Recovery Plan for Marbled Murrelet was completed in 1997. The plan focuses on the protection of habitat in the terrestrial environment and acknowledges the need to do so in the marine environment. In addition it discusses reduction of mortality from the net fisheries, minimizing the occurrence of oil spills, implementing silviculture techniques to accelerate habitat development, and the need for research and monitoring (USFWS 1997).

k. Golden Paintbrush

Golden paintbrush (*Castilleja levisecta*) historically occurred at many sites in Puget Sound, British Columbia, and as far south as the Willamette Valley in Oregon. Its extirpation from the majority of these sites, including all of Oregon, led to its ESA listing as threatened (USFWS 1997). The majority of golden paintbrush current distribution is associated with remnant prairie ecosystems and reintroduction sites. While there are some remaining populations in the San Juan Islands and on Whidbey Island it is limited to upland balds and grasslands and is not prevalent in coastal areas. USACE has determined that the PSNERP project will have no effect on golden paintbrush.

2. State-Listed Species

According to a query of the Washington Department of Fish and Wildlife's Priority Habitat and Species database conducted in December 2015 (Mitchell pers. comm.) the following Washington State sensitive species may occur within the vicinity of the area of projects proposed in the APA/RP:

Table 1: State sensitive species in project area.

Common Name	Occurrence Type	Occurrence Class	State Status	Project Name
Bald eagle	Nest	Breeding	Sensitive	Nooksack River Delta
Great egret	Biotic detection	Regular individual	Monitored	Nooksack River Delta
Harbor seal	Haulout	NA	Monitored	Duckabush River Estuary
Harbor seal	Haulout	NA	Monitored	Nooksack River Delta
Western toad	Biotic detection	NA	Candidate	Duckabush River Estuary
Western toad	Biotic detection	NA	Candidate	North Fork Skagit River Delta
American white pelican	Concentration	Unknown	Endangered	Nooksack River Delta
Bald eagle	Concentration	Unknown	Sensitive	Nooksack River Delta

3. Other Salmonid Resources

According to a query of the Statewide Washington Integrated Distribution database conducted in December 2015 (Mitchell pers. comm.) the following salmonid species and runs may utilize watersheds of the projects proposed in the APA/RP:

Table 2: Salmonid species in project area.

Species/Run	Distribution Type	Use Type	Project Name
Coho	Documented	Presence	Duckabush River Estuary
Coho	Documented	Spawning	Duckabush River Estuary
Dolly Varden/ Bull Trout	Documented	Presence	Duckabush River Estuary
Fall Chinook	Documented	Presence	Duckabush River Estuary
Fall Chinook	Documented	Rearing	Duckabush River Estuary
Fall Chum	Documented	Rearing	Duckabush River Estuary

Pink Odd Year	Documented	Presence	Duckabush River Estuary
Pink Odd Year	Documented	Spawning	Duckabush River Estuary
Rainbow Trout	Documented	Presence	Duckabush River Estuary
Resident Coastal Cutthroat	Documented	Presence	Duckabush River Estuary
Resident Coastal Cutthroat	Presumed	Presence	Duckabush River Estuary
Summer Chum	Documented	Presence	Duckabush River Estuary
Summer Steelhead	Presumed	Presence	Duckabush River Estuary
Winter Steelhead	Documented	Presence	Duckabush River Estuary
Coho	Documented	Presence	Nooksack River Delta
Coho	Documented	Rearing	Nooksack River Delta
Coho	Modeled	Presence	Nooksack River Delta
Coho	Presumed	Presence	Nooksack River Delta
Dolly Varden/ Bull Trout	Documented	Presence	Nooksack River Delta
Dolly Varden/ Bull Trout	Documented	Rearing	Nooksack River Delta
Dolly Varden/ Bull Trout	Modeled	Presence	Nooksack River Delta
Dolly Varden/ Bull Trout	Presumed	Presence	Nooksack River Delta
Fall Chinook	Documented	Presence	Nooksack River Delta
Fall Chinook	Documented	Rearing	Nooksack River Delta
Fall Chinook	Modeled	Presence	Nooksack River Delta
Fall Chinook	Presumed	Presence	Nooksack River Delta
Fall Chum	Documented	Presence	Nooksack River Delta
Fall Chum	Modeled	Presence	Nooksack River Delta
Pink Odd Year	Documented	Presence	Nooksack River Delta
Rainbow Trout	Documented	Presence	Nooksack River Delta
Resident Coastal Cutthroat	Documented	Presence	Nooksack River Delta
Resident Coastal Cutthroat	Modeled	Presence	Nooksack River Delta
Resident Coastal Cutthroat	Presumed	Presence	Nooksack River Delta
Sockeye	Documented	Presence	Nooksack River Delta
Sockeye	Documented	Rearing	Nooksack River Delta
Spring Chinook	Documented	Presence	Nooksack River Delta
Summer Steelhead	Documented	Presence	Nooksack River Delta
Winter Steelhead	Documented	Presence	Nooksack River Delta
Winter Steelhead	Modeled	Presence	Nooksack River Delta
Coho	Documented	Presence	N. Fork Skagit River Delta

Coho	Documented	Rearing	N. Fork Skagit River Delta
Coho	Modeled	Presence	N. Fork Skagit River Delta
Dolly Varden/ Bull Trout	Documented	Rearing	N. Fork Skagit River Delta
Fall Chinook	Documented	Presence	N. Fork Skagit River Delta
Fall Chinook	Documented	Rearing	N. Fork Skagit River Delta
Fall Chinook	Modeled	Presence	N. Fork Skagit River Delta
Fall Chum	Documented	Presence	N. Fork Skagit River Delta
Fall Chum	Modeled	Presence	N. Fork Skagit River Delta
Kokanee	Documented	Presence	N. Fork Skagit River Delta
Pink Odd Year	Documented	Presence	N. Fork Skagit River Delta
Pink Odd Year	Modeled	Presence	N. Fork Skagit River Delta
Rainbow Trout	Documented	Presence	N. Fork Skagit River Delta
Resident Coastal Cutthroat	Documented	Presence	N. Fork Skagit River Delta
Sockeye	Documented	Presence	N. Fork Skagit River Delta
Spring Chinook	Documented	Presence	N. Fork Skagit River Delta
Summer Chinook	Documented	Presence	N. Fork Skagit River Delta
Summer Steelhead	Documented	Presence	N. Fork Skagit River Delta
Winter Steelhead	Documented	Presence	N. Fork Skagit River Delta
Winter Steelhead	Modeled	Presence	N. Fork Skagit River Delta

Many of the salmonid fish species which may occur with the project area are in decline due to loss or degradation of habitat. This includes species in Table 2 that are not listed under the ESA and discussed in Section II.C.1. Between 1992 and 2002 The Salmon and Steelhead Stock Inventory, used to compare trends in salmon stocks within Puget Sound, documented a 33% increase in the number of salmon stocks that were listed as depressed or critical (WDFW 1993 and 2002). While habitat protection and restoration actions are on-going, it is likely that populations of anadromous fish will continue to decline due to alterations in rearing and spawning habitat by armoring, filling, and diking of the shoreline, and upper watershed development. The impacts of climate change will likely exacerbate degraded habitat conditions in nearshore areas and may affect populations of anadromous salmonids. For example an 18- to 32-inch sea-level change in the Skagit Delta may reduce the rearing capacity in marshes for juvenile Chinook salmon by an estimated 211,000 and 530,000 fish respectively (Hood 2005). If regional salmon recovery is successful losses may be slowed and eventually reversed. However other factors could influence population trends of salmonids including harvest, environmental contaminants, oceanic conditions, and other aspects of climate change including increased water temperature and changes in stream flows.

IV. EVALUATION METHODOLOGY

There are no known established models or alternative methodologies that can adequately represent and consider the complexities and dynamics of the physical and biological processes interacting in the study area that affect fish, wildlife, and their habitat. Thus best professional judgment and available science were used to evaluate benefits and impacts to fish and wildlife resources associated with implementation of the proposed PSNERP project. Service staff provided technical assistance to USACE and WDFW throughout the 10-plus years of active work of the PDT. This included representation in both interagency technical (i.e. Nearshore Science Team, Implementation Team) and policy (i.e. Steering Committee) groups convened to advise PSNERP. This General Investigation has produced 24 peer reviewed technical reports that document study methods, analytical results, and ecosystem restoration approach. The Service also reviewed numerous studies conducted in the watershed and the study area by USACE and others investigating and documenting fauna, watershed processes, and sources of Puget Sound nearshore ecosystem degradation.

V. FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

To support analysis of without project conditions for the GI, the PDT commissioned a future risk assessment study. Future population estimates associated with a medium regional growth rate provided by the Washington State Office of Financial Management were used to extrapolate a projection of a regional population growing from nearly 4 million residents today to 9.1 million residents by 2065. This increase in population was used in a land development model to forecast changes in land use (Bolte and Vache 2010). With increasing population driving additional development many portions of the Sound are expected to encounter further degradation of nearshore ecosystem processes well beyond current conditions. This analysis suggests that large portions of southern and central Puget Sound will be fall into a category of highly degraded (Schlenger *et al.*, 2011b). Without restoration, existing and future increases in shoreline stressors will contribute to further declines in nearshore habitat quantity, quality, and connectivity. The expanded footprint of degraded areas, combined with climate change and sea-level change, will further imperil the ecosystems that support diverse biological communities that inhabit or otherwise depend on Puget Sound.

Forecasts of future conditions suggest that without significant ecosystem restoration at-risk species may become further imperiled. Sea-level change is likely to cause substantial loss of surf smelt spawning habitat on beaches with armored shorelines because armoring prevents beach migration inland. (Griggs *et al.,* 1994). Reduction in spawning habitat may further depress stocks of surf smelt and other forage fish that rely on beaches. Anadromous fish species, already in decline due to habitat loss, will likely face increased risk of extirpation in highly impacted watersheds. Sea-level change will reduce availability of delta rearing habitats in locations where dikes, roads, and armoring prevent landward migration. Impacts to forage fish and juvenile salmonids will affect birds and mammals that utilize these prey resources. Statistically significant population declines have already been observed in many nearshore dependent bird species including red-throated loon, numerous grebe species, canvasback, scaup, black scoter, common goldeneye, ruddy duck, Bonaparte’s gull, glaucous-winged gull, common murre, and marbled murrelet (Bower 2009).

VI. ALTERNATIVES CONSIDERED

A. Formulation of Alternatives

The October 2014 Draft Feasibility Report and Environmental Impact Statement (FR/EIS) evaluated 18 projects for potential implementation by PSNERP and identified a preferred alternative of constructing 11 of these projects (Table 3, Figure 3) (USACE 2014). During a subsequent feasibility study completion strategy workshop attended by representatives of the Office of the Assistant Secretary of the Army, Corps Headquarters, Northwestern Division, Seattle District, and the non-federal sponsor (WDFW), alternatives were modified and a revised preferred alternative developed. Workshop participants revisited the complete list of 36 projects from which the October 2014 alternatives were derived. During this “vertical team” workshop, the list of projects identified by the GI was organized into five categories. The 36 projects developed by PSNERP were assigned one of five categories for a “tiered” approach to implementation based on their status of completion by other programs, suitability for implementation under existing Corps of Engineers Continuing Authority Programs (CAPs), or eligibility for completion through the GI process. This latter category of GI eligible projects was further divided into those projects for which PSNERP provides a sufficient level of detail for immediate authorization, and those projects for which additional data collection and analysis will be required prior to authorization (Table 4).

The outcome of this workshop is outlined in a memorandum from the U.S. Army Corps of Engineers Director of Civil Works (Headquarters) to the Commander of the Northwest Division (Portland) (USACE 2015). This includes the outcome of the workshop in categorizing restoration projects for implementation under USACE authorities. Most notably, the memo identifies three projects which met the definition of Category 4 (Table 4) and could therefore be advanced by USACE for implementation as an outcome of the GI.

Based on this guidance the subset of 18 potential projects (Figure 3) has been reformulated to derive a new alternative. This new Alternative 4 is the current Agency Preferred Alternative/Recommend Plan for the purposes of the NEPA analysis documented in the FR/EIS (Table 3).

B. Additional Actions of the Tiered Approach

In addition to the three sites now proposed as the APA/RP, nine sites were determined to be potentially eligible for completion through a Corps GI authority. However these projects currently lack sufficient engineering design and other detail sufficient for implementation at this time. Therefore, in addition to the three sites for construction authorization, USACE has identified nine sites to be the subject of additional future studies prior to potential request for authorization:

- Dugualla Bay
- Everett Marshland
- Telegraph Slough

- Chambers Bay
- Big Beef Creek Estuary
- Tahuya River Estuary
- Lilliwaup Estuary Restoration
- Big Quilcene River
- Snohomish Estuary Main Stem

In addition to completion of the three projects included in the APA/RP and potential future authorization of nine projects listed above, USACE and WDFW propose to pursue implementation of up to 12 additional projects outside of the GI process using other programs and authorities, including CAPs. Sites that could be completed through existing authorities include:

Projects that can be implemented under the Water Resources Development Act (WRDA) 2000 §544 Puget Sound and Adjacent Waters authority.

- Spencer Island
- Quilceda Estuary
- Twanoh State Park Beach
- Twin Rivers

Projects that can be implemented under WRDA §206 or §1135 Continuing Authorities Programs.

- Deepwater Slough
- Livingston Bay
- Harper Estuary
- Budd Inlet Beach
- Everett Riverfront Wetlands
- Chuckanut Estuary
- Sequalitchew Creek
- McGlinn Island

Taken together, the three projects proposed for immediate implementation, nines sites identified for additional study and potential future authorization, and 12 sites that can be implemented utilizing existing authorities and programs comprise the tiered approach to nearshore ecosystem restoration now envisioned by USACE and WDFW.

Table 3: Revised Alternatives and Associated Project Sites.

Alternative ID - Name	Project Site Names
Alternative 1 - No Action	
Alternative 2 - 11 Sites	
	Deepwater Slough
	Everett Marshland
	Milltown Island
	Nooksack River Delta
	North Fork Skagit River Delta
	Spencer Island
	Telegraph Slough
	Deer Harbor Estuary
	Dugualla Bay
	Livingston Bay
	Beaconsfield Feeder Bluff
Alternative 3 - 18 sites	
	Deepwater Slough
	Duckabush River Estuary
	Everett Marshland
	Milltown Island
	Nooksack River Delta
	North Fork Skagit River Delta
	Spencer Island
	Telegraph Slough
	Deer Harbor Estuary
	Harper Estuary
	Snow Creek and Salmon Creek Estuary
	Tahuya River Estuary
	Big Beef Creek Estuary
	Dugualla Bay
	Livingston Bay
	Point Whitney Lagoon
	Beaconsfield Feeder Bluff
	WDNR Budd Inlet Beach
Alternative 4 - 3 sites (preferred alternative)	
	North Fork Skagit
	Nooksack River Delta
	Duckabush River Estuary

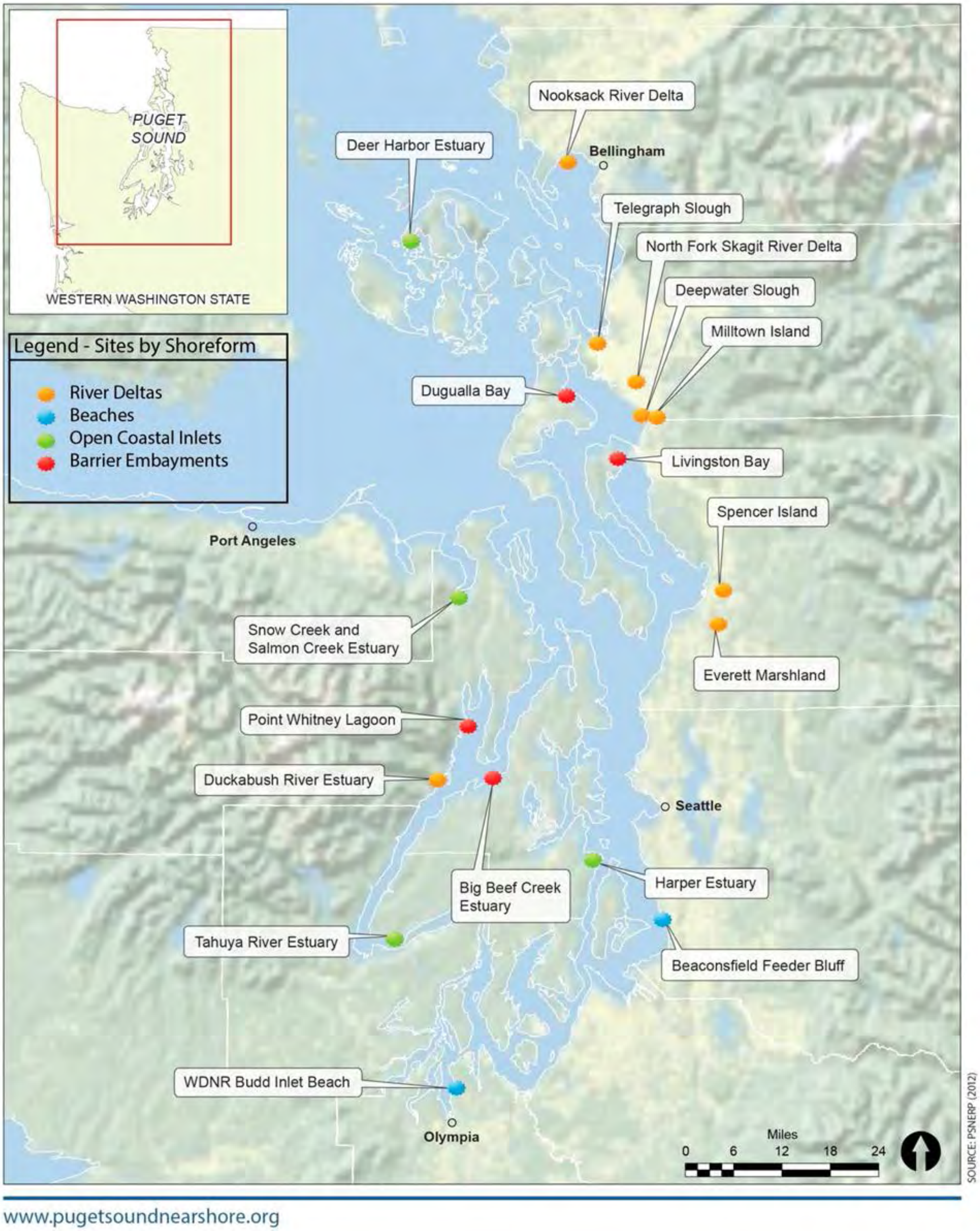


Figure 3: PSNERP Potential Project Sites

Table 4: Categorization of 36 PSNERP Projects by Tier.

Tier	Category	Project Site Names
1	***Projects in which other agencies are moving forward or have implemented restoration***	
		Milltown Island
		Point Whitney Lagoon
		Beaconsfield Feeder Bluff
		Kilisut Harbor/Oak Bay Reconnection
		Deschutes River Estuary
		Hamma Hamma Estuary
		Snow Creek and Salmon Creek Estuary
		Johns Creek Estuary
		Deer Harbor
		Mission Creek
		Smith Island
		Washington Harbor
2	***Projects that can be implemented under WRDA §544 Puget Sound and Adjacent Waters***	
		Spencer Island
		Quilceda Estuary
		Twanoh State Park Beach
		Twin Rivers
3	***Projects that can be implemented under WRDA §206 or §1135 CAPs***	
		Deepwater Slough
		Livingston Bay
		Harper Estuary
		Budd Inlet Beach
		Everett Riverfront Wetlands
		Chuckanut Estuary
		Sequalitchew Creek
		McGlinn Island
4	***Projects that fall within the GI program and have the level of detail to move forward***	
		North Fork Skagit
		Nooksack River Delta
		Duckabush River Estuary
5	***Projects that fall within the GI program but require additional analysis***	
		Dugualla Bay
		Everett Marshland
		Telegraph Slough
		Chambers Bay
		Big Beef Creek Estuary
		Tahuya River Estuary
		Lilliwaup Estuary
		Big Quilcene River
		Snohomish Estuary Main Stem

C. Agency Preferred Alternative / Recommended Plan

The revised APA/RP that USACE and WDFW now propose to advance for PSNERP includes three projects that have sufficient level of analysis to move forward for implementation at this time. These three sites are the focus and outcome of the NEPA process, and represent the primary scope of analysis for the Service's FWCA §2(b) Report:

- North Fork Skagit
- Nooksack River Delta
- Duckabush River Estuary

1. North Fork Skagit River Delta

The North Fork Skagit River empties into Skagit Bay south (downstream) of La Conner, Washington. The proposed action is located between the former Dry Slough inlet and the western levee system's end near Rawlins Road. Extensive diking of the North Fork caused substantial loss of tidal wetlands and associated tidal channels. River levees reduced the floodplain area and constrained the river channel. In the last century the Skagit Basin has lost approximately 80 percent of historic estuarine delta habitat, including a loss of 35 percent of estuarine mixing habitat, 98 percent of low salinity transitional habitat, and 89 percent of its freshwater tidal habitat (Simenstad *et al.*, 2011).

The Skagit River watershed is critically important to all five species of Pacific salmon as well as steelhead and sea-run cutthroat. This importance is due in large part to the productivity of large wilderness areas in the upper watershed upstream from the diked and developed floodplain (SWC 2002). The extensive remnant aquatic habitat in the delta is also an important contributing factor to salmonid productivity and significant loss of tidal wetlands is an established limiting factor for Chinook recovery (SWC 2005). The Skagit watershed supports 30 percent of all anadromous fish in Puget Sound and the largest populations of pink and chum in the contiguous United States (North Cascades Institute 2002, Smith no date). The Skagit River and its tributaries also host the largest populations of ESA-listed bull trout, steelhead, and wild Chinook in the Puget Sound Basin (USFWS 2004, Smith no date).

Declining salmon runs in the Skagit and elsewhere contribute to a cascading series of ecosystem impacts. Fewer returns of naturally spawning fish leads to declining marine nutrient input to riverine ecosystems as well as less food availability for bald eagles, bears, and other species that scavenge carcasses. Numerous species of fish, birds, and mammals – including people – rely upon on abundance and high nutritional value of salmon. Declines of Chinook salmon in marine environments of Puget Sound have been identified as a limiting factor for the ESA-listed southern resident killer whales. Additionally, the depressed levels of salmon populations has all but eliminated the once great commercial fishing industry of western Washington, severely reduced sport fishing, and significantly impacted the Native American tribes whose cultures center on salmon returns (USACE 2016).

The Skagit River Delta area is also a critical waterfowl wintering area due to the mild climate and available habitats including marshes, intertidal flats, and adjacent agricultural fields. It is an important stopping point for migratory birds along the Pacific Flyway including trumpeter swans and Wrangell Island snow geese. At least 180 species of birds have been documented in the project area including raptors, waterfowl, shorebirds, game birds, and songbirds (WDFW 2006). These birds use the Skagit Basin as over-wintering areas or as permanent residents. Wading birds, such as great blue heron, utilize the estuary areas year round. Shorebirds use flooded agricultural fields and estuaries primarily for feeding station during their long migration and as over-wintering habitat. Dunlin and black bellied plover winter in the Skagit delta. Although a large number and variety of birds use the area this broad delta could be substantially more productive in its restored condition with native plants and greater areas of distributary channels in the nearshore zone to support significantly greater populations of birds.

a. Key Design Elements

The restoration proposal lowers 13,000 linear feet of levee along the North Fork Skagit River south bank. Work will remove several structures and construct a levee along Rawlins Road as well as lower 3,140 feet of levee along the north bank. Existing topography provides flood risk management without a levee on the river's north side. Breaches in the lowered levees and excavated channels allow for water to access the newly restored floodplain restoring tidal hydrology to approximately 250 acres of historic tidal marsh habitat. Replanting lowered levees will restore a natural riparian corridor along the river (Figure 4). Total project costs are estimated at $102 million.

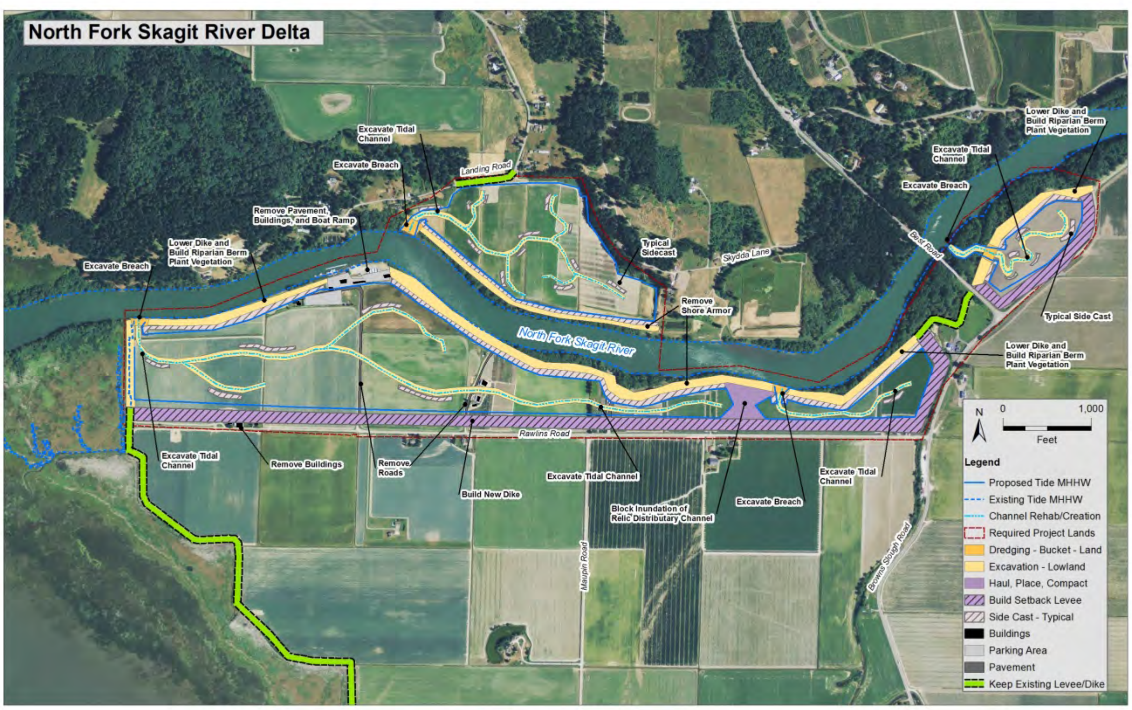


Figure 4: Key restoration design elements for North Fork Skagit River delta site.

2. Nooksack River Delta

The Nooksack is one of the largest contributing watersheds in Puget Sound and supports numerous salmonid stocks with relatively high abundance. The Nooksack River system supports nine species of salmonids represented by more than 20 distinct stocks that are separated by their run timing and spawning location. Three of these species are listed under the ESA: Puget Sound Chinook, Puget Sound steelhead, and Coastal/Puget Sound bull trout. The Nooksack River is one of five geographic areas considered essential for recovery of the Puget Sound Chinook ESU. Other anadromous salmonid species found in the Nooksack River include riverine sockeye, coho, even-year and odd-year pink, and chum salmon; summer and winter steelhead; and coastal cutthroat trout. Runs of all of these species have declined significantly from historic levels. In addition to a critical importance for fishery resources the Nooksack River delta provides important habitat for migratory shorebirds of the Pacific Flyway, waterfowl, trumpeter swans, Canada geese, and the Wrangell Island snow geese.

The Nooksack River delta is located on the Lummi Nation lands north of Bellingham, Washington. It includes nearly all of the Nooksack and Lummi River estuaries below Ferndale, Washington. The Nooksack and Lummi River flow paths have been modified since the mid-19th century beginning with active removal of large wood, draining, diking and levee construction. Today substantial surface water diversions, groundwater withdrawals, and drainage activities within the Nooksack River watershed impact the magnitude, timing and duration of delta surface water flows. The Nooksack floodplain has undergone a substantial loss of tidal freshwater and estuarine wetlands from an estimated 8,785 acres in 1888 to 3,211 acres remaining today, representing a 64% loss. This includes a 71% loss of vegetated tidal wetlands. More than half of the remaining acreage is disconnected from its natural hydrology by dikes, roads, and tidegates. The proposed restoration modifies levees, roads, and other hydrological barriers, restoring delta riverine and tidal flow, as well as sediment transport and delivery processes.

a. Key Design Elements

The restoration actions include partial levee removal along both Nooksack River banks and levee construction on North Red River Road. Approximately 12,000 linear feet of levees would be breached or removed, restoring 1,800 acres of tidal freshwater wetlands. Existing levels of flood protection for buildings, roads, and other infrastructure will be maintained by construction of new setback levees, often concurrent with existing arterial roads. Log jams installed on the Nooksack River would restore more natural channel morphology and enhance instream habitat availability. The Lummi River channel will be dredged and graded to reconnect it to Nooksack River flows. A water control structure at the historic divergence of Lummi and Nooksack River would replace the current dike which prevents freshwater from entering the Lummi River facilitating transfer of water and sediment to the restored channel. Old agricultural ditches will be filled and tidal channels recreated. Several roads on filled causeways would be replaced with widespan bridges to allow more tidal flows across the delta (Figure 5). This combination of numerous significant project features implemented at a large scale leads to a total project cost estimate of $260 million.

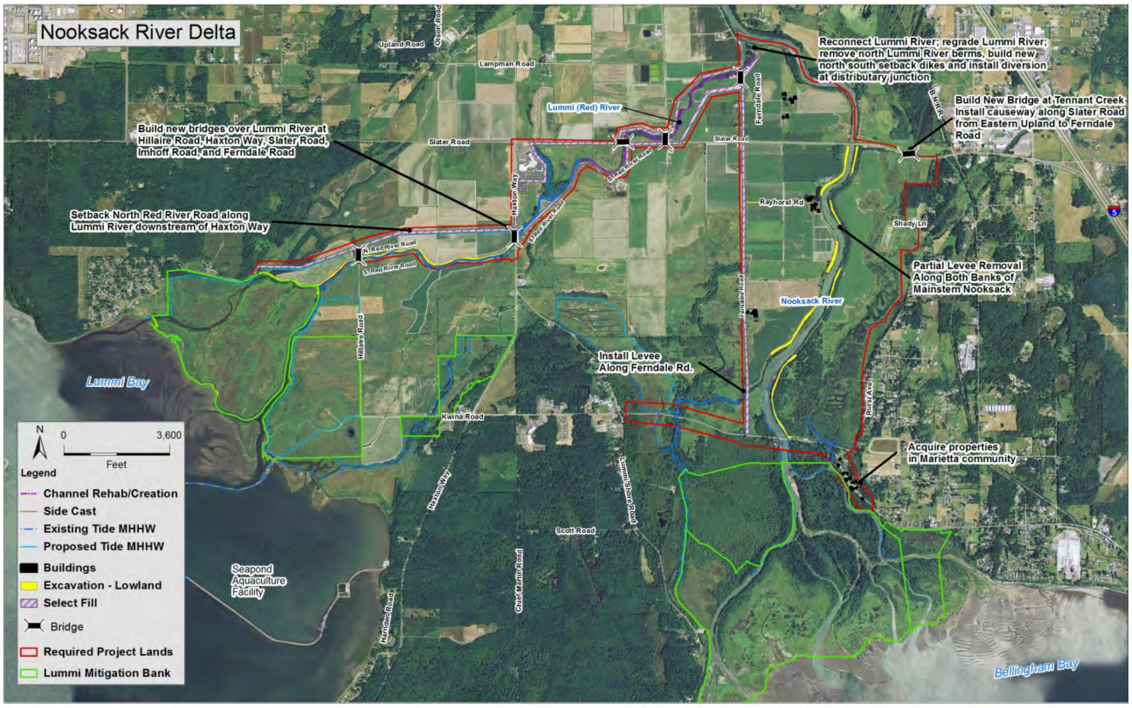


Figure 5: Key design elements for the Nooksack River delta site.

3. Duckabush River Estuary

The Duckabush River is one of several major river systems that drain the east slope of the Olympic Mountains to Hood Canal. The broad river delta fans out into Hood Canal on the south side of Black Point Peninsula. The Highway 101 causeway crosses the delta spanning the main channel and a historic distributary channel via bridges with box culverts. Levees along the main channel upstream of the causeway prevent river flows into historic distributary channels. This causeway limits tidal exchange resulting in the aggradation of tidal channel networks and inhibition of channel migration. These hydrologic constrictions along with fill within the estuary have led to decline in mudflats and salt marsh.

The Duckabush River supports four ESA-listed species of salmonids: Hood Canal summer chum, Puget Sound steelhead, Coastal/Puget Sound bull trout, and Puget Sound Chinook salmon. The wild Chinook run is nearly extirpated from this river. The Duckabush Estuary also supports important wildlife resources including trumpeter swans, bald eagles, and regionally significant concentrations of wintering waterfowl. Harbor seals haul out in this location throughout the year and pupping occurs in the winter. The extensive mud and gravel flats are productive shellfish beds. Salt marshes and eelgrass beds characterize the upper and lower intertidal and subtidal areas, respectively. Herring use this eelgrass for spawning.

a. Key Design Elements

Proposed restoration actions would restore natural hydrology to approximately 38 acres of the Duckabush River delta. Key features of the project include replacement of the Highway 101 fill causeway with a bridge of sufficient span to allow unconstrained riverine and tidal hydrology. This is the primary measure for this site as the Highway 101 causeway and two bridges structures are the key impediment to ecosystem process restoration at the site. Fill associated with Shorewood Road and other areas that impact floodplain wetlands would be removed and regraded. Filled distributary channels and sloughs would be excavated and large wood placed to reinitiate channel forming processes (Figure 6). Reinitiating natural water and sediment processes would also benefit downstream habitats allowing tidal flats and salt marsh habitats to accrete sediment and remain resilient in response to changing sea levels. Replacement of over 1,200 linear feet of a major highway river crossing contributes significantly to the $63 million estimated total project cost.

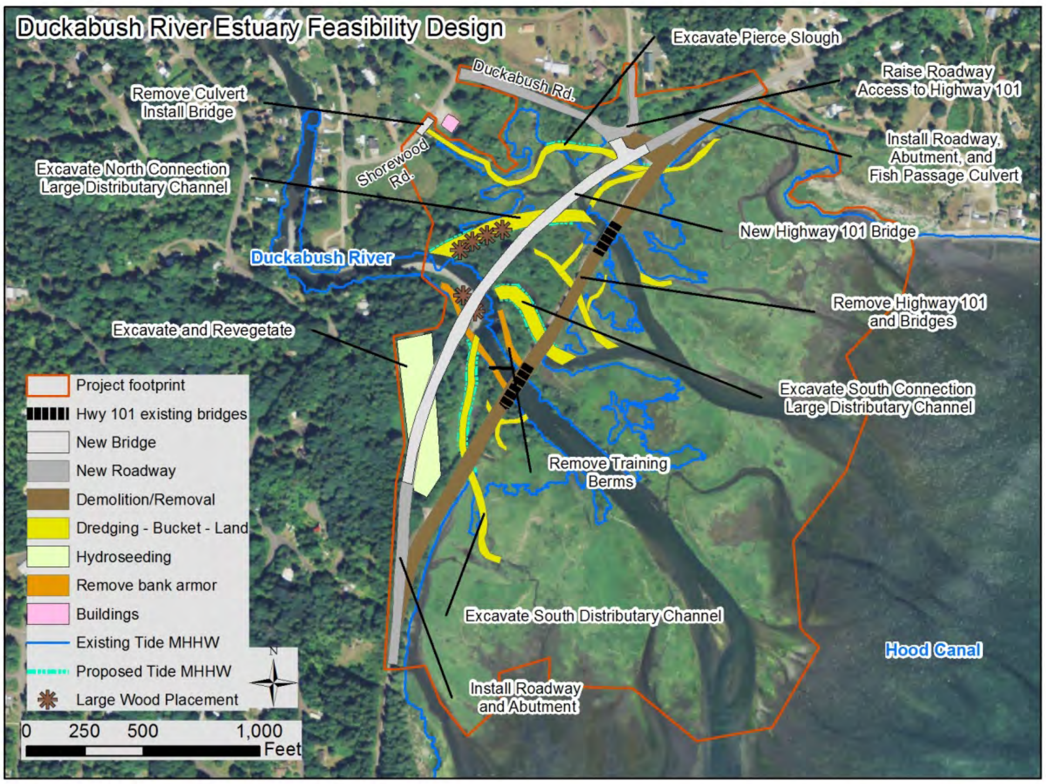


Figure 6: Key design elements for the Duckabush River Estuary site.

D. Other Alternatives

The other two action alternatives (Alternatives 2 and 3; see Table 3) include a greater number of projects for implementation under the PSNERP program. These alternatives were the subject of the 2014 Draft Feasibility Report / Environment Impact Statement. Alternative 2 proposed the implementation of 11 restoration sites. The 2014 DFR/EIS identified this as the Preferred Alternative / Tentatively Selected Plan. Alternative 3 involved a larger program of 18 restoration sites (Figure 3). As discussed above in Section VI.A, during review of these alternatives by Corps Headquarters, Alternative 4 was formulated with the Project Delivery Team (Seattle District and WDFW) and emerged as the Agency Preferred Alternative / Recommended Plan (APA/RP).

VII. PROJECT IMPACTS

A. Preferred Alternative / Recommended Plan

A full description and evaluation of project impacts is not possible since project designs for sites included in the APA/RP (and other action alternatives) are only at the conceptual stage of development. If authorized for implementation, future phases of the project would finalize project features and complete detailed engineering design. This will include additional discussions with effected landowners which may impact the footprint and scope of restoration actions.

In general there will be short-term negative impacts from construction of each action including diminished water quality (turbidity and suspended sediment), noise disturbance from construction machinery, airborne particulates from soil disturbance, and vegetation removal and disturbance associated with construction of temporary equipment access routes and conducting activities at each work site. These construction-related effects are common to many restoration activities and standard conservation measures and best management practices are generally followed to minimize the frequency, intensity, and duration of these impacts. For example, in designing and implementing Service-funded restoration projects, partners adhere to standard best management practices (BMPs and conservation measures (CMs) outlined in a programmatic biological assessment/biological opinion (USFWS 2015). All of the PSNERP proposed restoration actions have analogs in this programmatic consultation document and it is anticipated that USACE BMPs/CMs would be similar to those outlined in this and other restoration guidance.

The goal of PSNERP is to restore ecosystem process and habitat to provide long-term benefits to fish and wildlife species from implementing the actions identified in the APA/RP. In all cases it is reasonable to expect that benefits will outweigh negative impacts. Potential beneficial and negative impacts of each proposed action are discussed below. A more thorough evaluation of effects of implementing the APA/RP will be possible as the project advances into the design stage.

1. North Fork Skagit River Delta

a. Ecosystem Restoration Benefits

Project benefits extend across an estimated 256 acres where daily tidal and seasonal/episodic flood flows would be restored (Figure 7). Removal of barriers to tidal and riverine hydrology reestablishes important habitat-forming ecosystem processes including sediment transport, freshwater input, tidal exchange, channel migration, marsh accretion, overbank deposition, and natural levee formation. Ecosystem benefits include the restoration of highly productive tidal wetland habitats that support diverse fish and wildlife resources and provide connectivity between terrestrial and nearshore ecosystems. River delta ecosystems provide valuable rearing habitat for numerous species of juvenile salmonids, increasing survival and supporting recovery of Puget Sound populations, including threatened Chinook salmon and bull trout.

This project will also contribute to increases in shorebird foraging and resting habitats associated with tidal flats benefitting dunlin, great blue heron, and other wading/probing birds. Restoration of sediment input will promote marsh accretion downstream from the project site improving resilience of the estuary to effects of sea level change. Water quality will be improved by increasing floodplain retention time and flow through vegetated wetlands.

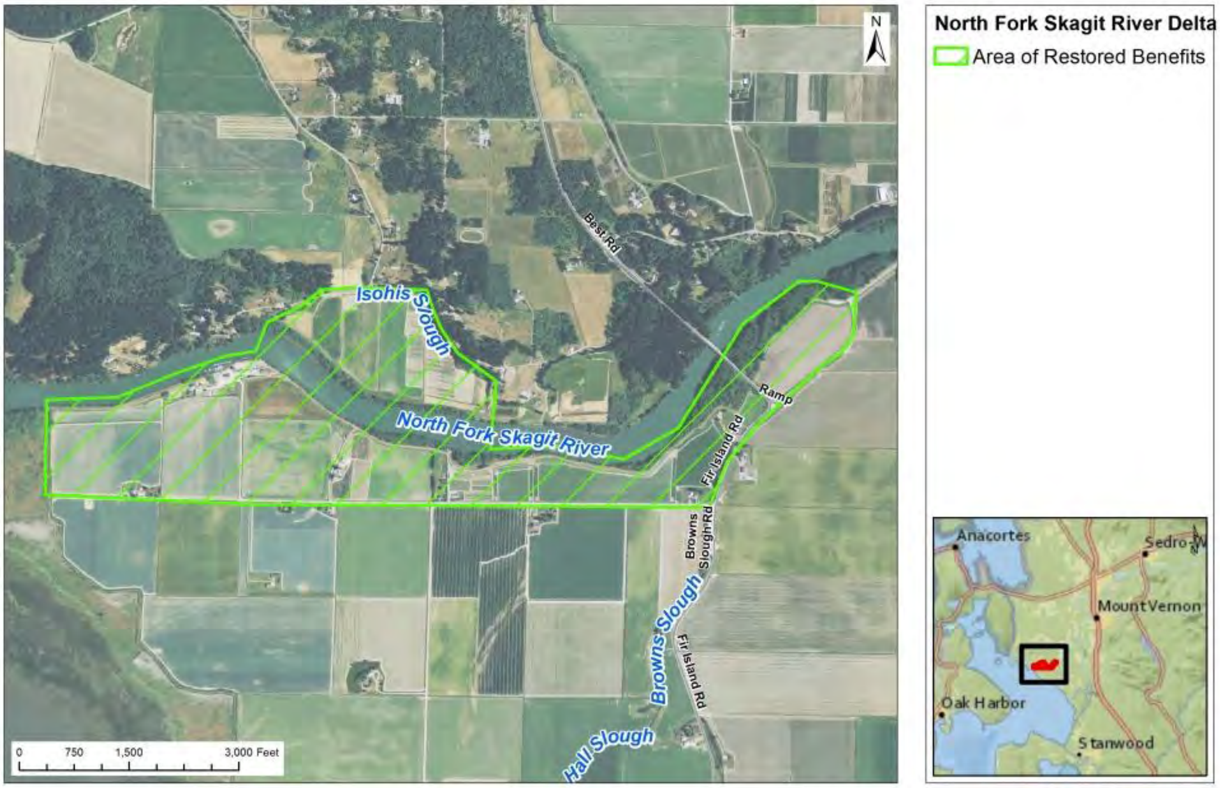
The significance of this project is underscored by its identification in the Skagit River watershed chapter of the Puget Sound Chinook Salmon Recovery Plan (Shared Strategy 2007). To date, most Skagit estuary restoration projects have been implemented along the South Fork Skagit River. This project would provide a significant increase in estuarine habitat on the lower North Fork Skagit River where developed and agricultural lands behind constructed flood control levees limit available habitat and restoration opportunities.

The separately authorized and implemented Skagit River General Investigation Feasibility Study is recommending flood risk management actions well upstream of the North Fork Skagit River project site. Ecosystem restoration actions proposed as part of the PSNERP recommended plan are independent from the Skagit flood risk management recommendations and are described as complementary to those separately proposed actions (USACE 2014).

b. Potential Adverse Impacts

Common to other sites where extensive excavation is proposed to remove or setback levees and restore filled tidal channels, this project would have temporary adverse impacts on aquatic habitats and organisms. Negative impacts include increased turbidity from excavation and dredging. Consistent with permit conditions and conservation measures construction would be limited to designated annual work windows when fish are less likely to be present and during low tides. Depending on specific construction activities at this site it may be necessary to install cofferdams or other water isolation structures to separate in-water construction activities from areas where fish or other wildlife sensitive to turbidity are present. Programmatic consultation documents for restoration projects identify these and other best management practices (BMP's) to ensure minimization of short term impacts. It is reasonable to anticipate that site specific BMP's will be developed following resolution of engineering design details, construction methods, sequencing of actions and project schedule.

There is a report indicating that a historic landfill or dump may exist within the project footprint. However there are no known active cleanup sites within the project footprint and no site records listed on the WDOE clean-up site database. Service (USFWS 2011) preliminary contaminant screening did not confirm this report. Additional site assessments are planned to determine if unresolvable contaminant issues exist within the project area. If contaminants are found to be present, those areas would be excluded from USACE restoration activities.



North Fork Skagit River Delta	
Shoreform type:	Large River Delta
Processes restored:	sediment transport, freshwater input, tidal exchange, channel migration, marsh accretion, overbank deposition, natural levee formation
Species directly associated:	bald eagle, waterfowl, western toad, salmon, bull trout, steelhead
Species indirectly associated:	green sturgeon, Steller sea lion, eulachon, marbled murrelet, lamprey
ESA Critical Habitat:	Chinook salmon, bull trout
Acres of wetlands restored	256

Restored Benefits:
North Fork Skagit River Delta

Figure 7: Area of Restored Benefits at North Fork Skagit River Delta site (from USACE 2014).

2. Nooksack River Delta

a. Ecosystem Restoration Benefits

As described above in VI.B.2 the Nooksack River delta project includes numerous actions across a large portion of the lower 2 miles of the Nooksack and Lummi Rivers. Actions planned to increase flood plain area and reconnect tidal and riverine flows would restore some 1,807 acres of scarce tidal freshwater wetlands. Removal of levees and other anthropogenic stressors will reinitiate sediment transport, freshwater input, tidal exchange, channel migration, marsh accretion, and longshore sediment transport processes. Resulting habitat benefits Chinook salmon and bull trout as well as peregrine falcon, bald eagle, shorebirds, waterfowl, invertebrates, forage fish, and eelgrass. Proposed restoration complements, but does not depend on, the proposed Lummi Nation Wetland and Habitat Bank project downstream and adjacent to this site (Lummi Nation 2008).

This project will restore a very large area of the river delta that provides valuable nursery habitat for juvenile salmonids, increasing survival and supporting Puget Sound population recovery.

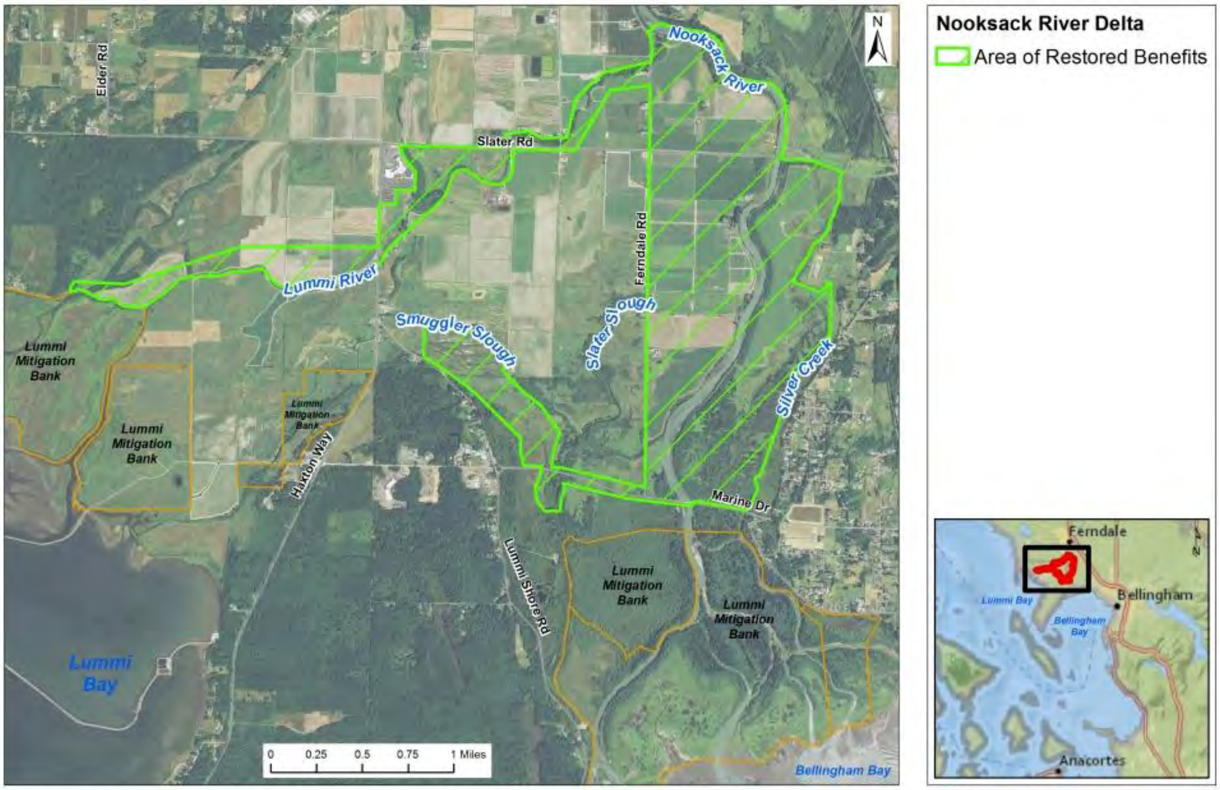
Re-established intertidal and shallow subtidal areas would facilitate kelp and eelgrass growth, increasing nearshore productivity for fish, birds and other marine species. This project would restore important landscape features, including connectivity between nearshore and adjacent uplands, and shoreline area, length, and complexity. Benefits include improved resiliency of the shoreline to respond to rising sea levels and increased frequency of storm and flood events linked to climate change.

Significant in scale as a stand-alone action, this project also builds on the Lummi Nation's existing and planned mitigation bank projects that similarly restore delta ecosystem processes and habitats. These projects are also central to Whatcom County's comprehensive approach to managing flooding and restoring estuary habitat in the lower Nooksack River. Restoration actions are aligned with the Puget Sound Chinook Salmon Recovery Plan. Implementation will provide 25 percent of Puget Sound Action Agenda's 2020 estuarine habitat recovery goal in this single project (PSP 2014).

b. Potential Adverse Impacts

Extensive levee setback and removal actions are proposed for this site. Similar to effects described for North Fork Skagit short-term impacts from increased turbidity can be expected from excavation work that would degrade water quality. This project also involves the replacement of bridges on the Lummi River and Tennant Creek (tributary to Nooksack). Bridge construction often involves various construction methods including use of tugboats, drilling, rock placement, and pile driving. Sound levels associated with these activities would temporarily increase during construction with some noise-generating activity potentially exceeding thresholds that are harmful to fish and wildlife. Estimates of sound levels should be calculated once project implementation details have been established and compared to data available on aquatic species' hearing and the regulated sound threshold under the ESA and the MMPA. Each method of construction that produces harmful underwater noise should be mitigated through physical means such as bubble curtains and sound dampening mats or through conservation measures including wildlife monitoring. Preliminary site construction plans avoid pile driving, the most deleterious of potential noise generating actions. Bridge supports are proposed as drilled shafts and poured concrete piers instead of compression driven steel piles.

The Lummi Nation has expressed concerns about the potential for reestablishing Lummi River flows to adversely affect tribal shellfish operations. Tribal concerns involve the potential for increased delivery of pollutants from the Nooksack River to Lummi Bay. Restoration of Lummi River flows will require assessment of upstream water quality and modeling of downstream impacts to receiving waters. USACE acknowledges the need for analysis of effects to water quality during the design phase to avoid impacting shellfish beds.



Nooksack River Delta	
Shoreform type:	Large River Delta
Processes restored:	sediment transport, freshwater input, tidal exchange, channel migration, marsh accretion, longshore sediment transport
Species directly associated:	peregrine falcon, bald eagle, shorebirds and waterfowl, crabs, forage fish, salmon, eelgrass
Species indirectly associated:	green sturgeon, Steller sea lion, eulachon, marbled murrelet, lamprey, killer whale
ESA Critical Habitat:	Chinook salmon, bull trout
Acres of wetlands restored:	1,807

Restored Benefits: Nooksack River Delta

Figure 8: Area of Restored Benefits at Nooksack River Delta site (from USACE 2014).

3. Duckabush River Estuary

a. Ecosystem Restoration Benefits

Restoration of this site provides benefits to ESA listed Chinook, Hood Canal summer chum, steelhead, and bull trout. The project provides direct benefits to harbor seals, bald eagles, waterfowl, shellfish, and eelgrass habitat at the edge of the site. Duckabush estuary restoration provides an opportunity to reconnect floodplain and intertidal wetlands, improving tidal exchange, sediment transport, and estuary development. Realignment of roads and bridges will restore tidal inundation and hydrology. Reconnection of distributary channels will promote greater diversity and resiliency of delta wetland habitats.

In addition to these habitat benefits the project may also improve intertidal and shallow subtidal areas that support important recreational and tribal shellfish resources. Oysters, clams, and mussels are harvested on lands managed by Washington Department of Fish and Wildlife for this purpose. Channelization of the Duckabush River and the hydraulic constraints of the current bridge-opening direct sediment to a relatively small portion of the delta leaving large areas of tidal flats disconnected from sediment supplies and vulnerable to loss from erosion and sea level change.

b. Potential Adverse Impacts

Bridge replacement is a major construction element of this project. Short-term impacts to turbidity can be expected following fill removal and channel reconstruction. In-water work is required for bridge replacement. However, pile driving is not proposed. Existing piles will be removed and test holes will used to assess substrate stability. Neither of these activities creates noise levels commensurate with pile driving. New bridge supports will be drilled and cast in place concrete piers to minimize noise impacts to aquatic species.

While general concerns discussed for the previous projects apply at this site as well, at this phase of design development, no site-specific potential adverse impacts to the biological environment have been identified.

The Duckabush River Bridge is listed on the National Register of Historic Places. Removal and replacement of this historic resource will require compliance with Section 106 of the National Historic Preservation Act (NHPA) including mitigation of impacts. USACE indicates that they are currently working on a Programmatic Agreement with the Washington State Historic Preservation Office, the Advisory Council of Historic Preservation, interested Tribes, and members of the public to address NHPA compliance for this site and other potentially affected cultural and historic resources.

B. Other Plans

The No Action Alternative (Alternative 1) would allow causes and consequences of nearshore ecosystem degradation to persist and worsen. Section V provides a discussion of the likely implications to fish and wildlife resources in the study area if proposed restoration actions are not implemented.

Other action alternatives anticipate implementation of substantially more restoration than that proposed by the agency preferred alternative / recommended plan. Alternative 2 would advance 11 sites for construction and was the initial APA/RP. Alternative 3 assessed environmental outcomes of restoration at 18 sites across Puget Sound including the 3 proposed under the current APA/RP.

Alternative 2 would restore 5,348 acres of nearshore habitat. This compares to 5,517 for Alternative 3 (1,807 restored for Alternative 4). These alternatives would more completely address project objectives by including one or more beach restoration sites involving armor removal. These alternatives also include sites where tidal hydrology is restored to coastal embayments, “pocket estuary” features not associated with one of the 16 major river deltas in the study area. Alternative 4 does not include beach or embayment sites and focuses largely on river delta restoration. The 11 sites that comprise Alternative 2 have a total cost of approximately $1,063,899,000; the Alternative 3 sites have a total cost of approximately $1,243,408,000. For comparison, total costs of the APA/RP (Alternative 4) are approximately $425,362,000.

VIII. EVALUATION OF ALTERNATIVES

Soundwide systematic analysis completed by the PSNERP PDT led to definition of six problem statements based on this scientific analysis. These problem statements provide a clear rationale for addressing the underlying causes of widespread nearshore ecosystem degradation and habitat loss. Large river deltas, smaller coastal embayments, and the bluff/beach systems that dominate the Puget Sound shorescape have all been widely impacted and are greatly diminished in quantity, quality, and connectivity relative to conditions in c.a. 1850. Numerous fish and wildlife resources rely upon these productive ecosystems that occupy the terrestrial/marine ecotone. Emblematic of the relationship between nearshore habitat loss and degradation are Pacific salmon species. While overfishing and upper watershed habitat impacts have contributed to the systematic decline in salmon production, estuarine wetland habitat loss which averages 55% in Puget Sound is a significant limiting factor for species recovery. Declines in populations of marine birds and other species show similar correlations between nearshore habitat loss and observed population declines. These observations support the conclusion of a compelling need for significant, large-scale nearshore ecosystem restoration. The study area is clearly in need of restoration to improve habitat conditions for listed and non-listed fish and other aquatic species, and for general aquatic ecosystem health.

The no action alternative (Alternative 1) would allow causes and consequences of nearshore ecosystem degradation to persist and perhaps worsen. Failure to implement projects following the substantial investment USACE, WDFW, the Service, and other partners have made towards the success of PSNEP would represent a significant missed opportunity. Western Washington tribes have asserted that habitat restoration efforts are not keeping pace with on-going habitat loss in Puget Sound. Nearshore habitat loss is impeding salmon recovery efforts to the detriment of tribes who depend on treaty reserved fishing rights for economic and cultural sustenance (NWIFC 2011). Federal agencies, including USACE, have an obligation to contribute to Puget Sound recovery; implementation of projects through the GI and other authorities provides an opportunity to do so.

Providing substantially less benefit than other action alternatives, Alternative 4 is the agency preferred alternative/recommended plan and would significantly contribute to Puget Sound recovery. Nooksack, Skagit, and Hood Canal are priority areas for recovery and Alternative 4 proposes important advances in these regions by implementing over 1,800 acres of nearshore restoration focused in river deltas. These projects will provide numerous ecosystem benefits and provide important habitat for fish and wildlife resources discussed above. Adverse environmental effects are minor in scale and duration compared to ecosystem benefits. Most adverse effects can be significantly minimized by implementing standard best management practices including timing construction activities for periods when fish and wildlife are less likely to be present.

Alternative 2, involving implementation of 11 restoration projects throughout the study area, would provide substantially greater ecosystem benefits than the APA/PR. Nearly 3 times as many acres of intertidal habitat would be restored, at a commensurate increase in project costs. While this alternative was originally identified as the Tentatively Selected Plan in the Draft FR/EIS, USACE is now advancing a tiered approach to the numerous projects evaluated by the GI and the request for immediate authorization of 3 sites represented in Alternative 4.

Alternative 3, even larger in scope and spatial scale and would advance 18 projects for construction. This alternative would accelerate Puget Sound recovery efforts delivering improvements in nearshore ecosystem conditions throughout the study area. The Service strongly endorses a U.S. Army Corps of Engineers ecosystem restoration authority that would enable this comprehensive alternative. However this alternative did not meet USACE tests of cost effectiveness and was not carried forward due to significant increases in cost for the larger suite of restoration sites.

While not a formal alternative assessed through the USACE NEPA analysis, full implementation of the tiered approach would likely exceed the scope of ecosystem restoration of alternatives evaluated with as many as 24 projects diverse in size and features constructed throughout the entirety of the Puget Sound basin.

IX. RECOMMENDATIONS FOR FISH AND WILDLIFE CONSERVATION

The Service supports the APA/RP and is providing the following list recommendations to minimize potentially adverse effects and maximize benefits to fish and wildlife resources associated with the proposed actions. Recommendations are divided into two tiers. Tier 1 recommendations are considered essential for minimizing potential negative impacts of the actions and ensuring that intended benefits are realized. Tier 2 recommendations are those that will enhance overall restoration effectiveness in the study area and provide additional benefits beyond those currently represented in the APA/RP.

A. Tier 1 Recommendations: Ensuring APA/RP Effectiveness

1. The Service recommends that USACE adhere to best management practices and conservation measures applicable to construction activities required to implement restoration projects. To achieve the maximum ecosystem benefit from this restoration program USACE should seek to avoid the need for variances and exceptions from practices that avoid or minimize adverse impacts to fish and wildlife resources.

2. For projects requiring replacement of highway and road bridges the Service recommends that USACE implement conceptual designs that avoid pile driving. Current plans specify that new bridge supports will be drilled and cast in place concrete piers to avoid noise impacts to aquatic species.

3. The Service recommends that riparian buffers installed by USACE restoration authorities and programs be consistent with NMFS guidelines for protection of salmon habitat quality. Projects that invest public resources in ecosystem restoration should conform to the highest standards of environmental protection.

4. The Service understands that USACE and WDFW have a significant amount of work remaining to finalize project designs and construction plans. This will include negotiations with landowners and other coordination to establish final project boundaries and the area of restored ecosystem benefits. The Service recommends that USACE and their partners exercise creativity and flexibility in working with landowners and other stakeholders in seeking to establish the maximum amount of ecosystem benefits from restoration projects.

5. The Service suggests that USACE continue to coordinate closely with tribal governments and entities with interest in these projects. In addition to compliance with requirements for formal government-to-government coordination, we strongly advise continued informal coordination with tribal government agency staff and tribal leaders. Success of these projects will be greatly facilitated by integrating collaboration with western Washington tribes throughout the process of project design and implementation.

6. The Service has provided technical assistance to PSNERP throughout the entire GI study process. We request that USACE continue to engage with the Service in the future,

seeking technical assistance to ensure that benefits to fish and wildlife resource are maximized and short-term adverse effects are minimized.

B. Tier 2 Recommendations: Generating Additional Benefits

1. Per the June 2015 guidance memo from of Office of the Assistant Secretary of the Army for Civil Works, USACE and WDFW have developed a tiered implementation approach for all 36 sites identified and evaluated by the General Investigation study. These sites were deemed critical to restore the connectivity and size of large river delta estuaries, restore the number and quality of coastal embayments, and restore the size and quality of beaches and bluffs. The tiered strategy allows for a more diversified scope of projects to be implemented under various restoration authorities and programs. This Coordination Act Report has focused on the recommended plan and alternatives evaluated in the draft FR/EIS which does not include substantial reference to other sites and implementation pathways. Nonetheless, in addition to the three sites proposed by USACE in their APA/RP, there is significant work to be done outside of an envisioned Nearshore Restoration authority for PSNERP. The Service strongly recommends that USACE adhere to the approach outlined in the guidance memo. This includes aggressive pursuit of opportunities to apply Corps of Engineers' Continuing Authority Program resources (e.g. §1135, §206, §544) to implement those projects deemed more appropriate for CAP implementation than via the PSNERP program (Categories 2 and 3, Table 4).

2. Similar to recommendation B(1) above, the Service recommends that USACE seek a local sponsor to support the required General Investigation(s) for the nine sites identified as falling within the GI program but require additional data collection and/or analysis that would be studied under future feasibility reports (Category 5, Table 4). These nine sites that require additional study prior to eligibility for authorization would more completely realize the potential provided by the extensive analysis of the PSNERP GI and greatly complement the three sites that are the focus of the current APA/RP.

X. SUMMARY AND THE SERVICE POSITION

The U.S. Fish and Wildlife Service supports the tiered approach for implementation agreed upon by USACE and WDFW for projects identified to address the ecosystem restoration needs documented by the analysis completed under the authority of the Puget Sound Nearshore Ecosystem Restoration General Investigation Study. We specifically endorse:

1. Immediate enactment of the agency preferred alternative/recommended plan. USACE and WDFW should continue engineering design and other tasks required to implement the three projects recommended for implementation by the General Investigation study. Completion of the Nooksack River, North Fork Skagit River, and Duckabush River projects will provide substantial positive benefits to Puget Sound recovery including important benefits for fish and wildlife resources.

2. Aggressive pursuit of opportunities to apply other USACE authorities to implement 12 projects identified by the tiered approach as appropriate for Puget Sound and Adjacent Waters (§544) or Continuing Authority Program (§1135, §206) execution. These projects are within reach of existing authorities and resources and should be implemented as expeditiously as possible.

3. Simultaneous work to develop local sponsorship and USACE vertical team support for additional GI studies to complete additional data collection and analysis required to advance nine projects determined suitable for GI implementation but lacking sufficient information for immediate authorization.

The Service finds substantial value in action alternatives evaluated by the FR/EIS that would have delivered significantly greater ecosystem benefit than the final proposal. However the Service understands that the tiered approach which includes implementation of restoration projects beyond the scope of the APA/RP may provide similar, or perhaps greater, ecosystem benefits than any of the formal NEPA alternatives considered. The path forward agreed upon by USACE Headquarters, USACE Seattle District, and WDFW delivers a desirable outcome in the delivery of authorization for constructing three significant restoration projects, resulting in over 1,800 acres of tidal wetlands. These projects, especially when complemented by other actions identified in the tiered implementation approach, will substantially improve Puget Sound nearshore ecosystem conditions, addressing degradation identified by the GI study. Nearshore restoration at this scale has the potential to contribute substantially to regional Puget Sound recovery efforts and is consistent with the obligations to uphold treaty reserved rights of western Washington tribes. These projects represent a significant contribution to the urgent need to recover Puget Sound ecosystems providing habitat for fish, wildlife, and plants to the continuing benefit of the American people.

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FINAL
Fish and Wildlife Coordination Act
Section 2(b) Report

Puget Sound Nearshore Ecosystem Restoration Project

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LIST OF ACRONYMS

APA/RP	Agency Preferred Alternative/ Recommended Plan
BMPs	Best Management Practices
CAP	Continuing Authority Program
CAR	Coordination Act Report
DPS	Distinct Population Segment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FR/EIS	Integrated Feasibility Report / Environmental Impact Statement
FWCA	Fish and Wildlife Coordination Act
GI	General Investigation
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PA	Preferred Alternative
PDT	Project Delivery Team
PMP	Project Management Plan
PSAW	Puget Sound and Adjacent Waters Restoration Program
PSNERP	Puget Sound Nearshore Ecosystem Restoration Project
RP	Recommended Plan
Service	U.S. Fish and Wildlife Service

USACE	U.S. Army Corps of Engineers
VEC	Valued Ecosystem Component
WDFW	Washington Department of Fish and Wildlife
WDE	Washington State Department of Ecology
WRDA	Water Resources Development Act

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers, Seattle District (USACE) has completed a General Investigation study (GI) of nearshore ecosystem conditions throughout the approximately 2,466 miles of Puget Sound shoreline. The GI was initiated in 2001 by USACE and the local cost-share sponsor, the Washington Department of Fish and Wildlife (WDFW). The Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) GI involved cooperation from numerous partners including federal, state, local, and tribal government representatives, as well as participants from non-governmental organizations and academic institutions. Results of the study are detailed in a series of 24 technical reports published by PSNERP, and summarized in an Integrated Feasibility Report and Environmental Impact Statement (FR/EIS).

Results of the GI include a characterization of nearshore ecosystem conditions and the articulation of a problem statement based on observed patterns of ecosystem degradation and habitat loss. USACE and partners derived restoration objectives to address identified problems. The PSNERP Project Delivery Team (PDT) screened numerous locally identified restoration concepts against planning objectives and identified restoration needs. Conceptual engineering designs were developed for 36 of these potential restoration actions to evaluate costs and benefits. Alternatives comprised of subsets of these 36 potential projects were analyzed and results documented in the FR/EIS. The initial draft FR/EIS was released for public and agency review in October 2014. During this review USACE revised the preferred alternative (PA) and recommend plan, reducing the number of potential projects proposed for immediate authorization through PSNERP. USACE also identified and categorized projects eligible for construction under existing authorities and programs. USACE places each of the 36 PSNERP projects into one of four potential construction categories as a "tiered approach" to implementation.

The revised agency preferred alternative/recommended plan (APA/RP) that USACE proposes to advance for PSNERP includes three projects that have sufficient level of analysis to move forward for implementation at this time. These three sites are the focus and outcome of the National Environmental Policy Act (NEPA) process and represent the primary scope of analysis for this Fish and Wildlife Coordination Act (FWCA) §2(b) Report:

- North Fork Skagit River Delta
- Nooksack River Delta
- Duckabush River Estuary

In addition to the three sites now proposed as the APA/RP, nine sites were determined to be potentially eligible for completion through a future USACE GI authority. However these projects currently lack sufficient engineering design and other detail sufficient for authorization at this time. Therefore, in addition to the three sites proposed for authorization, USACE has identified these nine sites as eligible for additional studies prior to a potential future request for authorization. Twelve of the 36 sites could be implemented through existing USACE programs or authorities and therefore do not require an additional request for authorization through PSNERP. The remaining 12 sites initially evaluated by the GI have already been implemented or are being addressed by other agencies. This tiered approach to implementation is the basis of the action proposed by USACE.

Systematic analysis completed by the PSNERP PDT provides a clear rationale for addressing the underlying causes of widespread nearshore ecosystem degradation and habitat loss. Large river deltas, smaller coastal embayments, and the bluff/beach systems that dominate the Puget Sound shorescape have all been widely impacted and are greatly diminished in quantity, quality, and connectivity relative to conditions in c.a. 1850. Numerous fish and wildlife resources that occupy the terrestrial/marine ecotone rely upon these productive ecosystems. Emblematic of the relationship between nearshore habitat loss and degradation are Pacific salmon species. While overfishing and upper watershed habitat impacts have contributed to the systematic decline in salmon production, estuarine wetland habitat loss, which averages 55% in Puget Sound, is a significant limiting factor for species recovery. Declines in populations of marine birds and other aquatic species show similar correlations between nearshore habitat loss and observed population declines. These observations support the conclusion of a compelling need for significant, large-scale nearshore ecosystem restoration. Puget Sound is clearly in need of restoration to improve habitat conditions for listed and non-listed fish and other aquatic species, and for general aquatic ecosystem health.

The APA/RP would significantly contribute to Puget Sound recovery. Skagit, Nooksack, and Hood Canal are priority areas for recovery and USACE proposes important advances in these regions by implementing over 2,100 acres of nearshore restoration focused in river deltas. These projects will provide numerous ecosystem benefits including habitat important for fish and wildlife resources. Adverse environmental effects associated with project construction are minor in scale and duration compared to ecosystem benefits. Most adverse effects can be significantly minimized by implementing standard best management practices (BMPs) including timing construction activities for periods when fish and wildlife are less likely to be present.

In fulfilling responsibilities of the U.S. Fish and Wildlife Service (Service) under the authority of the FWCA, this Coordination Act Report (CAR) includes recommendations to minimize potentially adverse effects and maximize benefits to fish and wildlife resources associated with the proposed actions. Recommendations considered essential for minimizing potential negative impacts and ensuring that intended benefits of the actions are realized include:

1. The Service recommends that USACE adhere to BMPs and conservation measures applicable to construction activities required to implement restoration projects. USACE should seek to avoid the need for variances and exceptions from practices that avoid or minimize adverse impacts to fish and wildlife resources.

2. The Service recommends that projects requiring replacement of highway and road bridges implement conceptual designs that avoid pile driving. Current plans specify that new bridge supports will be cast-in-place concrete piers to avoid noise impacts to aquatic species.

3. The Service recommends that riparian buffers installed by USACE restoration authorities and programs be consistent with the National Marine Fisheries Service (NMFS) guidelines for protection of salmon habitat functions.

4. The Service recommends that USACE and their partners exercise creativity and flexibility in working with landowners and other stakeholders in seeking to establish the maximum amount of ecosystem benefits from restoration projects.

5. The Service recommends that USACE continue to coordinate closely with tribal governments and entities with interest in these projects. In addition to compliance with requirements for formal government-to-government coordination, we strongly advise continued informal coordination with tribal government agency staff and tribal leaders.

6. The Service requests that USACE continue to engage with the Service and other natural resource agencies, seeking technical assistance to ensure that benefits to fish and wildlife resource are maximized and short-term adverse effects are minimized.

The Service supports the tiered approach for implementing USACE and WDFW projects that address the ecosystem restoration needs documented by the GI analysis. We specifically endorse:

1. Immediate implementation of the APA/RP. USACE and WDFW should continue engineering design and other tasks required to implement the three projects recommended by the GI. Completion of the Nooksack River, North Fork Skagit River, and Duckabush River projects will provide substantial positive benefits to Puget Sound recovery including important benefits for fish and wildlife resources.

2. Aggressive pursuit of opportunities to apply other USACE authorities to implement 12 projects identified by the tiered approach as appropriate for Puget Sound and Adjacent Waters (§544) or Continuing Authority Program (CAP) (§1135, §206) execution. These projects are within reach of existing authorities and resources and should be implemented as expeditiously as possible.

3. Simultaneous work to develop local sponsorship and USACE vertical team support for future GI studies to complete additional data collection and analysis required to advance nine projects determined suitable for GI implementation but lacking sufficient information for immediate authorization.

Our comments and recommendations have been prepared under the authority of and in accordance with the provisions of the FWCA (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This is our final report and constitutes an official report of the Secretary of the Interior required under Section 2(b) of the FWCA. WDFW, NMFS, and Tribes directly affected by the USACE APA/RP were invited to provide input and participate in developing recommendations. WDFW and NMFS expressed support for Service recommendations and stated position. This final 2(b) report reflects comments received by Tribes and these agencies as detailed in correspondence to the Service.

I. INTRODUCTION

The USACE is proposing to implement the PSNERP in Puget Sound, Washington. Nearshore ecosystems have been severely degraded throughout Puget Sound and have been the focus of significant attention by federal, state, local, tribal, and private entities. Numerous species of anadromous fish, migratory birds, and other trust resources are dependent upon habitats provided by nearshore ecosystems. Western Washington tribes have asserted that habitat loss, including impacts to nearshore ecosystems, threatens salmon recovery efforts and the treaty protected rights that depend upon healthy salmon populations (NWIFC 2011). USACE proposes to implement a suite of actions to be delivered through PSNERP intended to restore ecosystem structure, function, and processes in Puget Sound for the benefit of native salmonids and other aquatic species.

USACE, in coordination with local cost-share sponsors (State of Washington, represented by the Washington Department of Fish and Wildlife), stakeholders, and the Service, identified numerous potential restoration activities throughout the GI study area. The study area encompasses the entirety of lower watersheds draining into Puget Sound including floodplains and river deltas (see Section II.B. for more detail) as well as the intertidal and nearshore subtidal shoreline of Puget Sound. USACE and their partners in the GI completed a comprehensive assessment of ecosystem conditions and nearshore habitat loss throughout the approximately 2,466 miles of Puget Sound shoreline (USACE 2014). This analysis informed the articulation of a problem statement and associated planning objectives to address observed patterns of ecosystem degradation. Over 500 restoration project concepts were evaluated against project objectives and ultimately 36 projects were carried through preliminary design and engineering. Subsets of these projects were used to define alternatives that are the subject of a Draft Integrated Feasibility Report / Environmental Impact Statement (FR/EIS) intended to represent the range of alternatives of a NEPA assessment. USACE, in conjunction with local sponsors, identified a recommended plan (RP) intended to represent the agency's preferred alternative (APA) of a NEPA assessment.

The purpose of this FWCA Report is to evaluate possible effects to fish and wildlife of proposed PSNERP projects identified as the APA/RP. The report includes recommended actions for minimizing deleterious consequences and maximizing benefits. In doing so, this report broadly evaluates effects within the study area of each alternative in the FR/EIS in order to concur with or dispute selection of the APA/RP. The report concludes with an overall recommendation from the Service supporting the tiered approach to implementation of restoration projects proposed by USACE.

Our comments and recommendations have been prepared under the authority of and in accordance with the provisions of the FWCA (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq*.). This is our final report and constitutes an official report of the Secretary of the Interior required under Section 2(b) of the FWCA.

A. Coordination with Federal and State Agencies and Tribal Governments

Since the initiation of the GI in 2001 by USACE and the WDFW stakeholder involvement and agency coordination have been vital components of PSNERP. A multi-disciplinary, multi-agency PDT has supported USACE and WDFW with development and execution of all aspects of the GI. The PDT comprises six standing teams with agency, non-governmental organization and other representatives serving on the Executive Committee, Steering Committee, Project Management Team, Nearshore Science Team, Implementation Team, and Stakeholder Involvement Team. A comprehensive list of PDT composition and affiliation, including Service participation, is provided in the FR/EIS (USACE 2014).

USACE has engaged in formal and informal coordination with the federally recognized tribes of the Puget Sound throughout the feasibility phase. In addition to direct tribal coordination the PDT has also included representation from the Northwest Indian Fisheries Commission. Coordination with tribes is ongoing and USACE will continue to offer opportunities to meet informally or through government-to-government meetings. Most recently USACE has met with tribes most directly affected by proposed projects. Tribal coordination will continue throughout the feasibility phase, preconstruction engineering and design, and construction.

Many project partners, the Washington State Governor, and five members of Congress have provided letters that express their support for PSNERP.

B. Project Authority, Purpose, and Scope

Proposed actions are the outcome of the Puget Sound Nearshore Ecosystem Restoration Study (Nearshore Study), which USACE is conducting under the authority of the River and Harbor Act of 1962 (Public Law 87-874). USACE initiated the reconnaissance phase in September 1999 and determined that there was sufficient federal interest to advance to the next stage of conducting GI. WDFW, as the non-Federal sponsor, and USACE initiated the feasibility phase of the study on September 25, 2001.

The purpose of the GI was to evaluate ecosystem degradation in the Puget Sound Basin; to formulate, evaluate, and screen potential solutions to these problems; and to recommend sites that have a Federal interest and the support of a local entity willing to provide necessary local cooperation. The Nearshore Study aims to address the continuing degradation of nearshore ecosystems through restoration of natural processes (e.g. sediment movement and tidal hydrodynamics) and restoration of coastal wetlands, embayments, and beaches.

The PDT identified three goals for restoration of the Puget Sound nearshore zone:

- Restore and protect nearshore processes that sustain the ecological health of Puget Sound;
- Restore and protect ecosystem functions and structures that support valued ecosystem components (VECs); and
- Increase understanding of the Puget Sound nearshore zone to improve restoration and protection actions.

C. Prior Efforts and Coordination with the Service

USACE initiated consultation with the Service under the authority of FWCA in 2002, shortly after the start of the GI Feasibility Phase. The Service has provided three Planning Aid Letters (2005, 2007, and 2011) and provided a Service biologist to be a member of the Nearshore Science Team and the Steering Committee. The Service has been supportive of Nearshore Study efforts and USACE has been incorporating Service technical advice into project planning, strategies, objectives, site screening, and conceptual designs.

A Service report (USFWS 2011) supporting the formulation of a Nearshore Study PA includes information on federally listed threatened or endangered species under the Endangered Species Act (ESA) for each of the 18 sites evaluated. In our report the Service provided a species list and a species-specific and general conservation measures from the Programmatic Biological Assessment and Biological Opinion for Fish Passage and Restoration Actions in Washington State (NMFS and USFWS 2008). USACE, NMFS, and the Service are revising this programmatic consultation to cover all types of actions proposed by the Nearshore Study team with expected completion in 2016.

D. Prior Studies and Reports

USACE has conducted other GIs and has implemented other ecosystem restoration projects around Puget Sound prior to initiating the Puget Sound Nearshore Study (see Tables 1.7.1 and 1.7.2 from USACE 2014). These include the Puget Sound and Adjacent Waters Restoration Program (PSAW) which was authorized by §544 of the Water Resources Development Act (WRDA) of 2000. While this authority has not been fully utilized due to the lack of a supporting GI, directed funds have been used to implement several nearshore restoration projects. Projects implemented under PSAW include the Qwuloolt ecosystem restoration project and Seahurst Beach restoration Phases 1 and 2. PSAW authorization includes an upper limit of $40M in federal funding available through the life of the authority and per-project caps ($5M federal funding). Projects proposed under PSNERP would exceed these limits thus rendering PSAW insufficient to meet the needs identified by the PSNERP GI. Similarly, Corps of Engineers Continuing Authorities Programs (CAPs), including §1135 of WRDA 1986 and §206 of WRDA 1996, have been used to implement smaller restoration projects in Puget Sound and contributing watersheds. These programs are also constrained in their ability to deliver large-scale restoration actions proposed by PSNERP with per-project spending limits ($10M in federal funding).

In support of the GI PSNERP produced 24 peer reviewed technical reports. These reports documented study approach and results as well as establishing the conceptual framework upon which this ecosystem approach to restoration was based. Documents can be accessed on the program's website: http://www.pugetsoundnearshore.org/technical_reports.html.
A subset of these technical reports forms the basis for the USACE definition of planning objectives and project selection strategy, and is highlighted in the Chapter 12 of the FR/EIS (Annotated Bibliography). These principal PSNERP technical reports include:

> *Principles for Strategic Conservation and Restoration*. This report summarizes principles of landscape ecology and conservation biology that are applicable to the conservation and restoration of nearshore ecosystems in the Puget Sound and are

intended to guide the prioritization of sites and actions by the PDT and others (Greiner 2010).

Historical Change and Impairment of Puget Sound Shorelines: Atlas and Interpretation of Puget Sound Nearshore Ecosystem Restoration Project Change Analysis. This report is a comprehensive, spatially-explicit analysis (Change Analysis) of net changes to nearshore ecosystems of Puget Sound—its beaches, estuaries, and deltas—since its earliest industrial development. This Change Analysis report provides the spatially explicit analysis that identifies impacts to Puget Sound. These data were used to both quantify Sound-wide conditions and identify site-specific restoration needs and opportunities (Simenstad *et al.,* 2011).

Implications of Observed Anthropogenic Changes to the Nearshore Ecosystems in Puget Sound. This report presents a synthesis of the most significant physical changes to the nearshore ecosystems of Puget Sound and implications of these changes to ecosystem functions, goods, and services. This document served as the basis for definition of the Problem Statement for PSNERP and the rationale for ecosystem restoration objectives (Fresh *et al.,* 2011).

Strategies for Nearshore Protection and Restoration in Puget Sound. This report presents a model for integrating change analysis and estimating ecosystem degradation. This model is applied to evaluate potential delta, beach, barrier embayment, and coastal inlet restoration sites (Cereghino *et al.,* 2012)

The basis for design concepts and initial engineering for a suite of 36 potential nearshore restoration projects is presented in a contractor's report to the study: *Strategic Restoration Conceptual Engineering — Final Design Report* (ESA 2011), also available on the program website: http://www.pugetsoundnearshore.org/cdr.html

There is also a series of four documents produced by the Service with contractor support to supplement Nearshore Study conceptual design work and includes the following:

PSNERP Strategic Restoration Conceptual Design Preliminary Environmental Contaminants, Cultural Resource, and Endangered Species Site Evaluations. This report provides baseline information on environmental contaminants, cultural resources, endangered species, and conservation measures for 36 candidate restoration sites under consideration by the Nearshore Study team. Environmental Site Assessment Level 1 Survey Checklists were also completed for each of the 36 sites (USFWS 2011).

A Cultural Resources Assessment of the Puget Sound Nearshore Ecosystem Restoration Projects (PSNERP) Area, NW Washington, Task - Literature and Data Review and Synthesis. This report presents the results of cultural resource record/literature searches for 36 candidate restoration sites under consideration by the Nearshore Study team. An assessment of the potential for cultural resources within each project area is made based on a review of the environmental, cultural, and archaeological data. Recommendations are provided on where future archaeological efforts should be made for each of the 36 areas of potential effect.

A Cultural Resources Assessment of the Puget Sound Nearshore Ecosystem Restoration Projects (PSNERP) Area, NW Washington - Task 2: Historic Context of Agricultural Dikes. This report is a regional-scale historic context of late nineteenth and early twentieth century agricultural development within the Puget Sound region of northwest Washington. This report documents the history of development of dikes built in the region, and proposed evaluation criteria to use as a management tool for Service and others to use for future compliance with Section 106 of the National Historic Preservation Act (NHPA).

Cultural Resources Field Inventory for 15 Action Areas within the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) Area, NW Washington. This report presents the findings of both surface surveys and subsurface investigations concentrated on project components within areas previously determined to have high to moderate probabilities for cultural resources. The purpose of the inventory was to provide (1) descriptions of cultural resources in the area of potential effect (APE) for Nearshore Study undertakings, (2) determinations concerning the eligibility of cultural resources to the National Register of Historic Places (NHRP) and the Washington Heritage Register (WHR), and (3) recommendations on how to avoid or mitigate impacts to historic properties. This report was completed for subset of the 36 candidate restoration sites and only on lands where access had been granted by the landowner.

E. State Agency, National Marine Fisheries Service, and Tribal Coordination

The WDFW, NMFS, and Tribes directly affected by the USACE APA/RP were invited to provide input and participate in developing recommendations. A draft version of the CAR was provided to WDFW, NMFS, and affected Tribes. This report reflects concerns expressed by Tribes and these agencies, as detailed in correspondence to the Service (Appendices A through C).

1. Washington Department of Fish and Wildlife

In their letter dated February 11, 2016 (Appendix A), WDFW expresses support for Service recommendations and statements provided in this CAR. WDFW notes that they are actively working on the development of riparian guidance tools. WDFW, as local sponsor of proposed PSNERP actions, indicates that they will rely on this updated scientific guidance prior to concurring with our recommendation for adherence to NMFS riparian buffer guidelines stated in Section IX(A)(3) of this report.

2. National Marine Fisheries Service

In the email dated February 16, 2016 (Appendix B), the North Puget Sound Branch of the Oregon Coast Area Office of NMFS expressed strong support for Service findings and recommendations presented in the CAR. NMFS noted their recent completion of formal consultation under §7 of the ESA for the three projects proposed by USACE. These projects were identified in NMFS salmonid recovery plans, and the agency believes that the projects will have substantial benefit for the conservation of affected ESA listed salmon and steelhead.

NMFS also suggested inclusion of a procedural consideration in the final CAR consistent with recommendations provided in their formal consultation. Specifically:

> "*NMFS recommends that the COE provide detailed design information for each of four stages of design development identified in PSNERP program: 1) Concept (10 percent); 2) 30 percent design; 3) 60 percent design; and 4) 90 percent design*."

NMFS finds that provision of additional design information as projects progress towards completion will enable their agency to ensure that the ESA consultation completed for these projects remains valid. This on-going coordination will allow NMFS to determine if the incidental take statement remains sufficient to cover proposed actions and associated effects to ESA listed species or if new information has emerged which might trigger the need to reinitiate consultation.

This request is consistent with our more general recommendation for on-going coordination as stated in Section IX(A)(6) of the CAR. The Service supports this recommendation from NMFS, and requests USACE to coordinate with NMFS on a process to provide additional design information to ensure continued compliance of the proposed actions with §7 of the ESA.

3. Swinomish Indian Tribal Community

In the letter dated February 5, 2016 (Appendix C), the Swinomish Tribal Environmental Policy Director identifies concerns associated with potential impacts to tribal fishing sites associated with the North Fork Skagit River Delta project. The letter notes that the project was identified by the Tribe as an important option for estuarine restoration as part of the Skagit Chinook Recovery Plan. While indicating support for projects that contribute to Chinook and steelhead recovery, the Tribe seeks the opportunity to better understand how this section of the river will evolve with or without the project. Specifically, the Tribe raises concerns about effects of river changes on navigation, shoreline access, and associated impacts to Tribal fishermen. The Tribe requests inclusion in the development of future analysis of the project and the final project design.

This request is consistent with our recommendation for USACE coordination with tribal governments with interest in these projects as stated in Section IX(A)(5) of the CAR. The Service supports this request, and recommends that USACE coordinate with the Swinomish Tribe in assessing potential impacts to Tribal fisheries and in the Tribe's participation in future design phases for this project.

II. DESCRIPTION OF STUDY AREA AND ACTION AREA

A. Puget Sound Context

The waters of Puget Sound cover nearly 17,000 square miles, a watershed collectively referred to as the Puget Sound Basin. This basin is bordered on the east by the Cascade Mountains and on the west by the Olympic Mountains. The Puget Sound Nearshore Study area consists of the nearshore zone of the Puget Sound Basin including Puget Sound, the Strait of Juan de Fuca, and southern portions of the Strait of Georgia that occur within the borders of the United States (Figure 1). Headwaters for two of these basins originate just north of the border in Canada. The study area shoreline is approximately 2,466 miles in length. The basin is roughly 80 percent land and 20 percent water. The total water area covers nearly 3,090 square miles at mean high water. The region's soils are characterized as immature, being less than 10,000 years old. Typical of fjords, water depths in Puget Sound increase rapidly from shore, with an average depth of 200 feet and a maximum depth of more than 1,200 feet. (USACE 2014).

The structures and habitats of Puget Sound are a complex mixture of beaches and bluffs, estuaries, lagoons, river deltas, and rocky coastlines. Shipman (2008) defines a classification of Puget Sound nearshore landforms that reflects the primary role of geomorphic processes in shaping the landscape. This classification system identifies four geomorphic systems that form the foundation of this shoreline classification. Three of these systems (beaches, embayments, and river deltas) reflect differences in the roles of waves, tides, and rivers in transporting sediment and shaping the coastline. The most common Puget Sound shoreline type consists of mixed sand and gravel beaches backed by high coastal bluffs. Other sediment dominated shoreline environments include large river deltas, tidal flats, salt marshes, and estuaries. A fourth system, rocky coasts, is characterized primarily by the limited availability of mobile sediment and the lack of major depositional landforms. Rocky-bottom habitat is less common than soft-bottom habitat and is confined mostly to northern Puget Sound. The shorelines of the San Juan Islands exemplify rocky coast systems in Puget Sound (Shipman, 2008).

Widely varying fish communities utilize Puget Sound nearshore ecosystems where individuals spend all or portions of their lives. In general they are grouped as demersal/reef fish, forage fish, and anadromous fish. Fifteen native species of anadromous fish use marine and freshwater habitats of the Puget Sound area. These include all five species of Pacific salmon (pink - *Oncorhynchus gorbuscha*, coho – *O. kisutch*, chum – *O. keta*, Chinook – *O. tshawytscha*, and sockeye – *O. nerka*), two species of native char (bull trout - *Salvelinus confluentus* and Dolly Varden – *S. malma*), steelhead (*O. mykiss*) and coastal cutthroat trout (*Oncorhynchus clarkii clarkii*), longfin smelt (*Spirinchus thaleichthys*), eulachon (*Thaleichthys pacificus*), white (*Acipenser transmontanus*) and green sturgeon (*A. medirostris*), and Pacific lamprey (*Entosphenus tridentatus*) and river lamprey (*Lampetra ayresii*). Numerous anadromous fish populations are listed as threatened or endangered under the ESA in Puget Sound, with habitat loss cited as a threat limiting species recovery.

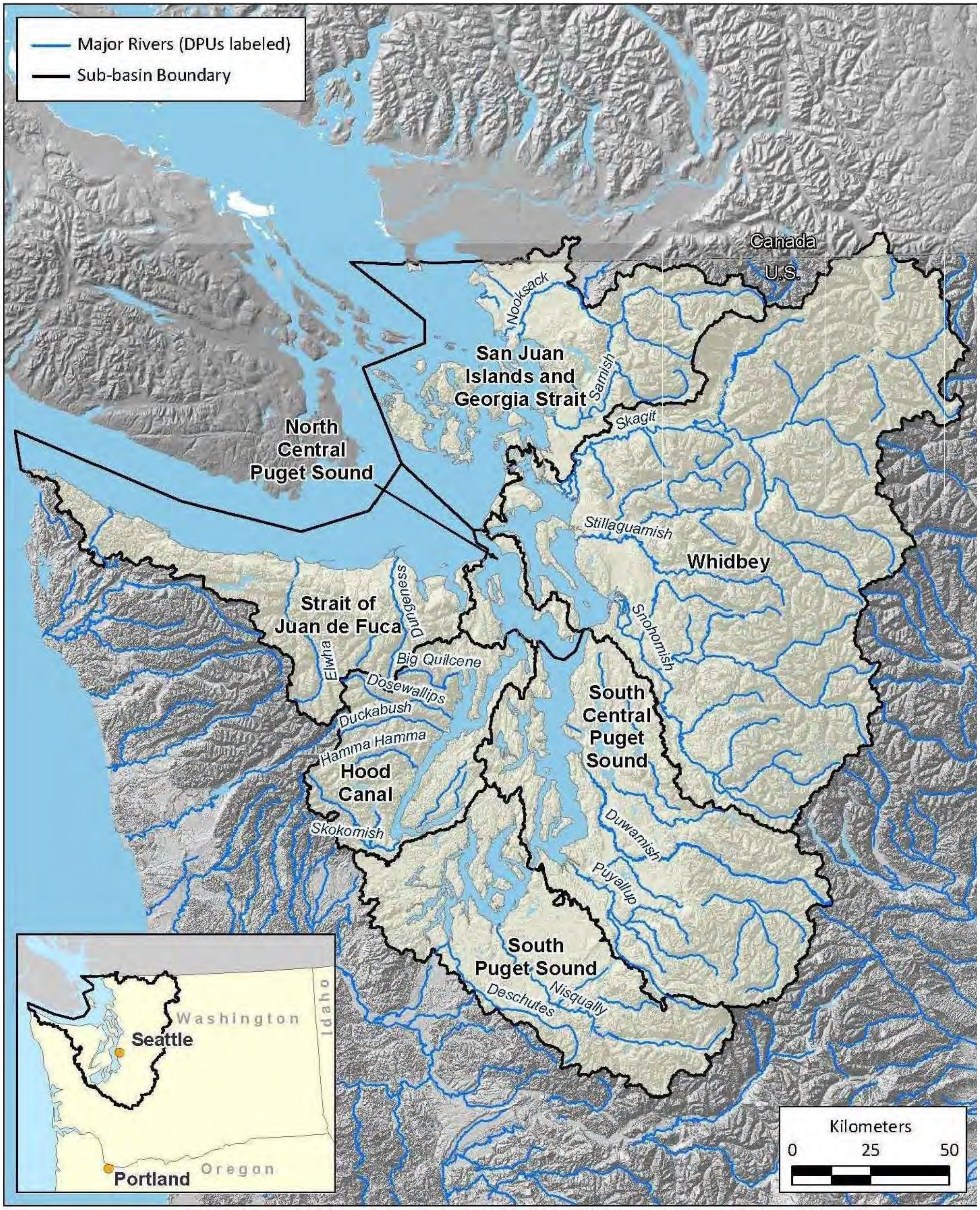


Figure 1: Puget Sound Nearshore Study Area and Oceanographic Sub-Basins (USACE 2014).

B. Study Area and Action Area

For the purpose of this project the study area has been divided into seven sub-basins based on geographic features including oceanographic sills and bathymetry, common issues and interests of the entities in these areas, and water flow patterns (Figure 1). Generally consistent with other delineations of greater Puget Sound, these sub-basins include:

- Strait of Juan de Fuca
- San Juan Islands – Georgia Strait
- Hood Canal
- North Central Puget Sound
- Whidbey
- South Central Puget Sound
- South Puget Sound

Five of these sub-basins are included within the watershed area of Puget Sound proper. The other two study area sub-basins include areas of the Strait of Juan de Fuca and the Georgia Strait seaward to the international boundary. Within these sub-basins, the study area consists of the entire extent of the nearshore zone, which includes beaches and the adjacent tops of coastal banks or bluffs, the shallow waters in estuarine deltas, and tidal waters from the head of tide to a depth of approximately 10 meters relative to the mean lower low water level (Figure 2). This contiguous band around the shoreline of the entire study area hosts diverse ecosystems that are shaped by coastal geomorphology and local environmental conditions, such as wave energy and salinity.

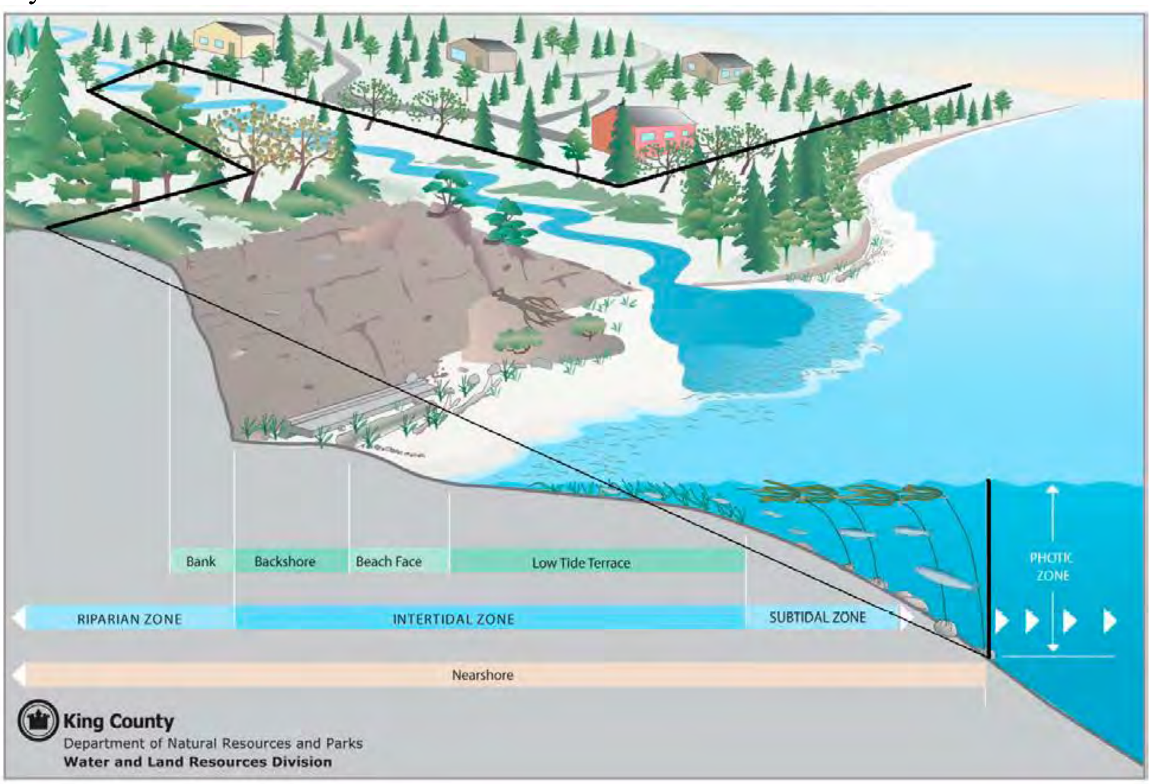


Figure 2: Generalized Extent of Nearshore Ecosystems in Puget Sound.

III. FISH AND WILDLIFE RESOURCES AND PLANNING OBJECTIVES

A. General Fish and Wildlife Concerns

Led by an interdisciplinary Nearshore Science Team, USACE, WDFW, and other project partners completed a comprehensive, spatially explicit assessment of the extent of change throughout Puget Sound's shorelines, estuaries, and deltas. This Change Analysis (Simenstad *et al.,* 2011) quantified structural and physical change between historical (ca. 1850s – 1890s) and current (ca. 2000 – 2006) conditions along the entire 2,466 miles of Puget Sound shoreline and corresponding 13,930 square miles of drainage area. Observed changes were subsequently analyzed to characterize the impacts of shoreline and watershed alterations on nearshore ecosystem processes, identify the fundamental causes of the observed ecosystem degradation, and assess which of the causes most need to be addressed in this feasibility study through restoration and protection alternatives (Schlenger *et al.,* 2011a). Conceptual models were used to connect alterations of critical ecosystem processes and the resulting habitat loss to a representative subset of socially relevant fish and wildlife resources referred to as "VECs". A series of white papers authored by species experts summarized scientific literature documenting these species/habitat relationships for VECs, including:

- Kelp and eelgrass (Mumford 2007)
- Marine riparian vegetation (Brennan 2007)
- Native shellfish (Dethier 2006)
- Forage fish (Penttila 2007)
- Juvenile salmon (Fresh 2006)
- Orca whales (Kriete 2007)
- Nearshore birds (Buchanan 2006)
- Great blue herons (Eissinger 2007)

Integration of these observed changes in nearshore ecosystem, identification of fundamental causes of degradation, and documented species/habitat relationship provided the technical basis for the definition of a problem statement. In the USACE planning process followed in the GI study, an understanding of ecosystem problems leads to establishment of planning objectives, against which restoration opportunities can be evaluated for effectiveness, efficiency, and feasibility. The problem statement defined by the Nearshore Science Team for the study is summarized by Fresh *et al.,* (2011):

1. Large river deltas have been widely impacted by multiple alterations that significantly limit the size of the estuaries and degrade the nearshore ecosystem processes that support them.
2. Many coastal embayments, including open coastal inlets, barrier estuaries, barrier lagoons, and closed lagoons/marshes, have been eliminated or disconnected from Puget Sound by the placement of fill, tidal barriers, and other stressors.
3. Stressors along beaches and bluffs have disconnected sediment inputs and altered sediment transport and accretion along long sections of the Puget Sound shoreline.

4. Estuarine wetlands have been extensively lost throughout Puget Sound including a loss of 56% in the 16 largest river deltas. In particular oligohaline and freshwater tidal wetlands have been almost completely eliminated (loss of 93%) in Puget Sound.
5. The shoreline of Puget Sound has become much shorter and simpler, as well as more artificial. Since Europeans began settling the region, Puget Sound's shoreline has had a net decline of 15% in length. Artificial landforms now represent 10% of the shoreline of Puget Sound.
6. Large portions of Puget Sound have been altered by multiple types of changes that may cumulatively combine to severely degrade nearshore ecosystem processes. Approximately 40% of the shoreline of Puget Sound has been altered by one or more stressor (e.g., overwater structures, roads, marinas, fill, armoring etc.).

1. Large River Deltas

PSNERP study documents conclude that barriers to tidal hydrology and shoreline armoring were the primary stressors impacting river delta ecosystems in Puget Sound. All of the 16 largest deltas of Puget Sound have been extensively modified with an estimated total loss of shoreline of 109 miles or 27% from historical conditions. Changes to the wetlands of the large deltas have been especially dramatic. In aggregate 56% of the historical wetlands (57,823 acres) of Puget Sound river deltas have been eliminated (Simenstad *et al.,* 2011).

USACE (2014) notes that these impacts have diminished the availability of habitat for numerous plant and animal species. Shorebirds that utilize estuarine tidal flats for feeding, roosting and reproduction have been adversely impacted by loss of river delta habitats (Buchanan 2006). Diking and filling of delta ecosystems has decreased tidal channel habitat, restricting fish and wildlife to less area. The Duwamish and Puyallup estuaries have been simplified to a single channel, concentrating fish, limiting ability to avoid predation, and reducing overall carrying capacity. While less severe than these urban estuaries, all large river deltas elsewhere in Puget Sound have been similarly degraded with the simplification of historically complex and dynamic tidal channel systems.

2. Coastal Embayments

Throughout Puget Sound small coastal embayments have been eliminated by filling or have been disconnected from the nearshore zone by fill causeways, tide gates, or diversions. PSNERP analysis mapped the location of 884 historical embayments. The current condition includes 579 mapped embayments, a net loss of 305 of these critical "pocket estuaries" in Puget Sound. Embayments historically accounted for 689 miles of Puget Sound shoreline (23%) but now account for 375 miles of shoreline (15%); this represents a decline in length of 46%. Many remnant embayments have been modified, reduced in area by encroaching fill or impacted by shoreline armoring. Approximately 18% of the remaining shoreline associated with coastal embayments is armored (Simenstad *et al.,* 2011).

The sheltered condition of embayments makes them important habitat for native shellfish, fish, and shorebirds. Embayments provide cover and a food-rich environment for several species of juvenile fish during their migration along the shore from natal streams to the Pacific Ocean. Recent evidence from the Whidbey Sub-basin shows that large numbers of post-larval and juvenile surf smelt rear in "pocket estuaries" (Beamer *et al.,* 2006). During late winter and early spring large numbers of juvenile Chinook and chum salmon rear in pocket estuaries of the Whidbey Sub-basin.

3. Beach and Bluff Systems

Puget Sound beaches have been broadly impacted by modifications with armoring (seawalls and revetments) observed as the most pervasive direct alteration. Armoring occurs along one-third of bluff-backed beaches and over a quarter of barrier beaches; 34% of all bluff-backed beaches are armored along more than half of their length. Only 25% of all bluff-backed beaches are completely unarmored. The distribution of armoring associated with beaches varies greatly among sub-basins with nearly 63% of the shoreline armored along the highly developed shores of south central Puget Sound between Tacoma and Everett. In addition to armoring, roads and nearshore fill are the most significant stressors affecting beaches in Puget Sound (Schlenger *et al.,* 2011a)

Shoreline armoring and other changes to beaches and bluffs have resulted in the loss of sediment supply (sand and gravel). The resulting interruption of sediment transport processes has impacted beaches and increased vulnerability to wave erosion and changes in sea level. Disruptions in sediment processes can also change the physical characteristics of a beach, including changes in sediment composition (e.g. coarsening), steepening of beach slopes, and narrowing of beach width (Shipman *et al.,* 2010). These changes decrease the quantity of beach habitat available, and sediment composition changes can lead to decreased availability of fine grained substrates needed for shellfish, probing shorebirds, and beach-spawning fish.

In addition to loss of fine-grained material that beach-spawning fish require, armoring can affect reproduction of forage fish in several ways. Armoring low in the intertidal zone can directly eliminate the spawning habitat of several species (e.g. surf smelt and sand lance) that spawn on the upper beach (Penttila, 2007). Armoring can also increase sediment temperatures on the upper beach where shading by natural shoreline vegetation has been removed; reducing survival of incubating embryos (Rice, 2006). In addition to effects on reproduction of forage fish, armoring can affect feeding behavior of juvenile forage fish (as well as juvenile Pacific salmon) that often feed in shallow water at high tide. When shoreline modifications extend lower on the shore the truncation of intertidal shallow water habitat by armoring reduces foraging by juvenile fish on riparian insects (Toft *et al.,* 2007).

4. Estuarine Wetlands

Eighty percent of historic Puget Sound estuarine wetlands were associated with the 16 large deltas; the remainder were associated with embayments. Historically delta system wetlands supported nearly 103,000 acres of estuarine wetlands compared to the current 45,220 acres, a decline of 56%. Coastal embayments have been similarly impacted with a loss of 69% of historic wetlands; only 8,229 acres remain. Tidal freshwater and oligohaline transitional wetlands (i.e. tidal forests and swamps) have been nearly eliminated; over 90% of these two wetland types have been lost throughout Puget Sound (Simenstad *et al.,* 2011). Based on land cover projections from Bolte and Vache (2010) losses of tidal wetlands are expected to continue.

5. Shoreline Simplification

The shoreline of Puget Sound has become shorter and simpler (i.e. straighter, less complex) over the past 150 years. Throughout the Puget Sound basin the net loss of shoreline length has been 431 miles, resulting in a current shoreline that is about 15% shorter than it was historically. While more than 600 miles of natural shoreline was eliminated, 229 miles of artificial shoreline (i.e. seawalls backed by fill) was added. Although the historic length of shoreline classified as artificial was negligible, artificial shoreline built by a modern industrial society now represents about 10% of the total length of shoreline in Puget Sound (Simenstad *et al.,* 2011).

6. Cumulative Effects

Many of the altered shoreline segments around Puget Sound have not just one, but multiple types of human-caused alterations. Only 14% of the project area is not impacted by a shoreline stressor. Of the nine shoreline stressors considered in the Nearshore Study armoring is clearly the dominant stressor, occurring in 78% of all shoreline segments analyzed. Although no shoreline segment was impacted by all nine stressors, 81% of segments have more than one type of stressor. It is highly likely that cumulative effects are negatively affecting nearshore ecosystem functions (Simenstad *et al.,* 2011).

B. Planning Objectives

Based on the analysis described above and in direct response to the identified problems of observed nearshore ecosystem degradation, the study team developed four planning objectives with associated sub-objectives to guide the formulation of alternative plans (USACE 2014). The planning objectives articulate the goal of PSNERP to restore the physiographic processes that sustain the Puget Sound nearshore ecosystem and its broad array of nationally and regionally significant resources. Through process restoration the project aims to sustainably address impairment to the nearshore zone's ability to deliver ecosystem functions, goods, and services, and to support VECs. Planning objectives most directly address the first three problem statements described above and indirectly address the others. The planning objectives are:

1. Restore connectivity and size of large river delta estuaries.
2. Restore the number and quality of coastal embayments.
3. Restore the size and quality of beaches.
4. Increase understanding of natural process restoration in order to improve effectiveness of project actions.

C. Current Status of Fish and Wildlife Resources

1. Federally Listed Species

In coordination with the Service, USACE has identified 13 fish and marine mammals within the study area listed as threatened or endangered under the ESA. Information provided by the Service was used by USACE to analyze potential impacts for proposed restoration actions

(USFWS 2011). Recovery plans for eight of the ESA-listed species have been or are being developed by the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Fish and Wildlife Service. Actions proposed by the Nearshore Study support salmon recovery consistent with NOAA's salmon recovery plans.

Federal ESA-listed species and/or the habitat suitable to support these species which may occur in the study area include the following:

- Bocaccio
- Canary rockfish
- Yelloweye rockfish
- Eulachon
- Hood Canal summer chum salmon
- Puget Sound Chinook salmon
- Coastal/Puget Sound bull trout
- Puget Sound steelhead trout
- Green sturgeon
- Southern resident killer whale (Orca)
- Humpback whale
- Marbled murrelet
- Golden paintbrush

Information on listing status, use of the nearshore zone of Puget Sound, and factors that have led to their decline is presented in the FR/EIS and discussed in further detail in supporting documents, including *Appendix F: Supplemental Information on the Affected Environment* (USACE 2014). Pertinent information for these ESA listed species is summarized below.

a. Boccacio, Canary, and Yelloweye Rockfish

Bocaccio (*Sebastes paucispinis*) are a rockfish species that range from northern British Columbia to central Baja California. Pelagic juveniles are known to occur along margins of nearshore ecosystems containing rocky substrate with kelp or sandy areas supporting eelgrass. Primary threats are associated with adult mortality from direct fishing and bycatch of this long-lived species. Overharvest led to recruitment failure in the early 1900s. Due to declining numbers and increased rarity, bocaccio is ESA-listed as endangered (NMFS 2009).

Canary rockfish (*Sebastes pinniger*) range from northern British Columbia to northern Baja California. Yelloweye rockfish (*Sebastes ruberrimus*) have an overlapping range with a slight northward shift in distribution from the eastern Aleutian Islands to Northern California. Both species can be very long-lived, with adult canary rockfish potentially living to be 80+ and yelloweye rockfish slightly longer. Adult canary rockfish occupy relatively deep marine environments, observed in depths of 250 to 650 meters in areas with considerable current around pinnacles and high relief rock. Yelloweye rockfish are associated with somewhat shallower, similar rocky marine areas with refuge such as crevices, caves, and boulder piles. Occasionally they will wander onto mudflats adjacent to rocky areas in shallower waters. As with boccacio, juveniles are pelagic drifting with coastal currents over nearshore areas. Both rockfish species are ESA-listed as threatened due to declining numbers and increased rarity. Threats to these species of rockfish are the same as those for bocaccio. There are no Federal recovery plans for these three species of rockfish. WDFW has a Rockfish Conservation Plan that focuses on managing fisheries, establishing marine conservation areas, reporting and removing fishing gear, and exploring hatchery program and artificial reefs. They also publish recommendations to limit bycatch and mortality from recreational angling (WDFW 2012).

b. Eulachon

Eulachon (*Thaleichthys pacificus*) are a small anadromous fish that range from California to Vancouver Island including northern Puget Sound. Threats to eulachon include habitat loss and degradation of spawning grounds via dams, siltation, and dredging, and potentially chemical pollution (Gustafson *et al.,* 2010). The southern Distinct Population Segment (DPS) of eulachon is ESA-listed as threatened (NMFS 2010). There are no formal recovery plans for eulachon.

Eulachon spend most of their lives in the nearshore zone before migrating into the major river systems along the west coast of North America to spawn in the early spring (late February to May). No spawning areas are documented in Puget Sound. The only documented eulachon spawning near the project area is the Elwha River in the Strait of Juan de Fuca (designated as critical habitat) (NMFS 2011). It is believed that eulachon return to the estuary of their birth but it is not known if they return to the same river from where they hatched. After hatching larvae are carried downstream and out into the estuary where they feed on zooplankton.

c. Hood Canal Summer Chum Salmon

Chum salmon (*Oncorhynchus keta*) range from Monterey, California to the Arctic coast and Beaufort Sea along the west coast of North America. While chum stocks in greater Puget Sound are relatively stable six of the eight summer chum salmon stocks within the Hood Canal Evolutionarily Significant Unit (ESU) were decreased in abundance with return stocks below viable replacement levels in the early 1990's (Fresh 2006). Threats to Hood Canal summer-run chum salmon include nearshore habitat loss and degradation, harvest, and low water flows in Hood Canal watersheds (Johnson *et al.,* 1997). Based on declining run sizes and threats to continued survival of this unique run the Hood Canal summer-run chum salmon ESU was ESA-listed as threatened in 1999 (NMFS 2005a). Subsequent harvest rate declines and recovery action implementation have contributed to stabilized and increasing run sizes. Reintroduction programs also appear to be succeeding with natural-origin spawners returning to two streams where summer chum had been extirpated for more than 10 years (Adicks *et al.,* 2007).

Unlike other salmonids that rear in natal freshwater streams and rivers juvenile chum salmon migrate quickly to marine waters after hatching. When the fry first enter saltwater they assemble in small schools and reside close to shore where they can avoid predators and forage on epibenthic prey. Juvenile chum salmon often use small coastal embayments and eelgrass beds as foraging areas and refuge from predators. As the young fish grow they gradually move to deeper water and generally migrate towards open ocean. Some chum salmon juveniles will remain in the nearshore zone until late in their second year before migrating to the open ocean. These generalized life history characteristics make chum salmon relatively more dependent upon nearshore ecosystems for juvenile and adult growth and survival (Fresh 2006).

d. Puget Sound Chinook Salmon

Chinook salmon (*Oncorhynchus tshawytscha*) range from central California to Kotzebue Sound, Alaska along the coast of North America. Abundance estimates for the Puget Sound ESU east of the Elwha River indicate that most populations are at a small fraction of their historic levels; several populations within the Nooksack, Lake Washington, mid-Hood Canal, Puyallup, and Dungeness basins have returns of fewer than 200 adult fish signifying extinction risk. Only the upper-Skagit stocks have returns of native (non-hatchery) fish in excess of 10,000 adults. A 1998 status review of these populations indicated a decline of 1.1 percent per year; more recent calculations indicate a slower decline (Shared Strategy 2007). Identified threats to Puget Sound Chinook salmon include degradation and loss of estuarine wetlands utilized by juveniles, sedimentation of upper tributary spawning reaches from forest management, and fish passage barriers and altered hydraulic flows from dams that limit access to habitat (Good *et al.,* 2005). The Puget Sound Chinook salmon ESU is ESA-listed as threatened (NMFS 2005a). Critical habitat exists throughout Puget Sound and its tributaries.

Chinook within the range of the study area exhibit a wide range of variability in life history including duration of freshwater residence for juveniles following emergence, variation in age of downstream migration (both within and between watershed-specific stocks), ocean distribution and ocean migratory patterns, and variation in age of spawning migrations. Downstream migration of juveniles and associated relative importance of freshwater or estuarine habitats for rearing can be generalized as stream-type and ocean-type life histories (Healey 1982). Stream-type populations may rear as juveniles in freshwater streams for one to three years prior to migrating downstream to marine waters. Ocean-type populations migrate within their first year relying on estuarine and nearshore marine habitats for juvenile rearing, including foraging and refuge from predation. Among the ocean-type populations of the Skagit River, Beamer and Larsen (2004) found a density-dependent relationship and displacement of fry migrants due to lack of estuarine habitat capacity. Juveniles arriving later in the season were unable to access high quality tidal channel and marsh habitats because earlier migrants occupied these areas. These late arrivals were forced downstream into marine nearshore areas with lower prey resource availability and higher predation rates, decreasing survival rates for this segment of the population. Presumably greater abundance of estuarine habitats would have led to overall increases in juvenile survival, and by extrapolation, adult returns and run size.

The Shared Strategy for Puget Sound facilitated development of a plan for Puget Sound salmon recovery organized by local watershed planning areas. The recovery plan has been adopted by NMFS and focuses on habitat restoration, harvest regulations, and interaction with hatchery fish (Shared Strategy 2007). Responsibility for the oversight of Puget Sound Chinook recovery plan implementation transferred to the Puget Sound Partnership in 2008.

e. Coastal/Puget Sound Bull Trout

Bull trout (*Salvelinus confluentus*) are native char of Washington, Oregon, Idaho, Nevada, Montana, and western Canada. Combinations of factors including habitat degradation, expansion of exotic species, and exploitation have contributed to the decline and fragmentation of bull trout populations. Puget Sound bull trout are ESA-listed as threatened (USFWS 1999). Critical habitat exists throughout much of Puget Sound and its tributaries. The Federal Draft Recovery Plan for Puget Sound Bull Trout focuses primarily on habitat including water quality and temperature (USFWS, 2004).

Eight bull trout core areas have been defined for watersheds along the eastern side of Puget Sound (Chester Morse Lake, Upper Skagit, Lower Skagit, Nooksack, Puyallup, Snohomish/Skykomish, Stilliguamish, and Chilliwack). Six populations on the Olympic Peninsula are limited to the Strait of Juan de Fuca and Hood Canal (Dungeness, Elwha, Hoh, Queets, Quinault, and Skokomish). Each core area has associated populations within it that exhibit varying life history types and spawning areas. Currently, no bull trout populations are known to use tributaries or estuaries on the western side of Puget Sound.

Bull trout are a wide-ranging species with multiple life history forms and a complex population structure reflecting a high degree of local site fidelity (Kanda and Allendorf 2001) and substantial genetic divergence between populations (Dunham and Rieman 1999; Spruell and Maxwell 2002). This diversity makes generalizing bull trout use of nearshore areas difficult. Bull trout have migratory and resident life history strategies. Residents spend their entire life cycle in the tributary streams in which they spawn and rear, whereas migratory forms rear in freshwater and then migrate to either a lake (adfluvial), a river (fluvial), or to saltwater (anadromous) (USFWS 2004). Unlike Pacific salmon anadromous bull trout are year-round residents of the Puget Sound basin. In marine areas sub-adult and adult bull trout commonly forage in shallow nearshore habitat and natal and non-natal estuaries along the shoreline. Primary prey items include surf smelt, sand lance, Pacific herring and juvenile salmonids.

f. Puget Sound Steelhead

Steelhead (*Oncorhynchus mykiss*) range from Kamchatka in Asia, east to Alaska, and south along the Pacific Coast to southern California (Busby *et al.,* 1996). Rapid declines have been observed over the past 10-plus years in Puget Sound steelhead populations with marked decreases observed within the Strait of Juan de Fuca, Bellingham Bay, Hood Canal, and south Puget Sound. Speculated causes of these declines include climate change, hatchery production, harvesting, and increased UV radiation (Hard *et al.,* 2007). Puget Sound steelhead are ESA-listed as threatened (NMFS 2007b). There are currently no recovery plans for Puget Sound steelhead.

Relative to the longer nearshore rearing periods of other juvenile salmonids, juvenile steelhead smolts generally outmigrate from natal streams to offshore areas rapidly. Once in saltwater, they quickly move into deeper water, and the transit time through the Puget Sound to the ocean is brief (15 to 25 days). Their diet while in Puget Sound is largely unknown due to lack of samples, but they are thought to eat squid and small fish (Goetz, pers. comm. 2012) Few reference sources discuss estuarine use by steelhead adults.

g. Green Sturgeon

Green sturgeon (*Acipenser medirostris*) are broadly distributed from Mexico to Alaska along the coast of North America. After completion of a study of its status (Adams *et al.,* 2002) NMFS determined that the green sturgeon is comprised of two DPSs that qualify as species under the ESA. In 2002 NMFS determined that the Northern DPS was not warranted for listing as threatened or endangered (NMFS 2002). The Southern DPS of green sturgeon is ESA-listed as threatened (NMFS 2006a). Threats to the listed entity are primarily attributed to reduction in spawning area to a limited number of rivers including the Sacramento, Rogue, and Klamath; limiting factors are not closely tied to Puget Sound. In Washington, critical habitat was designated for green sturgeon along the outer coast, the Strait of Juan de Fuca, and the southern portions of the San Juan Islands. No critical habitat exists in Puget Sound proper (NMFS 2009a). There is currently no recovery plan for green sturgeon.

h. Southern Resident Killer Whale

Killer whales (*Orcinus orca*) are one of the most widely distributed marine mammals, found in all parts of the world's oceans. They are most abundant in colder waters including Antarctica, the North Atlantic, and Pacific Oceans. Southern Resident killer whales are one of four identified populations of killer whales in the North Pacific and the only known resident population to occur in the U.S. Southern residents are comprised of three pods: J, K, and L pods. The Southern Residents are considered one "stock" under the Marine Mammal Protection Act (MMPA) and one "distinct population segment" (therefore "species") under the ESA. The Southern Resident killer whale population is currently estimated at about 80 whales, a decline from its estimated historical level of about 200 during the late 1800s. Due to its small population size NMFS listed this segment of the population as endangered under the ESA in 2005 (NMFS 2005b) and designated critical habitat in 2006 (NMFS 2006b). A final recovery plan for the Southern Resident killer whale was published on January 24, 2008 (NMFS 2008).

Killer whales dependence on nearshore ecosystems can be tied to the importance of Chinook salmon in their diets. Chinook are a key prey item for resident killer whales (Ford *et al.,* 1998). Researchers in coastal British Columbia observed that 72.2% of the 396 salmon taken by killer whales were Chinook, despite the much higher abundance of the other species (Ford and Ellis 2005). Bioaccumulation of contaminants from prey resources originating from industrial areas has been identified as an on-going threat to killer whale survival (Ross *et al.,* 2000; Ross *et al.,* 2004).

i. Humpback Whale

The humpback whale (*Megaptera novaeangliae*) was globally listed as endangered in 1970 under the Endangered Species Conservation Act of 1969, the precursor to the ESA. In April 2015, NMFS completed a comprehensive status review and proposed revisions to the listing

(NMFS 2015). The currently single population would be divided into 14 DPS and listing status revised accordingly. The proposed western North Pacific DPS would be classified as threatened under the ESA. The public comment period has closed and NMFS has not yet issued a final rule. Until a final rule is issued the current status of humpback whale as ESA-listed endangered remains effective.

The humpback whale is at best an infrequent transient of inland Puget Sound waters, more commonly observed along the outer Washington coast (Calambokidis and Steiger 1990). USACE has determined that the PSNERP project will have no effect on humpback whales.

j. Marbled Murrelet

Marbled murrelet (*Brachyramphus marmoratus*) is a small marine diving bird that occurs from southern California to Alaska. Few data are available to interpret trends in population; however, there was an estimated 51% decline in north Puget Sound between 1978 and 2003 (Huff *et al.,* 2006). Recent trends indicate a continued steady decline of marbled murrelets, with a decrease in population of 7.9% from 2000 to 2009 in Puget Sound and the Strait of Juan de Fuca (USFWS 2009). Threats include habitat loss from timber harvest in their terrestrial environment, and harmful algal blooms, declining prey availability (forage fish), and catastrophic events such as oil spills in their marine environment. Due to rapid declines in population and on-going threats to their continued existence marbled murrelet were ESA-listed as threatened in 1992 (USFWS 1992).

Murrelets are common winter residents in northern portions of Puget Sound. Forage habitat is deeper water in entrance channels of rocky shores, estuaries, and protected bays (Angell and Balcomb 1982). Common prey items are forage fish like sand lance, smelt, and herring (USFWS 1997). Critical habitat includes upland forested stands used for nesting but does not include marine water used for foraging.

A Federal Recovery Plan for Marbled Murrelet was completed in 1997. The plan focuses on the protection of habitat in the terrestrial environment and acknowledges the need to do so in the marine environment. In addition it discusses reduction of mortality from the net fisheries, minimizing the occurrence of oil spills, implementing silviculture techniques to accelerate habitat development, and the need for research and monitoring (USFWS 1997).

k. Golden Paintbrush

Golden paintbrush (*Castilleja levisecta*) historically occurred at many sites in Puget Sound, British Columbia, and as far south as the Willamette Valley in Oregon. Its extirpation from the majority of these sites, including all of Oregon, led to its ESA listing as threatened (USFWS 1997). The majority of golden paintbrush current distribution is associated with remnant prairie ecosystems and reintroduction sites. While there are some remaining populations in the San Juan Islands and on Whidbey Island it is limited to upland balds and grasslands and is not prevalent in coastal areas. USACE has determined that the PSNERP project will have no effect on golden paintbrush.

2. State-Listed Species

According to a query of the WDFW's Priority Habitat and Species database conducted in December 2015 (Mitchell pers. comm.) the following Washington State sensitive species may occur within the vicinity of the area of projects proposed in the APA/RP:

Table 1: State sensitive species in project area.

Common Name	Occurrence Type	Occurrence Class	State Status	Project Name
Bald eagle	Nest	Breeding	Sensitive	Nooksack River Delta
Great egret	Biotic detection	Regular individual	Monitored	Nooksack River Delta
Harbor seal	Haulout	NA	Monitored	Duckabush River Estuary
Harbor seal	Haulout	NA	Monitored	Nooksack River Delta
Western toad	Biotic detection	NA	Candidate	Duckabush River Estuary
Western toad	Biotic detection	NA	Candidate	North Fork Skagit River Delta
American white pelican	Concentration	Unknown	Endangered	Nooksack River Delta
Bald eagle	Concentration	Unknown	Sensitive	Nooksack River Delta

3. Other Salmonid Resources

According to a query of the Statewide Washington Integrated Distribution database conducted in December 2015 (Mitchell pers. comm.) the following salmonid species and runs may utilize watersheds of the projects proposed in the APA/RP:

Table 2: Salmonid species in project area.

Species/Run	Distribution Type	Use Type	Project Name
Coho	Documented	Presence	Duckabush River Estuary
Coho	Documented	Spawning	Duckabush River Estuary
Dolly Varden/ Bull Trout	Documented	Presence	Duckabush River Estuary
Fall Chinook	Documented	Presence	Duckabush River Estuary
Fall Chinook	Documented	Rearing	Duckabush River Estuary
Fall Chum	Documented	Rearing	Duckabush River Estuary
Pink Odd Year	Documented	Presence	Duckabush River Estuary

Pink Odd Year	Documented	Spawning	Duckabush River Estuary
Rainbow Trout	Documented	Presence	Duckabush River Estuary
Resident Coastal Cutthroat	Documented	Presence	Duckabush River Estuary
Resident Coastal Cutthroat	Presumed	Presence	Duckabush River Estuary
Summer Chum	Documented	Presence	Duckabush River Estuary
Summer Steelhead	Presumed	Presence	Duckabush River Estuary
Winter Steelhead	Documented	Presence	Duckabush River Estuary
Coho	Documented	Presence	Nooksack River Delta
Coho	Documented	Rearing	Nooksack River Delta
Coho	Modeled	Presence	Nooksack River Delta
Coho	Presumed	Presence	Nooksack River Delta
Dolly Varden/ Bull Trout	Documented	Presence	Nooksack River Delta
Dolly Varden/ Bull Trout	Documented	Rearing	Nooksack River Delta
Dolly Varden/ Bull Trout	Modeled	Presence	Nooksack River Delta
Dolly Varden/ Bull Trout	Presumed	Presence	Nooksack River Delta
Fall Chinook	Documented	Presence	Nooksack River Delta
Fall Chinook	Documented	Rearing	Nooksack River Delta
Fall Chinook	Modeled	Presence	Nooksack River Delta
Fall Chinook	Presumed	Presence	Nooksack River Delta
Fall Chum	Documented	Presence	Nooksack River Delta
Fall Chum	Modeled	Presence	Nooksack River Delta
Pink Odd Year	Documented	Presence	Nooksack River Delta
Rainbow Trout	Documented	Presence	Nooksack River Delta
Resident Coastal Cutthroat	Documented	Presence	Nooksack River Delta
Resident Coastal Cutthroat	Modeled	Presence	Nooksack River Delta
Resident Coastal Cutthroat	Presumed	Presence	Nooksack River Delta
Sockeye	Documented	Presence	Nooksack River Delta
Sockeye	Documented	Rearing	Nooksack River Delta
Spring Chinook	Documented	Presence	Nooksack River Delta
Summer Steelhead	Documented	Presence	Nooksack River Delta
Winter Steelhead	Documented	Presence	Nooksack River Delta
Winter Steelhead	Modeled	Presence	Nooksack River Delta
Coho	Documented	Presence	N. Fork Skagit River Delta
Coho	Documented	Rearing	N. Fork Skagit River Delta

Coho	Modeled	Presence	N. Fork Skagit River Delta
Dolly Varden/ Bull Trout	Documented	Rearing	N. Fork Skagit River Delta
Fall Chinook	Documented	Presence	N. Fork Skagit River Delta
Fall Chinook	Documented	Rearing	N. Fork Skagit River Delta
Fall Chinook	Modeled	Presence	N. Fork Skagit River Delta
Fall Chum	Documented	Presence	N. Fork Skagit River Delta
Fall Chum	Modeled	Presence	N. Fork Skagit River Delta
Kokanee	Documented	Presence	N. Fork Skagit River Delta
Pink Odd Year	Documented	Presence	N. Fork Skagit River Delta
Pink Odd Year	Modeled	Presence	N. Fork Skagit River Delta
Rainbow Trout	Documented	Presence	N. Fork Skagit River Delta
Resident Coastal Cutthroat	Documented	Presence	N. Fork Skagit River Delta
Sockeye	Documented	Presence	N. Fork Skagit River Delta
Spring Chinook	Documented	Presence	N. Fork Skagit River Delta
Summer Chinook	Documented	Presence	N. Fork Skagit River Delta
Summer Steelhead	Documented	Presence	N. Fork Skagit River Delta
Winter Steelhead	Documented	Presence	N. Fork Skagit River Delta
Winter Steelhead	Modeled	Presence	N. Fork Skagit River Delta

Many of the salmonid fish species which may occur with the project area are in decline due to loss or degradation of habitat. This includes species in Table 2 that are not listed under the ESA and discussed in Section II.C.1. Between 1992 and 2002 the Salmon and Steelhead Stock Inventory, used to compare trends in salmon stocks within Puget Sound, documented a 33% increase in the number of salmon stocks that were listed as depressed or critical (WDFW 1993 and 2002). While habitat protection and restoration actions are on-going, it is likely that populations of anadromous fish will continue to decline due to alterations in rearing and spawning habitat by armoring, filling, and diking of the shoreline, and upper watershed development. The impacts of climate change will likely exacerbate degraded habitat conditions in nearshore areas and may affect populations of anadromous salmonids. For example an 18- to 32-inch sea-level change in the Skagit Delta may reduce the rearing capacity in marshes for juvenile Chinook salmon by an estimated 211,000 and 530,000 fish respectively (Hood 2005). If regional salmon recovery is successful losses may be slowed and eventually reversed. However other factors could influence population trends of salmonids including harvest, environmental contaminants, oceanic conditions, and other aspects of climate change including increased water temperature and changes in stream flows.

IV. EVALUATION METHODOLOGY

There are no known established models or alternative methodologies that can adequately represent and consider the complexities and dynamics of the physical and biological processes interacting in the study area that affect fish, wildlife, and their habitat. Thus, best professional judgment and available science were used to evaluate benefits and impacts to fish and wildlife resources associated with implementation of the proposed PSNERP project. Service staff provided technical assistance to USACE and WDFW throughout the 10-plus years of active work of the PDT. This included representation in both interagency technical (i.e. Nearshore Science Team, Implementation Team) and policy (i.e. Steering Committee) groups convened to advise PSNERP. This GI has produced 24 peer reviewed technical reports that document study methods, analytical results, and ecosystem restoration approach. The Service also reviewed numerous studies conducted in the watershed and the study area by USACE and others investigating and documenting fauna, watershed processes, and sources of Puget Sound nearshore ecosystem degradation.

V. FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

To support analysis of without project conditions for the GI, the PDT commissioned a future risk assessment study. Future population estimates associated with a medium regional growth rate provided by the Washington State Office of Financial Management were used to extrapolate a projection of a regional population growing from nearly 4 million residents today to 9.1 million residents by 2065. This increase in population was used in a land development model to forecast changes in land use (Bolte and Vache 2010). With increasing population driving additional development many portions of the Sound are expected to encounter further degradation of nearshore ecosystem processes well beyond current conditions. This analysis suggests that large portions of southern and central Puget Sound will fall into a category of highly degraded (Schlenger *et al.,* 2011b). Without restoration, existing and future increases in shoreline stressors will contribute to further decline in nearshore habitat quantity, quality, and connectivity. The expanded footprint of degraded areas, combined with climate change and sea-level change, will further imperil the ecosystems that support diverse biological communities that inhabit or otherwise depend on Puget Sound.

Forecasts of future conditions suggest that without significant ecosystem restoration at-risk species may become further imperiled. Sea-level change is likely to cause substantial loss of surf smelt spawning habitat on beaches with armored shorelines because armoring prevents beach migration inland. (Griggs *et al.,* 1994). Reduction in spawning habitat may further depress stocks of surf smelt and other forage fish that rely on beaches. Anadromous fish species, already in decline due to habitat loss, will likely face increased risk of extirpation in highly impacted watersheds. Sea-level change will reduce availability of delta rearing habitats in locations where dikes, roads, and armoring prevent landward migration. Impacts to forage fish and juvenile salmonids will affect birds and mammals that utilize these prey resources. Statistically significant population declines have already been observed in many nearshore dependent bird species including red-throated loon, numerous grebe species, canvasback, scaup, black scoter, common goldeneye, ruddy duck, Bonaparte’s gull, glaucous-winged gull, common murre, and marbled murrelet (Bower 2009).

VI. ALTERNATIVES CONSIDERED

A. Formulation of Alternatives

The October 2014 Draft Feasibility Report and Environmental Impact Statement (FR/EIS) evaluated 18 projects for potential implementation by PSNERP and identified a PA of constructing 11 of these projects (Table 3, Figure 3) (USACE 2014). During a subsequent feasibility study completion strategy workshop attended by representatives of the Office of the Assistant Secretary of the Army, Corps Headquarters, Northwestern Division, Seattle District, and the non-federal sponsor (WDFW), alternatives were modified and a revised PA developed. Workshop participants revisited the complete list of 36 projects from which the October 2014 alternatives were derived. During this “vertical team” workshop, the list of projects identified by the GI was organized into five categories based on their status of completion by other programs, suitability for implementation under existing Corps of Engineers construction authorities, or eligibility for completion through the GI process. CAP eligible projects were distinguished by their suitability for either §206 or §1135 authorities. This category of GI eligible projects was further divided into those projects for which PSNERP provides a sufficient level of detail for immediate authorization, and those projects for which additional data collection and analysis will be required prior to authorization (Table 4). USACE now defines this delineation of the 36 PSNERP projects into one of four potential construction authorities (or completion by others) as a “tiered approach” to implementation.

The outcome of this workshop is outlined in a memorandum from the USACE Director of Civil Works (Headquarters) to the Commander of the Northwest Division (Portland) (USACE 2015). This includes the outcome of the workshop in categorizing restoration projects for implementation under USACE authorities. Most notably, the memo identifies three projects which met the definition of Category 4 (Table 4) and could therefore be advanced by USACE for implementation as an outcome of the GI.

Based on this guidance the potential projects have been reformulated to derive a new alternative. Alternative 4 is the current Agency Preferred Alternative/Recommend Plan for the purposes of the NEPA analysis documented in the FR/EIS (Table 3).

B. Additional Actions of the Tiered Approach

In addition to the three sites now proposed as the APA/RP, nine sites were determined to be potentially eligible for completion through a Corps GI authority. However these projects currently lack sufficient engineering design and other detail sufficient for authorization at this time. Therefore, in addition to the three sites proposed for authorization, USACE has identified nine sites to be the subject of additional future studies prior to a potential request for authorization:

- Dugualla Bay
- Everett Marshland
- Telegraph Slough

- Chambers Bay
- Big Beef Creek Estuary
- Tahuya River Estuary
- Lilliwaup Estuary Restoration
- Big Quilcene River
- Snohomish Estuary

In addition to completion of the three projects included in the APA/RP and potential future authorization of nine projects listed above, USACE and WDFW propose to pursue implementation of up to 12 additional projects outside of the GI process using other programs and authorities, including CAPs. Sites that could be completed through existing authorities include:

Projects that can be implemented under the WRDA 2000 §544 Puget Sound and Adjacent Waters authority.

- Spencer Island
- Quilceda Estuary
- Twanoh Beach
- Twin Rivers

Projects that can be implemented under WRDA §206 or §1135 CAP.

- Deepwater Slough
- Livingston Bay
- Harper Estuary
- Budd Inlet Beach
- Everett Riverfront Wetlands
- Chuckanut Estuary
- Sequalitchew Creek
- McGlinn Island

Taken together, the three projects proposed for immediate implementation, nines sites identified for additional study and potential future authorization, and 12 sites that can be implemented utilizing existing authorities and programs comprise the tiered approach to nearshore ecosystem restoration now envisioned by USACE and WDFW.

Table 3: Revised Alternatives and Associated Project Sites.

Alternative ID - Name	**Project Site Names**
Alternative 1 - No Action	
Alternative 2 - 11 Sites	
	Deepwater Slough
	Everett Marshland
	Milltown Island
	Nooksack River Delta
	North Fork Skagit River Delta
	Spencer Island
	Telegraph Slough
	Deer Harbor Estuary
	Dugualla Bay
	Livingston Bay
	Beaconsfield Feeder Bluff
Alternative 3 - 18 sites	
	Deepwater Slough
	Duckabush River Estuary
	Everett Marshland
	Milltown Island
	Nooksack River Delta
	North Fork Skagit River Delta
	Spencer Island
	Telegraph Slough
	Deer Harbor Estuary
	Harper Estuary
	Snow Creek and Salmon Creek Estuary
	Tahuya River Estuary
	Big Beef Creek Estuary
	Dugualla Bay
	Livingston Bay
	Point Whitney Lagoon
	Beaconsfield Feeder Bluff
	Budd Inlet Beach
Alternative 4 - 3 sites (preferred alternative)	
	North Fork Skagit
	Nooksack River Delta
	Duckabush River Estuary

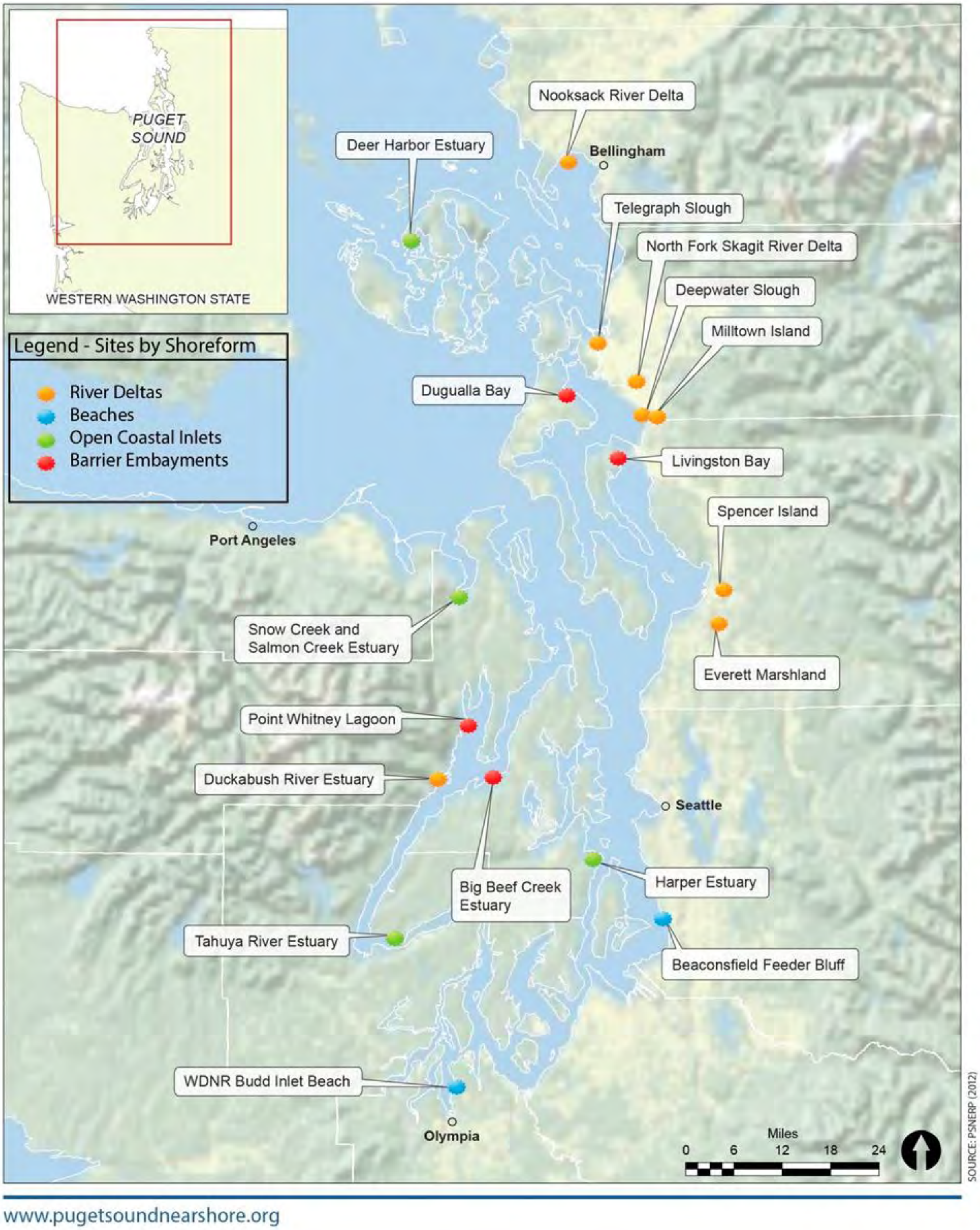


Figure 3: PSNERP Potential Project Sites

Table 4: Categorization of 36 PSNERP Projects by Tier.

Tier	Category	Project Site Names
1	***Projects in which other agencies are moving forward or have implemented restoration***	
		Milltown Island
		Point Whitney Lagoon
		Beaconsfield Feeder Bluff
		Kilisut Harbor/Oak Bay Reconnection
		Deschutes River Estuary
		Hamma Hamma Estuary
		Snow Creek and Salmon Creek Estuary
		Johns Creek Estuary
		Deer Harbor
		Mission Creek
		Smith Island
		Washington Harbor
2	***Projects that can be implemented under WRDA §544 Puget Sound and Adjacent Waters***	
		Spencer Island
		Quilceda Estuary
		Twanoh Beach
		Twin Rivers
3	***Projects that can be implemented under WRDA §206 or §1135 CAPs***	
		Deepwater Slough
		Livingston Bay
		Harper Estuary
		Budd Inlet Beach
		Everett Riverfront Wetlands
		Chuckanut Estuary
		Sequalitchew Creek
		McGlinn Island
4	***Projects that fall within the GI program and have the level of detail to move forward***	
		North Fork Skagit River Delta
		Nooksack River Delta
		Duckabush River Estuary
5	***Projects that fall within the GI program but require additional analysis***	
		Dugualla Bay
		Everett Marshland
		Telegraph Slough
		Chambers Bay
		Big Beef Creek Estuary
		Tahuya River Estuary
		Lilliwaup Estuary
		Big Quilcene River
		Snohomish Estuary

C. Agency Preferred Alternative / Recommended Plan

The revised APA/RP that USACE and WDFW now propose to advance for PSNERP includes three projects that have sufficient level of analysis to move forward for implementation at this time. These three sites are the focus and outcome of the NEPA process, and represent the primary scope of analysis for the Service's FWCA §2(b) Report:

- North Fork Skagit River Delta
- Nooksack River Delta
- Duckabush River Estuary

1. North Fork Skagit River Delta

The North Fork Skagit River empties into Skagit Bay south (downstream) of La Conner, Washington. The proposed action is located between the former Dry Slough inlet and the western levee system's end near Rawlins Road. Extensive diking of the North Fork caused substantial loss of tidal wetlands and associated tidal channels. River levees reduced the floodplain area and constrained the river channel. In the last century the Skagit Basin has lost approximately 80 percent of historic estuarine delta habitat, including a loss of 35 percent of estuarine mixing habitat, 98 percent of low salinity transitional habitat, and 89 percent of its freshwater tidal habitat (Simenstad *et al.,* 2011).

The Skagit River watershed is critically important to all five species of Pacific salmon as well as steelhead and sea-run cutthroat. This importance is due in large part to the productivity of large wilderness areas in the upper watershed upstream from the diked and developed floodplain (SWC 2002). The extensive remnant aquatic habitat in the delta is also an important contributing factor to salmonid productivity and significant loss of tidal wetlands is a limiting factor for Chinook recovery (SWC 2005). The Skagit watershed supports 30 percent of all anadromous fish in Puget Sound and the largest populations of pink and chum in the contiguous United States (North Cascades Institute 2002, Smith no date). The Skagit River and its tributaries also host the largest populations of ESA-listed bull trout, steelhead, and wild Chinook in the Puget Sound Basin (USFWS 2004, Smith no date).

Declining salmon runs in the Skagit and elsewhere contribute to a cascading series of ecosystem impacts. Fewer returns of naturally spawning fish leads to declining marine nutrient input to riverine ecosystems as well as less food availability for bald eagles, bears, and other species that scavenge carcasses. Numerous species of fish, birds, and mammals – including people – rely upon an abundance of salmon. Declines of Chinook salmon in marine environments of Puget Sound have been identified as a limiting factor for the ESA-listed southern resident killer whales. Additionally, the depressed levels of salmon populations have all but eliminated the once great commercial fishing industry of western Washington and severely reduced sport fishing opportunities. These declines have widespread impact on regional Native American tribes with cultures and economies dependent on salmon (USACE 2016).

The Skagit River Delta area is also a critical waterfowl wintering area due to the mild climate and available habitats including marshes, intertidal flats, and adjacent agricultural fields. It is an important stopping point for migratory birds along the Pacific Flyway including trumpeter swans and Wrangell Island snow geese. At least 180 species of birds have been documented in the project area including raptors, waterfowl, shorebirds, game birds, and songbirds (WDFW 2006). Wading birds, such as great blue heron, utilize the estuary areas year round. Shorebirds use flooded agricultural fields and estuaries primarily for feeding station during their long migration and as over-wintering habitat. Dunlin and black bellied plover winter in the Skagit delta. Although a large number and variety of birds use the area this broad delta could be substantially more productive in its restored condition with native plants and greater areas of distributary channels in the nearshore zone to support significantly greater populations of birds.

a. Key Design Elements

The restoration proposal lowers 13,000 linear feet of levee along the North Fork Skagit River south bank. Work will remove several structures and construct a levee along Rawlins Road as well as lower 3,140 feet of levee along the north bank. Existing topography provides flood risk management without a levee on the river's north side. Breaches in the lowered levees and excavated channels allow for water to access the newly restored floodplain restoring tidal hydrology to approximately 250 acres of historic tidal marsh habitat. Replanting lowered levees will restore a natural riparian corridor along the river (Figure 4). Total project costs are estimated at $102 million.

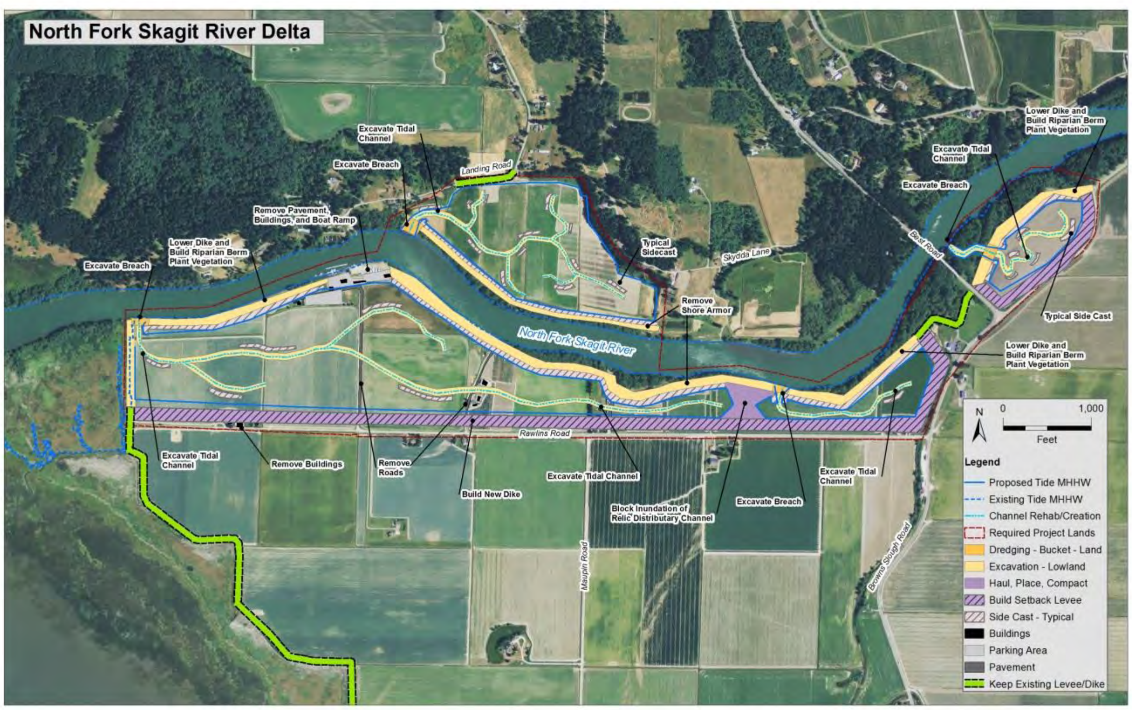


Figure 4: Key restoration design elements for North Fork Skagit River delta site.

2. Nooksack River Delta

The Nooksack is one of the largest contributing watersheds in Puget Sound and supports numerous salmonid stocks with relatively high abundance. The Nooksack River system supports nine species of salmonids represented by more than 20 distinct stocks that are separated by their run timing and spawning location. Three of these species are listed under the ESA: Puget Sound Chinook, Puget Sound steelhead, and Coastal/Puget Sound bull trout. The Nooksack River is one of five geographic areas considered essential for recovery of the Puget Sound Chinook ESU. Other anadromous salmonid species found in the Nooksack River include riverine sockeye, coho, even-year and odd-year pink, and chum salmon; summer and winter steelhead; and coastal cutthroat trout. Runs of all of these species have declined significantly from historic levels. In addition to being of critical importance for fishery resources the Nooksack River delta provides important habitat for migratory shorebirds of the Pacific Flyway, waterfowl, trumpeter swans, Canada geese, and the Wrangell Island snow geese.

The Nooksack River delta is located primarily on the Lummi Nation lands north of Bellingham, Washington. It includes nearly all of the Nooksack and Lummi River estuaries below Ferndale, Washington. The Nooksack and Lummi River flow paths have been modified since the mid-19th century beginning with active removal of large wood, draining, diking and levee construction. Today substantial surface water diversions, groundwater withdrawals, and drainage activities within the Nooksack River watershed impact the magnitude, timing and duration of delta surface water flows. The Nooksack floodplain has undergone a substantial loss of tidal freshwater and estuarine wetlands from an estimated 8,785 acres in 1888 to 3,211 acres remaining today, representing a 64% loss. This includes a 71% loss of vegetated tidal wetlands. More than half of the remaining acreage is disconnected from its natural hydrology by dikes, roads, and tidegates. The proposed restoration modifies levees, roads, and other hydrological barriers, restoring delta riverine and tidal flow, as well as sediment transport and delivery processes.

a. Key Design Elements

The restoration actions include partial levee removal along both Nooksack River banks. Restoration actions along the Lummi River includes levee setback and construction on North Red River Road. Approximately 12,000 linear feet of levees would be breached or removed, restoring 1,800 acres of tidal freshwater wetlands. Existing levels of flood protection for buildings, roads, and other infrastructure will be maintained by construction of new setback levees, often concurrent with existing arterial roads. Log jams installed on the Nooksack River would restore more natural channel morphology and enhance instream habitat availability. The Lummi River channel will be dredged and graded to reconnect it to Nooksack River flows and setback levees would be constructed. A water control structure at the historic divergence of Lummi and Nooksack River would replace the current dike which prevents freshwater from entering the Lummi River. Several roads on filled causeways would be replaced with widespan bridges to allow more tidal flow across the delta (Figure 5). This combination of numerous significant project features implemented at a large scale leads to a total project cost estimate of $260 million.

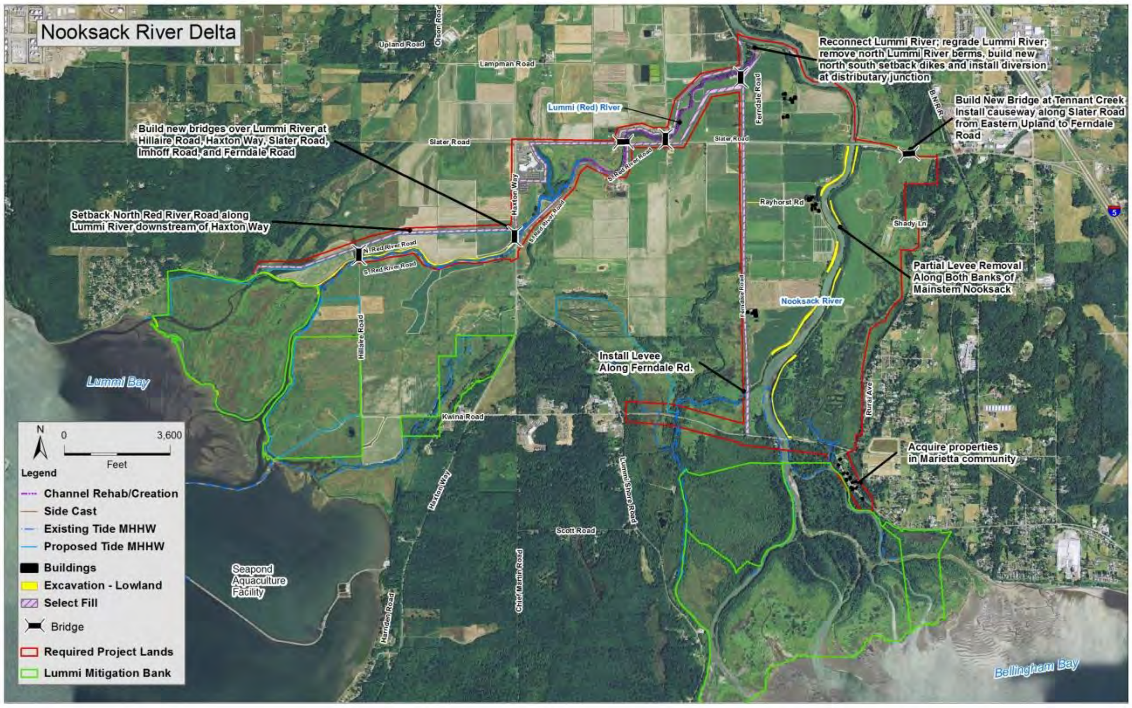


Figure 5: Key design elements for the Nooksack River delta site.

3. Duckabush River Estuary

The Duckabush River is one of several major river systems that drain the east slope of the Olympic Mountains to Hood Canal. The broad river delta fans out into Hood Canal on the south side of Black Point Peninsula. The Highway 101 causeway crosses the delta spanning the main channel and a historic distributary channel via bridges with box culverts. Levees along the main channel upstream of the causeway prevent river flows into historic distributary channels. This causeway limits tidal exchange and contributes to aggradation in tidal channels. These hydrologic constrictions along with fill within the estuary have led to decline in mudflats and salt marsh.

The Duckabush River supports four ESA-listed species of salmonids: Hood Canal summer chum, Puget Sound steelhead, Coastal/Puget Sound bull trout, and Puget Sound Chinook salmon. The wild Chinook run is nearly extirpated from this river. The Duckabush Estuary also supports important wildlife resources including trumpeter swans, bald eagles, and regionally significant concentrations of wintering waterfowl. Harbor seals haul out in this location throughout the year and pupping occurs in the winter. The extensive mud and gravel flats are productive shellfish beds. Salt marshes and eelgrass beds characterize the upper and lower intertidal and subtidal areas, respectively. Herring use this eelgrass for spawning.

a. Key Design Elements

Proposed restoration actions would restore natural hydrology to approximately 38 acres of the Duckabush River delta. Key features of the project include replacement of the Highway 101 causeway with a bridge of sufficient span to allow unconstrained riverine and tidal hydrology. This is the primary measure for this site as the Highway 101 causeway and two bridge structures are the key impediment to ecosystem process restoration at the site. Fill associated with Shorewood Road and other areas that impact floodplain wetlands would be removed and regraded. Filled distributary channels and sloughs would be excavated and large wood placed to reinitiate channel forming processes (Figure 6). Reinitiating natural water and sediment processes would also benefit downstream habitats allowing tidal flats and salt marsh habitats to accrete sediment and remain resilient in response to changing sea levels. Replacement of this 1,200 linear feet river crossing contributes significantly to the $63 million estimated total project cost.

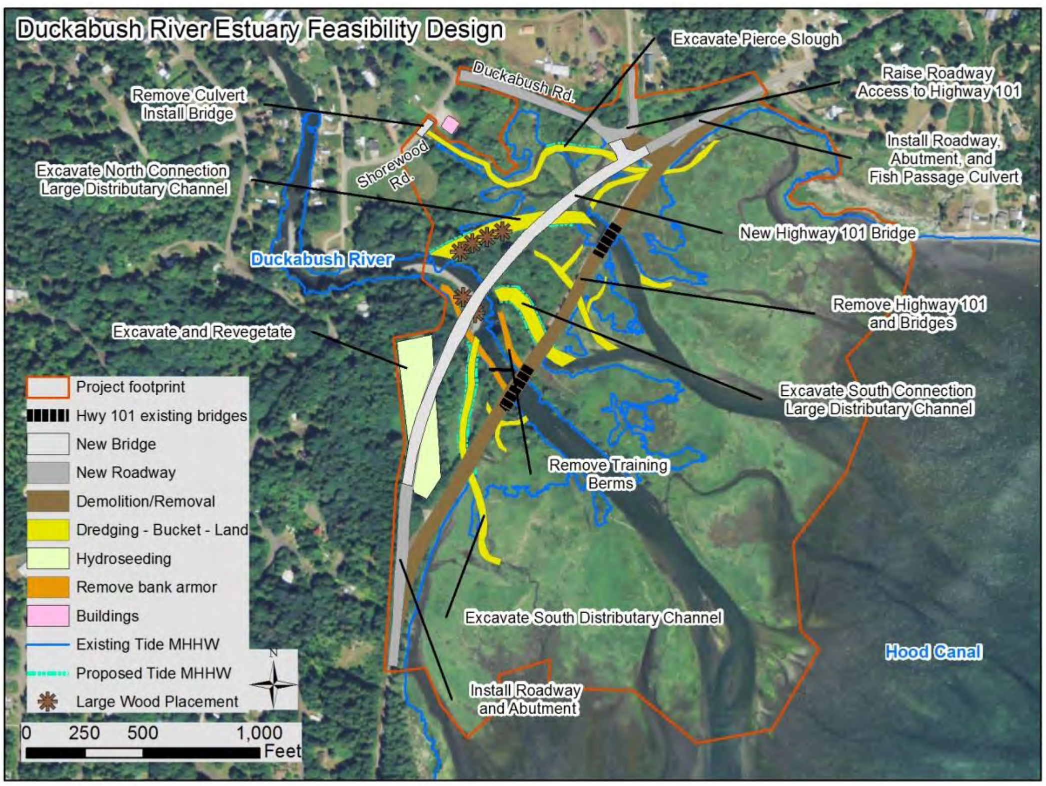


Figure 6: Key design elements for the Duckabush River Estuary site.

D. Other Alternatives

The other two action alternatives (Alternatives 2 and 3; see Table 3) include a greater number of projects for implementation under the PSNERP program. These alternatives were the subject of the 2014 DFR/EIS. Alternative 2 proposed the implementation of 11 restoration sites. The 2014

DFR/EIS identified this as the Preferred Alternative / Tentatively Selected Plan. Alternative 3 involved a larger program of 18 restoration sites (Figure 3). As discussed above in Section VI.A, during review of these alternatives by Corps Headquarters, Alternative 4 was formulated with the PDT (Seattle District and WDFW) and emerged as the Agency Preferred Alternative / Recommended Plan (APA/RP).

VII. PROJECT IMPACTS

A. Preferred Alternative / Recommended Plan

A full description and evaluation of project impacts is not possible since project designs for sites included in the APA/RP (and other action alternatives) are only at the conceptual stage of development. If authorized for implementation, future phases of the project would finalize project features and complete detailed engineering design. This will include additional discussions with affected landowners which may impact the footprint and scope of restoration actions.

In general there will be short-term negative impacts from construction of each action including diminished water quality (turbidity and suspended sediment), noise disturbance from construction machinery, airborne particulates from soil disturbance, and vegetation removal and disturbance associated with construction of temporary equipment access routes and conducting activities at each work site. These construction-related effects are common to many restoration activities and standard conservation measures and BMPs are generally followed to minimize the frequency, intensity, and duration of these impacts. For example, in designing and implementing Service-funded restoration projects, partners adhere to standard BMPs and conservation measures (CMs) outlined in a programmatic biological assessment/biological opinion (USFWS 2015). All of the PSNERP proposed restoration actions have analogs in this programmatic consultation document and it is anticipated that USACE BMPs/CMs would be similar to those outlined in this and other restoration guidance.

The goal of PSNERP is to restore ecosystem process to provide long-term benefits to fish and wildlife species from implementing the actions identified in the APA/RP. In all cases it is reasonable to expect that benefits will outweigh negative impacts. Potential beneficial and negative impacts of each proposed action are discussed below. A more thorough evaluation of effects of implementing the APA/RP will be possible as the project advances into the design stage.

1. North Fork Skagit River Delta

a. Ecosystem Restoration Benefits

Project benefits extend across an estimated 256 acres where daily tidal and seasonal/episodic flood flows would be restored (Figure 7). Removal of barriers to tidal and riverine hydrology reestablishes important habitat-forming ecosystem processes including sediment transport, freshwater input, tidal exchange, channel migration, marsh accretion, overbank deposition, and natural levee formation. Ecosystem benefits include the restoration of highly productive tidal wetland habitats that support diverse fish and wildlife resources and provide connectivity between terrestrial and nearshore ecosystems. River delta ecosystems provide valuable rearing habitat for numerous species of juvenile salmonids, increasing survival and supporting recovery of Puget Sound populations, including threatened Chinook salmon and bull trout.

This project will also contribute to increases in shorebird foraging and resting habitats associated with tidal flats benefitting dunlin, great blue heron, and other wading/probing birds. Restoration of sediment input will promote marsh accretion downstream from the project site improving resilience of the estuary to effects of sea level change. Water quality will be improved by increasing floodplain retention time and flow through vegetated wetlands.

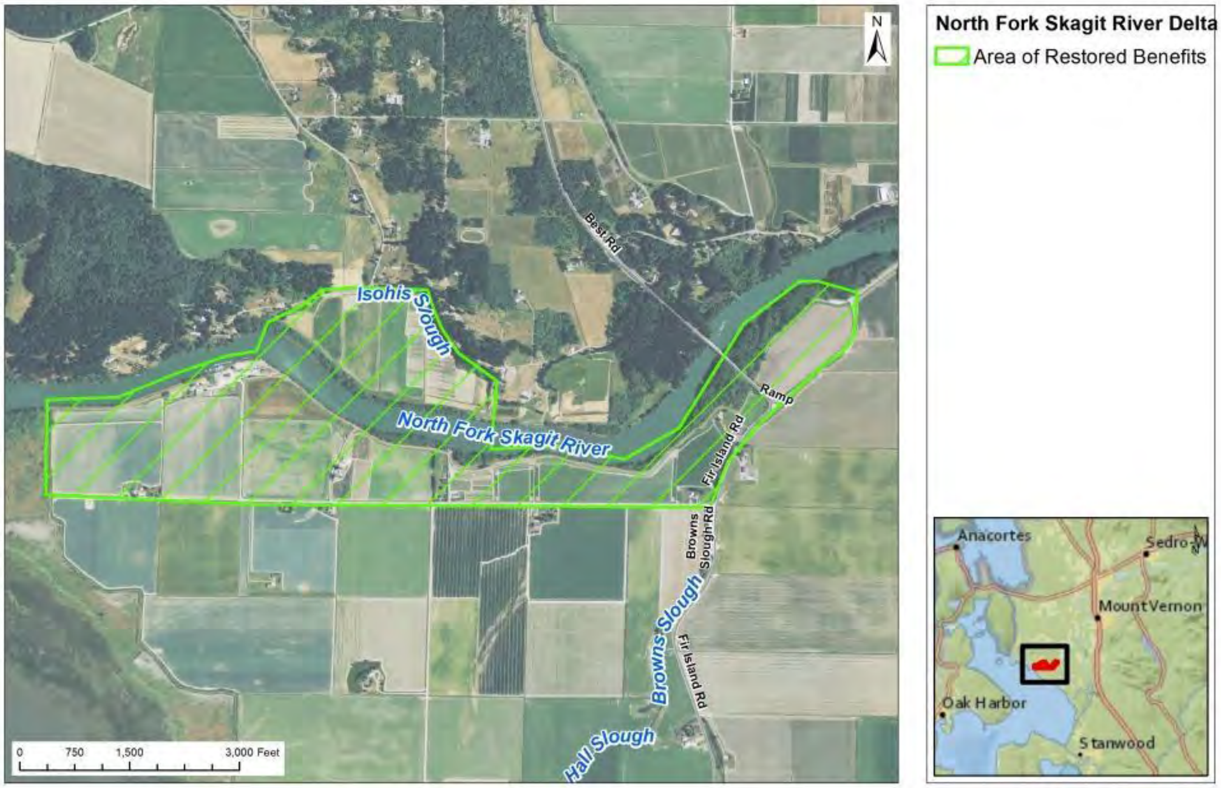
The significance of this project is underscored by its identification in the Skagit River watershed chapter of the Puget Sound Chinook Salmon Recovery Plan (Shared Strategy 2007). To date, most Skagit estuary restoration projects have been implemented along the South Fork Skagit River. This project would provide a significant increase in estuarine habitat on the lower North Fork Skagit River where developed and agricultural lands behind constructed flood control levees limit available habitat and restoration opportunities.

The separately authorized and implemented Skagit River GI Feasibility Study is recommending flood risk management actions well upstream of the North Fork Skagit River project site. Ecosystem restoration actions proposed as part of the PSNERP recommended plan are independent from the Skagit flood risk management recommendations and are described as complementary to those separately proposed actions (USACE 2014).

b. Potential Adverse Impacts

Common to other sites where extensive excavation is proposed to remove or setback levees and restore filled tidal channels, this project would have temporary adverse impacts on aquatic habitats and organisms. Negative impacts include increased turbidity from excavation and dredging. Consistent with permit conditions and conservation measures construction would be limited to designated annual work windows when fish are less likely to be present and during low tides. Depending on specific construction activities at this site it may be necessary to install cofferdams or other water isolation structures to separate in-water construction activities from areas where fish or other wildlife sensitive to turbidity are present. Programmatic consultation documents for restoration projects identify these and other BMPs to ensure minimization of short term impacts. It is reasonable to anticipate that site specific BMPs will be developed following resolution of engineering design details, construction methods, sequencing of actions and project schedule.

There is a report indicating that a historic landfill or dump may exist within the project footprint. However there are no known active cleanup sites within the project footprint and no site records listed on the WDOE clean-up site database. Service (USFWS 2011) preliminary contaminant screening did not confirm this report. Additional site assessments are planned to determine if unresolvable contaminant issues exist within the project area. If contaminants are found to be present, those areas would be excluded from USACE restoration activities.



North Fork Skagit River Delta	
Shoreform type:	Large River Delta
Processes restored:	sediment transport, freshwater input, tidal exchange, channel migration, marsh accretion, overbank deposition, natural levee formation
Species directly associated:	bald eagle, waterfowl, western toad, salmon, bull trout, steelhead
Species indirectly associated:	green sturgeon, Steller sea lion, eulachon, marbled murrelet, lamprey
ESA Critical Habitat:	Chinook salmon, bull trout
Acres of wetlands restored	256

Figure 7: Area of Restored Benefits at North Fork Skagit River Delta site (from USACE 2014).

2. Nooksack River Delta

a. Ecosystem Restoration Benefits

As described above in VI.B.2 the Nooksack River delta project includes numerous actions across a large portion of the lower two miles of the Nooksack and Lummi Rivers. Actions planned to increase flood plain area and reconnect tidal and riverine flows would restore 1,807 acres of scarce tidal freshwater wetlands. Removal of levees and other anthropogenic stressors will reinitiate sediment transport, freshwater input, tidal exchange, channel migration, marsh accretion, and longshore sediment transport processes. Resulting habitat benefits Chinook salmon and bull trout as well as peregrine falcon, bald eagle, shorebirds, waterfowl, invertebrates, forage fish, and eelgrass. Proposed restoration complements, but does not depend on, the proposed Lummi Nation Wetland and Habitat Bank project downstream and adjacent to this site (Lummi Nation 2008).

This project will restore a very large area of the river delta, providing additional rearing habitat for juvenile salmonids, increasing survival and supporting Puget Sound population recovery.

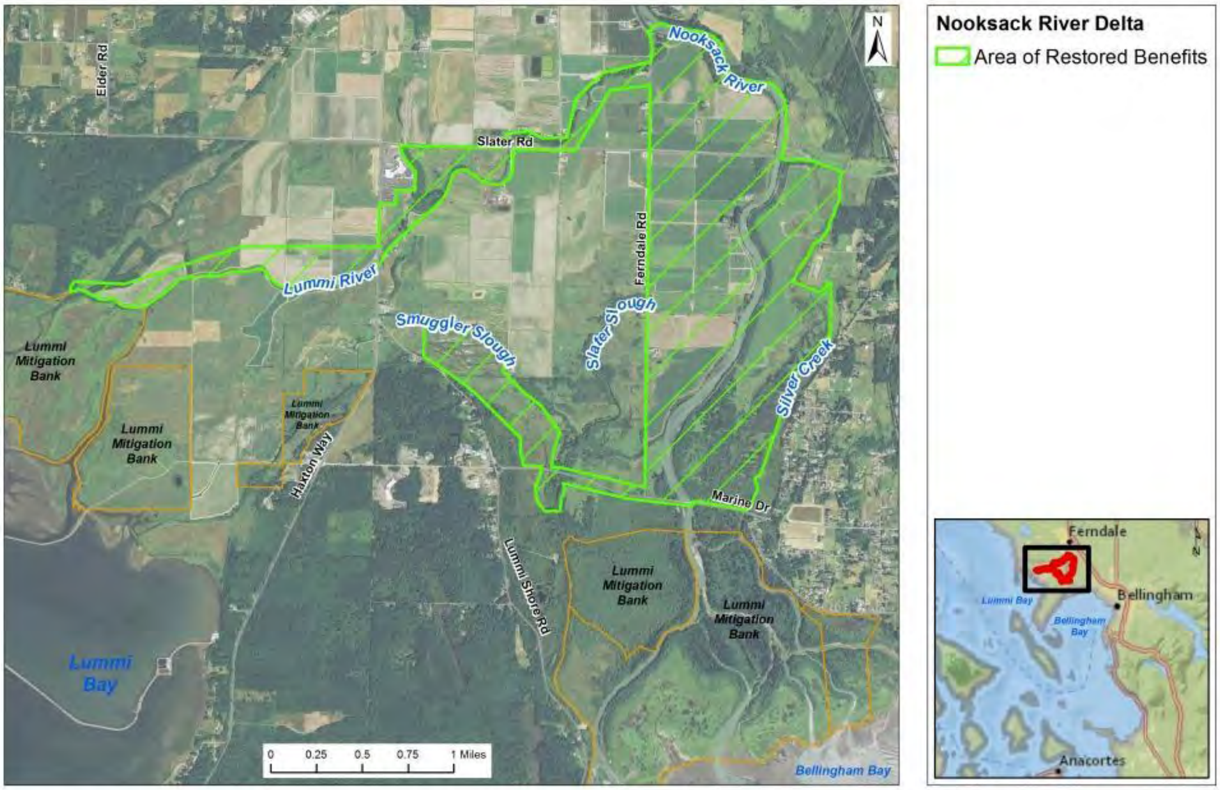
Re-established intertidal and shallow subtidal areas would facilitate kelp and eelgrass growth, increasing nearshore productivity for fish, birds and other marine species. This project would restore important landscape features, including connectivity between nearshore and adjacent uplands, and shoreline area, length, and complexity. Benefits include improved resiliency to potential climate change impacts, including rising sea levels and increased frequency of storms and floods.

Significant in scale as a stand-alone action, this project also builds on the Lummi Nation's existing and planned mitigation bank projects that similarly restore delta ecosystem processes and habitats. These projects are also central to Whatcom County's comprehensive approach to managing flooding and restoring estuary habitat in the lower Nooksack River. Restoration actions are aligned with the Puget Sound Chinook Salmon Recovery Plan. Implementation will provide 25 percent of Puget Sound Action Agenda's 2020 estuarine habitat recovery goal in this single project (PSP 2014).

b. Potential Adverse Impacts

Extensive levee setback and removal actions are proposed for this site. Similar to effects described for North Fork Skagit short-term impacts from increased turbidity can be expected from excavation work that would degrade water quality. This project also involves the replacement of bridges on the Lummi River and Tennant Creek (tributary to Nooksack). Bridge construction often involves various construction methods including use of tugboats, drilling, rock placement, and pile driving. Sound levels associated with these activities would temporarily increase during construction with some noise-generating activity potentially exceeding thresholds that are harmful to fish and wildlife. Estimates of sound levels should be calculated once project implementation details have been established and compared to data available on aquatic species' hearing and the regulated sound threshold under the ESA and the MMPA. Each method of construction that produces harmful underwater noise should be mitigated through physical means such as bubble curtains and sound dampening mats or through conservation measures including wildlife monitoring. Preliminary site construction plans avoid pile driving, the most deleterious of potential noise generating actions. Bridge supports are proposed as drilled shafts and poured concrete piers instead of compression driven steel piles.

The Lummi Nation has expressed concerns about the potential for reestablishing Lummi River flows to adversely affect tribal shellfish operations. Tribal concerns involve the possible increased delivery of pollutants from the Nooksack River to Lummi Bay. Restoration of Lummi River flows will require assessment of upstream water quality and modeling of downstream impacts to receiving waters. USACE (2014) acknowledges the need for further water quality analyses during future design phases to better understand potential impacts to shellfish beds.



Nooksack River Delta	
Shoreform type:	Large River Delta
Processes restored:	sediment transport, freshwater input, tidal exchange, channel migration, marsh accretion, longshore sediment transport
Species directly associated:	peregrine falcon, bald eagle, shorebirds and waterfowl, crabs, forage fish, salmon, eelgrass
Species indirectly associated:	green sturgeon, Steller sea lion, eulachon, marbled murrelet, lamprey, killer whale
ESA Critical Habitat:	Chinook salmon, bull trout
Acres of wetlands restored:	1,807

Figure 8: Area of Restored Benefits at Nooksack River Delta site (from USACE 2014).

3. Duckabush River Estuary

a. Ecosystem Restoration Benefits

Restoration at this site provides benefits to ESA listed Chinook, Hood Canal summer chum, steelhead, and bull trout. The project provides direct benefits to harbor seals, bald eagles, waterfowl, shellfish, and eelgrass habitat at the edge of the site. Duckabush estuary restoration provides an opportunity to reconnect floodplain and intertidal wetlands, improving tidal exchange, sediment transport, and estuary development. Realignment of roads and bridges will restore tidal inundation and hydrology. Reconnection of distributary channels will promote greater diversity and resiliency of delta wetland habitats.

In addition to these habitat benefits the project may also improve intertidal and shallow subtidal areas that support important recreational and tribal shellfish resources. Oysters, clams, and mussels are harvested on lands managed by WDFW and others for this purpose. Channelization of the Duckabush River and the hydraulic constraints of the current bridge-opening direct sediment to a relatively small portion of the delta leaving large areas of tidal flats disconnected from sediment supplies and vulnerable to loss from erosion and sea level change.

b. Potential Adverse Impacts

Bridge replacement is a major construction element of this project. Short-term impacts to turbidity can be expected following fill removal and channel reconstruction. In-water work is required for bridge replacement. However, pile driving is not proposed. Existing piles will be removed and test holes will used to assess substrate stability. Neither of these activities creates noise levels commensurate with pile driving. New bridge supports will be drilled and cast in place concrete piers to minimize noise impacts to aquatic species.

While general concerns discussed for the previous projects apply at this site as well, at this phase of design development, no site-specific potential adverse impacts to the biological environment have been identified.

The Duckabush River Bridge is listed on the National Register of Historic Places. Removal and replacement of this historic resource will require compliance with Section 106 of the NHPA including mitigation of impacts. USACE indicates that they are currently working on a Programmatic Agreement with the Washington State Historic Preservation Office, the Advisory Council of Historic Preservation, interested Tribes, and members of the public to address NHPA compliance for this site and other potentially affected cultural and historic resources.

B. Other Plans

The No Action Alternative (Alternative 1) would allow causes and consequences of nearshore ecosystem degradation to persist and worsen. Section V provides a discussion of the likely implications to fish and wildlife resources in the study area if proposed restoration actions are not implemented.

Other action alternatives anticipate implementation of substantially more restoration than that proposed by the agency preferred alternative / recommended plan. Alternative 2 would advance 11 sites for construction and was the initial APA/RP. Alternative 3 assessed environmental outcomes of restoration at 18 sites across Puget Sound including the 3 proposed under the current APA/RP.

Alternative 2 would restore 5,348 acres of nearshore habitat. This compares to 5,517 acres for Alternative 3 and 2,101 acres restored for Alternative 4. Alternatives 2 and 3 would more completely address project objectives by including one or more beach restoration sites involving armor removal. These alternatives also include sites where tidal hydrology is restored to coastal embayments, “pocket estuary” features not associated with one of the 16 major river deltas in the study area. Alternative 4 does not include beach or embayment sites and focuses largely on river delta restoration. The 11 sites that comprise Alternative 2 have a total cost of approximately \$1.06M; the Alternative 3 sites have a total cost of approximately \$1.25M. For comparison, total costs of the APA/RP (Alternative 4) are approximately \$0.45M.

VIII. EVALUATION OF ALTERNATIVES

Soundwide systematic analysis completed by the PSNERP PDT led to definition of six problem statements based on this scientific analysis. These problem statements provide a clear rationale for addressing the underlying causes of widespread nearshore ecosystem degradation and habitat loss. Large river deltas, smaller coastal embayments, and the bluff/beach systems that dominate the Puget Sound shorescape have all been widely impacted and are greatly diminished in quantity, quality, and connectivity relative to conditions in c.a. 1850. Numerous fish and wildlife resources rely upon these productive ecosystems that occupy the terrestrial/marine ecotone. Emblematic of the relationship between nearshore habitat loss and degradation are Pacific salmon species. While overfishing and upper watershed habitat impacts have contributed to the systematic decline in salmon production, estuarine wetland habitat loss which averages 55% in Puget Sound, is a significant limiting factor for species recovery. Declines in populations of marine birds and other species show similar correlations between nearshore habitat loss and observed population declines. These observations support the conclusion of a compelling need for significant, large-scale nearshore ecosystem restoration. The study area is clearly in need of restoration to improve habitat conditions for listed and non-listed fish and other aquatic species, and for general aquatic ecosystem health.

The no action alternative (Alternative 1) would allow causes and consequences of nearshore ecosystem degradation to persist and perhaps worsen. Failure to implement projects following the substantial investment USACE, WDFW, the Service, and other partners have made towards the success of PSNEP would represent a significant missed opportunity. Western Washington tribes have asserted that habitat restoration efforts are not keeping pace with on-going habitat loss in Puget Sound. Nearshore habitat loss is impeding salmon recovery efforts to the detriment of tribes who depend on treaty reserved fishing rights for economic and cultural sustenance (NWIFC 2011). Federal agencies, including USACE, have an obligation to contribute to Puget Sound recovery; implementation of projects through the GI and other authorities provides an opportunity to do so.

Although it provides less benefit than other action alternatives, Alternative 4 (APA/RP) would significantly contribute to Puget Sound recovery. Nooksack, Skagit, and Hood Canal are priority areas for recovery and Alternative 4 proposes important advances in these regions by implementing over 2,100 acres of nearshore restoration focused in river deltas. These projects will provide numerous ecosystem benefits and provide important habitat for fish and wildlife resources discussed above. Adverse environmental effects are minor in scale and duration compared to ecosystem benefits. Most adverse effects can be significantly minimized by implementing standard BMPs including timing construction activities for periods when fish and wildlife are less likely to be present.

Alternative 2, involving implementation of 11 restoration projects throughout the study area, would provide substantially greater ecosystem benefits than the APA/PR. Over 2 times as many acres of intertidal habitat would be restored, at a commensurate increase in project costs. While this alternative was originally identified as the Tentatively Selected Plan in the Draft FR/EIS, USACE is now advancing a tiered approach to the numerous projects evaluated by the GI and the request for immediate authorization of 3 sites represented in Alternative 4.

Alternative 3, even larger in scope and spatial scale and would advance 18 projects for construction. This alternative would accelerate Puget Sound recovery efforts delivering improvements in nearshore ecosystem conditions throughout the study area. The Service strongly endorses a USACE ecosystem restoration authority that would enable this comprehensive alternative. However this alternative did not meet USACE tests of cost effectiveness and was not carried forward due to significant increases in cost for the larger suite of restoration sites.

While not a formal alternative assessed through the USACE NEPA analysis, full implementation of the tiered approach would likely exceed the scope of ecosystem restoration of alternatives evaluated with as many as 24 projects diverse in size and features constructed throughout the entirety of the Puget Sound basin.

IX. RECOMMENDATIONS FOR FISH AND WILDLIFE CONSERVATION

The Service supports the APA/RP and is providing the following recommendations to minimize potentially adverse effects and maximize benefits to fish and wildlife resources associated with the proposed actions. Recommendations are divided into two tiers. Tier 1 recommendations are considered essential for minimizing potential negative impacts of the actions and ensuring that intended benefits are realized. Tier 2 recommendations are those that will enhance overall restoration effectiveness in the study area and provide additional benefits beyond those currently represented in the APA/RP.

A. Tier 1 Recommendations: Ensuring APA/RP Effectiveness

1. The Service recommends that USACE adhere to BMPs and conservation measures applicable to construction activities required to implement restoration projects. USACE should seek to avoid the need for variances and exceptions from practices that avoid or minimize adverse impacts to fish and wildlife resources.

2. The Service recommends that projects requiring replacement of highway and road bridges implement conceptual designs that avoid pile driving. Current plans specify that new bridge supports will be cast-in-place concrete piers to avoid noise impacts to aquatic species.

3. The Service recommends that riparian buffers installed by USACE restoration authorities and programs be consistent with NMFS guidelines for protection of salmon habitat functions. Projects that invest public resources in ecosystem restoration should conform to the highest standards of environmental protection.

4. The Service recommends that USACE and their partners exercise creativity and flexibility in working with landowners and other stakeholders in seeking to establish the maximum amount of ecosystem benefits from restoration projects. The Service understands that USACE and WDFW have a significant amount of work remaining to finalize project designs and construction plans. This will include negotiations with landowners and coordination with other interested parties to establish final project boundaries and the area of restored ecosystem benefits.

5. The Service recommends that USACE continue to coordinate closely with tribal governments and entities with interest in these projects. In addition to compliance with requirements for formal government-to-government coordination, we strongly advise continued informal coordination with tribal government agency staff and tribal leaders. Success of these projects will be greatly facilitated by integrating collaboration with western Washington tribes throughout the process of project design and implementation.

6. The Service has provided technical assistance to PSNERP throughout the entire GI study process. The Service requests that USACE continue to engage with the Service and other natural resource agencies, seeking technical assistance to ensure that benefits to fish and wildlife resource are maximized and short-term adverse effects are minimized.

B. Tier 2 Recommendations: Generating Additional Benefits

1. Per the June 2015 guidance memo from the Office of the Assistant Secretary of the Army for Civil Works, USACE and WDFW have developed a tiered implementation approach for all 36 sites identified and evaluated by the GI study. These sites were deemed critical to restore the connectivity and size of large river delta estuaries, restore the number and quality of coastal embayments, and restore the size and quality of beaches and bluffs. The tiered strategy allows for a more diversified scope of projects to be implemented under various restoration authorities and programs. This Coordination Act Report has focused on the RP and alternatives evaluated in the draft FR/EIS which does not include substantial reference to other sites and implementation pathways. Nonetheless, in addition to the three sites proposed by USACE in their APA/RP, there is significant work to be done outside of an envisioned Nearshore Restoration authority for PSNERP. The Service strongly recommends that USACE adhere to the approach outlined in the guidance memo. This includes aggressive pursuit of opportunities to apply Corps of Engineers' CAP resources (e.g. §1135, §206, §544) to implement those projects deemed more appropriate for CAP implementation than via the PSNERP GI (Categories 2 and 3, Table 4).

2. Similar to recommendation B(1) above, the Service recommends that USACE seek a local sponsor to support the required GI(s) for the nine sites identified as falling within the GI program but require additional data collection and/or analysis that would be studied under future feasibility reports (Category 5, Table 4). These nine sites that require additional study prior to eligibility for authorization would more completely realize the potential provided by the extensive analysis of the PSNERP GI and greatly complement the three sites that are the focus of the current APA/RP.

X. SUMMARY AND THE SERVICE POSITION

The Service supports the tiered approach for implementation agreed upon by USACE and WDFW for projects identified to address the ecosystem restoration needs documented by the analysis completed under the authority of the Puget Sound Nearshore Ecosystem Restoration GI Study. We specifically endorse:

1. Immediate implementation of the APA/RP. USACE and WDFW should continue engineering design and other tasks required to implement the three projects recommended by the GI. Completion of the Nooksack River, North Fork Skagit River, and Duckabush River projects will provide substantial positive benefits to Puget Sound recovery including important benefits for fish and wildlife resources.

2. Aggressive pursuit of opportunities to apply other USACE authorities to implement 12 projects identified by the tiered approach as appropriate for Puget Sound and Adjacent Waters (§544) or CAP (§1135, §206) execution. These projects are within reach of existing authorities and resources and should be implemented as expeditiously as possible.

3. Simultaneous work to develop local sponsorship and USACE vertical team support for additional GI studies to complete additional data collection and analysis required to advance nine projects determined suitable for GI implementation but lacking sufficient information for immediate authorization.

The Service finds substantial value in action alternatives evaluated by the FR/EIS that would have delivered significantly greater ecosystem benefit than the final proposal. However the Service understands that the tiered approach which includes implementation of restoration projects beyond the scope of the APA/RP may provide similar, or perhaps greater, ecosystem benefits than any of the formal NEPA alternatives considered. The path forward agreed upon by USACE Headquarters, USACE Seattle District, and WDFW delivers a desirable outcome in authorizing three significant restoration projects, resulting in over 2,100 acres of tidal wetlands. These projects, especially when complemented by other actions identified in the tiered implementation approach, will substantially improve Puget Sound nearshore ecosystem conditions, addressing degradation identified by the GI study. Nearshore restoration at this scale has the potential to contribute substantially to regional Puget Sound recovery efforts and is consistent with the obligations to uphold treaty reserved rights of western Washington tribes. These projects represent a significant contribution to the urgent need to recover Puget Sound ecosystems providing habitat for fish, wildlife, and plants for the continuing benefit of the American people.

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APPENDIX A: WASHINGTON DEPARTMENT OF FISH AND WILDLIFE COMMENTS

State of Washington
DEPARTMENT OF FISH AND WILDLIFE

Mailing Address: 600 Capitol Way N • Olympia, WA 98501-1091 • (360) 902-2200, TDD (360) 902-2207
Main Office Location: Natural Resources Building • 1111 Washington Street SE • Olympia, WA

February 11, 2016

Curtis Tanner
Environmental Assessment and Restoration Division
U.S. Fish and Wildlife Service
510 Desmond Drive Southeast, Suite 102
Lacey, Washington 98503

Dear Mr. Tanner:

The Washington Department of Fish and Wildlife (Department) submits the following comments in regard to the draft Fish and Wildlife Coordination Act report on the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP). The draft report is being prepared under authority of and in accordance with the Fish and Wildlife Coordination Act in fulfillment of the reporting requirements set forth in Section 2(b) of the Act, and is intended to accompany the U.S. Army Corps of Engineers' (Corps) final feasibility report for the PSNERP General Investigation.

The U.S. Fish and Wildlife Service (Service) has coordinated with the Department in the preparation of this draft Fish and Wildlife Coordination Act report on the PSNERP. The document captures the interests of the Department in advancing ecosystem restoration projects in partnership with the Corps.

After reviewing this draft report, we support the recommendations contained therein and concur with the statements provided by the Service in this report. However, the Department is actively developing riparian guidance tools in our Priority Habitats and Species – Riparian document, and thus will rely on the updated science of that work prior to concurring with the NMFS riparian guidance specified in your recommendations.

The Department appreciates the opportunity to review this report and submit comments. If I can be of further assistance, please contact me at (360) 902-2527.

Sincerely,

Jeff Davis

Jeff Davis, Assistant Director
Habitat Program

APPENDIX B: NATIONAL MARINE FISHERIES SERVICE COMMENTS

Tanner, Curtis <curtis_tanner@fws.gov>

Joint FWCA Report

David Hirsh - NOAA Federal <david.hirsh@noaa.gov> Tue, Feb 16, 2016 at 11:31 AM
To: "Tanner, Curtis" <curtis_tanner@fws.gov>
Cc: Martha Jensen <martha_l_jensen@fws.gov>, Mark Celedonia <mark_celedonia@fws.gov>, Elizabeth Babcock <elizabeth.babcock@noaa.gov>

Dear Curtis--On behalf of the North Puget Sound Branch of the Oregon Washington Coast Area Office of NMFS, I would like to express our strong support for your findings and recommendations presented in the USFWS's Draft CAR on the COE/WDFW PSNERP program in Puget Sound. We recently completed formal consultation on a batch of three projects under that program that we believe will have substantial benefits for the conservation of affected ESA listed salmon and steelhead. These projects have been identified in our salmonid recovery plans covering Puget Sound, and the PSNERP process considered the input of a variety of Agenices and Tribes with local knowlege and species expertise, thereby ensuring well-rounded stakeholder support.

We would like to use this opportunity to suggest the inclusion of a single procedural consideration in your final report regarding the intersection of the PSNERP design process and our Agencies' ESA section 7 duties. Specifically, NMFS recommends that the COE provide detailed design information for each of four stages of design development identified in PSNERP program: 1) Concept (10 percent); 2) 30 percent design; 3) 60 percent design; and 4) 90 percent design. At this time, in the absence of a programmatic consultation that would address all underlying activities proactively and prescriptively, the 10 percent design stage is only sufficient to enable a threshold analysis and might not be sustainable for ESA section 7 compliance over the long term. In contrast, requiring the COE to provide additional design information as design progresses toward construction would enable NMFS to ensure that ESA s7 consultation completed at the 10 percent design stage remains valid or identify new information that might trigger the need to reinitiate consultation.

Presently, we lack an operating programmatic consultation covering these types of actions in Puget Sound. For our recently completed batched consultation, we required the COE to provide that design information for all three projects to ensure the continuing validity of our incidental take statement. NMFS recommends that process continue for all PSNERP actions sent to the Services for ESA consultation until a programmatic consultation can be completed.

Thank you again for the opportunity to review your draft CAR. It was a pleasure collaborating with you and we look forward to doing more of that in the future.

DH

David Hirsh
Division Manager/Senior Program Analyst, Oregon-Washington Coast Area Office
National Marine Fisheries Service, West Coast Region
7600 Sandpoint Way, Building 1
Seattle, WA 98115
(206)-526-4506

[Quoted text hidden]

APPENDIX C: SWINOMISH INDIAN TRIBAL COMMUNITY COMMENTS

Phone (360) 466-3163
Fax (360) 466-5309

Swinomish Indian Tribal Community

A Federally Recognized Indian Tribe Organized Pursuant to 25 U.S.C. § 476
11404 Moorage Way
LaConner, Washington 98257-0817

United States Department of the Interior
Fish and Wildlife Service
Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, WA 98503

February 5, 2016

RE: Puget Sound Nearshore General Investigation

Dear Mr. Rickerson:

The Swinomish Indian Tribal Community (the Tribe) appreciates the opportunity to provide input to the Fish and Wildlife Service's Coordination Act Report (CAR). As you may be aware, the North Fork Skagit River Delta Project was first identified by the Tribe as an important option for estuarine restoration as part of the 2005 Skagit Chinook Recovery Plan. However, it was, and remains, our expectation that considerable technical analysis would be undertaken before this project would be advanced to the next level of design. In particular, we are keenly interested in a thorough evaluation of the sustainability of the habitat to be restored, benefits to ecosystem processes, as well as any potential impacts to the Tribe's important fishing sites in the vicinity of the proposed project. It was therefore of some surprise to learn that this project is on a fast track for authorization before Congress without a full determination as to how Tribal concerns will be addressed.

Clearly the Tribe is supportive of projects that will make significant contributions to chinook and steelhead recovery in the Skagit River. We also know that significant investments are already being made through local and state funding sources to evaluate the hydrologic processes at play in this stretch of the river. We have been eager to see the results of these analysis and understand they are soon to be made available for review. Until such time as we have the opportunity to review and analyze these assessments we believe it is virtually impossible to answer the most basic of questions regarding the pros and cons of this project as proposed.

To illustrate or concerns, changes in the river at this location since the Chinook Recovery Plan was written have resulted in some challenges to the Tribe in our ability to access and fish in this portion of the river. Most specifically, the accumulation of sediment in one channel of the North Fork in this area has reduced our access to our fishing sites and has resulted in difficulties for fisherman to access this traditional resource. To better understand how this section of river will evolve with or without a project being implemented is essential to the welfare of the Swinomish people. To advance a specific proposal that does not first thoroughly consider the hydrologic ramifications of all alternatives and approaches to design, at a landscape level, seems premature given what is at stake. We do want to see a project move forward, but only after we can adequate assess and mitigate for impacts that may occur. We therefore believe this project should not move forward without assurances that appropriate hydrodynamic studies are conducted such that we can determine how much habitat will be gained, and for how long. Also, we are also concerned that a levee setback may result in additional hardship on Tribal fishermen. We need to understand in adequate detail how a levee setback will effect river navigation and shoreline access as well as salmon habitat. In this regard, we feel that it is necessary that the Tribe be an integral part in any studies that are conducted to assess habitat or riverine impacts, and we would expect to be intimately involved in the design of any of the restoration alternative to insure that Treaty secured fishing activities are not compromised.

We therefore request that this CAR detail our concerns and advocate for Tribal inclusion in the development of any future analysis and in the ultimate project design.

Thank you for your consideration.

Sincerely,

Larry Wasserman
Environmental Policy Director

cc Wetzler, USACE

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

REPLY TO
ATTENTION OF

Environmental and Cultural Resources Branch

MAR 05 2013

Mr. Reid Nelson
Director, Office of Federal Agency Programs
Advisory Council on Historic Preservation
1100 Pennsylvania Ave. NW, Suite 803
Washington DC 2004-2501

Subject: Puget Sound Nearshore Marine Habitat Restoration Project, Puget Sound vicinity, Washington

Dear Mr. Nelson,

The United States Army Corps of Engineers (Corps), in cooperation with the Washington Department of Fish and Wildlife (WDFW), is currently preparing a feasibility study and ecosystem restoration plan, referred to as the Puget Sound Nearshore Marine Habitat Restoration Project (Nearshore Project), to address significant ecosystem degradation at 18 locations in the nearshore zone of the Puget Sound Basin, Washington (see enclosed fact sheets and maps). Ecological degradation of the nearshore zone is primarily attributable to man-made stressors that have impeded ecosystem processes such as tidal exchange, transport of sediments and freshwater inflow. These man-made stressors include shoreline armoring and bank stabilization, wetland fill, tidal barriers or channel restrictions such as levees, dams and overwater structures such as railroad and highway infrastructure, and marinas, for example. Alternatives being considered within the Nearshore Project will address ecosystem degradation by removing many of these stressors and taking other actions to restore the natural ecosystems. Our review of the Nearshore Project for purposes of Section 106 of the National Historic Preservation Act (NHPA) has concluded that, given the multiple alternatives and locations under consideration and the restricted scope and scale of identification efforts in support of the planning decision, as per the Corps' new Planning SMART framework requirements for projects (see enclosed Planning Smart brochure), a Programmatic Agreement (PA) may be required to manage issues related to the level of effort for inventory and evaluation, effects to historic properties, and other requirements of Section 106. Within the context of a PA, and pursuant to 36 CFR 800.4(b)(2), the Corps proposes to use a phased process to conduct identification and evaluation of historic properties, including the partial deferment of identification and evaluation until the specific aspects or locations of alternatives are more fully defined. Pursuant to 36 C.F.R.

800.6(a)(1)(i)(c), the Corps is inviting the Advisory Council on Historic Preservation (ACHP) to participate in the development of the PA.

The nearshore zone of the Puget Sound is the transitional zone between terrestrial, freshwater, estuary and marine systems. It includes beaches, coastal banks or bluff, shallow waters in estuarine deltas, and tidal lands. These areas support a diverse array of fish, wildlife and plants, including several species listed under the Endangered Species Act. The Corps and WDFW have prepared a draft Feasibility Report/ Environment Impact Statement (FR/EIS) for the Nearshore Project. The FR/EIS takes a programmatic approach for considering restoration plans comprised of multiple locations. The FR/EIS provides a base-line study which utilizes readily-available information and analyzes proposed restoration actions at a 10 percent design level only. As indicated above, the tentatively selected plan (TSP) alternative provides for restoration actions at 18 nearshore locations. These locations are in six of the seven sub-basins around Puget Sound, including the highly productive shellfish regions of south Puget Sound and Hood Canal, and the Strait of Juan de Fuca which is a transition zone between the Pacific Ocean. Eight locations are in coastal embayments and five locations are in one of three major river deltas. All 18 locations contain critical habitat for ESA-listed species. Please refer to the enclosed fact sheets for current conditions and tentative restoration actions proposed at each location.

The cultural resource analysis presented in the FR/EIS is based on a series of preliminary investigations sponsored by the United States Fish and Wildlife Service (USFWS) in 2011. Those investigations were part of a larger study designed to provide baseline environment information for a candidate list of 36 nearshore locations with significant ecosystem degradation issues. The USFWS anticipated the Corps and WDFW would utilize the information to review, prioritize and select locations most appropriate to a request for federal funding. Baseline information collected for candidate locations not selected for the Nearshore Project, alternatively, would be made available to support and expedite final implementation of restoration actions through other federal, local, state or other programs.

Preliminary or baseline investigations for cultural resource concerns included: 1) literature review; 2) reconnaissance inventory; and 3) development of historic context for one of the most prevalent historic-age resources found at nearshore locations, agricultural dikes /levees. The first investigation reviewed existing literature for known and potential cultural resources within the area of potential effects (APE) at all 36 candidate locations. Consulted sources included the Washington Department Archaeology and Historic Preservation's data base of cultural resources reports and documented cultural resource properties, Washington State Register and National Register of Historic Places, and a wide variety of relevant primary and secondary documents. The reconnaissance inventory involved a pedestrian survey of public lands within the APE of 15 candidate locations, 10 of which became Nearshore Project locations. Findings of the literature review and reconnaissance inventory revealed that 10 of the 18 Nearshore Project locations contain known prehistoric archaeological sites and three contain known historic archaeological sites, all of which could be impacted by restoration actions. Built environment resources identified and proposed for removal are two sections of railroad line, seven railroad bridges, eight highway bridges, nine dike/levee systems, five industrial facilities, fish hatchery, four marine-related research facilities, and numerous agricultural, residential, and commercial buildings.

Context developed for agriculture dikes / levees provided highly useful information for the era of initial construction and use in the 1860s and 1870s, and up to 1910. A more detailed analysis, however, is required for the historic-era post 1910. The Corps' program of upgrading existing agricultural dikes and constructing new levees for flood control purposes is of particular concern.

After approval of the FR/EIS, the Nearshore Project would be submitted to Congress for approval and funding. Once funding is authorized, the Corps would prepare Environment Assessments (EA) for each of the restoration project authorized for construction. At that point, each individual restoration project would be fully designed and analyzed within a project specific EA.

In addition to the ACHP, the Corps has notified the Washington State Historic Preservation Officer about the development of a PA and is also identifying and inviting parties who might be interested in consulting on the PA, including Indian tribes, Historic Preservation Commissions of certified local governments, WDFW and other government agencies and members of the public with a demonstrated interested in cultural or historical components of the Nearshore Project. We anticipate the PA would provide a process for completing the identification and evaluation of possible historic properties as the alternatives are refined and the projects are approved and funded, determining effects on historic properties, and addressing post-review discoveries of archaeological sites and inadvertent discoveries of human remains. We may also consider identifying best management practices or standard treatments of certain properties or effects, and the manner in which the Corps will conclude its Section 106 responsibilities for these individual actions.

As noted at the outset of this letter, our primary purpose is to notify you of the Nearshore Project and invite you to participate in the development of PA as provided at 36 C.F.R. § 800.6(a)(1)(i)(c). As we move forward in consultation with the consulting parties to develop the draft agreement document for this undertaking, we would appreciate any advice and guidance you might provide.

We look forward to our consultations with your office on this undertaking. For more information about this project or clarification about this request, please contact Ms. Mary McCormick (Cultural Resources Lead) by telephone at (206) 316-3938 or by email at mary.e.mccormick@usace.army.mil. I can be reached by telephone at (206) 316-3096 or by email at rolla.l.queen@usace.army.mil.

Sincerely,

Rolla Queen, Chief
Cultural Resources Section
Environmental and Cultural Resources Branch

cc with enclosures

CENWS-EN-ER
SUBJECT: SECTION 106 Letter to ADHP requesting participation in development of Programmatic Agreement for identification and treatment of historic properties with potential for impact by the Puget Sound Nearshore Marine Habitat Restoration Project, Washington.

MCCORMICK/EN-ER mm 3/5/13
QUEEN/EN-ER RQ 3/5/13

EN-ER Files

Preserving America's Heritage

March 22, 2013

Lieutenant General Thomas P. Bostick
Commanding General
U.S. Army Corps of Engineers
441 G. Street, NW
Washington, DC 20314-1000

REF: Puget Sound Nearshore Marine Habitat Restoration Project, Washington State

Dear General Bostick:

The Seattle District of the Corps of Engineers has requested that the Advisory Council on Historic Preservation (ACHP) participate in the development of a Programmatic Agreement to help ensure that historic properties are fully considered as the Seattle District implements the referenced Nearshore Project. Pursuant to the Criteria for Council Involvement in Reviewing Individual Section 106 Cases (Appendix A to our regulations, 36 CFR Part 800) we believe the criteria are met for our participation in this undertaking. The restoration of natural ecosystems in Puget Sound and the activities associated with it (including removal of ecosystem stressors and enhancement of tidal exchange, sediment transport, and freshwater inflow) have the potential to adversely affect important historic properties, and may present questions of policy or interpretation. Accordingly, we will participate in consultation with the Seattle District on this undertaking.

By copy of this letter we are also notifying Mr. Rolla Queen, Chief of the Seattle District's Cultural Resources Section, of our decision to participate in consultation.

Our participation will be handled by Dr. Tom McCulloch, who can be reached at 202-606-8554 or at tmcculloch@,achp.gov. We look forward to working with the Corps on this important project.

Sincerely,

John M. Fowler
Executive Director

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

REPLY TO
ATTENTION OF

Environmental and Cultural Resources Branch

MAR 05 2013

Dr. Allyson Brooks, Ph.D.
State Historic Preservation Officer
Department of Archaeology and Historic Preservation
P.O. Box 48343
Olympia, WA 98504

Subject: Section 106 Notification and Review of the Puget Sound Nearshore Marine Habitat Restoration Project, vicinity of Puget Sound, Washington

Dear Dr. Brooks:

The United States Army Corps of Engineers (Corps), in cooperation with the Washington Department of Fish and Wildlife (WDFW), is currently preparing a feasibility study and ecosystem restoration plan, referred to as the Puget Sound Nearshore Marine Habitat Restoration Project (Nearshore Project), to address significant ecosystem degradation at 18 locations in the nearshore zone of the Puget Sound Basin, Washington (see enclosed fact sheets and maps). Ecological degradation of the nearshore zone is primarily attributable to man-made stressors that have impeded ecosystem processes such as tidal exchange, transport of sediments and freshwater inflow. These man-made stressors include shoreline armoring and bank stabilization, wetland fill, tidal barriers or channel restrictions such as levees, dams and overwater structures such as railroad and highway infrastructure, and marinas, for example. Alternatives being considered within the Nearshore Project will address ecosystem degradation by removing many of these stressors and taking other actions to restore the natural ecosystems. Our review of the Nearshore Project for purposes of Section 106 of the National Historic Preservation Act (NHPA) has concluded that, given the multiple alternatives and projects under consideration and the restricted scope and scale of identification efforts in support of the planning decision, a Programmatic Agreement (PA) may be required to manage issues related to the level of effort for inventory and evaluation, effects to historic properties, and potential management strategies. Within the context of a PA, and pursuant to 36 CFR 800.4(b)(2), the Corps proposes to use a phased process to conduct identification and evaluation of historic properties, including the partial deferment of identification and evaluation until the specific aspects or locations of alternatives are more fully defined. The Corps is also notifying the Advisory Council on Historic Preservation (ACHP) as required at 36 C.F.R. 800.6(a)(1)(i)(c) and inviting them to participate in the development of the PA.

The nearshore zone of the Puget Sound is the transitional zone between terrestrial, freshwater, estuary and marine systems. It includes beaches, coastal banks or bluff, shallow waters in estuarine deltas, and tidal lands. These areas support a diverse array of array of fish, wildlife and plants, including several species listed under the Endangered Species Act. The Corps and WDFW have prepared a draft Feasibility Report/ Environment Impact Statement (FR/EIS) for the Nearshore Project. The FR/EIS takes a programmatic approach for considering restoration plans comprised of multiple locations. The FR/EIS provides a baseline study which utilizes readily-available information and analyzes proposed restoration actions at a 10 percent design level only. As indicated above, the tentatively selected plan (TSP) alternative provides for restoration actions at 18 nearshore locations. These locations are in six of the seven sub-basins around Puget Sound, including the highly productive shellfish regions of south Puget Sound and Hood Canal, and the Strait of Juan de Fuca which is a transition zone between the Pacific Ocean. Eight locations are in coastal embayments and five locations are in one of three major river deltas. All 18 locations contain critical habitat for ESA-listed species. Please refer to the enclosed fact sheets for current conditions and tentative restoration actions proposed at each location.

The cultural resource analysis presented in the FR/EIS is based on a series of preliminary investigations sponsored by the United States Fish and Wildlife Service (USFWS) in 2011. Those investigations were part of a larger study designed to provide preliminary baseline environmental information for a candidate list of 36 nearshore locations with significant ecosystem degradation issues. The USFWS anticipated the Corps and WDFW would utilize the information to review, prioritize and select locations most appropriate to a request for federal funding. Baseline information collected for candidate locations not selected for the Nearshore Project, alternatively, would be made available to support and expedite final implementation of restoration actions through other federal, local, state or other programs.

Preliminary or baseline investigations for cultural resource concerns included: 1) literature review; 2) reconnaissance inventory; and 3) development of historic context for one of the most prevalent historic-age resources found at nearshore locations, agricultural dikes /levees. The first investigation reviewed existing literature for known and potential cultural resources within the area of potential effects (APE) at all 36 candidate locations. Consulted sources included the Washington Department Archaeology and Historic Preservation's data base of cultural resources reports and documented cultural resource properties, Washington State Register and National Register of Historic Places, and a wide variety of relevant primary and secondary documents. The reconnaissance inventory involved a pedestrian survey of public lands within the APE of 15 candidate locations, 10 of which became Nearshore Project locations. Findings of the literature review and reconnaissance inventory revealed that 10 of the 18

Nearshore Project locations contain known prehistoric archaeological sites and three contain known historic archaeological sites, all of which could be impacted by restoration actions. Built environment resources identified and proposed for removal are two sections of railroad line, seven railroad bridges, eight highway bridges, nine dike/levee systems, five industrial facilities, fish hatchery, four marine-related research facilities, and numerous agricultural, residential, and commercial buildings.

Context developed for agriculture dikes / levees provided highly useful information for the era of initial construction and use in the 1860s and 1870s, and up to 1910. A more detailed analysis, however, is required for the historic-era post 1910. The Corps' program of upgrading existing agricultural dikes and constructing new levees for flood control purposes is of particular concern.

After approval of the FR/EIS, the project would be submitted to Congress for approval and funding. Once funding is authorized, the Corps would prepare Environment Assessments (EA) for each of the restoration projects authorized for construction. At that point, each individual restoration project would be fully designed and analyzed within a project specific EA.

In addition to the Washington State Historic Preservation Officer and Tribal Historic Preservation Officers, the Corps is in the process of identifying consulting parties who might be interested in consulting on the PA, including Indian tribes, Historic Preservation Commissions of certified local governments, WDFW and other government agencies and members of the public with a demonstrated interested in cultural, historical or social components of the Nearshore Project. We anticipate the PA would provide a process to continue identification and evaluation of possible historic properties as the alternatives are refined and the projects are approved and funded, determining effects on historic properties, and addressing post-review discoveries of archaeological sites and inadvertent discoveries of human remains. We may also consider identifying best management practices or standard treatments of certain properties or effects, and the manner in which the Corps will conclude its Section 106 responsibilities for these individual actions.

As noted at the outset of this letter, our primary purpose is to notify you of the Nearshore Project and our request to phase and defer identification and evaluation of historic properties as provided at 36 C.F.R. § 800.4(b)(2) through the development of a PA as provided at 36 C.F.R. § 800.14(b). As we move forward in consultation with the other consulting parties and your office to develop the draft agreement document for this undertaking, we would appreciate any advice and guidance you might provide.

We look forward to our consultations with your office on this undertaking. For more information about this project or clarification about this request, please contact Ms. Mary McCormick (Cultural Resources Lead) by telephone at (206) 316-3938 or by email at mary.e.mccormick@usace.army.mil. I can be reached by telephone at (206) 316-3096 or by email at rolla.l.queen@usace.army.mil.

Sincerely,

Rolla 7. Queen

Rolla Queen, Chief
Cultural Resources Section
Environmental and Cultural Resources Branch

cc with enclosures

CENWS-EN-ER
SUBJECT: SECTION 106 Letter to SHPO requesting participation in development of Programmatic Agreement for identification and treatment of historic properties with potential for impact by the Puget Sound Nearshore Marine Habitat Restoration Project, Washington.

MCCORMICK/EN-ER mm 3/5/13
QUEEN/EN-ER RQ 3/5/13

EN-ER Files

DEPARTMENT OF
ARCHAEOLOGY &
HISTORIC PRESERVATION
Protect the Past, Shape the Future

Allyson Brooks Ph.D., Director
State Historic Preservation Officer

April 3, 2013

Ms. Rolla Queen
Cultural Resource Section Chief
US Army Corps of Engineers
PO Box 3755
Seattle, WA 98124-3755

In future correspondence please refer to:
Log: 040313-10-COE-S
Property: Puget Sound Near-shore Marine Habitat Restoration Programmatic Agreement
Re: More Information Needed

Dear Ms. Queen:

Thank you for contacting the Department of Archaeology and Historic Preservation (DAHP). I have reviewed the materials you provided for this project. We look forward to working with you, the US Army Corps of Engineers and the US Department of Fish and Wildlife in developing a Programmatic Agreement in the coming months to mitigate for cultural resource concerns while enhancing near-shore habitat and ecosystems.

These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations 36CFR800. Please contact me should you have any specific questions about our request and we look forward to having an opportunity to review and comment on the draft programmatic agreement when it is available.

Thank you for notifying DAHP of the opportunity. Should you have any questions, please feel free to contact me.

Sincerely,

Russell Holter

Russell Holter
Project Compliance Reviewer
(360) 586-3533
russell.holter@dahp.wa.gov

Tribal Correspondence Summary:

Tribal Name	Date of Notification		
Confederated Bands of the Yakama Nation		Oct 23, 2014	Sep 4, 2015
Hoh Indian Tribe	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Jamestown S'Klallam Indian Tribe	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Lower Elwha Klallam Business Council	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Lummi Business Council	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Makah Tribal Council	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Muckleshoot Tribal Council	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Nisqually Tribe	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Nooksack Indian Tribal Council	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Port Gamble S'Klallam Business Committee	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Puyallup Tribal Council	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Quileute Tribal Council	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Quinault Nation Business Committee	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Samish Indian Nation	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Sauk-Suiattle Indian Tribe	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Skokomish Tribal Council	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Snoqualmie Tribe	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Squaxin Island Tribal Council	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Stillaguamish Board of Directors	Aug 2, 2012		Sep 4, 2015
Suquamish Tribal Council	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Swinomish Indian Senate	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
The Tulalip Tribes	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Upper Skagit Tribal Council	Aug 2, 2012	Oct 23, 2014	Sep 4, 2015
Yakama Tribal Council	Aug 2, 2012	Oct 23, 2014	
Tribal Organizations			
NW Indian Fisheries Commission	Aug 2, 2012		Sep 4, 2015

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

REPLY TO
ATIENTION OF

SEP - 4 2015

Civil Works Branch

The Honorable [Name]
Chair/President, [Tribal Name]
[Address]
[Town], Washington [Zip Code]

Dear Chairperson/President [Name]:

The Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) is a multi-year partnership between the U.S. Army Corps of Engineers (Corps) and the Washington Department of Fish and Wildlife to formulate, evaluate, and select an ecosystem restoration plan for sites across Puget Sound. The purpose of this letter is to follow up to our October 23, 2014 letter to notify you of the progress and status of the PSNERP.

At the time of our 2014 letter, the PSNERP team had reduced the potential list of restoration sites from 36 potential restoration sites to a Tentatively Selected Plan of 11 potential restoration sites. Since 2014, a tiered-implementation strategy has been developed to implement all 36 sites under various restoration authorities and partners. Sites were selected based on restoration potential, restoration opportunity, and local support. Of the 36 sites, 3 are being recommended for construction authorization under the existing Corps feasibility study and will be presented as the recommended plan in the Final Feasibility Report and Environmental Impact Statement. These three sites include the Duckabush River Estuary, Nooksack River Delta, and North Fork Skagit River Delta. In addition, 9 of the 36 sites are recommended for further Corps study. Eight medium-sized projects are identified for future implementation under the Corps' Continuing Authorities Program (CAP), and four small projects are identified for future implementation under the Corps' Puget Sound and Adjacent Waters (PSAW) authority. Sites implemented under CAP or PSAW will go through a separate National Environmental Policy Act /consultation process at a future date. Finally, 12 sites are identified for implementation by other agencies. The enclosed strategy paper provides additional information about the tiered-implementation approach for each of the 36 sites, including more-specific information about the 3 sites being recommended for construction authorization.

I look forward to working with you to continue important nearshore restoration activities. If you have any questions about the status of a project or the PSNERP study process, please do not hesitate to contact the District Tribal Liaison Lori Morris at (206) 764-3625 or via email at frances.morris@usace.army.mil. For additional information about the PSNERP, please contact the Project Manager Lynn Wetzler at (206) 764-3695 or via email at lynn.wetzler@usace.army.mil.

Sincerely,

John G. Buck
Colonel, Corps of Engineers
District Commander

Enclosure

cc with enclosure:

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

REPLY TO
ATTENTION OF

OCT 23 2014

Environmental and Cultural Resources Branch

The Honorable [Name]
Chair/President, [Tribal Name]
[Address]
[Town}, Washington [Zip code]

Dear Chairperson/President [Name]

The Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) is a multi-year partnership between the U.S. Army Corps of Engineers (Corps) and the Washington Department of Fish and Wildlife (WDFW) to formulate, evaluate, and select an ecosystem restoration plan for sites across Puget Sound. The purpose of this letter is to follow up to our August 2, 2012 letter to notify you of the progress and status of the PSNERP. At the time of our 2012 letter, the PSNERP team had reduced the potential list of restoration sites from 36 potential restoration sites to 15 potential restoration sites. Since 2012, the list of restoration sites has been further refined to 11 sites. The current 11-site Preferred Alternative/Tentatively Selected Plan (TSP) has resulted from review in accordance with Corps regulation and guidance. I would like to offer you an opportunity to meet with us to discuss the 11 proposed restoration sites and provide more information on the study.

The currently proposed 11 ecosystem restoration sites were chosen after the PSNERP team undertook a comprehensive analysis of historical and current conditions in the Puget Sound nearshore zone. The study team evaluated more than 500 potential restoration sites, identifying the best places and opportunities to improve the nearshore zone's ability to provide locally and nationally valued resources. The currently proposed 11 sites in the TSP will restore an estimated 5,300 acres of nearshore ecosystems with an estimated total project cost of about $1.1 billion.

The Corps and WDFW have prepared an integrated Draft Feasibility Report and Environmental Impact Statement (FR/EIS) that takes a basin-wide approach for considering restoration plans at the proposed 11 restoration sites. The draft FR/EIS is undergoing a 45-day public comment period and is available for review at http://bit.ly/PSNearshore. The public comment period is October 10 through November 24, 2014.

After approval of the Final FR/EIS at Corps headquarters, we anticipate that the project will be submitted to Congress for final approval and funding. Authorization by Congress and project implementation is likely several years away. Once authorized, each of the proposed 11 restoration sites would need to receive Federal appropriations before further design and implementation work could occur. Enclosed is a map and brief description of each of the 11 proposed restoration sites.

I look forward to working with you to continue important Nearshore restoration activities. If you have any questions about the status of a project, the PSNERP study process, or wish to participate in either a staff level meeting or a formal Government-to-Government meeting, please do not hesitate to contact the District Tribal Liaison, Lori Morris, at (206) 764-3625 or via email at frances.morris@usace.army.mil. For additional information about the PSNERP, please contact the Project Manager, Lynn Wetzler, at (206) 764-3695 or via email at lynn.wetzler@usace.army.mil.

Sincerely,

John G. Buck
Colonel, Corps of Engineers
District Commander

Enclosure

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

REPLY TO
ATTENTION OF

AUG 2 - 2012

Civil Works Branch

The Honorable [Name]
Chair/President, [Tribal Name]
[Address]
[Town}, Washington [Zip code]

Dear Chairperson/President [Name]

I am sending you this letter to notify you of the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) teams' progress in project selection and to obtain your opinion and, ideally, your support for these projects. I would also like to offer you an opportunity to meet with us to further discuss these projects and the overall restoration study. This could occur at either the staff level or though a Government-to-Government consultation meeting. A staff-level meeting with us would not be intended to replace a Government-to-Government meeting between our respective governments. As you are aware, you may request a Government-to-Government meeting with the U.S. Army Corps of Engineers (Corps) at any time during the development of this project, and we invite you--as a Federally recognized Tribe--to participate in consultation with the Corps so that your concerns are identified and addressed prior to making a final decision on project selection for the PSNERP General Investigation study.

As you also may be aware, the PSNERP--a partnership between the Corps and the Washington Department of Fish and Wildlife--has been studying problems and opportunities related to the Puget Sound Nearshore ecosystem and evaluating potential solutions. The local community, including Tribal governments, provided the PSNERP with an extensive listing of potential project ideas throughout Puget Sound.

Of the nearly 700 projects initially identified, the PSNERP teams used scientific tools and criteria to initially narrow the potential list to 36 projects and finally to 15 projects--each addressing identified nearshore restoration and/or protection priorities for Puget Sound. The 15 projects will be included in a draft feasibility report and programmatic Environmental Impact Statement (EIS) that will be submitted to Congress for potential Federal authorization. A map and brief descriptions of each of the final 15 projects are included as an enclosure. Once authorized, each of the 15 projects will need to receive Federal appropriations before further design and implementation work could occur.

The PSNERP team is working diligently to complete the draft feasibility report and EIS this year. Subsequent review and revision work will take several months, while potential authorization by Congress and project implementation is likely several years away. If you would like to schedule a meeting with my staff to better understand the PSNERP project and timeline, how projects in your area of interest fit into the bigger picture, and what the next steps are, please do not hesitate to contact us.

As part of our work, PSNERP has collected significant information that may be useful to you as you continue to pursue restoration opportunities within Puget Sound. This information includes more-specific information on projects that are not being pursued for construction through the PSNERP authorization. We will make this information available to you upon request.

I look forward to working with you to advance important nearshore restoration and protection activities. If you have any questions about that status of a project or the PSNERP process or wish to participate in a Government-to-Government consultation or staff-level meeting, please do not hesitate to contact my Tribal Liaison, Lori Morris, at (206) 764-3625 or frances.morris@usace.army.mil. For additional information about the project, please contact the Project Manager, Jessica Winkler, at (206) 764-3462 or jessica.g.winkler@usace.army.mil.

Sincerely,

Bruce A. Estok
Colonel, Corps of Engineers
District Commander

Enclosure

CLEAN WATER ACT SECTION 404(b)(1) EVALUATION
PUGET SOUND NEARSHORE ECOSYSTEM RESTORATION PROJECT
WASHINGTON STATE
January 2016

1. Introduction. The purpose of this document is to record the Corps' evaluation and findings regarding the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) pursuant to Section 404 of the Clean Water Act (CWA). This document covers placement of excavated material at the three project sites listed below and shown in Figure 1 within the waters of the U.S. as part of PSNERP. This project will involve placement of fill below Ordinary High Water (OHW) in riverine areas and placement of fill below Mean Higher High Water (MHHW) in marine areas:

- Nooksack River Delta, Ferndale, WA
- North Fork Skagit River Delta, La Conner, WA
- Duckabush River Estuary, Jefferson County, WA

The information contained in this document reflects the findings of the project record. Specific sources of information included the following:

a. *Historical Change and Impairment of Puget Sound Shorelines: Atlas and Interpretation of Puget Sound Nearshore Ecosystem Restoration Project Change Analysis* (Simenstad et al. 2011)
b. *Implications of Observed Anthropogenic Changes to the Nearshore Ecosystems in Puget Sound* (Fresh et al. 2011)
c. *Management Measures for Protecting the Puget Sound Nearshore* (Clancy et al. 2009)
d. *PSNERP Strategic Restoration Conceptual Engineering – Final Design Report* (ESA et al. 2011)
e. PSNERP Final Feasibility Report/EIS (FR/EIS; USACE *in preparation*)
f. 404(b)(1) Evaluation (see below)
g. Public Interest Review (see below)

This document addresses the substantive compliance issues of the Clean Water Act 404(b)(1) Guidelines [40 CFR §230.12(a)] and Public Interest Factors [33 CFR §320.4 as reference].

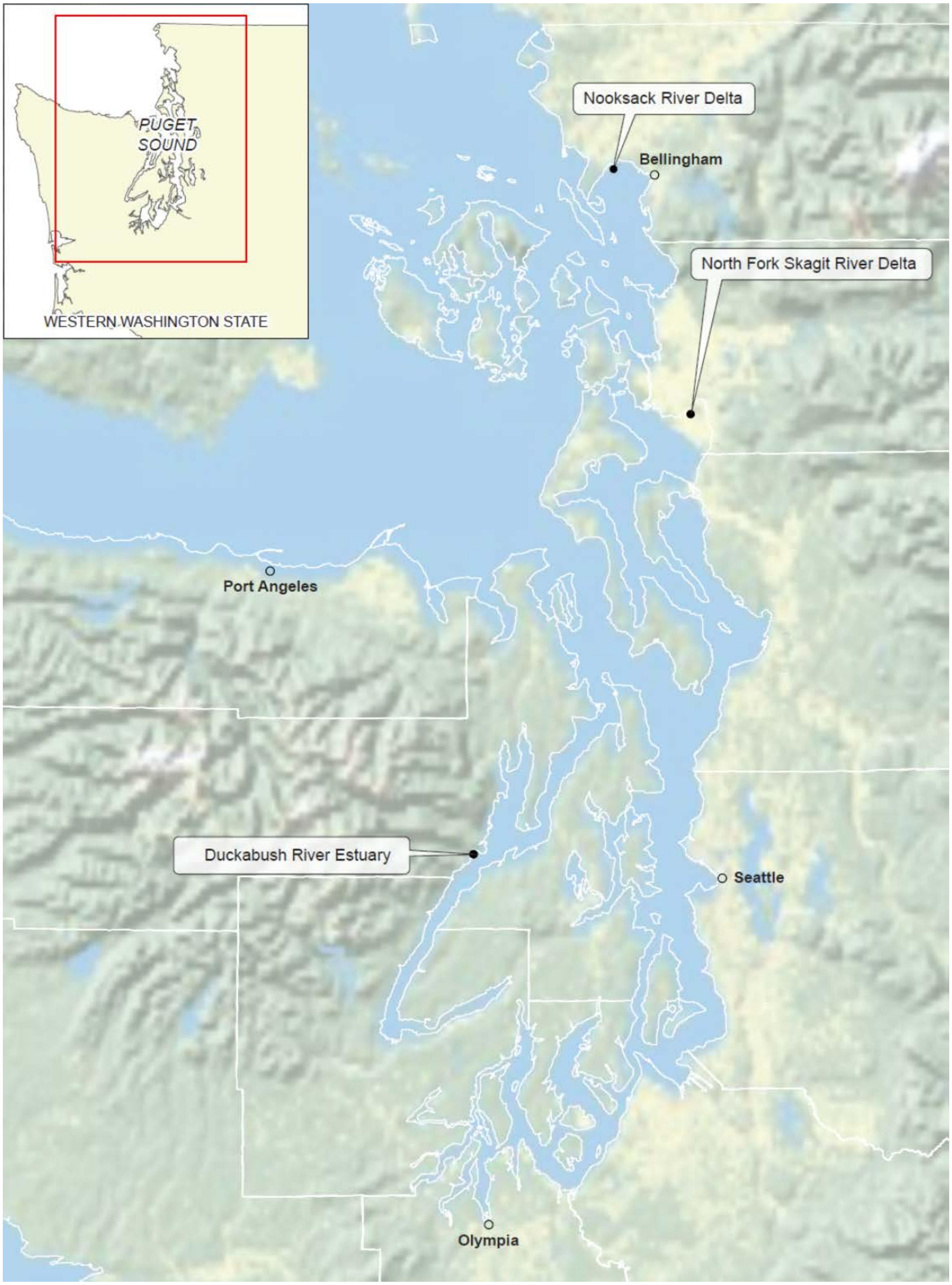

Figure 1. Geographic locations of the sites included in the recommended plan.

2. Description of Proposed Discharge.

The three sites of the preferred alternative will each have excavation and fill or discharge below their relevant jurisdictional line as listed in Table 1. Some discharge may occur incidentally along with the various types of excavation required at each site. Some site restoration plans involve filling of drainage ditches to restore natural site hydrology, and some plans involve discharge of excavated material to restore a more complex topography. General project descriptions are located in Chapter 6 of the FR/EIS and complete descriptions of all features appear in Appendix B – Engineering Appendix of the FR/EIS. Table 1 lists the types of excavation, fill, discharge, and whether the jurisdictional consideration is mean higher high water (MHHW) for the marine environments or the OHW for riverine environments.

Table 1. Fill type and jurisdictional line for each of the 3 sites in the recommended plan.

Site	Acres	Excavation	Fill and/or discharge	Water body type	Jurisdictional line type
Nooksack River Delta	1807	Dredging (regrading of the Lummi River), levee removal,	install diversion at Lummi/Nooksack confluence, install wide-span bridge pilings at 6 locations	tidal fresh	OHW
North Fork Skagit River Delta	256	excavate channels; levee breaches; remove levees, fill, and roads	sidecast material	tidal fresh	OHW
Duckabush River Estuary	38	Excavate channels, removal of culverts, reconstruct Pierce Slough	install wide-span bridge pilings	estuarine mixing	MHHW and OHW

Types of materials that may be discharged during construction will be native materials that have been excavated on site and discharged as sidecast material if beneficial for the restoration purpose. Bridge abutments and pilings will be constructed of concrete suitable for aquatic use. Bridge abutments will be above the OHW mark.

3. Project Purpose and Need.

The purpose of the proposed action is to restore the natural processes in the nearshore zone that sustain the ecological resources important to the people of the Puget Sound region and the nation. Removal of stressors such as shoreline armoring, bank stabilization, tidal barriers, wetland fill, overwater structures, and tidal channel restrictions including levees will allow natural processes to recover. These processes support fish and wildlife and promote the ecosystem structures and functions provided by wetlands, kelp and eelgrass beds, and riparian vegetation including critical habitat for species listed under the Endangered Species Act (ESA).

Valuable natural resources in Puget Sound have declined to a point that the ecosystem may no longer be self-sustaining without intervention to curtail ecological degradation. Impairment of nearshore processes and degradation of ecosystem functions are critical factors in the declining health of Puget Sound. Anthropogenic stressors causing this impairment and degradation include the direct effects of physical alterations to the landscape that have eliminated large expanses of habitat and have disrupted the major ecological processes that create and sustain habitats. The degradation and loss of nearshore ecosystems is of critical concern because the nearshore zone serves as the connection between terrestrial, freshwater, and marine ecosystems. This means that the nearshore zone vitality, resilience, and productivity influence the productivity of the entire Puget Sound Basin. Alterations to nearshore physiographic processes directly affect the ecosystem functions that support biodiversity and productivity.

The purpose of the material disposal component of the project varies by location. Some sites provide for beneficial re-use of native material excavated on site, and others require the placement of wide-span bridge abutments and pilings. These purposes are used in the analysis of impact avoidance and minimization.

4. <u>Availability of Less Environmentally Damaging Practicable Alternatives to Meet the Project Purpose.</u> The FR/EIS discusses 4 alternatives that the Corps analyzed for the proposed action:

<u>Alternative 1 (No Action):</u>

This alternative is included for comparison purposes and represents future conditions without implementation of a large-scale Federal restoration project. Degradation trajectories would continue as influenced by development and existing restoration and protection authorities. Physical stressors of human influence on the nearshore zone such as fill, armoring, overwater structures, and other types of development would continue to impair water quality. These structures replaced wetlands and preclude the re-establishment of wetlands around Puget Sound that provide valuable water filtration and pollutant sequestration functions.

<u>Alternative 2: Restore 11 Nearshore Zone Sites</u>

Alternative 2 includes 11 sites. The majority of these 11 sites are focused around the Skagit and Snohomish River Deltas, with one site on the stretch of shoreline between Tacoma and Seattle (Beaconsfield) and one to the north in the San Juan Islands (Deer Harbor). Sites are distributed in four of the seven Puget Sound sub-basins defined by PSNERP (see Figure 1-1 in the FR/EIS). Sites in this alternative range from six to 1,807 acres for a total area of 5,354 acres of restored wetland and aquatic habitat.

The 11 sites in this alternative include the following:

- Beaconsfield Feeder Bluff
- Deepwater Slough
- Deer Harbor Estuary
- Dugualla Bay
- Everett Marshland
- Livingston Bay
- Milltown Island
- Nooksack River Delta
- North Fork Skagit River Delta

- Spencer Island
- Telegraph Slough

Alternative 3: Restore 18 Nearshore Zone Sites

Alternative 3 includes 18 sites. These sites are geographically diverse, representing excellent process-based restoration opportunities across the entire Puget Sound nearshore zone. These sites range from the Nooksack River estuary in northern Puget Sound to the WDNR Budd Inlet beach in the South Sound, as well as three sites in Hood Canal, one in Discovery Bay on the Strait of Juan de Fuca, and several sites in between. Sites are distributed in six of the seven Puget Sound sub-basins defined by the Nearshore Study. The sites range from two to 1,807 acres for a total area of restored wetland and aquatic habitat of 5,523 acres.

The 18 sites in this alternative include all 11 sites in Alternative 2, plus these additional sites:

- Big Beef Creek Estuary
- Duckabush River Estuary
- Harper Estuary
- Point Whitney Lagoon
- Snow Creek and Salmon Creek Estuary
- Tahuya River Estuary
- WDNR Budd Inlet Beach

Alternative 3 contains all of the same types of fill and discharge as Alternative 2 and would have all of the same types of construction impacts with similar types of long-term gain in aquatic ecosystem function.

Alternative 4: Restore 3 Nearshore Zone Sites

Alternative 4 includes three of the sites that were analyzed in Alternatives 2 and 3. After release of the Draft FR/EIS, the Corps reformulated the overall program strategy to arrive at a comprehensive plan for implementation of 36 sites under various Corps restoration authorities. The resulting strategy from this analysis is to recommend three sites for near-term authorization with final design and implementation as described here in Alternative 4. Two of these sites are located in northern Puget Sound and the third site is located on the western side of Hood Canal. This recommended plan is not as geographically diverse as Alternatives 2 and 3, but can be implemented with an earlier start date than the larger alternatives, and will lead the way for the strategy of restoring all 36 sites of the PSNERP plan.

- Nooksack River Delta
- North Fork Skagit River Delta
- Duckabush River Estuary

Aspects common to all of the Action Alternatives

Each of these project sites among Alternatives 2, 3, and 4 is a water-dependent activity because the purpose and need for the project is to achieve ecosystem restoration at each of the various types of aquatic habitat represented by the sites. Components of these sites that involve fill below OHW or MHHW are the filling of drainage channels that prevent wetland establishment, installing culverts or wide-span bridges for fish passage, sediment transport process restoration that assists with forage fish spawning, water diversion for improved water quantity and quality.

Effects to water quality from filling drainage channels would be temporary, limited turbidity within the canals and in the immediate vicinity of their outlet; however, the majority of these channels will be dry as the Corps would work during the driest months of the year and use strategic construction sequencing to avoid unnecessary impacts. No fish inhabit the channels that run through agricultural fields, although some loss of aquatic invertebrate life may occur. Removal of old pilings would likely cause a small area of turbidity on the order of tens of square feet in shallow subtidal habitat. Turbidity would dissipate quickly and would not be substantial enough to bury organisms. Any beach nourishment that may occur would be accomplished in dry conditions, but the first tide waters that inundate the site may wash any remaining sediment across the beach for a temporary turbidity disturbance. Fish would be able to avoid the area and the quantity would not be substantial enough to cause mortality of invertebrates.

For sites in which the Corps will excavate distributary channels and then sidecast the material, sidecasting is the environmentally preferred alternative as it achieves the purpose of restoration of micro-topography at these sites. The combination of excavating channels, then creating swales with the sidecast material immediately improves the complexity of elevations at the site, and will allow for plantings on top of the sidecast material and survive the newly established tidal inundation. Excavation to breach and remove levees would likely occur during low water levels when the work can occur in the dry. As with beach nourishment sites, the first tide waters that inundate these sites will cause turbidity; however, fish are expected to be able to avoid areas of turbidity and the quantity of sediment that becomes suspended in the water would not be substantial enough to cause mortality of invertebrates or to inhibit photosynthesis of any nearby submerged aquatic vegetation. For installation of culverts and wide-span bridges, some turbidity will be associated with stream/river diversion, pile and bridge abutment installation, then reintroduction to the improved channel. Turbidity typically endures for several hours before completely dissipating at these types of projects. For the installation of a permanent diversion structure at the confluence of the Lummi and Nooksack Rivers, a temporary block will be placed during construction. Turbidity is anticipated to be minimal during construction. Isolation devices may be used to minimize turbidity impacts, as well as physical impacts to aquatic species. Reintroduction of water to the site would be similar to what occurs at a typical culvert replacement site. All temporary degradation of water quality caused during construction would be minor and would dissipate within hours of the disturbance.

Findings. The Corps rejected Alternative 1 because it would not meet the project purpose and need to restore the natural processes in the nearshore zone that sustain biological resources including wetlands that provide natural filtration and improve water quality. As described in the FR/EIS, the PSNERP team evaluated a list of 36 potential restoration sites. Since identification of the 11-site alternative (Alternative 2) and 18-site alternative (Alternative 3), a tiered-implementation strategy has been developed to implement all 36 sites with various restoration authorities and partners. Sites were selected based on restoration potential, restoration opportunity, and local support. Of the 36 sites, three are being recommended for construction authorization under the existing Corps feasibility study and are presented as the recommended plan (preferred alternative; Alternative 4) in the FR/EIS. Designs are at the conceptual level of detail, so precise quantification of impacts is not available; however, means and methods of construction and project locations were analyzed and compared for their minimization of environmental impacts to aquatic habitats and water quality.

Impacts associated with fill and discharge from Alternative 4 are substantially less than those in Alternatives 2 and 3 due to its smaller scale. These impacts include elevated turbidity, noise, and physical disturbance from the excavation of channels, regrading of the Lummi River, removal of roads, levees, narrow bridges, and culverts and installation of wide-span bridge pilings. Alternative 4 would have a similar long-term gain in aquatic ecosystem function as Alternatives 2 and 3, but to lesser extent. Alternative 4 is a small, near-term component of the overall strategy for implementation of 36 sites.

5. <u>Significant Degradation, Either Individually or Cumulatively, To the Aquatic Environment</u>

a. Impacts on Ecosystem Function. Activities conducted for this project will not adversely affect environmental concerns such as water, air, noise, aesthetics, or public access except during construction. These effects were described in the alternatives above and will be discussed in the relevant sections of the 404(b)(1) evaluation below. The activities will improve the physical, chemical, and biological characteristics of the aquatic environment. Significant areas of wetlands will be restored, enhanced, or established, which may result in the alteration or conversion of some types of wetlands. Freshwater tidal wetlands may convert to saltwater-influenced wetlands as tidal flow and prism are restored and some vegetation types may shift toward salt-tolerant plants. Small portions of wetlands may be temporarily impacted by construction activities such as staging and access; however, these wetland areas will be fully restored. There will be no permanent degradation to ecosystem function as a result of this project.

b. Impacts on Recreational, Aesthetic, and Economic Values. No significant adverse effects on recreation, aesthetics, or the economy are anticipated from the restoration proposal, nor have these types of effects occurred during previous similar restoration actions in the Puget Sound nearshore zone. The elimination of one small marina is not expected to reduce boat-based recreation; the activity would likely remain in the area but relocate to nearby facilities.

Findings. The Corps has determined that there would be no significant adverse effects to aquatic ecosystem functions and values. The proposed action will not cause significant degradation, either individually or cumulatively to the aquatic environment.

<u>6. Appropriate and Practicable Measures to Minimize Potential Harm to the Aquatic Ecosystem.</u>

a. Impact Avoidance Measures. The Corps will avoid and minimize impacts to waters of the U.S. to the maximum extent practicable at the project sites. Implementation would involve three ecosystem restoration sites with construction near ecological resources. Through the analysis of potential effects of each of the proposed sites, certain potential adverse effects were identified. Each of the proposed sites would have short-term construction-related effects with varying spatial and temporal scales and degrees of intensity. Construction designs would include practices that avoid and minimize effects to affected significant resources. Some of these avoidance measures include the following:

- The Corps would schedule in-water work to occur during designated in-water work windows consistent with recommended periods established by WDFW per Washington Administrative Code (WAC) 220-110-271.
- The Corps would schedule work outside of bird nesting season except where unavoidable.
- Each construction contractor would be required to prepare an Environmental Protection Plan to anticipate and avoid impacts for approval by the Corps.
- Construction sequencing would avoid exposing the entire site at one time and would avoid having bare soils during rainy months.
- Construction methods would include stabilizing erodible surfaces with mulch, compost, seeding, or sod to avoid causing turbid runoff.
- Methods would include the use of isolation devices such as silt fences, gravel filter berms, silt dikes, check dams, and gravel bags for interception and dissipation of turbid runoff water to avoid contributing turbid water to a water body.
- Construction timing seasonally as well as diurnally can avoid exposure of fish, diving birds, and marine mammals to sound by scheduling the noise-inducing activities for times when the animals are less likely to be present.
- Marine mammal and marbled murrelet monitoring plans can be implemented in required to alert construction teams when the animals are nearby and work would stop until the animals leave.
- Impacts to agricultural resources will be avoided to the maximum extent practicable through project footprint adjustments or other measures as appropriate.
- All Hazardous, Toxic, and Radioactive Waste sites will be avoided.
- Impacts to wetlands would be avoided to the maximum extent practicable.
- The construction footprint would avoid impacts to essential fish habitat as established under the Magnuson-Stevens Sustainable Fisheries and Conservation Act.

b. Impact Minimization Measures. When avoidance is not feasible, the action agency should employ efforts to minimize impacts. The following is a list of methods to minimize adverse construction effects of the proposed restoration sites.

- Flag resources on site prior to construction to minimize the area of ground disturbance and vegetation clearing.
- Use the site's natural contours to minimize run-off and erosion.
- Encourage contractors to obtain construction materials and equipment from local producers or vendors to minimize energy use for shipping.
- Encourage construction personnel to carpool or use a crew shuttle van to minimize combustion of fuel and reduce emissions.
- Turn off equipment when not in use to reduce idling.

- Maintain equipment in good working order to maximize fuel efficiency and minimize emissions and to ensure no leaking or dripping occurs.
- All machinery that will work in or near water will be required to use vegetable-based products for its lubricants and other hydraulic fluids
- Sound-absorptive mats called sound aprons made of rubber, lead-filled fabric, or plastic layers can be hung around the noise source to help shield the aquatic environment from excessive noise if deemed necessary through site analysis during PED phase.
- Project features shall be designed to minimize post-project erosion of any identified areas of contaminated sediment that may occur downstream or downcurrent from the project footprint.
- Follow strict protocols for handling hazardous materials to minimize the risk of releases occurring.
- All bare soils, including sidecast material for topography improvements, will be hydroseeded or planted with native plants as early in the construction process as possible to minimize turbid runoff

c. Compensatory Mitigation Measures. Compensatory mitigation is not anticipated to be required since all of the ecosystem restoration activities authorized by this project have the purpose of resulting in net increases in aquatic resource area and functions.

Findings. The Corps has determined that all appropriate and practicable measures, including impact avoidance, minimization, and mitigation, will be taken to minimize potential harm to the aquatic ecosystem. There are no practicably available fill or discharge alternatives that would be environmentally preferable and still be consistent with engineering requirements while meeting the project need for disposition of dredged, fill, and sidecast material.

7. Other Factors in the Public Interest.

a. Fish and Wildlife. The Corps has coordinated with State and Federal agencies, as well as the Native American tribes of the Puget Sound basin, to assure careful consideration of fish and wildlife resources. The Corps will assure full compliance with the Endangered Species Act, Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act, Marine Mammal Protection Act, and all other applicable laws as described in Chapter 7 of the FR/EIS prior to project implementation. Project designs will be coordinated with all applicable natural resource agencies.

b. Water Quality. The Corps will obtain a Water Quality Certification under Section 401 of the Clean Water Act for each proposed action. The Corps will abide by the conditions in each 401 Water Quality Certification to ensure compliance with state water quality standards when conducting activities involving the discharge of dredged material into waters of the United States.

c. Historic and Cultural Resources. Based on cultural resources investigations, the Corps has determined that additional research and field investigations will be required during Pre-construction, Engineering, and Design phase (PED) to identify historic properties. Archaeological sites and other cultural resources have been identified within the area of potential effect of the project. The Corps has coordinated with stakeholders to prepare a Programmatic Agreement for protection of cultural resources or mitigation for impacts to cultural resources (see Appendix D of the FR/EIS).

d. Activities Affecting Coastal Zones. The Corps has determined that this work is consistent to the maximum extent practicable with the enforceable policies of the State of Washington under the Coastal Zone Management Act. The Corps has prepared a Coastal Zone Management Act consistency determination for each site of the proposed action for review by the Washington Department of Ecology.

e. Environmental Benefits. The PSNERP is a set of ecosystem restoration sites along the Puget Sound nearshore zone. The types of features identified for restoration include freshwater and tidal wetlands, coastal embayments, intertidal mudflats, and estuarine tidal channels. The proposed restoration measures remove stressors such as bank stabilization, tidal barriers, wetland fill, overwater structures, and tidal channel restrictions including levees to allow natural processes to recover. The project would restore 2,101 acres of tidally influenced wetlands. This will restore the natural processes that support fish and wildlife and promote the ecosystem structures and functions provided by wetlands, kelp and eelgrass beds, and riparian vegetation. All three sites of the recommended plan include critical habitat for ESA-listed species.

f. Navigation. No disruption of navigation traffic is anticipated to result from the small bridge replacements as a component of restoration at the specific sites. The Corps would ask the U.S. Coast Guard to issue a Notice to Mariners before operations are initiated in the event that construction could disrupt navigation. The Corps will seek a Bridge Permit from the U.S. Coast Guard for replacement of the bridge at the Duckabush River.

Findings. The Corps has determined that the proposed action is within the public interest based on review of the public interest factors.

8. Conclusions. Based on the analyses presented in project NEPA and ESA documents, as well as the following 404(b)(1) Evaluation and General Policies for the Evaluation of Permit Applications analysis, the Corps finds that this project complies with the substantive elements of Section 404 of the Clean Water Act.

Clean Water Act Section 404(b)(1) Evaluation [40 CFR §230]

Potential Impacts on Physical and Chemical Characteristics (Subpart C)

1. **Substrate [230.20]** Substrate composition varies widely among the three proposed restoration sites. The purpose of the ecosystem restoration is to restore the natural hydrogeomorphological processes such that each site would evolve to host its most natural substrate characteristics and support bottom-dwelling organisms. Any imported materials would match native site conditions and would be free of contaminants.
2. **Suspended Particulate/Turbidity [230.21]** Discharge of excavated material will cause a temporary increase in turbidity and suspended particulate levels in the water column as tidal water or river flows inundate the restoration sites. Sand and silt sink rapidly to the bottom, while a small percentage of finer material is expected to remain in suspension for a period of several hours. Increases in turbidity associated with placement operations will be local (confined to the areas in the immediate vicinity of the active excavation and the placement sites during sediment placement) and of short duration (i.e., currents disperse any suspended material within hours of placement) (Simenstad 1988; Nightingale and Simenstad 2001). An excavator will be used on site where the Corps proposes to excavate distributary channels to accelerate site evolution for restoration purposes, remove levees and narrow and culverted bridges, and make room for bridge abutments and concrete piers. Work will be conducted in dry conditions to the maximum extent practicable. Isolation devices may be used during construction if work is necessary during wet conditions. Following construction, tidal inundation or river flows introduced to each site may initially become turbid, but immediately following construction, the water is expected to clear as disturbed sediments are redistributed through restored natural flows. In the case of pile installation for wide-span bridges, minimal disturbance of the substrate will occur during placement and may have temporary increase in turbidity and noise, but will have no permanent effect.
3. **Water Quality [230.22]** No significant water quality effects are anticipated. The types of fill or discharge that will occur for filling of ditches and drainage channels, bridge and culvert installations, and sidecasting of excavated material would not cause any significant or long-term degradation to color, odor, taste, or other chemical or physical characteristics aside from temporary turbidity as described above. As sites containing former agricultural fields are restored, this will reduce the type of nutrient input that can cause harmful algal blooms. Since placement operations will largely be conducted in dry conditions (or be isolated if conditions are wet) with an aquatic connection opened toward the end of the construction schedule in many cases, water quality impacts should be short lived (hours) and localized (immediate vicinity). Long-term benefits to water quality will occur through the restoration of 2,101 acres of wetlands, which serve as natural filters and help with sequestration of pollutants. Restoration will reconnect floodplains and riparian habitat.
4. **Current Patterns and Water Circulation [230.23]** The placement of fill and excavated materials will not obstruct flow; however, the purpose of the proposed restoration is to change the direction and velocity, and increase inundation area of water flow/circulation at each site, and to change the dimensions of the receiving water body at certain sites. The proposed action

is intended to achieve a net benefit to current patterns and circulation for improved water quality and aquatic organism habitat and productivity by restoring historic processes and functions of nearshore habitats.

5. Normal Water Fluctuations [230.24] The placement of fill and excavated material from the proposed restoration work will not impede normal tidal fluctuations; in fact, it will improve conditions at each restoration site.

6. Salinity Gradients [230.25] The placement of fill and excavated material is intended to improve tidal flows and may appreciably affect salt wedge or salinity gradients for the benefit of water quality and aquatic organism habitat and productivity.

<u>Potential Impacts on Biological Characteristics of the Aquatic Ecosystem (Subpart D)</u>

1. Threatened and Endangered Species [230.30] ESA consultation was completed via the Fish Passage and Restoration Project Biological Opinion. The Corps prepared a Biological Assessment for restoration projects. The National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) issued the Biological Opinion for Fish Passage and Restoration Projects in Washington State to the Corps' Seattle District in 2008, and coverage under this Biological Opinion has been extended through 2018 by USFWS. The NMFS revised their consultation to specifically cover the actions proposed by the Nearshore Study. The reissuance of this consultation with explicit inclusion of all PSNERP sites and features occurred in January 2016. ESA-listed species are anticipated to see a net benefit as a result of this project.

2. Aquatic Food Web [230.31] Construction disturbance associated with fill may interfere with feeding and respiratory mechanisms of benthic, epibenthic, and planktonic invertebrates. Some sessile invertebrates in the aquatic areas of the sites will suffer mortality from construction disturbance. Potential impacts of material placement on salmonids, forage fish, and Dungeness crabs will be avoided through implementation of timing restrictions. The proposed restoration work is anticipated to provide a net benefit to the aquatic food web of Puget Sound. Details are provided in Chapter 5 of the FR/EIS.

3. Wildlife [230.32] Construction activity including pile driving, demolishing roads and culverted and narrow bridges, and hauling off large amounts of material would cause temporary disturbances to bird communities, terrestrial and marine mammals, and amphibians due to noise (both airborne and underwater) and the presence of heavy equipment. These disturbances would likely cause a behavioral response to flee the area. Best management practices, such as working outside of the nesting season, would minimize these impacts. At several sites, agricultural areas would be flooded due to removal of tidal barriers. These areas are seasonally heavily used by migratory bird species; allowing tidal flow to enter would likely lead to a transition from communities dominated by snow geese and trumpeter swans (which are not habitat-limited in the Puget Sound region) to a wider variety of species like goldeneye, sandpipers, wigeons, scaups, and brandts that are associated with salt water habitats. Freshwater marshes that would be flooded with brackish water would transition from species like mallards and pintails to the saltwater species mentioned previously. A variety of birds that depend on forage fish and juvenile and adult salmon would greatly benefit from restored sites where these fishes' habitats (including marshes, eelgrass beds, and spawning beaches) are increased.

Marine mammals are likely to be present only at the Duckabush site during construction due to its proximity to the marine shoreline. The other two sites are farther upstream, making marine mammal presence unlikely. The primary impacts to marine mammals would result from noise disturbances caused by drilling machinery for the cast-in-place concrete piers, which could cause behavioral response such as fleeing, interfere with ability to locate prey, or result in physiological damage. Elevated turbidity could cause temporary displacement of marine mammals as well, likely those that occur in shallower water, such as harbor seals. Long-term benefits to marine mammals would be closely tied to the benefits provided to their prey, including increased habitat for forage fish and salmonids. Southern Resident killer whales would likely gain the most benefits from restoring processes that increase habitat for Chinook and chum salmon. Other marine mammals like porpoises, sea lions, and seals would benefit as well, but to a lesser extent since their diet consists of a wider variety of fish, some of which are not nearshore dependent. No impact hammer pile driving will occur at the restoration sites; therefore, disturbance from underwater noise is not anticipated to exceed regulated thresholds.

<u>**Potential Impacts to Special Aquatic Sites (Subpart E)**</u>

1. **Sanctuaries and Refuges [230.40]** The proposed action will not adversely affect any designated sanctuary or refuge area. Restoration will enhance the Skagit Wildlife Area (17,000 acres managed by Washington Department of Fish and Wildlife for hunting and wildlife viewing).
2. **Wetlands [230.41]** The project will overall have a net increase in total wetland area by restoring a total of 2,101 acres of various property types to become tidal or riverine wetlands. Some freshwater wetland areas may transition to more salt-tolerant plant and animal species. The Corps anticipates a net increase in functions and values of wetlands.
3. **Mudflats [230.42]** The project will overall have a net increase in total mudflat area supporting mudflat biota, and foraging and nursery areas.
4. **Vegetated Shallows [230.43]** The project will overall have a net increase in total area of vegetated shallows and will support nesting, spawning, nursery, cover, and forage areas.
5. **Coral Reefs [230.44]** Not applicable.
6. **Riffle and Pool Complexes [230.45]** Not applicable.

<u>**Potential Effects on Human Use Characteristics (Subpart F)**</u>

1. **Municipal and Private Water Supplies [230.50]** Not applicable.
2. **Recreational and Commercial Fisheries [230.51]** Removal of bank armoring, tidal barriers, and artificial fill in river deltas and embayments would provide more shallow water habitat for juvenile salmon migration, increase eelgrass beds that are critical nursery areas, and provide more spawning beaches for forage fish, an important prey item for salmon. The increased salmon habitat could be presumed to assist with recovery of diminished populations thereby adding potential for increased sportfishing. Benefits to multiple aspects of salmon ecology

would assist with recovery of this important recreationally and commercially harvested resource. Restoring important ecosystem processes of the nearshore zone could expand areas available for shellfish. Removal of tidal barriers would benefit clams, oysters, and crabs by increasing sediment delivery. Diversion of flow from the Nooksack River to the Lummi River will be optimized in PED phase so as not to impact shellfish beds in Bellingham Bay.

3. Water-Related Recreation [230.52] The proposed project would not significantly affect long-term public access. During construction activities, some access and recreation sites may be temporarily closed. Restoration of 2,101 acres of tidal wetlands would support fish and wildlife species and associated recreational opportunities such as bird watching opportunities. Finally, there is a chance for potential displacement or substitution of recreation opportunities associated with this alternative. Waterfowl hunting opportunities may be displaced by new or different recreation opportunities (e.g., bird watching) at some of the sites included in this alternative due to habitat type changing the type of birds that use the areas. One marina would be removed; this is Blake's Marina on the North Fork of the Skagit River. Recreational vessels would be expected to relocate to one of the several marinas within 10 miles. This project has no components that are specifically for recreational purposes.

4. Aesthetics [230.53] The proposed project sites would have a temporary reduction of aesthetic quality for the duration of construction, which may take months to years per site as vegetation matures. The long-term change, however, would be a return of the shoreline to a more natural configuration resembling the pre-settlement wilderness conditions. None of the stated values of the Shoreline Management Act would be precluded or degraded. The result of the proposed action would not degrade natural viewsheds, conflict with local guidelines or goals related to visual quality, reduce sunlight availability in residential areas, or obstruct views of valued resources. Therefore, the proposed action would have no significant impact on the visual quality and aesthetic resources in the Puget Sound area.

5. Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves [230.54] Ecosystem restoration of the Puget Sound Nearshore zone would have a net benefit to all valued qualities of parks, national and historic monuments, national seashores, wilderness areas, research sites and similar preserves.

<u>Evaluation and Testing (Subpart G)</u>

1. General Evaluation of Dredged or Fill Material [230.60] No specific soils testing has occurred at the project sites, but will be completed during PED phase. No contaminated material will be used as fill, nor will it be sidecast after excavation if found to contain contaminants. Sources of fill will be examined to ensure that any material imported to restoration sites to be used as fill will be clean material free of contaminants.

2. Chemical, Biological, and Physical Evaluation and Testing [230.61] No specific soils testing has occurred at the project sites, but will be completed during PED phase, or during construction phase prior to delivery to the restoration sites. Any material within the restoration sites found to contain contaminants will be permanently removed from the aquatic environment to an upland placement site.

Action to Minimize Adverse Effects (Subpart H)

1. Actions Concerning the Location of the Discharge [230.70] The effects of the discharge would be minimized by locating the fill to avoid smothering organisms. The construction timing will avoid periodic inundation patterns such as high tides, and project designs will restore natural patterns that have been interrupted. The location and timing of the discharge have been planned to minimize effects to marine organisms.

2. Actions Concerning the Material to be Discharged [230.71] No treatment substances nor chemical flocculates will be added to the materials before placement. Sidecast material and fill material will be placed on site in the smallest quantities required for restoration. Piles and bridge abutments for wide-span bridges will replace culverts and narrow roadway crossings to allow for unrestricted tidal flow.

3. Actions Controlling the Material after Discharge [230.72] Methods for reducing the potential for erosion, slumping, or leaching will be employed to minimize disturbance to the aquatic environment. The timing of placement will occur within environmentally protective work windows. The construction methods may employ berms and dewatering as necessary to control immediate runoff and associated loss of material deposited above the high tide line, but placed material is expected to subsequently erode through natural processes.

4. Actions Affecting the Method of Dispersion [230.73] The placement sites have been selected to execute process-based restoration and to avoid nearshore and wetland impacts from material placement. Some fill material will be used to plug drainage channels that have been inhibiting wetland development.

5. Actions Related to Technology [230.74] Appropriate machinery and methods of transport of the material for discharge will be employed. All machinery will be properly maintained and operated. Selection of machinery will be appropriate for each type of restoration site and will aim to avoid and minimize impacts to wetlands.

6. Actions Affecting Plant and Animal Populations [230.75] The timing of the proposed discharge operations will minimize the potential for adverse effects to animal populations. To avoid impacts to bull trout, juvenile salmon, and forage fish, the Corps will observe work windows and may use isolation devices if in-water work is necessary. Construction timing will avoid spawning and migration seasons and other biologically critical periods for fish and wildlife. Seasonality of plant life will be considered in both construction impacts as well as revegetation timing in restored sites.

7. Actions Affecting Human Use [230.76] The placement will not damage aesthetically pleasing features of the aquatic landscape. The placement will not increase incompatible human activity in remote fish and wildlife areas. Potential impacts on Native American fishing rights are minimized mainly by construction timing and close coordination with the potentially affected tribes. All public access available at the sites will be closed during construction but fully re-opened after construction is complete.

8. Other Actions [230.77] The Corps has considered the likely conversion of freshwater wetlands to estuarine and marine wetland ecosystem types. An alternatives analysis appears in the FR/EIS.

Application by Analogy of the General Policies for the Evaluation of Public Interest [33 CFR §320.4 for reference]

1. Public Interest Review [320.4(a)] The Corps finds these actions to be in compliance with the 404(b)(1) guidelines and not contrary to the public interest.

2. Effects on Wetlands [320.4(b)] Effects to wetlands have been determined to be a net benefit and will cause a net increase in wetland acreage.

3. Fish and Wildlife [320.4(c)] The Corps consulted USFWS and NMFS to ensure that direct and indirect loss and damage to fish and wildlife resources attributable to the proposed work will be minimized. The project will result in a net benefit to fish and wildlife resources.

4. Water Quality [320.4(d)] Timing of excavation and material placement will help reduce potential temporary local impacts on fish and wildlife due to water quality. The Corps will abide by the conditions of the Section 401 Water Quality Certification anticipated to be issued for each restoration site to ensure compliance with water quality standards when conducting activities involving the discharge of dredged material into waters of the United States.

5. Historic, Cultural, Scenic, and Recreational Values [320.4(e)] No wild and scenic rivers, National Landmarks, National Rivers, National Wilderness Areas, National Seashores, National Recreation Areas, National Lakeshores, National Parks, National Monuments, or estuarine and marine sanctuaries will be adversely affected by the proposed work. Some historic properties and archaeological resources have been identified at the project sites. The Corps is consulting with the State Historic Preservation Office and the Advisory Council on Historic Preservation regarding the agency's Section 106 responsibilities. See Appendix D of the FR/EIS.

6. Effects on Limits of the Territorial Sea [320.4(f)] The proposed work will not alter the coastline or baseline from which the territorial sea is measured for the purposes of the Submerged Lands Act and international law.

7. Consideration of Property Ownership [320.4(g)] Projects will not be implemented without obtaining all applicable lands, easements, and rights-of-way. Section 6.5 of the FR/EIS outlines the real estate planning strategy.

8. Activities Affecting Coastal Zones [320.4(h)] The proposed action is consistent to the maximum extent practicable with the policies, general conditions, and general activities specified in the Washington State Coastal Zone Management Program. Individual Coastal Zone Consistency Determinations have been prepared for each project according to its locality.

9. Activities in Marine Sanctuaries [320.4(i)] The proposed action will not affect any marine sanctuaries.

10. Other Federal, State, or Local Requirements [320.4(j)] The Corps has analyzed the proposed action under all applicable Federal, State, and local requirements and documented this compliance in Chapter 7 and Appendix J of the FR/EIS.

11. Safety of Impoundment Structures [320.4(k)] Not applicable.

12. Floodplain Management [320.4(l)] The proposed work will restore and improve floodplain areas.

13. Water Supply and Conservation [320.4(m)] Not applicable.

14. Energy Conservation and Development [320.4(n)] Not applicable.

15. Navigation [320.4(o)] No permanent impacts to navigation are anticipated. Diversion of flow from the Nooksack River to the Lummi River will be optimized in PED phase so as not to impact navigation on the Nooksack River.

16. Environmental Benefits [320.4(p)] The three sites of the recommended plan will restore 2,101 acres of tidally influenced wetlands or beach area.

17. Economics [320.4(q)] Restoration of natural resources is anticipated to have a net benefit to socioeconomic resources through increasing populations of recreationally and commercially harvested species.

18. Mitigation [320.49(r)] Project designs will incorporate all available impact avoidance and minimization measures to the extent practicable. Compensatory mitigation is not anticipated to be required since all of the ecosystem restoration activities authorized by this project have the purpose of resulting in net increases in aquatic resource functions.

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

January 8, 2016

U.S. Army Corps of Engineers
Seattle District
ATTN: Mr. Evan R. Lewis, Chief
Environmental and Cultural Resources Branch
P.O. Box 3755
Seattle, Washington, 98124-3755

Re: Puget Sound Nearshore Ecosystem Restoration Project

Dear Mr. Lewis:

The State of Washington Department of Ecology (Ecology) appreciates the early coordination efforts by the U.S. Army Corps of Engineers (Corps) concerning the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP). Ecology has received documentation of compliance with Clean Water Act Section 404(b)(1) and preliminary information regarding Coastal Zone Management (CZM) Federal Consistency Determination for the following sites listed in the Recommended Plan for PSNERP:

1. Nooksack River Delta, Ferndale, WA.
2. North Fork Skagit River Delta, La Conner, WA
3. Duckabush River Estuary, Jefferson County, WA

Ecology appreciates the opportunity to review the project proposal and supports the continued development of the proposed projects and plans. These ecosystem restoration projects offer the opportunity to provide meaningful improvements to water quality while also improving marine and estuarine habitat in Puget Sound, an estuary of national significance.

Based upon the review of the proposed project during the feasibility phase and additional information, Ecology is optimistic that the Corps will be able to design the projects with necessary measures for the protection of water quality. Also because of the ongoing coordination between the Corps and Ecology the Corps should be able to provide the necessary documentation to move through the Section 401 Water Quality

Certification (WQC) request and CZM consistency review processes prior to construction.

Ecology is providing this letter of support to the Corps to continue to seek funding for these important projects. Please be advised that this letter does not substitute for or prejudge Ecology's Section 401 Water Quality Certification and CZM consistency decisions which will be issued in the future.

We look forward to continuing coordination on these proposals as you move into the formal permit phase. Please contact Loree' Randall at 360/407-6068 if you have any questions.

Sincerely,

Brenden McFarland
Shorelands & Environmental Assistance Program
Headquarters Office – Ecology
State of Washington

cc: Loree' Randall, Ecology

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
510 Desmond Dr. SE, Suite 102
Lacey, Washington 98503

FEB 4 2010

Colonel Anthony Wright
Seattle District Commander
U.S. Army Corps of Engineers
P.O. Box 3755
Seattle, Washington 98124

Dear Colonel Wright:

Subject: Puget Sound Nearshore Ecosystem Restoration Project

On behalf of the U.S. Fish and Wildlife Service (Service), I am writing to define our agency's position of support for the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) General Investigation. It is our intent that this agency view letter be included in the feasibility scoping meeting submittal package currently being prepared by your staff for transmittal to U.S. Army Corps of Engineers Headquarters. Our agency has consistently supported the work of PSNERP to systematically assess nearshore conditions in Puget Sound, use sound science to identify and advance priority restoration and protection actions, and increase funding for nearshore project implementation; all towards advancing our shared goal of the recovery of Puget Sound.

Our on-going support for PSNERP is directly related to advancing our agency mission and objectives. The mission of the Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The Service also helps ensure a healthy environment for people through its work benefiting wildlife, and by providing opportunities for Americans to enjoy the outdoors and our shared natural heritage. In carrying out our duties, we understand the need for a strong reliance on science, and the importance of working collaboratively with other agencies and organizations. The PSNERP has consistently applied these strategies to achieve success.

The Service has provided in-kind support to PSNERP through participation of our staff in all aspects of PSNERP. The Service is represented on PSNERP Executive and Steering Committees. Our technical staff have been active participants in the Nearshore Science Team and Implementation Team, providing their experience and expertise in coastal ecosystem restoration, monitoring, and project evaluation. For over five years, Service biologist Curtis Tanner has been on assignment to the Washington Department of Fish and Wildlife, serving as the PSNERP local project manager. His technical expertise has benefitted the project's science basis, and he has helped integrate the lessons of PSNERP into our agency's work.

The Service has already used emerging results from PSNERP in successfully implementing on-going restoration programs, including the Puget Sound Coastal Program. The PSNERP's comprehensive, Sound-wide analysis of change in nearshore ecosystem conditions and additional site specific information is valuable for our understanding of what has been lost in Puget Sound. This information will help us to define priorities and strategic approaches for the future. Having access to this level of information and sharing it with our partners will result in more effective and strategic restoration and protection actions.

Early actions identified through the Estuary and Salmon Restoration Program, associated with PSNERP, have provided opportunities for the Service to cost-share on regional priorities. Coastal Program funds and staff time have been used to help achieve on the ground benefits from PSNERP early actions. Similarly, the Estuary and Salmon Restoration Program's investment in estuary restoration at Nisqually National Wildlife Refuge, and PSNERP technical support for monitoring plan development, has provided a mutually beneficial partnership advancing the goals of the Service.

The approach used by the PSNERP study team provides a successful example for science-based decision support for ecosystem management. The Service will use the lessons and results from PSNERP as we advance Landscape Conservation Cooperatives (LCCs). We expect that stressors, threats, and conservation opportunities identified by PSNERP will help inform the North Pacific LCC. The LCCs are conservation-science partnerships between the Service, U.S. Geological Survey, and other agencies, states, tribes, and stakeholders within an ecoregion. They inform resource management decisions to address landscape-scale stressors which are anticipated to be accelerated by climate change.

Finally, the Service understands and supports the important contribution that PSNERP is making, and will continue to make, to the Puget Sound Partnership (Partnership). Identified as an Action Agenda priority, PSNERP delivers the nearshore component of the Partnership's efforts to recover the health of Puget Sound. The Service is an active member of the Puget Sound Federal Caucus and the Ecosystem Coordination Board, and strongly supports the role the PSNERP serves in meeting the Partnership's objectives.

Thank you for the opportunity to express our agency view. If you have any questions, or require additional information on the work of the Service in Puget Sound, please contact Mary Mahaffy at (360-753-7763).

Sincerely,

Ken S. Berg

Ken S. Berg, Manager
Washington Fish and Wildlife Office

cc:
COE, Seattle, WA (B Hargrave)

From:	Jensen, Martha
To:	Baird, Maryann NWS; Lewis, Evan R NWS
Cc:	Gleason, Nancy C NWS; Laufle, Jeffrey C NWS; Jackels, Chemine R NWS; Urelius, Karen M NWS; Shirley Burgdorf
Subject:	[EXTERNAL] Re: FPRP - request for approval on 1 restoration project
Date:	Thursday, February 04, 2016 9:52:41 AM
Attachments:	Duckabush River Estuary Restoration Approval.doc SkagitDelta_Restoration_EmailApproval.docx Nooksack_Restoration_EmailApproval.docx

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Evan and Maryann

This is in response to your November 13, 2015 letter requesting review of Specific Project Information Forms for restoration actions in the Duckabush River, Nooksack and Lummi Rivers, and the North Fork of the Skagit River as part of the Puget Sound Nearshore Ecosystem Restoration Projects (PSNERP). The Corps requested approval for use of the 2008 Fish Passage and Habitat Restoration Programmatic for consultation for these three projects pursuant to Section 7 of the Endangered Species Act.

In September, 2013, the Service reviewed projects that were covered under the 2008 Fish Passage and Habitat Restoration Programmatic (Ref.# 13410-2008-F-0209) during the first five years and determined that the programmatic could be extended because: 1) the environmental baseline previously analyzed remains relatively unchanged; 2) effects of activities analyzed and addressed in the Opinion would be the same; 3) the incidental take that was exempted under the Opinion has not been exceeded and is not expected to be reached due to the extension; 4) allowing restoration projects to continue will not jeopardize the continued existence of of listed species under our jurisdiction. On May 29, 2012, the National Marine Fisheries Service and U.S. Fish and Wildlife Service provided a letter of support to the Corps to cover PSNERP under the Corps Programmatic.

The electronic approvals for these projects are attached. If you have any questions, please feel free to contact me.

Martha Jensen
Branch Manager, Federal Activities
Division of Consultation and Conservation Planning
Washington Fish and Wildlife Office
510 Desmond Dr. SE
Lacey, Washington 98503
tel: (360) 753-9000 fax: (360) 753-9008
email: martha_l_jensen@fws.gov <mailto:martha_l_jensen@fws.gov>

On Fri, Nov 13, 2015 at 9:09 AM, Baird, Maryann NWS <Maryann.Baird@usace.army.mil <mailto:Maryann.Baird@usace.army.mil> > wrote:

Hi Martha -

Today we'll be sending by postal service our request for approval on 1 project under the 2008 Fish Passage and Restoration programmatic consultation (PC). Our letter requesting consultation is attached.

JEFFERSON, WHATCOM, AND SKAGIT CO - FWFS ONLY

1) U.S. Army Corps of Engineers, a project proposing restoration actions in the Duckabush River (Jefferson County), Nooksack River (Whatcom County), and North Fork Skagit and Lummi Rivers (Skagit County). These actions, which we discussed via teleconference in October, are associated with the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP). The actions meet all conditions of the PC. NOTE: Because the NMFS' biological opinion with the Corps for the FPRP PC expired, the Corps is requesting individual consultation with NMFS.

Please send your approval for the action to me, Nancy Gleason, Jeff Laufle, and Karen Urelius. We look forward to receiving your approval.

Maryann Baird
Endangered Species Act Coordinator
Regulatory Branch, Seattle District
US Army Corps of Engineers
Post Office Box 3755
Seattle, Washington 98124-3755
Telephone: 206.764.5531
Email: Maryann.Baird@usace.army.mil <mailto:Maryann.Baird@usace.army.mil>

Electronic Approval for Use of the
2008 Fish Passage and Restoration Programmatic

U.S. Army Corps of Engineers Civil Works Duckabush River Delta
Restoration Project
(FWS# 01EWFW00-2016-TA-0168, xref: 13410-2008-F-0209)

The U.S. Fish and Wildlife Service (Service) has reviewed the Specific Project Information Form (SPIF), dated November 18, 2015, for restoration projects in the Duckabush River Estuary. The U.S. Army Corps of Engineers – Seattle District Civil Works Department (Corps) made a "may affect, not likely to adversely affect" determination for the marbled murrelet (*Brachyramphus marmoratus*), northern spotted owl (*Strix occidentalis caurina*), and designated critical habitat for the bull trout (*Salvelinus confluentus*) and a "may affect, likely to adversely affect" determination for the bull trout associated with the Duckabush restoration projects. There is no suitable spotted owl or marbled murrelet nesting habitat within one mile of the project site and the proposed action will not result in noise levels that could extend into potential nesting habitat. The project does not include pile driving or blasting and all construction activities are far enough inland (approx. 0.3 miles away from open marine water) that we do not expect disturbance to marbled murrelets that may be foraging in Hood Canal.

The Corps, in conjunction with tribes, state agencies and partners, proposes to fund restoration projects in the Duckabush Estuary to improve hydrologic connectivity and restore intertidal habitat in the delta. The Duckabush watershed is located on the eastern side of the Olympic Peninsula and drains into Hood Canal just south of the community of Brinnon, Jefferson County, Washington. Currently, U.S. Route 101 is built on fill material and cuts directly across the river delta, severely impacting tidal flows and estuary functions. The mainstem Duckabush River and distributary channels are directed through two undersized culverts which severely constrict flows, sediment transport and morphology. To improve and restore estuary processes, the Corps is proposing to relocate the highway landward and replace the culverts with a new elevated full channel-spanning bridge. The new bridge will allow the river and its distributary channels to reconnect and flow unimpeded into Hood Canal. The project includes installation of woody debris, removal of fill material and culverts, and planting disturbed areas with native species. Reconnection of the north distributary channel will improve tidal processes and allow fresh water to more efficiently transport and deliver sediments and bedload materials.

Relocating the highway will require installation of cofferdams or caissons and worksite isolation (including fish removal) where new bridge footings and piers will be located, installation of temporary crossing structures, and a temporary work trestle. New footings will be drilled into the substrate material and temporary structures will be removed after the project is completed. All work below the ordinary high water mark will be conducted during the approved work window (July 16 through August 31). Removal of culverts, fill material, and piles from existing crossing structures will require sediment management (worksite isolation) to reduce impacts to water quality. Other in-water work associated with dike breaching and channel rehabilitation will be sequenced and timed during the summer low flows to minimize impacts to listed fish. The project does not include impact pile driving or blasting; all support structures will be drilled in. The project is expected to take 2 to 3 years to complete and will result in the restoration of approximately 38 acres of freshwater and estuary habitat at the mouth of the Duckabush River.

There are only two documented occurrences of bull trout in the Duckabush River (from 1992) and only a few historical records of isolated observations in other drainages in western Hood Canal. The project site is located more than 20 miles north of the nearest bull trout population in the Skokomish River. The population in the Skokomish River is fluvial and adfluvial (above Cushman Dam). As there are no documented occurrences of individuals from the Skokomish River entering the estuary or marine waters, it is presumed that the anadromous life history form is severely depressed, extirpated, or absent.

The western shoreline of Hood Canal is designated critical habitat for bull trout. The final revised rule designating bull trout critical habitat (75 FR 63898 [October 18, 2010]) identifies nine Primary Constituent Elements (PCEs) essential for the conservation of the species. The proposed activities will impact several of the primary constituent elements (PCEs) of critical habitat, including the following: the migratory corridor (PCE 2), prey base (PCE 3), nearshore habitat complexity (PCE 4), the natural hydrograph (PCE 7), and water quality (PCEs 5 and 8).

PCE 2 - Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers. The proposed action will result in temporary impacts to water quality and disturbance associated with elevated levels of turbidity and suspended sediments. Removing levees and berms supporting the road, bridge and culverts, realigning distributary channels, and installing large wood will produce pulses of increased turbidity during and after construction at each high tide and during the first heavy rain events after the cofferdams have been removed. Increased turbidity will be short-term and will not preclude bull trout from being able to move through the area during or after construction. Long-term effects of the proposed action are expected to be beneficial because replacing the berms and constricting bridge and culverts with larger, elevated crossing structures, will improve flows and the overall function of the migratory corridor. Therefore, short- and long-term effects to the migratory corridor are considered insignificant and beneficial, respectively.

PCE 3 - An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish. The proposed action may impact the food base through short-term degradation of water quality and disturbance of intertidal habitat during construction. Upon completion of the proposed action, we anticipate that the newly restored estuary, tidal channels and tidal marshes, will provide habitat for juvenile salmonids, marine forage fish, and a diversity of terrestrial and marine invertebrates. The installation of large wood complexes and removal of levees will improve both habitat complexity and the food base in the action area and is expected to increase the abundance and diversity of aquatic macroinvertebrates and juvenile fish, both of which are prey for bull trout. Therefore, long-term effects to this PCE are considered beneficial.

PCE 4 - Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.
The proposed action is designed to improve instream and wetland habitat complexity and restore connectivity of the Duckabush River and tidal channels in the estuary at the confluence with Hood Canal. The project will improve hydrologic flows (freshwater discharge and tidal mixing) and estuary processes, restore saltmarsh habitats and instream complexity, and increase tidal channel diversity in the estuary. Removal of the levees and reconnection of distributary channels will improve floodplain connectivity, restore interception of groundwater sources and hyphoreic flows, and provide better mixing of fresh and saltwater. Opening the constrictions will also improve the transport and deposition of trees and logs that are carried down by the current; the placement of large wood will serve to capture debris and restore instream habitat complexity until the system reaches equilibrium and natural estuary processes have been restored. Overall, long-term effects of the action on this PCE are considered beneficial.

PCE 7 - A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph. The proposed action will remove the current channel constrictions and greatly improve flows. Elevating and reconfiguring the bridge and removing undersized culverts will allow high flows to move unimpeded, reconnect the river to historic side and distributary channels in the estuary, improve natural tidal flushing, and restore the hydrograph back to near-historic/natural conditions in the lower Duckabush River. The installation of large wood will create scour pools; restoration of tidal channels will provide slow water areas and reduce the velocity of peak flows; and removal and widening of channel constrictions will improve discharge of freshwater and reduce backflow and reflux of marine water during high tides. Because the project will improve the natural hydrology, ecological processes, and natural channel complexity of the river and estuary, long-term effects to this PCE are considered beneficial.

PCE 8 - Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited. Although there may be short-term and localized elevated turbidity associated with the removal of berms and culverts, installation of temporary crossing structures and the placement of large wood, most of the work will be conducted in the dry (inside cofferdams and silt screens) and will not result in adverse effects to water quality during construction. However, once the cofferdams are removed and disturbed areas are inundated by high tides and/or high flows, sediments in disturbed areas will be resuspended. Impacts to water quality will be episodic and relatively short (weeks or months) in duration as sediments are redistributed across the estuary and mixed with marine waters. Pulses of turbidity likely will continue until the restored tidal channels and disturbed sites reach equilibrium (most likely after the first winter). Because the project site is located at the confluence of the marine environment in a location where background levels of turbidity are relatively high, these periodic increases in turbidity are not expected to affect normal reproduction, growth or survival of bull trout or other salmonids in the project area. Short-term effects to water quality may be measurable, especially during high tides or storm events the first winter after construction. Once the restoration site stabilizes, impacts to water quality are expected to improve over current condition due to improved flow conditions.

As per the criteria set forth in this programmatic consultation, the Service is responding via this electronic format to give approval to cover the proposed action under the programmatic. The project complies with the conservation measures outlined for the following Activity Categories: 1. Fish Passage (replacement of culverts and bridges); 2. Instream Structures (installation of large wood and engineered log jams); 3. Levee Removal and Modification; and 4. Side or off-Channel Habitat Restoration and Reconnection. The consultation tracking number for this action is 01EWFW00-2016-TA-0168 (xRef.: 13410-2008-F-0209).

Incidental Take Statement

The Service expects very few, if any, bull trout to be present in the Duckabush River when construction is scheduled to begin. The project is fairly large, with construction activities extending over three years and the potential for periodic elevated levels of turbidity extending through the winter following each construction season. Adult and larger subadult bull trout are highly mobile and can easily detect and avoid inwater activities and areas of high turbidity. Because of the distance to the nearest core area, no juvenile bull trout will be affected, and we do not anticipate any adult or larger subadult bull trout to be physically injured or killed during project implementation. Since most of the excavation work and bridge construction will be conducted behind cofferdams, during the time of year when bull trout are less likely to be in the marine environment, and the project is located more than 20 miles from the nearest population, the likelihood of bull trout being exposed to project activities or degraded water quality is extremely low.

Based on the available information, the Service is exempting incidental take in the form harassment (disturbance) of one adult bull trout associated with exposure to fish exclusion efforts and elevated levels of turbidity. The duration of potential effects will extend from mid-July through December each of the three years that construction will be conducted. These effects will extend from the culvert crossing on Shorewood Road (approximately 900 ft upstream of the northern bridge crossing) to the edge of the delta fan, approximately 5,000 ft downstream of Shorewood road and all areas in between where tidal channels will be restored, wood will be installed and construction activities will occur. The Fifth Field HUC Code for this project is 1711001804 (Duckabush River).

The Corps has met their obligation under Section 7 of the Endangered Species Act and no further consultation on this action is required unless the project changes. Standard reinitiation triggers for consultation apply if: 1) new information reveals effects of the action that may affect listed species or critical habitat in a manner, or to an extent, not considered in this consultation, 2) if the action is subsequently modified in a manner that causes an effect to a listed species or critical habitat that was not considered in this consultation, 3) a new species is listed or critical habitat is designated that may be affected by this project, and/or 4) the amount of incidental take exempted for the projects is exceeded. Project progress reports on in-water work and results of fish capture and handling efforts should be sent to:

Eric V. Rickerson, State Supervisor
(Attn. Martha Jensen or Shirley Burgdorf)
Washington Fish and Wildlife Office
510 Desmond Drive SE
Lacey, Washington 98503

The U.S. Fish and Wildlife Service tracking number for this project is 01EWFW00-2016-TA-0168. If you have any questions, please contact me at (360) 753-9000 or send an e-mail to Martha_l_jensen@fws.gov

Thank you

Electronic Approval for use of the
2008 Fish Passage and Restoration Programmatic

U.S. Army Corps of Engineers Civil Works Nooksack and Lummi Rivers Restoration Project
(FWS# 01EWFW00-2016-TA-0203, xRef: 13410-2008-F-0209)

On November 18, 2015, the U.S. Fish and Wildlife Service (Service) received your letter, the Memorandum for the Services, and Specific Project Information Form requesting consultation for the U.S. Army Corps of Engineers –Seattle District Civil Works Nooksack River Delta Restoration Project. The U.S. Army Corps of Engineers (Corps) made a “likely to adversely affect" determination for the bull trout (*Salvelinus confluentus*) and a "may affect, not likely to adversely affect" determination for the marbled murrelet (*Brachyramphus marmoratus*) and designated bull trout critical habitat. The project is located near the town of Ferndale, in Whatcom County, Washington (T39N, R2E, Sections 31 and 32 and several in T38N, R02E, Sections 5, 6, 8, and 17). There is no suitable marbled murrelet nesting habitat within one mile of the project site and the proposed action will not result in noise levels that could extend into potential nesting habitat.

The proposed project includes: 1) levee removals, breaches, and setbacks; 2) installation of three engineered log jams (ELJs); 3) hydraulic modifications (diversion at Lummi River connection with the Nooksack River); 4) channel creation and rehabilitation, 5) property acquisition; 6) removal or alteration of existing bridges; 7) installation of new bridges and other traffic structures; and 8) planting riparian vegetation. Installation of caissons and/or cofferdams will be used where bridge piers and ELJs would be located in water, and diversion and/or isolation of work areas will comply with the protocols established in the 2008 Fish Passage and Restoration Programmatic. Any fish stranded due to work area isolation and dewatering will be removed using dip nets, seines, and electrofishing (if necessary). Most of the construction activities will be accomplished using land-based heavy equipment. Some temporary stream crossings may be necessary. Temporary trestle structures and/or local filling may be needed along the proposed bridge alignments to provide access for heavy equipment. The trestles and fill will be removed at the end of construction. Turbidity monitoring will occur during all in-water work and will comply with the conditions issued in the water quality certification issued by the Washington Department of Ecology. Construction of each bridge will take 10 to 18 months, and the entire project is expected to take two to four years. In-water work will be sequenced and timed during the summer in-water work window to minimize turbidity and other disturbance. Work site isolation will require fish exclusion, capture and handling.

If changes are proposed during the pre-construction engineering and design phase, the Service will be contacted to determine if reinitiation of consultation is necessary. The standard reinitiation triggers for consultation are: 1) new information reveals effects of the action that may affect listed species or critical habitat in a manner, or to an extent, not considered in this consultation, 2) the action is modified in a manner that causes an effect to a listed species or critical habitat that was not considered in this consultation, 3) a new species is listed or critical habitat is designated that may be affected by this project, and/or 4) the amount of incidental take exempted for the projects is exceeded.

Best management practices will be used during all construction activities. Turbidity monitoring will occur during all in-water work and will comply with the conditions issued in the water quality certification issued by the Washington Department of Ecology. The purpose of the project is to restore the natural hydraulic, sediment, and ecological processes to the action area in the lower Nooksack River.

The project is located in the Nooksack and Lummi Rivers just upstream of the rivers' deltas. The Nooksack River watershed is a core area for bull trout (local populations and spawning and rearing). Bull trout in the Nooksack are fluvial or anadromous and have been documented using freshwater floodplain areas along the mainstem Nooksack River, tributaries and side channels, as well as nearshore marine areas north and south of the Lummi Peninsula. Based on telemetry studies in other similar bull trout systems (Skagit and Snohomish Rivers), juvenile bull trout in the Nooksack River move downstream from their natal areas at age 2 and individuals as small as about 90 mm (fork length) may be present in the lower river. Many subadult and adult bull trout make extensive use of the lower rivers and nearshore marine areas for extended rearing, foraging, and/or overwintering.

It is thought that the Nooksack core area supports a spawning population of migratory bull trout that numbers less than 1,000 adults. The nearest potential bull trout spawning habitat is found in the upper watershed. Although non-reproductive adult, subadult, and larger juvenile bull trout may be present in the action area, few bull trout are expected to be present during the in-water work window (July 16 to August 15). Because of the level of temporary increased turbidity from in-water construction activities, the Service anticipates disturbance (significant impairment of normal behavior) of adult, subadult, and juvenile bull trout that may be present within the proposed project area. We also expect dewatering and fish handling (seining, capture, electrofishing) of individual fish to result in significant disturbance and stress or even injury and death.

The project reach is designated as critical habitat. The final revised rule designating bull trout critical habitat (75 FR 63898 [October 18, 2010]) identifies nine Primary Constituent Elements (PCEs) essential for the conservation of the species. The following PCEs are present in the action area and may be affected by the proposed action:

PCE 1 - Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia. The proposed action is designed to improve complexity and connectivity to the floodplain of the Nooksack River. Setting back levees will result in more available floodplain area, increase interception of groundwater sources and improve hyphoreic connections. The installation of ELJs will create deep pool habitat and cold water refugia. Thus, the long-term effects of the action on this PCE are considered beneficial.

PCE 2 -Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, *including but not limited to permanent, partial, intermittent, or seasonal barriers.* The proposed action will result in temporary impacts to water quality and disturbance associated with elevated levels of turbidity and suspended sediments. Construction of the setback levees, breaching of the existing levees, and installation of large woody debris will produce pulses of increased turbidity especially during the first heavy rains and high water. Increased turbidity will be short-term and will not preclude bull trout movement through the area during and after construction. Long-term effects of the proposed action are expected to be beneficial because the lowering and breaching of the existing levees and the installation of ELJs will provide foraging habitat and complexity. Therefore, construction-related effects to this PCE are considered insignificant and long-term effects are anticipated to be beneficial.

PCE 3 - An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish. The proposed action may affect the food base of bull trout through short-term degradation of water quality. Upon completion of the proposed action, we anticipate that the newly planted riparian vegetation will, in one to five years, grow to provide some shade, macroinvertebrates, and other organic inputs. The river reach provides habitat for juvenile salmonids and a diversity of aquatic macro-invertebrates. The installation of ELJs, removal of levees, and channel restoration will improve both habitat complexity and the food base in the action area and is expected to increase the abundance and diversity of aquatic macroinvertebrates and juvenile fish, both of which are prey for bull trout. Therefore, long-term effects to this PCE are considered beneficial.

PCE 4 - Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure. The primary objective of the project is to restore stream and floodplain functions and increase habitat and channel complexity in the action area through the restoration of floodplain connectivity, channel creation and rehabilitation, installation of ELJs, and riparian vegetation plantings. No measurable short- or long-term construction-related impacts to this PCE are anticipated. Therefore, effects to this PCE are considered beneficial.

PCE 7 - A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph. The proposed action will create new floodplain connectivity in the newly accessible areas due to levee setbacks. Increasing floodplain connectivity and enlarging channel constrictions (e.g. replacing constrictions with wider span bridges) will improve flows and improve natural flushing and tidal inundation in the lower river. Because the proposed project will improve the natural hydrology, ecological processes, and natural channel complexity of the river, long-term effects to this PCE are considered beneficial.

PCE 8 - Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited. Although there may be short-term and localized elevated turbidity associated with the removal of berms and culverts, installation of temporary crossing structures and the placement of large wood, most of the work will be conducted in the dry (inside cofferdams and silt screens) and will not result in adverse effects to water quality during construction. However, once the cofferdams are removed and disturbed areas are inundated by high tides and/or high flows, sediments in disturbed areas will be resuspended. Impacts to water quality will be episodic and relatively short (weeks or months) in duration as sediments are redistributed across the estuary and mixed with marine waters. Pulses of turbidity likely will continue until the restored tidal channels and disturbed sites reach equilibrium (most likely after the first winter). Because the project site is located at the confluence of the marine environment in a location where background levels of turbidity are relatively high, these periodic increases in turbidity are not expected to affect normal reproduction, growth or survival of bull trout or other salmonids in the project area. Short-term effects to water quality may be measurable, especially during high tides or storm events the first winter after construction. Once the restoration site stabilizes, impacts to water quality are expected to improve over current condition due to improved flow conditions.

Incidental Take Statement

Given the duration of in-water work (two to four in-water work seasons), the Service anticipates individual bull trout that are in the project area to be exposed to elevated levels of turbidity and to disturbance associated with access crossings, installation of the ELJs, bridge construction, and breaching of the levees. We also expect dewatering and fish handling (seining, capture, electrofishing) of individual fish to result in significant disturbance and stress, injury or potential mortality.

Most of the adult bull trout will be upstream of the project reach in their natal streams preparing to spawn at the time that in-water work will be conducted. Some non-reproductive adults, subadults, and larger juvenile bull trout may be present in the action area; however, we expect the number of fish that may be present and exposed to construction to be small, due to the time of year that work will be done (summer low flow) and the low bull trout population in the watershed.

Adverse effects to large juvenile, subadult, and some non-reproductive adult bull trout are anticipated from activities that generate high levels of turbidity and disturbance associated with use of heavy equipment, installation of ELJs, channel rehabilitation, levee removal, work site isolation, and fish handling. In-water work is scheduled to occur between July 16 and August 15 over two to four consecutive years. All adult, subadult, and larger juvenile bull trout that are present in the project reach and area of elevated turbidity will experience significant impairment of feeding, sheltering, and normal behavior (harassment) during installation of the ELJs. A small number of adult, subadult, and larger juvenile bull trout in the project area may be physically injured or killed (harmed) during work site isolation, dewatering and fish handling efforts.

The extent of take in the action area will extend for approximately 100 ft upstream and up to 1,000 ft downstream of each in-water construction activity. In-water activities will occur at approximately ten sites including installation of three ELJ, reconnection of the Lummi River, grading and rehabilitation of existing Lummi River channels, and installation of five new bridges. All individuals that are present in areas where elevated turbidity and suspended sediments occur will be exposed to stress and/or potential disturbance. The duration of take is intermittent between July 16 and August 15 and during high flow events in the winter following construction over two to four in-water work seasons. Project progress reports on in-water work and results of fish capture and handling efforts should be sent to:

Eric V. Rickerson, State Supervisor
(Attn. Martha Jensen or Shirley Burgdorf)
Washington Fish and Wildlife Office
510 Desmond Drive SE
Lacey, Washington 98503

The proposed action meets all of the applicable criteria in the Fish Passage and Habitat Enhancement Restoration Programmatic (Programmatic) for Activity Category 2: Installation of Instream Structures, Category 3: Levee Removal and Modification, 4: Side Channel/Off Channel Habitat Restoration and Reconnection; and Category 11: Ecosystem Function Improvements. As per the criteria set forth in the Programmatic, the Service is responding via this electronic format to give approval to cover the proposed action under the Programmatic. The Fifth Field HUC Code for this project is 1711000405 (Nooksack River).

Unless there are significant changes, the Corps has met their obligation under Section 7 of the Endangered Species Act and no further consultation on this action is required. The U.S. Fish and Wildlife Service tracking number for this project is 01EWFW00-2016-TA-0203. If you have any questions, please contact Shirley Burgdorf at (360) 534-9340 or Martha Jensen at (360) 753-9000, of this office.

Thank you

Electronic Approval for use of the
2008 Fish Passage and Restoration Programmatic

U.S. Army Corps of Engineers Civil Works Skagit River Delta
Restoration Project
(FWS# 01EWFW00-2016-TA-0204, xref: 13410-2008-F-0209)

On November 18, 2015, the U.S. Fish and Wildlife Service (Service) received your letter, the Memorandum for the Services, and Specific Project Information Form requesting consultation for the U.S. Army Corps of Engineers –Seattle District Civil Works Skagit River Delta Restoration Project. The U.S. Army Corps of Engineers (Corps) made a “likely to adversely affect" determination for the bull trout (*Salvelinus confluentus*) and a "may affect, not likely to adversely affect" determination for the marbled murrelet (*Brachyramphus marmoratus*) and designated bull trout critical habitat. The project is located near the town of Mount Vernon, in Skagit County, Washington (T33N, R3E, Section 9). There is no suitable marbled murrelet nesting habitat within one mile of the project site and the proposed action will not result in noise levels that could extend into potential nesting habitat.

The proposed project includes: 1) lowering and of breaching levees, 2) constructing new levees landward of the existing levees, 3) excavating distributary channel networks, 4) removing shoreline armor, buildings, pavement, a boat ramp, and roads from the floodplain, and 5) planting riparian vegetation on sidecast berms created during levee lowering and along the new levees. Access to the work sites will be by existing county and farm access roads. In-water work will be sequenced and timed during the approved in-water work window (June 15 through August 31) to minimize turbidity and impacts to listed fish. Some limited earthwork from in-water barges may be needed to remove armoring and isolation of work area during in-water work may be necessary. Use of these activities will be determined during the pre-construction engineering and design phase. If changes are proposed, the Service will be contacted to determine if reinitiation of consultation is necessary. Best management practices will be used during all construction activities. Turbidity monitoring will occur during all in-water work and will comply with the conditions issued in the water quality certification issued by the Washington Department of Ecology. The pre-construction engineering and design phase will be developed over one to two years, and the proposed construction activities will take one to two years to complete. The purpose of the project is to restore the natural hydraulic, sediment, and ecological processes on 256 acres of floodplain along the lower 2 miles of the North Fork Skagit River downstream of Best Road and north of Rawlins Road. The project should be designed to prevent or reduce the risk of fish becoming stranded inside constructed channels or behind levees and to ensure that there are adequate flows to flush and maintain distributary channels, thus minimizing the need for maintenance or repairs in the future.

The project is located at the confluence of the North Fork Skagit River and Puget Sound. The Skagit River watershed is a core area and supports many local populations of bull trout. Based on studies from other nearby river systems and the Skagit River, bull trout in the lower Skagit River (below the dams) are fluvial or anadromous. Juveniles migrate downstream from their natal areas at approximately age 2 and may be present in the lower river. Many bull trout make extensive use of the lower estuary and near shore marine areas for extended rearing, foraging and overwintering.

The Lower Skagit core area supports a spawning population of migratory bull trout that numbers in the thousands, making it the largest population in Washington. The nearest potential bull trout spawning habitat is found mostly on federally protected lands in the upper watershed. Water temperatures in the Lower Skagit River near the project site are cool (at or below 15°C, based on water quality monitoring data at Mount Vernon) and suitable for bull trout year-round. Based on the cool water temperatures and good habitat quality, we anticipate adult, subadult, and larger juvenile bull trout to be present in the project area during project implementation. Because of the level of increased turbidity during and after construction, the Service anticipates a significant impairment of normal behavior (disturbance) to bull trout associated with exposure to elevated levels of turbidity.

The project reach is designated as critical habitat. The final revised rule designating bull trout critical habitat (75 FR 63898 [October 18, 2010]) identifies nine Primary Constituent Elements (PCEs) essential for the conservation of the species. The following PCEs are present in the action area and may be affected by the proposed action:

PCE 1 -Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia. The proposed action is designed to improve flows and floodplain connectivity in the lower North Fork Skagit River. Construction of distributary channels and setback of the levees will intercept groundwater sources and improve hyphoreic connections. Because the project is designed to improve flows and tidal inundation in the floodplain, the long-term effects of the action on this PCE are considered beneficial.

PCE 2 - Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers. The proposed action may result in temporary impacts to water quality and disturbance associated with elevated levels of turbidity and suspended sediments. Construction of the distributary channels, breaching of the levees, and removing shore armoring will produce pulses of increased turbidity especially during the first high tides. Increased turbidity will be short-term and will not preclude bull trout movement through the area during and after construction. Long-term effects of the proposed action are expected to be beneficial because the lowering and breaching of the existing levee and the construction of distributary channel habitat will provide foraging habitat. Therefore, construction-related effects to this PCE are considered insignificant and long-term effects are anticipated to be beneficial.

PCE 3 - An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish. The proposed action may affect the food base of bull trout through short-term degradation of water quality and removal of some shrubs and overhanging vegetation. Upon completion of the proposed action, we anticipate that the newly planted riparian vegetation will, in one to five years, grow to provide some shade, habitat for terrestrial macroinvertebrates, and other organic inputs. The river reach provides habitat for juvenile salmonids and a diversity of aquatic macroinvertebrates. The construction of distributary channels and removing levees will improve both habitat complexity and result in a net increase of up to 256 acres of tidally-influenced floodplain habitat which will support both terrestrial and aquatic prey species for bull trout. Therefore, long-term effects to this PCE are considered beneficial.

PCE 4 - Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure. The primary objective of the project is to restore delta and nearshore functions and increase habitat and channel complexity in the action area through the removal and setback of levees, reconnection of distributary channels, and planting of riparian vegetation. No measurable short-term construction-related adverse impacts to this PCE are anticipated. Therefore, effects to this PCE are considered entirely beneficial.

PCE 7 - A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph. The proposed action will create new tidal channels that will naturally evolve over time in the newly accessible areas due to levee setbacks. Because the purpose project will improve the natural hydrology, ecological processes, and natural channel complexity of the river, long-term effects to this PCE are considered beneficial.

PCE 8 - Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited. Construction activities will result in short-term and localized elevated turbidity; the removal of berms, replacement of bridges, and in-water work during construction will result in short-term degradation of water quality in the vicinity of the project sites during construction and after construction during high flow events as sediments are redistributed across the floodplain and mixed with the river flows. Short-term impacts to water quality likely will be measurable, especially during high tides or storm events the first winter after construction. Pulses of turbidity will continue until the restored distributary channels and disturbed sites reach equilibrium (approximately 1 to 2 years after construction). The project site is located in the lower river just near the confluence with the marine environment where background levels of turbidity are relatively high. Because most of the restoration site is not currently accessible to fish and pulses of turbidity will be relatively short, the periodic impacts to water quality are not expected to affect normal reproduction, growth or survival of bull trout or forage fish in the project area. Long-term effects to this PCE are not expected to be measurable and are considered insignificant.

Incidental Take Statement

Given the duration of in-water work (two in-water work seasons), the Service anticipates individual bull trout that are in the project area to be exposed to elevated levels of turbidity and disturbance associated with excavation to remove shore armoring and breach the levees and in-water construction activities. Although we anticipate most of the adult bull trout to be upstream of the project reach in their natal streams preparing to spawn at the time that work will be conducted, some non-reproductive adults, subadults and larger juvenile bull trout may be present in the action area.

Adverse effects to larger juvenile and subadult bull trout are anticipated from activities that generate high levels of turbidity and disturbance associated with use of heavy equipment, breaching of the levee, and construction of distributary channels. In-water work is scheduled to occur between June 15 and August 31 over two consecutive years. Elevated levels of turbidity are expected to extend downstream and upstream of each in-water work site. All adult, subadult, and juvenile bull trout that are present in the project reach and area of elevated turbidity will experience significant impairment of feeding, sheltering, and normal behavior (Harassment). The extent of take is along the riverbanks in the action area extending for approximately 2.2 river miles on the left bank and 0.5 mile on the right bank. All individuals that are present in areas that elevated turbidity and suspended sediments will occur (e.g., at the four breaches in the levees and armored banks) will be stressed. The duration of take is anticipated to be between June 15 and August 31 over two in-water work seasons.

Restoration of habitat complexity for bull trout will enhance the quality of suitable habitat with associated positive effects on long-term survival and recovery of the species. The proposed action meets all of the applicable criteria in the Fish Passage and Habitat Enhancement Restoration Programmatic (Programmatic) for Activity Category 3: Levee Removal and Modification, Category 4: Side Channel/Off Channel Habitat Restoration and Reconnection, Category 9: Debris and Structure Removal, and Category 11: Ecosystem Function Improvements. The Fifth Field HUC Code for this project is 1711000702 (North Fork Skagit River).

As per the criteria set forth in the Programmatic, the Service is responding via this electronic format to give approval to cover the proposed action under the Programmatic. The Corps has met their obligation under Section 7 of the Endangered Species Act and no further consultation on this action is required unless the project changes. Standard reinitiation triggers for consultation apply if: 1) new information reveals effects of the action that may affect listed species or critical habitat in a manner, or to an extent, not considered in this consultation, 2) if the action is subsequently modified in a manner that causes an effect to a listed species or critical habitat that was not considered in this consultation, 3) a new species is listed or critical habitat is designated that may be affected by this project, and/or 4) the amount of incidental take exempted for the projects is exceeded. Turbidity reports should be sent to:

Eric V. Rickerson, State Supervisor
(Attn. Martha Jensen or Shirley Burgdorf)
Washington Fish and Wildlife Office
510 Desmond Drive SE
Lacey, Washington 98503

The U.S. Fish and Wildlife Service tracking number for this project is 01EWFW00-2016-TA-0204. If you have any questions, please contact Shirley Burgdorf at (360) 534-9340 or Martha Jensen at (360) 753-9000, of this office.

United States Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
United States Department of the Interior
Fish and Wildlife Service

National Marine Fisheries Service
510 Desmond Drive SE. Suite 103
Lacey, Washington 98503

U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, Washington 98503

May 29, 2012

Evan Lewis
Seattle District - U.S. Army Corps of Engineers
Post Office Box 3755
Seattle, Washington 98124-3755

Dear Mr. Lewis:

This letter documents the coordination between the Seattle District U.S. Army Corps of Engineers (Corps) and the National Marine Fisheries Service and U.S. Fish and Wildlife Service (Services) regarding permitting for the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) proposed restoration projects. The Services express joint support for Corps' use of the new Fish Passage and Restoration Programmatic (FPRP) to consult on PSNERP projects. It is our intent to further review these proposed actions to determine which would be covered under the FPRP. The Services share an interest with the Corps in using the FPRP to address Endangered Species Act consultation requirements with most, if not all, of the PSNERP projects.

The Services are scheduled to continue writing a 2013 Fish Passage and Restoration Programmatic Opinion in the fall/winter of 2012 with anticipated completion prior to the 2013 construction season. This 2013 FPRP will replace the 2008 FPRP and update it for the additional species listed since 2008 and with additional action categories, mainly in the marine and estuarine environment.

The Services have reviewed the descriptions of the 15 initial PSNERP projects for which the Corps will likely be seeking construction authorization. Based on this initial review, we have drafted a new project category, Ecosystems Function Improvements (see Attachment 1) which is intended to cover restoration projects proposed by PSNERP. In developing the 2013 FPRP, we will work to further update project categories to provide programmatic coverage for restoration actions proposed by PSNERP where appropriate. These updates will necessarily be balanced by the legal requirements of the Services' to ensure protection of species and habitats covered by the Endangered Species Act.

The Services' acknowledge the potential for PSNERP projects proposed by the Corps to make substantial improvements in the health of Puget Sound nearshore ecosystems. These projects also advance our shared responsibilities to recover listed species dependent upon nearshore ecosystems. It is our intent to continue to support the Corps mission of ecosystem restoration to the extent our legal authorities and resource capacity allows. Please contact Stephanie Ehinger (NMFS) and/or Martha Jensen (UWFW) if you require additional assistance in this matter.

Sincerely,

William W. Stelle, Jr.
Regional Administrator
NOAA Fisheries

Ken S. Berg, Manager
Washington Fish and Wildlife Office
U.S. Fish and Wildlife Service

ATTACHMENT 1: PROPOSED ADDITIONAL FPRP CATEGORY RELATED TO PSNERP

Ecosystem Function Improvements (draft language, may change in the final)

Description. The objective of ecosystem function improvements is to remove and/or replace shoreline infrastructure (e.g., roads, trails, railroad crossings, shoreline armoring, dikes, fill, docs and marinas, and nearshore dams) with significantly less impacting infrastructure to allow for improved self-sustaining ecosystem function including passage of aquatic organisms, sediment transport and delivery, channel migration, tidal flow, and large wood movement. These projects are generally larger in scope than culvert replacements which were a principal focus of the original 2008 FPRP programmatic and include replacement of causeways[1] that currently constrict estuaries or floodplains with elevated, floodplain-spanning structures. Projects must comply with the General Conservation Measures (GCMs) listed in the GCM section of this Programmatic Biological Assessment (PBA) as well as the Specific Conservation Measures listed below.

[1]A causeway is a road or railway elevated, usually across a broad body of water like an estuary or wetland.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to NMFS No:
WCR-2015-3719

February 11, 2016

Michelle Walker
Chief, Regulatory Branch
Seattle District, Corps of Engineers
P.O. Box 3755
Seattle, Washington 98124-3755

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for Three Civil Works Wetland Restoration actions under the Puget Sound Nearshore Restoration Projects (PSNERP) in the Duckabush, Nooksack/Lummi, and North Fork Skagit River Estuaries (Jefferson, Skagit, and Whatcom Counties, Washington)

Dear Ms. Walker:

Thank you for your November 13, 2015 letter requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for Three PSNERP Restoration Actions under the Fish Passage Restoration Programmatic Consultation (NMFS No. NWR-2008-3598, et al). That programmatic consultation expired in 2014. Therefore, NMFS considered each of the three PSNERP actions against the backdrop of the expired programmatic and its requirements and prepared the attached biological opinion batching those considerations for efficiency and to streamline reviews.

As required by section 7 of the Endangered Species Act, the National Marine Fisheries Service provided an incidental take statement with the biological opinion. The incidental take statement describes reasonable and prudent measures the National Marine Fisheries Service considers necessary or appropriate to minimize incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions. Incidental take from actions that meet the term and condition will be exempt from the Endangered Species Act take prohibition.

This document also includes the results of our analysis of the action's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes one conservation recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. This conservation recommendation is a subset of the ESA take statement's terms and conditions. Section 305(b) (4) (B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations.

If the response is inconsistent with the EFH conservation recommendations, the Federal action agency must explain why the recommendations will not be followed, including the scientific justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we request that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

Please contact David Hirsh, (206) 526-4506 or david.hirsh@noaa.gov, if you have any questions concerning this section 7 consultation, or if you require additional information.

Sincerely,

William W. Stelle, Jr.
Regional Administrator

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat

Three Civil Works Wetland Restoration actions under the Puget Sound Nearshore Restoration Projects (PSNERP) in the Duckabush, Nooksack/Lummi, and North Fork Skagit River Estuaries (Jefferson, Skagit, and Whatcom Counties, Washington)

NMFS Consultation Number: WCR-2015-03719

Action Agency: United States Army Corps of Engineers, Seattle District

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species or Critical Habitat?	Is Action Likely To Jeopardize the Species?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Puget Sound Chinook salmon(*Oncorhynchus tshawytscha*)	Threatened	Yes	No	No
Puget Sound steelhead (*O. mykiss*)	Threatened	Yes	No	No
Hood Canal Summer chum salmon *(O. keta)*	Threatened	Yes	No	No
Southern Resident Killer Whale *(Orcinus orca)*	Endangered	No (see section 2.11)	No	No

Fishery Management Plan That Describes EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service
West Coast Region

Issued By:

for William W. Stelle, Jr.
Regional Administrator

Date: February 11, 2016

TABLE OF CONTENTS

1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

1.1 Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.), and implementing regulations at 50 CFR 402. Please contact David Hirsh of the Oregon Washington Coastal Area Office at 206-552-3965, or by e-mail at david.hirsh@noaa.gov, if you have any questions concerning this section 7 consultation, or if you require additional information.

1.2 Consultation History

On November 13, 2015, the COE sent NMFS three individual actions to be processed under the NMFS's 2008 Programmatic Consultation with the COE on Fish Passage and Restoration actions in Puget Sound (NMFS Nos. NWR-2008-3598 and WCR-2014-10665). NMFS No. NWR-2008-3598 expired in 2013 and WCR-2014-10665 expired in 2014 without an express request to consult anew on the program in its current form.

Since the COE submitted information covering these three actions in the format dictated in NMFS No. NWR-2008-3598, NMSF coordinated with the COE to determine the most efficient method for conducting ESA section 7 interagency consultation on the three actions. As a result of those discussions, NMFS and the COE determined to batch all three actions into a single biological opinion reflecting individual consultations on the actions while ensuring to incorporate all relevant information from the expired restoration programmatic opinion. Relying on conceptual design information, measures present in the PSNERP program, and the prescriptive and some analytical elements in NMFS No. NWR-2008-3598, NMFS initiated consultation on January 22, 2016.

The administrative record for this consultation includes the specific project information forms and Memo for the Services submitted by the COE under the expired Fish Passage and Restoration Programmatic. In addition, NMFS gathered information on the underlying PSNERP program all of which is on file with NMFS.

1.3 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). "Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration (50 CFR 402.02). At the time of consultation, NMFS did not identify any actions interrelated to or interdependent on the proposed action.

The COE submitted three individual nearshore restoration projects developed under the Puget Sound Nearshore Ecosystem Restoration Program (PSNERP) for consideration under an expired programmatic consultation (NMFS No. NWR-2008-3598) covering COE fish passage restoration actions in Puget Sound. These projects are:

1. Duckabush River and wetlands at the Highway 101 crossing, near the town of Duckabush, Jefferson County, Washington (47.649175 N latitude, -122.934644 W longitude)
2. Nooksack River near Ferndale, Whatcom County, Washington (48.826772 N latitude, -122.593378 W longitude)
3. North Fork (NF) Skagit River near Mt. Vernon, Skagit County, Washington (48.35825 N latitude, -122.4355 W longitude)

Although that programmatic consultation is expired, the prescriptive elements of NMFS No. NWR-2008-3598 remain acceptably protective of listed fish and their habitat. Therefore, those measures are incorporated into the proposed actions batched for this consultation and excerpted below. The COE commits to integrate these measures, as appropriate, into each of the three actions. If the COE determines that it cannot integrate an otherwise appropriate prescription from NMFS No. NWR-2008-3598, the COE will contact NMFS staff to determine whether or not to reinitiate consultation on that action.

The PSNERP's restoration strategies are aimed at restoring damaged or degraded ecosystem processes. Process-based restoration involves making intentional changes to an ecosystem to allow erosion, accretion, tidal exchange, accumulation of wood debris, and other natural process to occur. Process-based restoration is often distinguished from species-based restoration which aims to improve the services an ecosystem provides to a single species or group of species as opposed to improving the entire ecosystem. In PSNERP's framework, each candidate restoration action involves removing one or more ecosystem *stressors* using specific *management measures*. Stressors are physical alterations that interrupt, preclude, or displace nearshore processes such as stream crossings and shoreline modification that prevent the function of processes that create and maintain habitat and access to it (PSNERP 2012).

The PSNERP restoration actions considered in this consultation will consist of activities from at least or more of the following categories of restoration activities and the associated conservation measures. These measures are excerpted directly from NMFS No. NWR-2008-3598.

1.3.1 Categories of Restoration Activities and Applicable Minimization Measures

1. **Fish Passage**

Description: The objective of passage barrier removal is to allow all life stages of salmonids access to historical habitats from which they have been excluded by non-functioning drainage structures (road, trail, and railroad crossings) and water impoundments (tide gates, temporary dams).

a. Culvert Replacement and Relocation

Description: Culverts at road crossings will be replaced with bridges, appropriately sized culverts, bottomless culverts, or arch pipes. Culverts may be replaced with slightly longer culverts to accommodate safety improvements. Culverts may be relocated to restore natural hydrology and stream alignment.

Conservation Measures:

1. When there is a series of barriers on one system that are scheduled to be resolved in a short period of time, work will start at the most upstream barrier. This way, the work at the more upstream sites can be done without listed fish in the action area.
2. Road crossings will be designed to the culvert design benchmarks set in the most current version of the NMFS Anadromous Salmonid Fish Facility Design manual (http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish_Passage_Design.pdf) except for the deviations mentioned below. The Washington Department of Fish and Wildlife (WDFW) technical guidance manual Design of Road Culverts for Fish Passage (Bates et al. (2003)) may be used to achieve these benchmarks.
3. Where site specific designs lead to a conflict in design standards, a solution will be proposed by the designer. This solution will be used as a basis of talks between the Services, WDFW, and the project applicant. The final design needs to be approved by the Services.
4. Projects in stream channel with gradients above six percent will preferably utilize a bridge. If that is not feasible, crossings will be designed using the stream simulation option. For culverts in fish bearing streams with gradients higher than six percent the Services can request monitoring data of: 1) placed substrate integrity and bedload deposition; 2) inlet and outlet conditions; and 3) channel form (structural elements of high gradient channel: boulders, pools, low flow channel) after the first 10 year flow (or higher) events. The Services will require a maintenance plan to assure the crossing remains within design conditions.
5. Culvert replacements on fish-bearing streams will be designed to provide upstream and downstream passage for juvenile and adult salmonids using the criteria below (6-17).
6. Project designs for stream simulation will meet the WDFW (Bates et al. (2003)) design standards for width (for confined to moderately confined channels: width of the culvert bed to equal 1.2 * bankfull width + 2 feet; unconfined channels will require a larger span).
7. The hydraulic design method is a design process that matches the hydraulic performance of a culvert with the swimming abilities of a target species and age class of fish. There are significant errors associated with estimation of hydrology and fish swimming speeds that are resolved by making conservative assumptions in the design process. Determination of the high and low fish passage design flows, water velocity, and water depth is required for this option. Designs will meet the WDFW (Bates et al. (2003)) flow range criteria and will be designed to accomplish fish passage between the 7

consecutive days, 2 year low flow and the 10 percent exceedance flow (the flow that is exceeded only 10 percent of the time; high design flow). Additionally, the high design flow will be calculated based on the life histories of the target fish species[1], and time periods they are most likely to be moving upstream. This design method may be applied to the design of new and replacement culverts and may be used to evaluate the effectiveness of retrofits of existing culverts.

Hydraulic design is limited to situations where:

a. Channel gradient is low to moderate, generally less than 3 percent. If it is not possible to embed/countersink the culvert, the maximum channel gradient should not exceed 0.5 percent.
b. The bottom of the culvert should be buried into the streambed a minimum of 20 percent of the height of the culvert below the elevation of the tailwater control point downstream of the culvert, and the minimum embedment must be at least 1 foot.

8. Active channel (no-slope/embedded pipe): This method provides a simplified design intended to provide a culvert of sufficient size and embedment to allow the natural movement of bedload and the formation of a stable bed inside the culvert. It is intended for use only in very small streams. Determination of the high and low fish passage design flows, water velocity, and water depth is not required for this method, since the stream hydraulic characteristics within the culvert are intended to mimic the stream conditions upstream and downstream of the crossing. Structures for this design method are typically round, oval, or squashed pipes made of metal or reinforced concrete. Culverts are installed level at 0 percent slope.

Design is limited to situations where:

a. The natural slope is less than 3 percent and the culvert length is less than 80 feet.
b. The bottom of the culvert should be buried into the streambed not less than 20 percent of the culvert height at the outlet and not more than 40 percent of the culvert height at the inlet. For example, in a ten foot diameter circular culvert the downstream end invert has to have at least 2 feet of substrate.
c. At a minimum the culvert width has to be equal to the average channel bed width at the elevation the culvert meets the streambed; generally this elevation is at 20 percent to 30 percent of its diameter (see above, 8b). Thus, combining the requirements of countersinking the outlet and the culvert width for a circular culvert, the diameter must be at least 1.25 times the channel bed width.

[1] Target Fish Species are generally all adults and juveniles of the species for which the subject area has been designated as critical habitat. However, deviations can be suggested by the applicant and implemented with agreement by both NMFS and WDFW. There may be cases where NMFS may require additional species passage.

The culvert bed slope (S in units of length/length or rise/run) times culvert length (L) is less than or equal to 20 percent of the culvert diameter (D). S*L<0.2*D (Chapter 4 (Bates et al. 2003)). Thus, culverts utilizing the no-slope option are generally less than 75 feet long.

Length (ft)	Slope	S*L	Channel Bed Width CBW (ft)	Diameter Culvert D=1.2* CBW	0.2*D
50	0.02	1	6	7.2	1.44
50	0.03	1.5	8	9.6	1.92
75	0.02	1.5	10	12	2.4
75	0.03	2.25	12	14.4	2.88

9. Culverts longer than: 150 feet for stream simulation, 75 feet for no-slope and 500 for any other option are excluded under this programmatic.
10. Culvert widths greater than 20 feet are excluded under this programmatic, because for widths greater than 20 feet a bridge generally provides better passage.
11. For any design, the proponent will demonstrate that the design condition can be maintained over the expected life of the culvert. This includes maintaining placed bed material in the culvert.
12. All sites will have a maintenance plan that assures that the culvert will be in design condition prior to each fish passage season. The best designed culvert will not provide passage if it is blocked by debris, or if energy dissipation features are compromised.
13. Bridge footings will be located outside of the ordinary high water line (OHWL).
14. Hard bank stabilization at crossing structures will be limited to the width of the existing road fill prism.
15. Grade control structures to prevent headcutting above or below the culvert or bridge may be built using rock or wood. Grade control structures typically consist of boulder and/or wood structures (see below: Grade Control Engineered Log Jams (ELJs), Boulder Weirs and Roughened Channels) that are keyed into the banks, span the channel, and are buried in the substrate. Grade control structures will provide fish passage for juvenile and adult salmonids, and will be designed to most current version of the NMFS Anadromous Salmonid Fish Facility Design manual.
16. Designs will demonstrate that ecological functions including bedload movement, large wood and other debris movement, and flood flows can occur as appropriate to the site.

b. Retrofitting Culverts

Description: Where culvert replacement is not currently feasible, culverts may be retrofitted in the short term to improve passage by installing structures including baffles and step-and-pool weirs at outlets.

Conservation Measures:

1. Projects will be retrofitted to meet the most current version of the NMFS Anadromous Salmonid Fish Facility Design manual or WDFW's fish passage criteria for salmon and trout (Bates et al. 2003).
2. Projects will demonstrate a commitment to a long-term solution. A retrofitted culvert will be replaced with a bridge or culvert that is at the time of retrofitting scheduled and funded and that meets the most current version of the NMFS Anadromous Salmonid Fish Facility Design manual.
3. All retrofitted culverts will have a maintenance plan which assures that the fishway will be maintained to provide original design conditions prior to each fish passage season and inspected at least after every 10 year flow event.

c. Culvert Removal

Description: Removal of unnecessary culverts to improve salmonid access and habitat functions. When circumstances permit, culvert removal is the preferred alternative.

Conservation Measures: When there is a series of barriers that are proposed to be removed in a short period of time on one system, work will start at the most upstream barrier to minimize impacts to listed fish.

d. Tidegate Removal

Description: Removal of unnecessary or non-functioning tide gates to restore salmonid access to historic estuarine habitats.

e. Removal or Modification of Sediment Bars or Terraces that Block or Delay Salmonid Migrations

Description: Land use practices such as timber harvest, large scale agriculture and urban development have resulted in increased, generally fine, sediment delivery to streams. This sediment can accumulate in low velocity areas and contribute to widening of stream mouths, forming bars or terraces. The bar or terrace can spread the streamflow into finely braided or sheet flow patterns, forming low flow fish passage barriers. These temporary blockage points often provide opportunities for illegal snagging of holding adult salmon. The COE proposes to restore fish passage by removing sediment to restore flow conditions that allow for passage.

Conservation Measures:

1. The maximum amount of material removed from a passage impediment is 100 cubic yards.
2. If the removed material contains more than 60 percent silt or clay it will be disposed of upland. Material with more than 40 percent gravel will be deposited within the active floodplain, but not in wetlands. Material with more than 50 percent gravel and less than 30 percent fines (silt or clay) may be deposited below the OHWL. If material is deposited below the OHWL the applicant will explain the expected benefits, e.g. use as bankfull bench for riparian plantings in area where flood storage is not an issue.

3. If the removed material is suitable for spawning it may be used within the watershed for spawning gravel supplementation including below dams and in sediment-starved reaches.
4. Sandbags may be placed to temporarily improve fish passage. Sandbags will be removed prior to anticipated high flows that could wash away sandbag or cause flow to go around them.
5. If removal of sediment at the same location is proposed for a second time within ten years, a long term plan for a solution other than sediment removal will be presented. For example, placement of large wood can result in scour that may alleviate the local passage impediment.

f. Temporary Placement of Sandbags, Hay Bales, and Ecology Blocks to Improve Salmonid Passage

Description: Land use practices such as large scale agriculture, including irrigation, and urban and residential development have changed the hydrology of affected watersheds. Reduced forest cover and increased impervious surface have resulted on the one hand in increased runoff and peak flows and on the other hand in less aquifer recharge and resulting increased frequency, duration and magnitude of summer droughts. During recent droughts, temporary placement of sandbags, hay bales, and ecology blocks have been successful in providing short-term fish passage, especially in Eastern Washington. The COE proposes to utilize these techniques to restore fish passage during seasonal low flow periods.

Conservation Measure: All material placed in the stream to aid fish passage will be removed when stream flows increase, prior to the onset of the fall rains.

g. Construction of Structures to Provide Passage over Small Dams

Description: Diversion dams, generally in Eastern Washington, often create a permanent or temporary fish passage blockage. The COE proposes to build structures at existing dams to restore fish passage. Structures will be constructed from rock or wood or a combination of rock and wood. Examples of designs of structures include Rock Chevrons and V-weirs.

Conservation Measures:

1. Construction of passage structures over irrigation dams is limited to dams of less than seven feet in height.
2. NMFS engineers are presented with plans for and approve of passage projects at structures that are between 3 and 7 feet high.
3. Construction of passage structures is limited to facilitate passage at existing diversion dams, not in combination with new dams.
4. The design of passage structures will follow the appropriate design standards in the most current version of the NMFS Anadromous Salmonid Fish Facility Design manual.

Specifically Excluded Activities:

- Tidegate and floodgate replacements are not proposed for this consultation and need be addressed project by project.
- Installation of fish ladders to create passage around blockages higher than

seven feet is not proposed under this programmatic biological assessment (PBA).

- Culvert replacements for road capacity improvements are not proposed under this PBA.

2. Installation of Instream Structures

Anthropogenic activities that have altered riparian habitats, such as splash damming and the removal of large wood and logjams, have reduced instream habitat complexity in many rivers. They have eliminated or reduced features like pools, hiding cover, and bed complexity. Salmonids need habitat complexity for rearing, feeding, and migrating. To improve habitat complexity where an identified need exists, the COE proposes to permit the following practices:

a. Placement of Woody Debris

Description: Large Woody Debris (LWD) can be placed in the channel, estuary, or marine environment either unanchored or anchored in place using rock, rebar, or wooden piles. The amount of rock used is limited to that needed to anchor the LWD. The use of metal cables will be limited to situations where no other technique will work.

Conservation Measure: Large trees may be dislodged or felled for constructing in-stream habitat in areas where the following criteria are met: (1) Lack of instream LWD has been identified by a watershed analysis, reach assessment, or similar document as a limiting factor for the subject reach; and (2) Presence of an adequately stocked and healthy mature riparian forest; (3) Felling or tipping (or both) of trees into the water will not significantly impact stream shading; (4) Sufficient natural recruitment of native woody vegetation is expected and the threat of invasive vegetation filling created gaps is minimal or replanting with native woody species is planned; (5) The LWD design aims at providing several years of in-stream habitat benefits; (6) The trees are not suitable habitat for listed terrestrial species. Whenever possible, rootwads will be used for in-stream habitat, too. Attempts will be made to procure and stockpile LWD to be used before felling live trees. Finally, felling trees may be most appropriate where stream access is limited for creating LWD jams.

b. Placement of Live Stakes

Description: This technique consists of planting of live cottonwood stakes perpendicular in the ground. The arrays are planted either perpendicular, at slight angles to, or parallel to the flow/course of the river; in the floodplain or into the active channel, depending on the objective of the project. Objectives of flood fencing include:

i. Establish riparian vegetation and mimic (hydraulically) a mature riparian forest. Spaces between rows may be planted with additional riparian vegetation.
ii. Create habitat complexity. The live stakes slow water velocities and collect/catch debris and sediment during bankfull and flood events.
iii. Slow water velocities to reduce scour in the vicinity of riparian plantings, increasing successful establishment of new riparian plantings,
iv. Decrease width to depth ratios in widened channel reaches,
v. Create backwater effects to allow natural reconnection of side channels.

The installation of flood fences is accomplished by boring with augers and placing boles vertically into arrays, or by trenching in adjacent, and staggered, rows to create arrays.

Conservation Measures: All materials removed are replaced once boles are in place, and in fact, are used to reduce scour around boles during the first bankfull events. Boles are generally sealed on the top to prevent excessive desiccation. In sensitive areas, such as side channels and bar locations, this step is omitted.

c. Placement of Engineered Log Jams

Description: For detailed descriptions of each technique refer to the Stream Habitat Restoration Guidelines (Saldi-Caromile et al. 2004), the Integrated Streambank Protection Guidelines (Cramer et al. 2003), and the Conceptual Design Guidelines: Application of Engineered Logjams (Herrera 2006). Engineered log jams are designed collections of LWD. Different types of ELJs include bank protection ELJs (see below, General CM), bar apex ELJs, and grade control ELJs (see below). Engineered log jams are patterned after stable natural log jams and can be either unanchored or anchored in place using rebar, rock, or piles (steel may be used if other long term anchoring is not possible at site. Explain in SPIF). Engineered log jams create a hydraulic shadow, a low-velocity zone downstream that allows sediment to settle out. Scour holes develop adjacent to the log jam. While providing valuable fish and wildlife habitat they also redirect flow and can provide stability to a streambank or downstream gravelbar.

Excluded Activities: Logjams with a primary purpose other than habitat restoration or enhancement.

d. Grade Control Engineered Log Jams

Description: Grade control ELJs are designed to arrest channel downcutting or incision by providing a grade control that retains sediment, lowers stream energy, and increases water elevations to reconnect floodplain habitat and diffuse downstream flood peaks. Grade control ELJs also serve to protect infrastructure that is exposed by channel incision and to stabilize over-steepened banks. Unlike hard weirs or grade control structures, a grade control ELJ is a complex broad-crested structure that dissipates energy more gradually. Examples of grade control ELJs include Bronson Creek, Portland, Oregon (Herrera 2006).

e. Trapping Mobile Wood

Description: Construction of wood structures to trap mobile wood. Wood may be anchored with rebar, anchor rocks, and untreated wood pilings. Less than 10 inch diameter steel pilings may be used if necessary for stability reasons. Examples of streamside LWD catchers are outlined in Slaney P.A. and D. Zaldokas (1997), http://nfcp.org/Archived_Reports/RM97-2.pdf and http://nfcp.org/Archived_Reports/RM96-3.pdf. The Lower Columbia Fisheries Enhancement Group which operates in southwest Washington has installed several of these structures and is willing to offer limited design help.

Conservation Measures: In the marine environment, steel piles will not be driven with an impact hammer.

f. Placement of Boulders

Description: Placement of individual large boulders and boulder clusters to increase structural diversity. Structural and hydraulic diversity is important to provide holding and rearing habitat for salmonids. As with all proposed methods, this treatment will be used in streams that have been identified as lacking structural diversity and that naturally and/or historically had boulders. (Boulders may have been removed historically to facilitate wood transport.) For a more detailed description of potential applications see “Boulder Clusters” in WDFW (2004). Preferably, boulders will be sized and located to avoid the need for anchoring. However, if necessary for design objective, boulders placed on bedrock may be pinned with for example epoxy resin (Hilty system) to ensure long-term stability (Slaney and Zaldokas 1997).

Excluded Activities: Boulders may not be cabled in systems other than bedrock.

g. Boulder Weirs and Roughened Channels

Description:

Full channel-spanning boulder weirs will be installed to enhance or provide fish habitat in stream reaches where log placements are not practicable due to channel conditions (not feasible to place logs of sufficient length, bedrock dominated channels, deeply incised channels, artificially constrained reaches, etc.). Boulder weirs and roughened channels may also be installed for grade control at culverts (see No. 1 above) and constructed side channels. For boulder weirs in wood dominated systems, grade control ELJs (see above) will be used.

Conservation Measures:

1. Boulder weirs will be installed only in:
    a. Highly uniform, incised, bedrock channels.
    b. Stream channels that have been artificially confined between levees or other floodplain revetments that are not feasible to remove or set-back.
    c. Locations for which salmonid recovery plans identifies channel spanning boulder weirs as a priority restoration technique (e.g. lower Entiat River).
    d. To provide grade control at culverts or constructed side channels.
2. Boulder weirs will be low in relation to channel dimensions so that they are completely overtopped during channel-forming, bankfull flow events (approximately a 1.5-year flow event).

    Boulder weirs will be placed diagonally across the channel or in more traditional upstream pointing "V" or “U” configurations with the apex oriented upstream.
3. Boulder weirs will be constructed to allow upstream and downstream passage of all native listed fish species and life stages that occur in the stream at all flows.
4. The project shall be designed and inspected by a multidisciplinary team (including a salmon or trout biologist) that has experience with these types of structures.
5. Full spanning boulder weir placement will be coupled with measures to

improve habitat complexity and protection of riparian areas to provide long-term inputs of LWD to the maximum extent possible.

6. Roughened channels will be designed to standards contained in the most current version of the NMFS Anadromous Salmonid Fish Facility Design manual.

h. Gravel Placement Associated with Structure Placement

For work in gravel-deficient areas, a maximum of 100 cubic yards of clean, washed, appropriately sized gravel (river-run gravel, not quarry spalls or crushed gravel) can be imported or relocated and placed upstream of each structure. When placing LWD on the outside of meander bends, bar material can be removed from the inside of the meander bend and relocated immediately up and/or downstream of the new structure. If the work area on the gravel bar is dry, work may be performed without use of a coffer dam. This gravel relocation would be expected to speed up the realignment of the thalweg and protect the new structure.

Excluded Activities:

- Construction of instream structures with a primary purpose other than habitat enhancement.
- Construction of boulder weirs or other channel spanning structures in gravel or finer substrate dominated streams.
- Gravel shall not be placed in areas are currently suitable for salmonid spawning

3. Levee Removal and Modification

Description: Levee modification or removal serves many purposes including habitat restoration, erosion reduction, water quality improvements, reduced high flow velocities, groundwater recharge and reduction of floods in other sections of the river. Techniques that are covered by this programmatic need to have the sole purpose of restoring flood plain functions or to enhancing fish habitat. Covered actions in freshwater, estuarine, and marine areas include:

- Full and partial removal of levees, dikes, berms, and jetties.
- Breaching of levees, dikes and berms.
- Lowering of levees, dikes and berms.
- Setback of levees, dikes and berms.

Conservation Measures:

1. Non-native dike and levee material will be hauled to an upland site to the greatest degree practicable.
2. Native material may be spread across the floodplain in a manner that does not restrict floodplain capacity and minimizes juvenile stranding. If the material is used to create/alter microtopograhphy it has to be done in a manner to minimize juvenile stranding. This can be achieved by sloping side channels to the main channel or water body and by designing access channels for depressional areas. These restrictions on microtopography in the floodplain only apply, if the project contains elements of altering/designing floodplain microtopography like side channels and depressions.

3. Ditches previously constructed to drain wetlands will be filled preferably with native material, otherwise with clean imported material of similar substrate to the adjacent/native banks.
4. In setback dikes/levees the amount of rock will be kept to a minimum. However, up to the same amount of hard material as in the to be replaced dike/levee may be used.

4. Side Channel/Off-Channel Habitat Restoration and Reconnection

Description: Side channel habitats are generally small watered remnants of river meanders. They provide important spawning and rearing habitat for juveniles and refuge habitat during high flows. They are most common in floodplains that have been strongly glacially influenced leaving alluvial material in a flat valley floor. Off-channel habitat includes abandoned river channels, spring-flow channels, oxbows and flood swales. Off-channel habitat has been reduced by human activities in the floodplain including diking, removal of LWD, straightening of the channel, and bank armoring. Thus, there is a need in many Washington watersheds for off-channel restoration.

Restoration techniques covered by the Biological Assessment (BA) focus on the restoration or creation of self-sustaining off-channel habitat. Self-sustaining is not synonymous with maintaining a static condition. Self-sustaining means the restored or created habitat would not require major or periodic maintenance, but function naturally within the processes of the floodplain. However, up to two project adjustments, including adjusting the elevation of the created side channel habitat are included under this proposal. The long-term development of a restored side channel will depend on natural processes like floods and mainstem migration. Over time, the side channel may naturally get drier or be taken over by the main river flow.

The following off-channel restoration activities are covered under the BA:

- Creation of new side channel habitat. This approach would create self-sustaining side channels which are maintained through natural processes. Designs must demonstrate sufficient hydrology.
- Excavating pools and ponds in the historic floodplain/channel migration zone to create connected wetlands.
- Reconnecting existing side channels with a focus on restoring fish access and habitat forming processes (hydrology, riparian vegetation).
- ELJs, barbs and groins may be used to direct some flow through a side channel, see below General Conservation Measures 1.
- Restoration of existing side channels including one-time dredging and an up to two times project adjustment including adjusting the elevation of the created side channel habitat.

Conservation Measures:

1. All side channel and pool habitat work will occur in isolation from waters occupied by listed fish species until project completion, at which time a final opening may be made by excavation to waters occupied by listed fish or water will be allowed to return into the area.
2. Side channel habitat will be constructed to prevent fish stranding by providing a continual positive grade to the intersecting waters of the US or a year around water connection.

9. Debris and Structure Removal

Description: The COE proposes to remove manmade debris and structures from freshwater and marine habitats. Examples of structures or debris that could be removed include derelict vessels, bank protection and shore armoring, creosote treated timbers, piers, ramps, and boat launches.

1. Removal methods for derelict vessels may include use of floatation bags or slings (hydraulic jetting can be used to place slings); cutting up and disposing of the hull at an approved disposal site; use of a crane and heavy equipment to transport all or part of the vessel away; or sinking (all toxic material and liquids must be removed first).
2. Structures that extend into the water (e.g. docks, floats, pilings, or piers) are generally removed using a barge with a clamshell bucket or crane assembly. Creosote-treated piles should be pulled out or cut off at the mud line and covered with clean sediments.
3. Shoreline structures and debris such as boat ramps, bank protection, shore armoring, creosote-treated logs or timbers, derelict buildings or other material are generally removed using land-based equipment and taken to an upland disposal site.

Conservation Measures:

1. If the removal involves the use of hydraulic jetting for sling placement and the vessel or debris is embedded more than three feet in bottom sediments, work will be accomplished during the appropriate marine or freshwater work windows.
2. All toxic materials such as fuel and oil will be removed from the vessel before it is towed or removed.
3. Creosote-treated timbers and materials containing asbestos will be disposed of at an approved facility.
4. In the marine environment, beach nourishment with appropriately sized substrate may accompany the removal of shoreline armoring.
5. After removing bank protection, the bank will be revegetated with native species.
6. After removing hard bank protection like rip-rap or sheet pile the bank may be stabilized with soft stabilization methods as in “General CM Frequently Associated with Some Restoration Actions 7” (p. 25).

Excluded Activities:

- Removal of vessels in contaminated sediments or in superfund sites.
- Removal of vessels in eelgrass, kelp beds or other macroalgae in a documented herring or foragefish spawning area.

1.3.3 General Prescriptions that Apply to all Proposed Restoration Actions

1. **Pre-Construction/Surveying**

    1. All organic material that has to be cleared for access will remain on site.
    2. The removal of riparian vegetation for access will be minimized and estimated in the Specific Project Information Form (SPIF) at the time the COE seeks to conduct the action.
    3. The number of temporary access roads will be minimized and roads will be designed to avoid adverse effects like creating excessive erosion.
    4. Temporary access-ways across slopes greater than 30 percent will be avoided. If temporary access needs to cross slopes greater than 30 percent it will be indicated in the SPIF.
    5. No permanent access-ways will be built. All temporary access-ways will be removed (including gravel surfaces) and planted after project completion.
    6. New temporary stream crossings will avoid potential spawning habitat (i.e. pool tailouts) and pools to the maximum extent possible. They will minimize sedimentation impacts by using best management practices like mats and boards to cross a stream. Best management practices will be listed by each applicant in a SPIF. After project completion temporary stream crossing will be abandoned and the stream channel restored where necessary.
    7. Boundaries of clearing limits associated with site access and construction will be marked to avoid or minimize disturbance of riparian vegetation, wetlands, and other sensitive sites.
    8. A Pollution and Erosion Control Plan, commensurate with the size of the project, must be prepared and carried out to prevent pollution caused by surveying or construction operations.
    9. A supply of emergency erosion control materials will be on hand and temporary erosion controls will be installed and maintained in place until site restoration is complete.

2. **General**

    1. Work windows will be applied to avoid and minimize impacts to listed salmonids or forage fish.
    2. Electrofishing is not proposed in the vicinity of redds from which fry may not have emerged, or in areas where adult salmonids may be holding prior to spawning.
    3. Sandbags may be placed to temporarily keep fish out of work areas. Sandbags will be removed after completion of project.
    4. Temporary roads in wet or flooded areas will be abandoned and restored by the end of the in-water work period.
    5. Existing roadways or travel paths will be used whenever possible.
    6. Any large wood, native vegetation, weed-free topsoil, and native channel material displaced by construction will be stockpiled for use during site restoration.
    7. When construction is finished, the construction area will be cleaned up and rehabilitated (replanted and reseeded) as necessary to renew ecosystem processes that form and maintain productive fish habitats.

8. Work below the OHWL or mean lower low tide line will be completed during preferred in-water work windows, when listed salmonids or forage fish are least likely to be present in the action area. Exceptions will be requested in the SPIF.
9. If listed fish are likely to be present, the project sponsor will assess what is less impacting to fish, isolation of the in-water work area or work in the wet, see below "6. Isolation of Work Site".
10. Prepare a Work Area Isolation Plan for all work below the bankfull elevation requiring flow diversion or isolation. Include the sequencing and schedule of dewatering and rewatering activities, plan view of all isolation elements, as well as a list of equipment and materials to adequately provide appropriate redundancy of all key plan functions (e.g., an operational, properly sized backup pump and/or generator). This standard material does not need to be submitted with a SPIF. However, it needs to be available to the Services at their request.
11. Any water intakes used for the project, including pumps used to dewater the work isolation area, will have a fish screen installed, operated and maintained according to NMFS' fish screen criteria (NMFS 1997; NMFS 2008).
12. The site will be stabilized during any significant break in work.
13. Project operations will cease under high flow conditions that may inundate the project area, except as necessary to avoid or minimize resource damage.
14. All discharge water created by construction (e.g., concrete washout, pumping for work area isolation, vehicle wash water, drilling fluids) will be treated to avoid negative water quality and quantity impacts. Removal of fines may be accomplished with bioswales; concrete washout with altered ph, may be infiltrated.

3. Equipment

1. Heavy equipment will be limited to that with the least adverse effects on the environment (e.g., minimally-sized, low ground pressure equipment).
2. When not in use, vehicles and equipment that contain oil, fuel, and/or chemicals will be stored in a staging area located at least 150 feet from the COE' jurisdictional boundary of wetlands and waterbodies. If possible staging is located at least 300 feet away from the COE's jurisdictional boundary of wetlands and waterbodies, and on impervious surfaces to prevent spills from reaching ground water. Where moving equipment daily at least 150 feet of waterbodies would create unacceptable levels of disturbance (multiple stream crossings, multiple passes over sensitive vegetation) a closer staging location with an adequate spill prevention plan may be proposed.
3. When conducting in-water or bank work, hydraulic lines will be filled with vegetable oil for the duration of the project to minimize impacts of potential spills and leaks.
4. Spill prevention & clean-up kits will be on site when heavy equipment is operating within 25 feet of the water.
5. To the extent feasible, work requiring use of heavy equipment will be completed by working from the top of the bank.
6. Equipment shall be checked daily for leaks and any necessary repairs shall be completed prior to commencing work activities around the water.
7. Equipment will cross the stream in the wet only under the following conditions:
   a. equipment is free of external petroleum-based products, soil and debris has been

removed from the drive mechanisms and undercarriage; and

b. substrate is bedrock or coarse; and
c. in soft bottom streams mats or logs are used to drive across to minimize compaction; and
d. stream crossings will be performed at right angle if possible; and
e. no stream crossings will be performed at spawning sites when spawners are present or eggs or alevins could be in the gravel; and
f. the number of crossings will be minimized.

4. Planting and Erosion Control

1. Within seven calendar days of project completion, any disturbed bank and riparian areas shall be protected using native vegetation or other erosion control measures as appropriate. For erosion control, sterile grasses may be used in lieu of native seed mixes.
2. If native riparian vegetation has to be disturbed it will be replanted with native herbaceous and/or woody vegetation after project completion. Planting will be completed between October 1 and April 15 of the year following construction. Plantings will be maintained as necessary for three years to ensure 50 percent herbaceous and/or 70 percent woody cover in year three, whatever is applicable. For all areas greater than 0.5 acres, a final monitoring report will be submitted to the COE in year three. Failure to achieve the 50 percent herbaceous and 70 percent woody cover in year three will require the applicant to submit a plan with follow up measures to achieve standards or reasons to modify standards.
3. Fencing will be installed as necessary to prevent access to revegetated sites by livestock, beavers or unauthorized persons. Beaver fencing will be installed around individual plants where necessary.

5. Water Quality

1. Landward erosion control methods shall be used to prevent silt-laden water from entering waters of the United States. These may include, but are not limited to, straw bales, filter fabric, temporary sediment ponds, check dams of pea gravel-filled burlap bags or other material, and/or immediate mulching of exposed areas.
2. Wastewater from project activities and water removed from within the work area shall be routed to an area landward of the OHWL in an upland disposal site to allow removal of fine sediment and other contaminants prior to being discharged to the waters of the United States.
3. All waste material such as construction debris, silt, excess dirt, or overburden resulting from this project will generally be deposited above the limits of flood water in an upland disposal site. However, material from pushup dikes may be used to restore microtopography, e.g. filling drainage channels.
4. If high flow or high tide conditions that may cause siltation are encountered during this project, work shall stop until the flow subsides.

Measures shall be taken to ensure that no petroleum products, hydraulic fluid, fresh cement, sediments, sediment-laden water, chemicals, or any other toxic or deleterious materials are allowed to enter or leach into waters of the US. A spill prevention plan will be prepared for every project that utilizes motorized equipment or vehicles. Plan will be available to Service by request. An erosion control plan will be prepared for every project that results in ground disturbance. Plan will be available to Service by request.

6. **Isolation of Work Site**

   To reduce impacts to listed fish and water quality, major habitat restoration projects would be performed in isolation from flowing waters whenever possible. Examples of activities that may be done in the water include placing wood and rock structures that require very little in-water excavation, small scale work in systems with sand or coarser grained substrate and work in rock bottom systems. The choice and rational on whether or not to isolate the worksite needs to be included in the SPIF. The focus needs to be on minimization of impacts on water quality, listed salmonids and forage fish. If worksite isolation and fish capture and removal is the least impacting method, the applicant will follow procedures outlined in Appendix D of NMFS No. NWR-2008-3598.

   When working in the wet some turbidity monitoring may be required, subject to discussions between applicant and the Services. Turbidity monitoring generally is required when working in streams with more than 40 percent fines (silt/clay) in the substrate. Turbidity will be monitored only when turbidity generating work takes place, for example, pulling the culvert in the wet, reintroducing water. The applicant will measure the duration and extent of the turbidity plume (visible turbidity above background) generated. The data will be submitted to the Services.

   Measurements of concentration preferably in mg/l are very helpful for the Services. Turbidity measurements are used by the Services to develop procedures to minimize turbidity and estimate take for future projects. If you can provide turbidity measurements in mg/l (NTUs are also less helpful for purposes of comparison with literature values) the Services will greatly appreciate your data.

1.3.4 General Prescriptions that Apply to some of the Proposed Restoration Actions

1. **Installation of Bank Stabilization Features:**

Description: In many riparian areas anthropogenic activities have led to streambank degradation and accelerated erosion. This usually leads to lack of cover, growth of invasive plants, reduction in pool habitat, and increased fine sediment input and accumulation, which all negatively affect salmonids. Projects that improve riparian habitat conditions for salmonids, such as riparian plantings or side channel construction/reactivation, may utilize the bank stabilization techniques listed below. For a detailed description of each technique refer to Integrated Streambank Protection Guidelines (Cramer et al. 2003).

All restoration/enhancement projects that employ bank stabilization need to have restoration as their primary purpose and need to address the cause of the habitat degradation. Streambank stabilization cannot be the only proposed component, but rather a conservation measure applied to help a primary action like removal of bank protection and installation of riparian revegetation to succeed.

a. **Bank Protection Engineered Log Jams**: The goal of bank protection ELJs is to protect a section of natural stream bank that may be vulnerable to accelerated erosion resulting from project activities or existing infrastructure that have altered the natural stream flow. Bank protection ELJs can be placed intermittently as a series of flow defectors or as a continuous revetment (Herrera 2006b). Examples in the Pacific Northwest include the Elwha River in Washington and Johnson Creek in Portland, Oregon.
b. **Groins/Spur Dikes:** Groins are large roughness elements that project from the bank into the channel. Different from barbs, groins extend above the high-flow water-surface elevation. Usually they are constructed in a series to provide continuous bankline roughness.
   Groins must be constructed exclusively from wood with minimal anchor rock. Constructing less permanent (compared to rock) wood groins will ensure that in the long-term the groins do not interfere with natural river dynamics and provide maximal habitat.
c. **Barbs/Vanes/Bendway Weirs:** Barbs, vanes, and bendway weirs are low-elevation structures that project from a bank into the channel. They are angled upstream to redirect flow away from the bank. They increase channel roughness and reduce water velocity near the bank. Barbs have to be constructed from wood with minimal anchor rock. Wooden barbs within the active river channel may be used to allow soft bank treatments such as reshaping and native plantings to mature. Constructing less permanent (compared to rock) wood groins will ensure that in the long-term the groins do not interfere with natural river dynamics and provide maximal habitat.
d. **Rootwad Toes:** Rootwad toes are structural features that prevent erosion at the toe of a streambank. The toe refers to that portion of the steambank that extends from the channel bottom up to the lower limit of vegetation. Rootwad toes can provide the foundation for soft upper-bank treatments such as bank reshaping and soil reinforcement. Rootwad toes provide better fish habitat and have a shorter life span than rock toes.
e. **Bank Reshaping:** Reducing the angle of the bank slope without changing the location of its toe. However, the toe may be reinforced with rootwads or coir logs.
f. **Soil Reinforcement/Soil Pillows:** Soil layers or lifts encapsulated within natural materials. Often the lifts are used to form a series of stepped terraces along the bank which then are planted with woody vegetation.
g. **Coir Logs:** Coir (coconut fiber) logs are long, sausage-shaped bundles of bound-together coir. They are commonly used as a temporary measure to stabilize the bank toe while riparian vegetation grows.

1.3.5 The PSNERP Actions

Duckabush River Delta Restoration

The action would restore the natural geomorphology to the Duckabush River delta wetlands by removing major roadway obstructions, excavating channels, and removing fill. The action would realign Highway 101 across the estuarine delta to restore tidal connection to the estuary. A surface street crossing (Shorewood Road) and adjacent fill at a distributary channel (Pierce Slough) would also be removed. Multiple tidally influenced distributary river channels would be reestablished, and blind tidal channels would be excavated within the marsh areas. Figure 1 displays the restorative actions accompanying the relocation of the Highway 101 causeway.

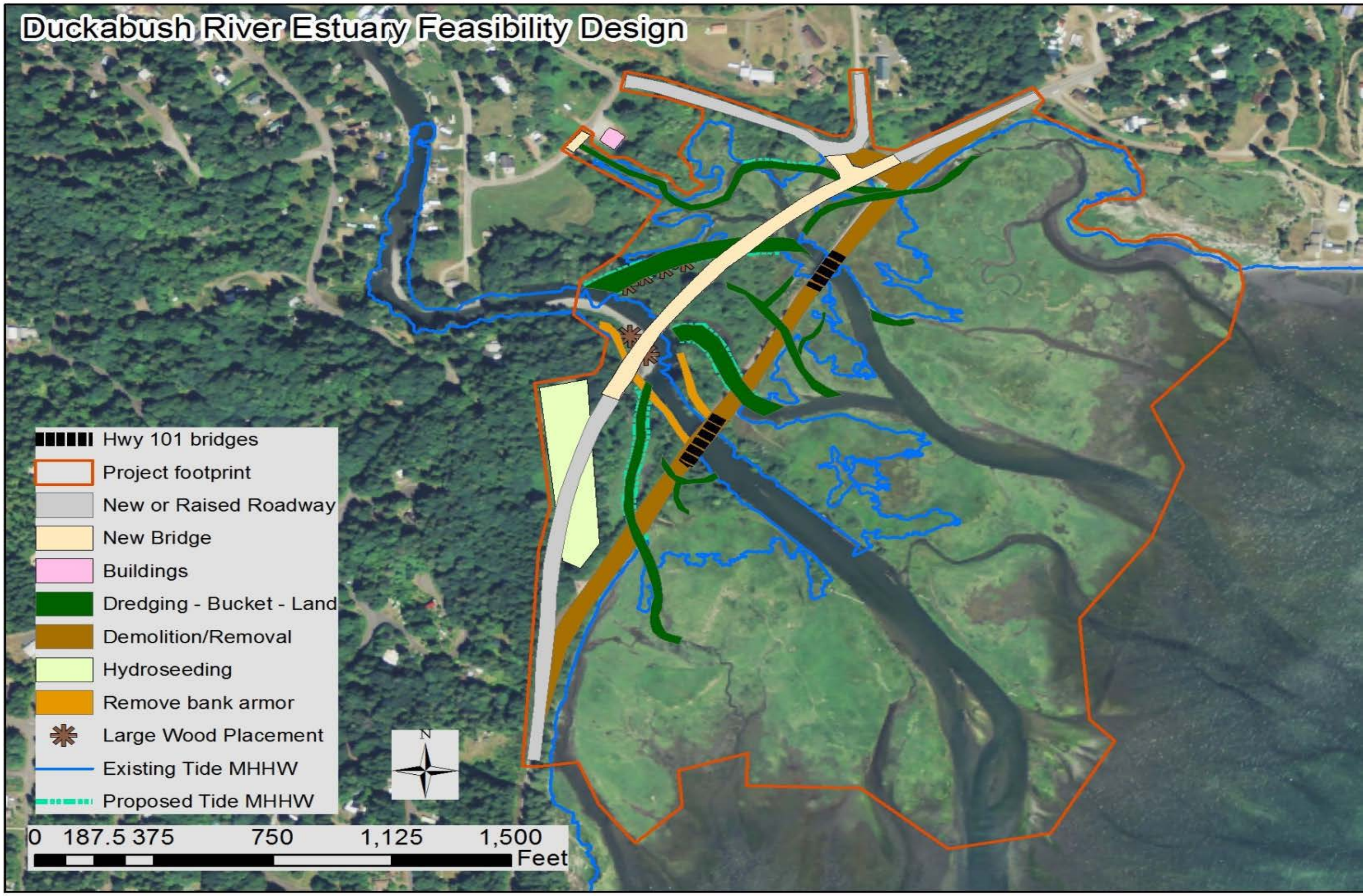


Figure 1. Duckabush Causeway Replacement and Estuary Restoration, concept at 10 percent design.

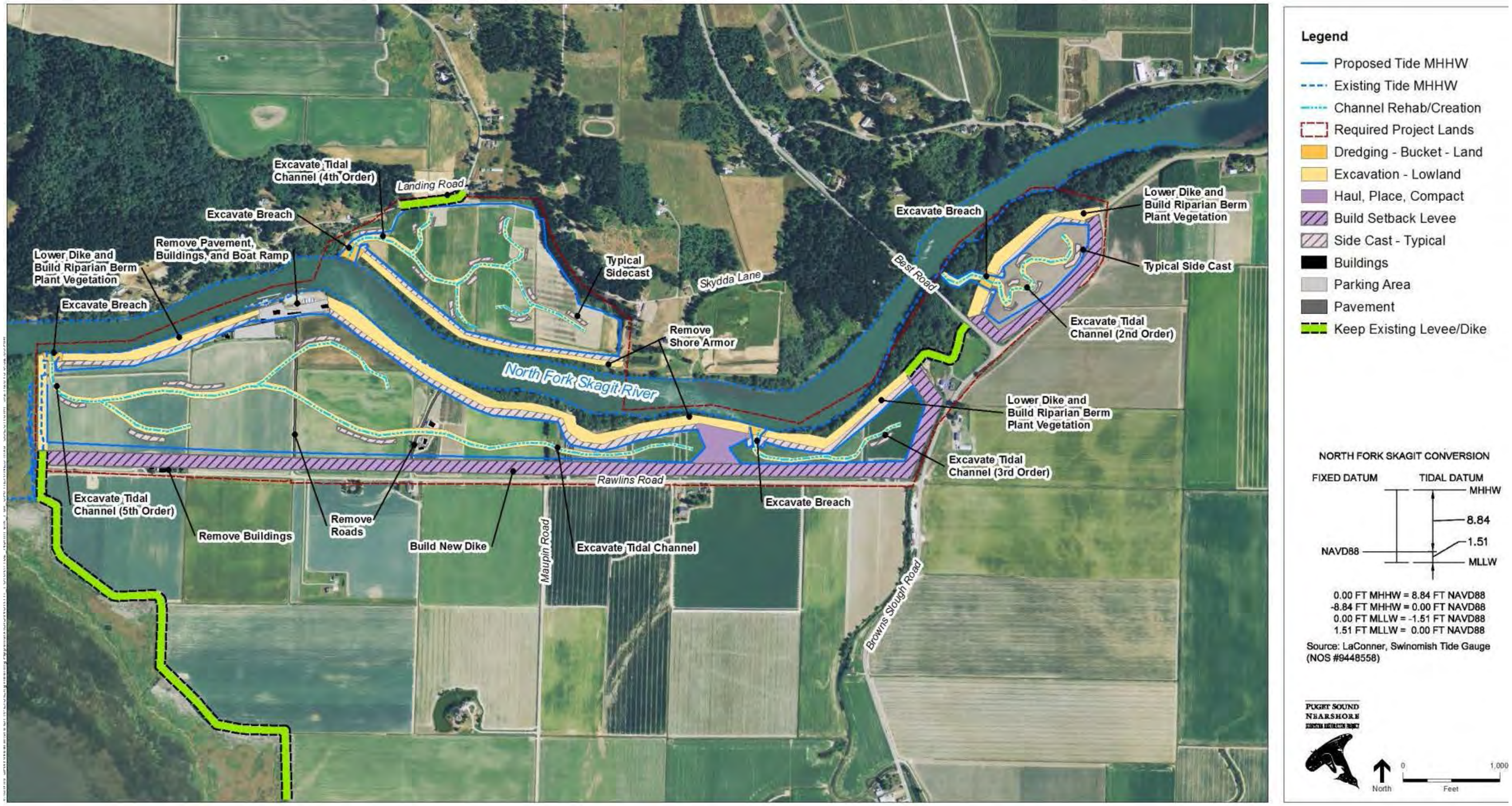
Table 1 summarizes the actions comprising the Duckabush River Estuary Restoration Action, and the extent of area affected by those actions. Completing all elements of the project will require up to three years. Work in the water will be constrained to the period between July 16 and August 31 of each year of construction.

Table 1. Key Design Elements—Duckabush River Delta Restoration

Item	**Description of Item**	**Approx. Quantity**
Roadway Removal	Remove 3,300 LF of Hwy 101 embankment including removing 1 culvert, approximately 300 feet of Duckabush Road, and 150 feet of Shorewood Road and culvert	3,750 LF
New Roadway	Build 2,100 feet of new highway including 2 culvert replacements, 150 feet of Duckabush Road, and 80 feet of new Shorewood Road	2,330 LF
Bridge Removal	Remove two existing Hwy 101 bridges	970 LF
New Bridges	Build one 1,100-foot bridge (8 spans at 138 feet) Build 100-foot bridge approach at Duckabush Road	1,200 LF
Shorewood Road	70-foot bridge at Shorewood Road	70 LF
Overhead Power	Relocate to new alignment	
Distributary Channels (large)	670 feet of north channel connection to the mainstem of Duckabush River and 460 feet of south channel connection to mainstem	1,130 LF
Distributary Channels (large)	1,900 feet of Pierce Slough reconstruction; 2,000 feet of other tidal channels	3,900 LF
Fill Removal	Remove training berms along river (0.7 acre), road embankment and roads (3.3 acres), and developed areas (2.5 acres)	6.5 acres

North Fork Skagit River Estuary Restoration

A brief description of the project is included in the Skagit Chinook Recovery Plan (SRSC and WDFW 2005). The proposed action will restore the riverine floodplain and tidal connectivity along the lower reach of the North Fork of the Skagit River. This will require constructing a new flood protection dike further inland. The existing dike would be lowered and selectively breached to allow inundation of the estuarine emergent marsh and sustain back channel habitat. Forested floodplain habitat would be created along the lowered dike adjacent to the mainstem river channel. Please see Figure 2 for a conceptual overview of the action at 10 percent design.



SOURCE: Washington Public Lands Database (2006); Washington Counties Parcels (2009); Action Area (PSNERP, 2010) Service Layer Credits:

Site Name: North Fork Skagit River Delta

Lead Contractor: ESA
Design Lead: ESA PWA

Figure 2. North Fork Skagit River Delta Restoration, concept at 10 percent design

Table 2. Key Design Elements—North Fork Skagit River Restoration

Item	Description of Item	Approx. Quantity
Lower Levees and Build Riparian Berm	Excavate lowlands to lower 15,691 LF of existing levee to elevations similar to natural levees (13.5 ft MLLW, 12 ft NAVD 88 on the inboard side of the site, sloping down to 10.5 ft MLLW, 9.0 ft NAVD 88 on the main channel bank); Excavated material to be placed landward of existing levee to create 15,130 LF of floodplain berm approximately 100 to 150 ft wide (width to be determined by amount of material available) with the exception of 10,260 CY that will be used to block existing distributary channel west of Browns Slough Road	211,820 CY
Excavate Breaches in Lowered Levee	Excavate lowlands to breach lowered levee in 4 locations. Breaches will be constructed to dimensions of 5th order channel; assume 50-foot wide benches at 7 ft NAVD88 (8.5 ft MLLW) installed on either side of the breach. At the end of the 50 ft bench, 10H:1V slopes extend up to between 9 .0 and 11.0 ft. This section results in an excavation of 45 CY/LF (at 9.0 ft NAVD88 top elevation) to 79 CY/LF (at 11.0 ft NAVD88 top elevation)	29,720 CY
Excavate Tidal Channel Network	Excavate 19,617 LF of tidal channels and sidecast generated material adjacent to the channels to create low berms that will support a riparian corridor. Excavation includes: 2,349 LF of second-order channel; assume 3 ft bottom width at elevation 2.0 ft, 3H:1V sideslopes, and average surface elevation of 6.5 ft 6,953 LF of third-order channel; assume 3 ft bottom width at elevation 0.0 ft, 3H:1V sideslopes, and average surface elevation of 6.5 ft 7,702 LF of fourth-order channel; assume 3 ft bottom width at elevation -2.0 ft, 3H:1V sideslopes, and average surface elevation of 6.5 ft 2,613 LF of fifth-order channel; assume 3 ft bottom width at elevation -5.0 ft, 5H:1V sideslopes, and average surface elevation of 6.5 ft	179,315 CY
Block Distributary Channel	Place excavated material from levee lowering to block distributary channel located 2,650 ft downstream of Best Road bridge; assume 158,240 SF area with an average depth of 1.75 ft	10,260 CY

Item	Description of Item	Approx. Quantity
Remove Shore Armor	Remove 16,140LF of riprap armoring from existing levee (13,000 LF along south bank, 3,140 LF along north bank); assume entire length of levee is riprap composed of average of 5 ft height and 3 ft wide, with a density of 1.5 ton/CY	13,400 tons
Remove Buildings	Remove 17 buildings distributed throughout the project area including Blake's Resort and along Rawlings Road within the proposed levee lowering footprint; approximate area calculated from GIS	45,024 SF
Remove Pavement and Boat Ramp at Blake's Resort	Remove pavement at Blake's Resort; approximate area calculated from GIS Remove boat ramp; assume 100 ft x 300 ft	139,906 SF 30,000 SF
Remove Roads	Remove pavement from roads in newly setback area between lowered levee and new flood risk management levee; approximate area calculated from GIS	104,353 SF
Build New Levee	Construct new flood risk management levee along Rawlins Road, Browns Slough Road- Fir Island Rd, and Moore Road. Assume 11,970 LF with average select fill of 40 CY/LF and typical surface elevations between 7.0 and 6.0 ft NAVD88	478,800 CY
Plant Vegetation	Plant riparian vegetation along slopes of lowered natural levee and sidecast berms and along realigned levee on Rawlins Road, Brown's Slough Road, and Moore Road. Assume 100 ft wide along 15,691 LF of lowered levee and 11,970 LF of new levee	62 AC (approx.)

The entire project will require one to two years to complete. In water work will be constrained to the period between June 15 and August 31 of each construction year to avoid exposure of vulnerable life stages of listed salmonids.

<u>Nooksack River Delta Restoration</u>

This action removes levees, roads, and other barriers to restore hydraulic and sediment processes throughout the Nooksack River delta. Project elements would restore fluvial processes and enhance tidal hydrology to both the east (Nooksack River) and the west (Lummi River) sides of the delta; restore formerly drained and filled channels and sloughs through excavation; remove and/or relocate levees and berms to increase floodplain inundation and allow for channel migration, and restore sediment dynamics; and modify existing roads and other infrastructure such as bridges. The entire action will require two to four years of construction to complete. Work in the water will be constrained to the period between June 15 and August 15 of each construction year.

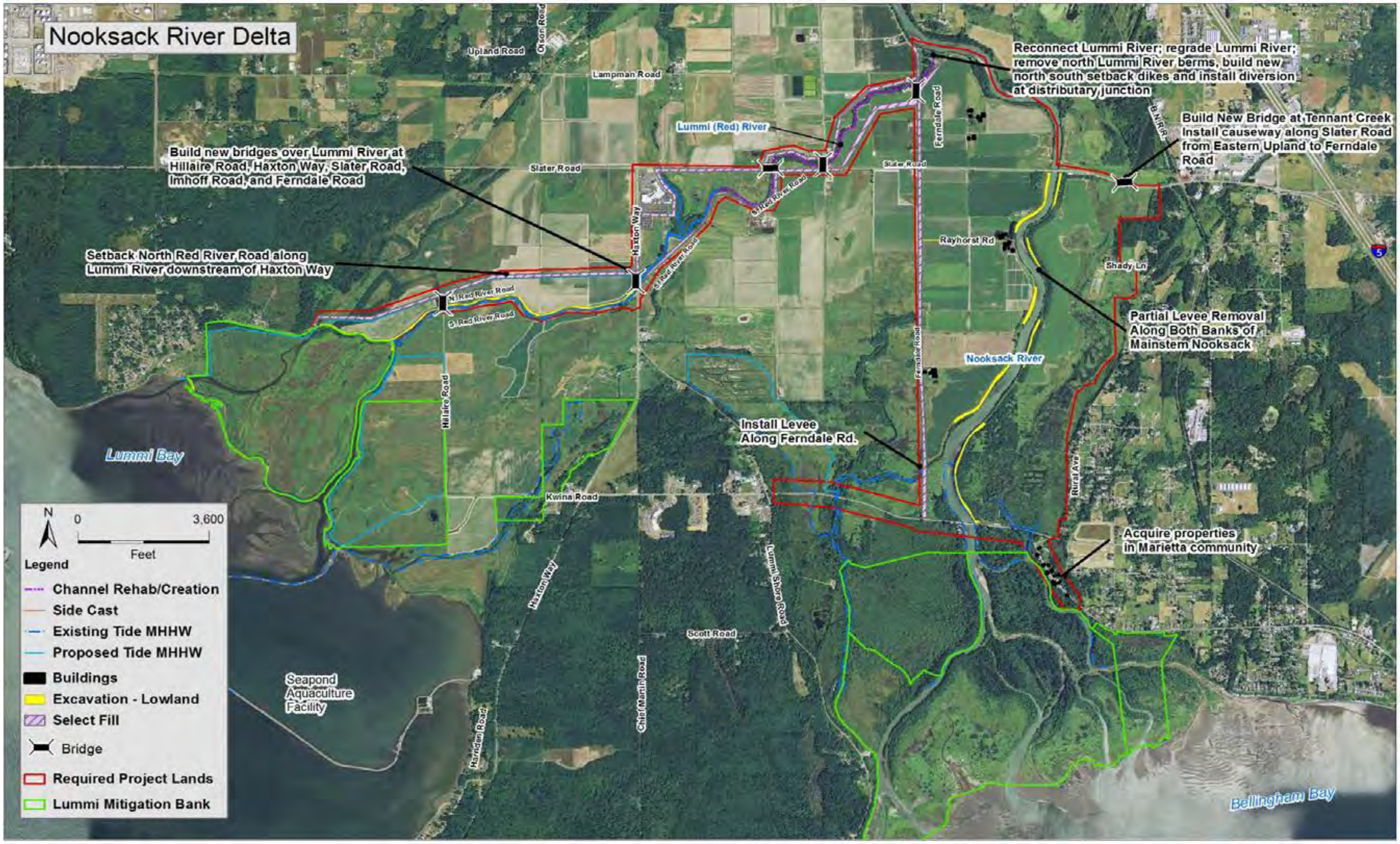
Table 3. Key Design Elements—Nooksack/Lummi Rivers Restoration

Item	**Description of Item**	**Approx. Quantity**
Nooksack River		
Install New Setback Levee and Relocate Ferndale Road	Set back right bank levee to Ferndale Road alignment between Slater Road and Marine Drive. New levee will be 12,633 LF with a typical section of 600 SF. Will include new paved road on	280,750 CY
Remove Portions of Existing Levees on Both Banks	Remove approximately 60 percent of right and left bank dikes from the Slater Road to near Marine Drive. Total length of 12,263LF.	75,450 CY
Install Log Jams in Mainstem Nooksack	Install large wood structures within Nooksack mainstem to assist geomorphic response of the river in concert with setting back the levees (location to be determined)	3 structures
Lummi River		
Install New Water Control Structure at Confluence	Upstream Lummi River connection to Nooksack River to be regulated via an engineered diversion structure that will be designed during PED. This structure is intended to facilitate transfer of freshwater and sediment to the Lummi River, while preventing avulsion of the mainstem to the west.	1 EA
Regrade Lummi River Channel and Berms. Remove North Red River Road West of Haxton	-Regrade existing Lummi River channel to install 0.04% bed slope and larger channel cross section to better match invert to water surface elevation of the Nooksack River, increase conveyance capacity, and create surface to encourage geomorphic processes. -Regrade would occur over the upper 9,980 LF of the channel, with a typical section of 285 SF in the upper 5,000 LF and 80 SF in the lower 4,890 LF.	67,300 CY
	Remove existing berm and road along north side of Lummi River west of Haxton Way. Length of berm to be removed and associated volumes are: west to Hillaire=3,843 LF; 10,659 CY; Hillaire to Haxton=5,927 LF; 13,017 CY; Haxton to Slater=1,981	30,900 CY
Build New Setback Levees[1]	Install setback levee on south side of the Lummi River channel between Haxton and Ferndale. Length is 11,232 LF with typical section of	72,800 CY
	Install setback levee on the north side of the Lummi River channel from the valley margin to the Ferndale Rd and realign North Red (Lummi) River Road away from channel. Length is 23,025 LF with typical sections varying from 135 SF/LF to 432 SF/LF based on levee heights 5 to 8 feet.	279,500 CY

Item	**Description of Item**	**Approx. Quantity**
Transportation Improvements		
Modify Slater Road at Lummi River	Remove a portion of the existing roadway.	450 LF
	Raise Slater Road (build new roadway)	200 LF
	Build new bridge (two 125-foot spans) over Lummi River	250 LF
Modify Slater Road at Tennant Creek	Add span on Tennant Creek to allow 100-year flow to pass below the two bridges.	390 LF
	Install elevated causeway along Slater from eastern upland to	5,600 LF
Modify Haxton Way	Build new bridge (three 150-foot spans) over Lummi River	450 LF
	Install new road approaches	200 LF
	Remove a portion of the existing roadway	1,300 LF
Re-align North Red River Road and Haxton Way	New road on top of setback levees (30-foot width)[1]	9,216 LF
Modify Hillaire Road at Lummi River	Build new bridge (three 150-foot spans)	450 LF
	Remove a portion of the existing roadway	575 LF
	Build new roadway	200 LF
Modify Imhoff Road at Lummi River	Build new bridge (two 125-foot spans)	250 LF
	Remove a portion of the existing roadway	400 LF
	Build new roadway	150 LF
Modify Ferndale Road at Lummi River	Build new bridge (two 125-foot spans).	250 LF
	Remove a portion of the existing roadway	650 LF
	Build new roadway[1]	12,200 LF

[1]Necessary to protect adjacent land from additional flows that are diverted into the Lummi River from the Nooksack River.
[2]Necessary for emergency evacuation due to removal of levees along the Nooksack River.

Figure 3. Nooksack River Delta Restoration Concept, 10 percent design



1.4 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). Although three actions covered in this opinion were submitted to NMFS as a batch, each occurs in a discrete location in Puget Sound. Therefore each action has a discrete action area. A common element of all three actions is the corridor-based aspect to the action areas. Each action area track the effects of the restoration activities for each action. These include hydraulic modifications to enable each river greater access to its historic floodplain and the restoration of historic channels of the river to restore a more natural hydraulic regime for each delta.

<u>Duckabush River Delta Restoration</u>

The proposed action is located in the Duckabush River and wetlands at the Highway 101 crossing, near the town of Duckabush, Jefferson County, Washington 47.649175 N latitude, -122.934644 W longitude. The action area for the Duckabush River Delta Restoration action is defined by actions having environmental effects from Highway 101 removal and replacement with an elevated structure, among other things. All effects of other elements of the proposed action will manifest in a polygon defined in the 3500-foot corridor of the existing Highway 101 through the Duckabush Estuary bounded by Robinson Road to the North and the beach of the southern-most distributary to the south. The corridor includes approximately 300 feet of estuary East of and parallel to the existing highway, and 600 feet of land West of and parallel to the existing highway. The 600 foot portion of the corridor west of the existing highway includes the location of the planned bridge and new approaches for Highway 101, the road removal elements at Duckabush and Shorewood Roads, channel rehabilitation for each of the distributaries, and berm removal within the estuary and along the Duckabush River. See Figure 1 for a complete depiction of the larger area containing the action area.

<u>North Fork Skagit River Delta Restoration</u>

The proposed action is located in the North Fork Skagit River near Mt. Vernon, Skagit County, Washington 48.35825 N latitude, -122.4355 W longitude. The action area for the North Fork Skagit River Delta Restoration is defined mainly by actions removing existing berms and levees, restoring relict off-river channels, and is bounded firmly by setting-back of the levee on the south bank of the river. This includes the River corridor and a portion of the floodplain adjacent to the River from the junction of Polson and Fir Island Roads (on the south side of the River) to the mouth of the river at the Skagit River Estuary. An extensive majority of the work under this action occurs between the location of the new setback levee, south of the river. However, the action area includes a small area of new channel on the north bank of the river between Skylda Lane and Landing Road. See Figure 2 for a complete depiction of the area containing the action area.

<u>Nooksack River and Lummi River Delta Restoration</u>

The proposed action is located in the Nooksack and Lummi Rivers near Ferndale, Whatcom County, Washington 48.826772 N latitude, -122.593378 W longitude. The effects of the action will be collectively diffuse as they are several and scattered along the banks of both rivers from their confluence near 5059 Ferndale Road downstream to near the to the mouth of each river just upstream from their deltas on Puget Sound. See Figure 3 for a complete depiction of the area containing the action area.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, Federal agencies must ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provides an opinion stating how the agency’s actions would affect listed species and their critical habitat. If incidental take is expected, section 7(b)(4) requires NMFS to provide an incidental take statement (ITS) that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures and terms and conditions to minimize such impacts.

None of the three actions batched for this consultation are likely to adversely affect SRKW or its critical habitat. There is no SRKW critical habitat in Hood Canal south of the Hood Canal Bridge and therefore the Duckabush action will have no effect on SRKW critical habitat. The analysis is found in the "Not Likely to Adversely Affect" Determinations section 2.11.

2.1 Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis.

The jeopardy analysis relies upon the regulatory definition of “to jeopardize the continued existence of a listed species,” which is “to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species” (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

The adverse modification analysis considers the impacts of the Federal action on the conservation value of designated critical habitat. This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.[2]

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[2] Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (Application of the “Destruction or Adverse Modification” Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action.
- Describe the environmental baseline in the action area.
- Analyze the effects of the proposed action on both species and their habitat using an "exposure-response-risk" approach.
- Describe any cumulative effects in the action area.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.
- Reach jeopardy and adverse modification conclusions.
- If necessary, define a reasonable and prudent alternative to the proposed action.

2.2 Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the current function of the essential physical and biological features that help to form that conservation value.

One factor affecting the range-wide status of PS Chinook salmon and HC summer-run chum salmon, and aquatic habitat at large, is climate change. Salmon throughout Washington are likely affected by climate change. Several studies have revealed that climate change has the potential to affect ecosystems in nearly all tributaries throughout the state (Battin et al 2007). While the intensity of effects will vary by region, climate change is generally expected to alter aquatic habitat (water yield, peak flows, and stream temperature). As climate change alters the structure and distribution of rainfall, snowpack, and glaciations, each factor will in turn alter riverine hydrographs. Given the increasing certainty that climate change is occurring and is accelerating (Battin et al 2007), NMFS anticipates salmonid habitats will be affected. Climate and hydrology models project significant reductions in both total snow pack and low-elevation snow pack in the Pacific Northwest over the next 50 years (Mote and Salathe 2010) – changes that will shrink the extent of the snowmelt-dominated habitat available to salmon. Such changes may restrict our ability to conserve diverse salmon life histories.

In Washington State, most models project warmer air temperatures, increases in winter precipitation, and decreases in summer precipitation. Average air temperatures in Washington State are likely to increase 0.1-0.6ºC per decade (Mote and Salathe 2010). Warmer air temperatures will lead to more precipitation falling as rain rather than snow. As the snow pack diminishes, seasonal hydrology will shift to more frequent and severe early large storms, changing stream flow timing and increasing peak river flows, which may limit salmon survival (Mantua 2009). The largest driver of climate-induced decline in salmon populations is projected to be the impact of increased winter peak flows, which scour the streambed and destroy salmon eggs (Battin et al 2007).

Higher water temperatures and lower spawning flows, together with increased magnitude of winter peak flows are all likely to increase salmon mortality. Higher ambient air temperatures will likely cause water temperatures to rise. Salmon require cold water for spawning and incubation. As climate change progresses and stream temperatures warm, thermal refugia will be essential to persistence of many salmonid populations. Thermal refugia are important for providing salmon with patches of suitable habitat while allowing them to undertake migrations through or to make foraging forays into areas with greater than optimal temperatures. To avoid waters above summer maximum temperatures, juvenile rearing may be increasingly found only in the confluence of colder tributaries or other areas of cold water refugia (Mantua 2009).

In marine habitat, effects of climate change include: increased ocean temperature, increased stratification of the water column, ocean acidification, and changes in intensity and timing of coastal upwelling. These continuing changes will alter primary and secondary productivity, the structure of marine communities, and in turn, the growth, productivity, survival, and migrations of salmonids. A mismatch between earlier smolt migrations (due to earlier peak spring freshwater flows and decreased incubation period) and altered upwelling may reduce marine survival rates. Increased concentration of CO_2 reduces the availability of carbonate for shell-forming invertebrates, including some that are prey items for juvenile salmonids.

Climate change is expected to make recovery targets for these salmon populations more difficult to achieve. Habitat action can address some of the adverse impacts of climate change on salmon. Examples include restoring connections to historical floodplains and freshwater and estuarine habitats to provide fish refugia and areas to store excess floodwaters, protecting and restoring riparian vegetation to ameliorate stream temperature increases, and purchasing or applying easements to lands that provide important cold water or refuge habitat (Battin et al 2007).

2.2.1 Status of Listed Species

Table 4, below provides a summary of listing and recovery plan information, status summaries and listing factors for the species addressed in this opinion. More information can be found in recovery plans and status reviews for these species. These documents are available at the NMFS West Coast Region Website (http://www.westcoast.fisheries.noaa.gov/).

Table 4. Status of the Species in this Consultation

Species	Listing Classification and Date	Recovery Plan Reference	Most Recent Status Review	Status Summary	Limiting Factors
Puget Sound Chinook salmon	Threatened 6/28/05	Shared Strategy for Puget Sound 2007 NMFS 2006	Ford 2011	This ESU comprises 22 populations distributed over five geographic areas. No trend was notable for total ESU escapements; escapement trends vary from decreasing to increasing among populations. Median recruits per spawner for the last 5-year period (brood years 2002-2006) is the lowest over any of the 5-year intervals. Many of the habitat and hatchery actions identified in the Puget Sound Chinook salmon recovery plan are likely to take years or decades to be implemented and to produce significant improvements in natural population attributes, and these trends are consistent with these expectations.	• Degraded floodplain and in-river channel structure • Degraded estuarine conditions and loss of estuarine habitat • Degraded riparian areas and loss of in-river large woody debris • Excessive fine-grained sediment in spawning gravel • Degraded water quality and temperature • Degraded nearshore conditions • Impaired passage for migrating fish • Severely altered flow regime
Hood Canal summer-run chum	Threatened 6/28/05	Hood Canal Coordinating Council 2005 NMFS 2007	Ford 2011	This ESU is made up of two independent populations in one major population group. The spawning abundance of this ESU has clearly increased since the time of listing, although the recent abundance is down from the previous 5 years. However, productivity in the last 5-year period (2002-2006) has been very low, especially compared to the relatively high productivity in the 5-10 previous years. Since abundance is increasing and productivity is decreasing, improvements in habitat and ecosystem function likely are needed.	• Reduced floodplain connectivity and function • Poor riparian condition • Loss of channel complexity Sediment accumulation • Altered flows and water quality
Puget Sound steelhead	Threatened 1/5/06	In development	Ford 2011	This DPS comprises 32 populations. The DPS is currently at very low viability, with most of the 32 populations and all three population groups at low viability. Most populations within the DPS continue downward trends in estimated abundance, a few sharply so. Only three winter-run steelhead populations examined exhibit positive growth rate. Trends could not be calculated for the South Puget Sound Tributaries winter-run population. Little or no data is available on summer-run populations to evaluate extinction risk or abundance trends.	• Continued destruction and modification of habitat • Widespread declines in adult abundance despite significant reductions in harvest • Threats to diversity posed by use of two hatchery steelhead stocks • Declining diversity in the DPS, including the uncertain but weak status of summer-run fish • A reduction in spatial structure • Reduced habitat quality • Urbanization • Dikes, bank hardening, and channelization

2.2.2 Status of Critical Habitat

In this section we review the status of designated critical habitat for Puget Sound Chinook, HC summer-run chum, and Puget Sound steelhead. These primary constituent elements (PCEs) are features essential to the conservation of the listed species because they support one or more of the species' life stages (e.g., sites with conditions that support spawning, rearing, migration and foraging). Thus, while critical habitat must contain one or more PCEs, this does not mean that all PCEs are present or that the PCEs present are functioning optimally.

Puget Sound Recovery Domain
Critical habitat has been designated throughout Puget Sound and in the action area for PS Chinook salmon, HC summer-run chum salmon, and Puget Sound steelhead. Notable tributary river basins in and near the Puget Sound basin include the Nooksack, Skagit, Stillaguamish, Snohomish, Lake Washington, Green, Puyallup, White, Nisqually, Skokomish, Duckabush, Dosewallips, Big Quilcene, Elwha, and Dungeness rivers.

***Freshwater Primary Constituent Elements*.** Water quality is a PCE of spawning, rearing, and migration habitats. In many areas, water quality is affected by sediment load. Landslides can occur naturally in steep, forested lands, and inappropriate land use practices combined with severe storms in some places have accelerated their frequency and the amount of sediment delivered to streams. Fine sediment from unsurfaced roads has also contributed to stream sedimentation. Historical logging removed most of the riparian trees near many stream channels. Water quality in many locations of CH is also impaired by warm temperature. Agricultural and urban conversion has permanently altered riparian vegetation in the river valleys, leaving either no trees, or a thin band of trees. The riparian zones along many agricultural areas are now dominated by alder, invasive canary grass and blackberries, and provide substantially reduced stream shade. Impervious surface in urban and urbanizing watersheds has interrupted hyphoreic processes that would otherwise allow cool water recharge, thus stormwater returns to streams are warmer, and also carry a variety of chemical pollutants. Lack of riparian trees has also decreased, and in many areas precluded, large wood recruitment (NMFS 2007).

Habitat complexity and floodplain connectivity are PCEs of spawning and rearing habitat areas. These PCEs have been modified or eliminated by diking, agriculture, revetments, railroads and roads, especially in lower river reaches. Significant loss of secondary channels in major valley floodplains occurs throughout this region. Confined main channels create high-energy peak flows that remove smaller substrate particles and large wood. The loss of side-channels, oxbow lakes, and backwater habitats has resulted in a significant loss of juvenile salmonid rearing and refuge habitat. When the water level of Lake Washington was lowered 9 feet in the 1910s, thousands of acres of wetlands along the shoreline of Lake Washington, Lake Sammamish and the Sammamish River corridor were drained and converted to agricultural and urban uses. Wetlands play an important role in hydrologic processes, as they store water which ameliorates high and low flows. The interchange of surface and groundwater in complex stream and wetland systems helps to moderate stream temperatures. Forest wetlands are estimated to have diminished by one-third in Washington State (Spence 1996, NMFS 2007).

Severe alteration of riparian habitat, elevated water temperatures, elevated levels of nutrients, increased nitrogen and phosphorus, and higher levels of turbidity, presumably from urban and highway runoff, wastewater treatment, failing septic systems, and agriculture or livestock impacts, have been documented in many Puget Sound tributaries (NMFS 2007).

In some rivers, peak stream flows are believed to have increased over time due to paving (roads and parking areas), reduced percolation through surface soils on residential and agricultural lands, simplified and extended drainage networks, loss of wetlands, and rain-on-snow events in (NMFS 2007).

Marine and Estuarine PCEs. The nearshore marine habitats which are a PCE for juvenile outmigrant salmonids have been extensively altered and armored by industrial and residential development near the mouths of many of Puget Sound's tributaries. A railroad runs along large portions of the eastern shoreline of Puget Sound, eliminating natural cover along the shore and natural recruitment of beach sand and gravels (NMFS 2007).

Adverse water quality of the near-shore environment occurs some years in the southeastern areas of Hood Canal, when natural circulation is altered and marine oxygen is depleted in late summer, causing significant fish kills. Circulation of marine waters is naturally limited, and partially driven by freshwater runoff, which is often low in the late summer. In addition to higher loading of nitrogen from alders growing along many streams, human development has increased nutrient loads from failing septic systems along the shoreline, and from use of nitrate and phosphate fertilizers on lawns and farms. Shoreline residential development is widespread and dense in many places. The combination of highways and dense residential development has degraded certain physical and chemical characteristics of the near-shore environment (NMFS 2007) (Hood Canal Coordinating Council 2005).

In summary, salmon critical habitat throughout the Puget Sound basin has been degraded by numerous management activities, including hydropower development, loss of mature riparian forests, increased sediment inputs, removal of large wood, intense urbanization, agriculture, alteration of floodplain and stream morphology (i.e., channel modifications and diking), altered riparian vegetation, wetland draining and conversion, dredging of spawning and rearing habitats, armoring of shorelines, marina and port development, road and railroad construction and maintenance, logging, and mining. Changes in habitat quantity, availability, diversity, as well as altered flow, temperature, sediment load and channel stability are common limiting factors in areas of salmon critical habitat. While PCEs are degraded throughout much of the designated CH of the domain, many areas are still ranked as providing high conservation value due to the important role that those locations serve in meeting salmonid life history needs, or due to the relative importance of the populations that rely on those locations.

2.3 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section

7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

Duckabush River Delta

The Duckabush River is one of several major river systems in the Hood Canal Subbasin draining the east slope of the Olympic Mountains to Hood Canal. The broad river delta fans out into the canal on the south side of Black Point Peninsula. The Highway 101 causeway crosses the delta, spanning the main channel and a northern distributary channel via bridges. The area south of the river delta is primarily a basaltic shoreline with a few pocket beaches. The river and the feeder bluff on the side of Black Point Peninsula provide abundant sediment for the drift cell that begins at the central portion of the delta and continues north to the cuspate spit at Quatsop Point. Residential development is concentrated just south of the delta and on the north and east sides of Black Point

The Duckabush River opens to a wide valley within the action area. The river is contained within a single channel through the site before emptying into the marsh and submerged marsh outboard of the site. The historic northern arm of the river has been blocked, is aggraded, and is a dead-end channel in the middle portion of the site. Both channels are tidally influenced and pass under bridge crossings. Training berms are in place at the southern arm, just upstream of the Highway 101 crossing, to control lateral movement of the channel. The northern channel branches to form smaller dead-end channels upstream of Highway 101, and receives freshwater flow from a connection to the small tributary that crosses Shorewood Road.

Pierce Slough, located at the northwest corner of the site, is partially disconnected from tidal flows by the culverted Highway 101 crossing. A remnant tidal channel network exists outboard of the highway between the north and south channels. The northern tidal channel network appears to have aggraded over time, though it is partially present today.

Highway 101 bisects the Duckabush River in its estuary in Hood Canal. Although the estuary at the mouth of the Duckabush River is in relatively good condition, the fill that makes up the road bed of Highway 101 blocks natural estuary function, simplifies the distributary channels and limits habitat available to summer chum. Additionally, blocking distributaries has been shown to increase predation on juvenile summer chum by forcing them into the mainstem river channel during outmigration. Without redesigning Highway 101 across the Dosewallips and Duckabush Rivers to improve estuary functions, habitat restoration of critical summer chum habitat will be limited. Habitat protection and restoration elsewhere in the system would not likely be sufficient to overcome the negative impacts to the estuaries caused by the highway (PSNERP 2012).

Listed Species in the Action Area

The Duckabush River is used by Hood Canal Summer-run chum salmon. The NMFS identified two independent populations of Puget Sound Chinook salmon within Hood Canal: the Skokomish River and Mid-Hood Canal Rivers (Dosewallips, Duckabush, and Hamma Hamma) (Ruckelshaus et al. 2006). The greatest abundance of adult PS Chinook salmon along in the Mid-

Hood Canal group occurs from early August to October as the adults return from the ocean to their natal streams and rivers.

Generally, PS Chinook salmon juveniles emigrate from freshwater natal areas for estuarine and nearshore habitats from January through April as fry, and from April through early July as larger subyearlings. By July juvenile PS Chinook salmon are sufficiently large to no longer orient to the shoreline and thus would be less likely to be caught during beach seine surveys. Juvenile PS Chinook salmon are likely present outside of the action area during the in-water work window, in deeper, offshore waters.

Steelhead in the Duckabush River are part of the West Hood Canal Winter-Run Steelhead demographically independent population (DIP) (PSTRT 2009). The West Hood Canal Winter-Run Steelhead DIP combines winter steelhead from the Hamma Hamma, Duckabush and Dosewallips rivers, and Quilcene River/Dabob Bay. Historic escapement data is lacking for this DIP, but based on recent stream surveys, the population most likely consists of only a few hundred fish. In response to the low estimates, the Hood Canal Steelhead Project was initiated in 2007 by NOAA Fisheries. The goals of the project were to access the benefits of conservation hatchery programs, provide guidance to fisheries managers about steelhead hatchery practices and recovery policies, and attempt to recover three Hood Canal steelhead populations (Duckabush, Dewatto and South Fork Skokomish). The project is monitoring 8 streams within Hood Canal that are divided between supplemented and control streams. The Duckabush is one of three supplemented streams and receives hatchery smolts and adults that are the progeny of excavated natural origin steelhead redds from the Duckabush (Weinheimer 2014).

The areas that most directly affect survival and persistence of these salmonid populations are the estuary and immediate nearshore marine habitat. Thus, loss of channel complexity, altered sediment dynamics, riparian degradation, estuarine habitat loss and degradation from diking, filling, log storage, and road causeways, and alteration of the nearshore environment from shoreline development are factors limiting the ESU’s survival. Indications of these types of conditions are present in the action area owing to the channel simplification caused by the present location of US Highway 101 and its construction on fill placed through the corridor directly over the estuary.

North Fork Skagit River Delta

The north fork of the Skagit River diverges the Skagit River near Skagit City, Washington for the last few miles of its oceanward flow. Both forks end at Skagit Bay on the eastern shore of Puget Sound across from Whidbey Island. Extensive diking of the North Fork Skagit River has caused substantial loss of estuarine connectivity. The proposed restoration would set back flood protection dikes on both sides of the North Fork, from the former inlet of Dry Slough to the western terminus of the dike system near Rawlins Road.

Historically, estuarine wetlands were extensive in the floodplains of the Skagit River, accounting for at least 27 percent of land area (Collins 1998). The Skagit River delta also had extensive freshwater wetlands covering a further 22 percent of the land area (freshwater wetlands include riverine tidal areas in which tidal backwater augmented the effects of flooding). The delta had numerous distributary and blind tidal channels which, because of the delta's diverging-spreading form, were dominated by estuarine channels. Deposition patterns associated with these channels created topographic gradients. The highest areas occur upstream where there was initial deposition of coarser material from fluvial sources. Elevations lowered and the sediment became finer southward as estuarine processes dominated. There was also an elevation gradient laterally with distance from the distributary channels. Coarser, better drained soils were found in the natural levees that line the banks of the distributary channels, creating distinctive riparian corridors in the deltas. Typically, small channels would have run parallel to the main channel behind the natural levee.

Presently, The North Fork levee action area lies on a salinity gradient from estuarine-emergent marsh, to estuarine-scrub-shrub, to forested floodplain zones (Collins 2000). While salinity and elevation gradients still exist in the action area, much of the associated habitat has been lost. Only a discontinuous narrow strip of riparian floodplain now lies between the channel and the dike. This strip is about 500 feet wide on either side of the North Fork Bridge but narrows significantly downstream. The floodplain disappears altogether for long stretches where the dike is adjacent to the channel. In several of these locations the dike has been armored with riprap. The remnant riparian floodplain has been significantly narrowed and fragmented. The only remaining channels associated with the floodplain are found adjacent to the North Fork Bridge and appear to have been truncated by diking.

There are significant areas of emergent marsh, scrub-shrub and forested floodplain west of Rawlins Road. Continuing this band of habitat eastward through the site would significantly improve the ecosystem connectivity within North Fork floodplains, tidal channels, and estuarine wetlands. This would increase the migratory conditions for salmonids between the Skagit River and nearshore marsh habitats eliminated with the construction of the dikes. It would also restore landscape-scale ecological processes on Fir Island as the health of a coastal marshland habitat is dependent upon an adequate supply of sediment and nutrients, which was eliminated with construction of the dikes.

Listed Species in the Action Area

The Skagit River watershed is the largest within the Puget Sound. Its large size features relatively diverse sub-watersheds that support six independent populations of Chinook salmon: Lower Sauk, Upper Sauk, Suiattle, Upper Cascade River, Lower Skagit, and Upper Skagit populations (PSTRT 2006). No other river within Puget Sound supports more than two populations. Individually and collectively, the Skagit Chinook salmon populations are essential to the survival and recovery of the ESU because they provide vital contributions to its abundance, productivity, diversity and spatial structure.

In all, more than a fourth of the ESU's populations reside within the Skagit River system. The six Skagit River populations have been relatively uninfluenced by hatchery releases, as compared to most other ESU populations, and represent a significant portion of naturally produced fish within the ESU (Myers et al. 1998). Collectively, the Skagit Chinook salmon populations (in addition to the North Fork Stillaguamish population), make up one of six genetic groups within the ESU. Marshall et al. (1995) assigned all Skagit and North Fork Stillaguamish

Chinook salmon stocks to the same Genetic Diversity Unit based on life history, genetic, and habitat similarities within the Skagit and North Fork Stillaguamish River basins. There is one hatchery in the Skagit River system. As such, these populations represent a valuable reserve of genetic diversity for the ESU.

Nooksack and Lummi River Deltas

This action area is centered on the Lummi Reservation north of Bellingham in the San Juan/Georgia Strait Subbasin. It encompasses nearly all of the Nooksack and Lummi River Estuaries below Ferndale, Washington. The mainstem Nooksack River currently flows into Bellingham Bay on the east side of the Lummi Peninsula, and the alignment is enforced with levees.

Nooksack River and has also been separated from tidal influence by the levee system. The Lummi River has full tidal access but is essentially a blind channel because it is separated from the mainstem Nooksack River by a levee, and only receives intermittent mainstem flow through the aforementioned culvert. The Lummi River receives freshwater inflows from Shell Creek, which drains portions of the City of Ferndale to the north. Most of the former western delta wetlands are separated from tidal influence by a levee system along the Lummi River and levees and tide gates in other areas. Forest cover has been almost entirely eliminated from the western delta. Riparian forest along the mainstem and forested areas within the progradating delta occur on the eastern portion of the delta.

Collins and Sheikh (2005) estimated general losses of wetland types using mapping from 1880 and 1998. These estimates indicate substantial losses of palustrine (freshwater) and estuarine wetlands. The modern “winter inundation area” is around five percent of the historical condition, and “summer inundation” about one percent of the historical area. The area of estuarine wetland is estimated to be about 30 percent of the historical condition (Collins and Sheikh 2005).

Listed Species in the Action Area

The Nooksack River is used by Puget Sound Chinook salmon and Puget Sound steelhead. There are two populations of listed Chinook (North and South Fork) with early-run timing. A third population is a hatchery-bred fall run that is not part of the listed ESU but is derived from native stock (Lummi Nation 2005).

The North/Middle Fork and South Fork spring Chinook populations are at extreme high risk due to their low numbers and the low productivity of freshwater habitat. Estimates of historic Chinook abundances are an average of 26,000 and 13,000 respectively for the North Fork and the South Fork populations. Now, natural-origin Chinook return in the low hundreds, averaging 170 (North/Middle Fork) and approximately 80 (South Fork) fish in recent years. There are seven significant habitat factors limiting the Chinook: Instability of channel in the upper and middle portions the Forks; Increased sediment coming from natural and human causes, and changes in how that sediment is transported through the system; Loss of logs and other structures in the Forks and their tributaries that create pools and rearing places for the fish; Bank armoring mostly in the South Fork and mainstem that constrain the river and eliminate side channels where fish rear and could seek refuge during floods; Obstructions that block fish from key habitats; Changes in the river flow and temperature. The temperature and low summer/fall flows in the South Fork are viewed as a significant challenge to the long term survival of that population; and Changes along marine shorelines in Bellingham Bay and in nearshore areas have affected Nooksack and other Puget Sound populations that use these waters.

Primary Constituent Elements of Critical Habitat in all three Action Areas

The PCE of most concern in these action areas is the estuarine PCE. The estuarine PCE consists of areas free of obstruction and excessive predation with: (i) Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and (iii) Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

Because estuarine hydraulics are constrained by a variety of stream crossings, berms, and levees in all three systems considered in this consultation, the processes that support transactions between salt and freshwater are impaired. This impairment decreases several factors in each action area that would otherwise fully support estuarine life histories of the affected populations. Specifically, these areas cannot optimally support physiological transition to salt water and do not provide as much available cover, distributary connectivity, and juvenile salmonid forage production. Furthermore, the lack of space from floodplain and distributary connectivity constrains space needed to increase carrying capacity of the affected areas.

The restoration actions that are the subject of this consultation would address these limitations directly and completely in each action area.

2.4 Effects of the Action on Listed Species and Designated Critical Habitat

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. For the following effects discussion "salmonids" stands for listed salmonids these actions are likely to adversely affect, including PS Chinook salmon, Hood Canal summer-run chum salmon, and PS steelhead.

As stated in the Description of the Proposed Action (Section 1.3), programmatic consultation (and accompanying programmatic consideration of the effects of the action) works well when the program consists of applying standardized practices and prescriptions are applied to the same activities, across similar landscapes. Consistently applying standardized practices where needed renders the environmental outcomes of those activities readily predictable.

Predictable environmental outcomes makes for reliable assessment of the likely effects of individual actions carried out under the programmatic review, such as the three PSNERP actions that are the subject of this consultation. As such, the following section extensively excerpts the relevant portion of the effects analysis presented in NMFS No. NWR-2008-3598, and presents the likely environmental results of the relevant categories of restoration activities and their accompanying conservation or minimization measures included in each of the PSNERP actions. Section 2.4.2 does the same for the Critical Habitat analysis. Finally, Section 2.4.3 presents the ecological outcomes of removing certain process-limiting structures from each of the three PSNERP action areas. Specifically, Section 2.4.3 discusses the likely restoration outcomes for each action in terms of restored process and their bearing on habitat function for fish use.

2.4.1 Effects of the Restoration Activities Common to the three PSNERP Actions

The nine restoration categories from NMFS No. NWR-2008-3598 are designed for the sole purpose of improving habitat conditions for listed salmonids. As a general matter, restoration activities developed under PSNERP will cause immediate and long-term improvements to the processes that create and maintain habitat for listed species and incrementally result in improvements to abundance, productivity, and the spatial distribution of all listed salmonids.

Aside from long-term benefits, the actions will have some construction-related, short-term, minor, unavoidable, adverse effects like increased turbidity and injury or death of individual fish from work site isolation that requires fish capture and handling. NMFS has conducted hundreds of individual consultations on each activity type over the past ten years. The knowledge gained from these individual consultations has been applied to compose the activity design criteria and conservation measures for this consultation.

In NMFS No. NWR-2008-3598, NMFS determined that quantifying the specific number of individuals that would be injured or killed by short term construction effects (excluding work area isolation) actions taken under the programmatic was not possible without site-specific information. Similarly, as the three PSNERP actions under consultation here are conceptual in design at the time of consultation, determining a specific number of individual fish that would be injured or killed during construction of the restored areas is impossible to quantify from conceptual design information. However, the value of programmatic consultation is the ability to group categories of actions that will be carried out under carefully prescribed conditions, such that their results are predictable, repeatable, and constrained, no matter where they occur. Predictability and repetition of results enables NMFS to make larger scale, and longer term predictions about how those results will integrate with conditions under the environmental baseline given the backdrop of species and critical habitat status in the action area. As such, these factors enable NMFS to consult programmatically without the burden they might otherwise encounter created by uncertainty surrounding the locations and intensity of the effects of future projects, including the accrual of the benefits of habitat restoration where those activities occur.

Short-Term Effects of Construction Relevant to Every Activity Category

The COE proposes to implement conservation measures that would minimize the construction-related negative impacts. However, some negative impacts would be unavoidable.

Fish Capture and Handling during Worksite Isolation. Dewatering the work area is a conservation measure that is applied to reduce the risk of potential injury to salmonids associated with increased sedimentation and equipment operating in the channel. Restoration activities that involve dewatering stream segments will follow the Dewatering and Fish Capture Protocol (Appendix A of NMFS No. NWR-2008-3598), which is designed to minimize impacts to salmonids from worksite isolation, mainly stranding, capture, handling and electroshocking. This conservation measure sets up a sequence of actions used to exclude fish from the work area. Generally, an upstream block net is set first then fish are seined downstream. After that the work area will be dewatered slowly over several hours. In areas where salmonid presence is likely, the project is left in a stable low flow condition overnight. During gradual dewatering, most fish are expected to voluntarily leave the worksite. Fish that get stranded or trapped will be removed with a sanctuary net to keep them in water at all times. Using electroshocking is proposed only when all other methods of removing fish have been applied.

The Dewatering Protocol directs that all fish capture operations will be conducted by or under the supervision of an experienced fishery biologist, and all staff working with the seining operation must have the necessary knowledge, skills, and abilities to ensure the safe handling of salmonids. Additionally, this Protocol directs that fish must be handled with extreme care and kept in water at all times during transfer procedures in order to prevent the added stress of an out-of-water transfer. The fish removed from the dewatered reach will be released as near as possible to the isolated reach in a pool or area that provides cover and flow refuge. Following the in-water work windows (Appendix B of NMFS No. NWR-2008-3598) further minimizes the risk to salmonids, because they are less likely to be present in the stream reach during the construction period.

Even with implementation of the Protocol and in-water work windows, there is a potential that a small number of juvenile salmonids or their prey will avoid being captured and relocated and may die because they remain undetected in stream margins under vegetation or gravels during installation of water diversions and dewatering of the stream channels. Adult and sub-adult salmonids, because of their larger size, cannot seek refuge in the gravel and are easier to detect and herd downstream. These larger fish are only very rarely expected to be exposed to stranding or electroshocking. Sub-adult salmonids, older than one year and generally larger than 150 mm (with variations depending on the species and population), like adults, cannot seek refuge in the gravel and are easier to detect and herd downstream. However, some sub-adults may hide under vegetation. Thus, they may be exposed to capture using dip nets during the dewatering process. Usually, sub-adults are successfully excluded from the construction area prior to electroshocking. Thus, some juveniles and sub-adults and very few adult salmonids are reasonably certain to hide in the gravel or under structural cover and may be injured or killed during capture and/or use of the electro-shocker.

Electrofishing is typically used as a last resort to remove fish from exposure to the construction effects. The process involves passing an electrical current through water containing fish to stun them, making them easier to locate and remove from the work area. The process of running an electrical current through the water can cause a suite of effects on fish ranging from annoyance or fright behavior and temporary immobility to physical injury or death resulting from accidental contact with the electrodes. The amount of unintentional mortality attributable to electro-fishing can vary widely depending on the equipment used, the settings on the equipment, and the expertise of the technician.

To minimize unintended negative effects, NMFS' electrofishing guidelines (NMFS 2000) will be followed in all projects employing electrofishing equipment. The guidelines require that field crews be trained in observing animals for signs of stress and shown how to adjust electrofishing equipment to minimize that stress. Electrofishing will be used only when other methods to eliminate salmonids from the work area have been exhausted or are not feasible. Electrofishing is not done in the vicinity of redds or spawning adults. All electrofishing equipment operators are trained by qualified personnel to be familiar with equipment handling, settings, maintenance, and safety. Only direct current units will be used, and the equipment will be regularly maintained to ensure proper operating condition. Voltage, pulse width, and rate will be kept at minimal levels and water conductivity will be tested at the start of every electrofishing session so those minimal levels can be determined. When such low settings are used, shocked fish normally revive very quickly.

Because of their larger size and surface area exposed to the voltage, electrofishing can have severe effects on adult salmonids. Adverse effects include spinal hemorrhages, internal hemorrhages, fractured vertebra, spinal misalignment, and separated spinal columns (Hollender and Carline 1994; Dalbey et al. 1996; Thompson et al. 1997). Sharber and Carothers (1988) reported that electrofishing killed 50 percent of the adult rainbow trout in their study. The long-term effects electrofishing has on both juvenile and adult salmonids are not well understood, but long experience with electrofishing indicates that most impacts occur at the time of sampling and are of relatively short duration.

Most of the studies on the effects of electrofishing on fish have been conducted on adult fish greater than 300 millimeters in length (Dalbey et al. 1996). The relatively few studies that have been conducted on juvenile salmonids indicate that spinal injury rates are substantially lower than they are for large fish. Smaller fish intercept a smaller head-to-tail potential than larger fish (Sharber and Carothers 1988) and may therefore be subject to lower injury rates (Dalbey et al. 1996; Thompson et al. 1997; Thompson et al. 2008). McMichael et al. (1998) found a 5.1 percent injury rate for juvenile MCR steelhead captured by electrofishing in the Yakima River subbasin. The incidence and severity of electrofishing damage is partly related to the type of equipment used and the waveform produced (Sharber and Carothers 1988; Dalbey et al. 1996; Dwyer and White 1997). Continuous direct current or low-frequency (equal or less than 30 Hz) pulsed direct current have been recommended for electrofishing (Fredenberg 1992; Dalbey et al. 1996) because lower spinal injury rates, particularly in salmonids, occur with these waveforms (Fredenberg 1992; Dalbey et al. 1996). Only a few studies have examined the long-term effects of electrofishing on salmonid survival and growth (Dalbey et al. 1996; Ainslie et al. 1998). These studies indicate that although some of the fish suffer spinal injury, few die as a result. However, severely injured fish grow at slower rates and sometimes they show no growth at all (Dalbey et al. 1996).

Isolation of the work site has the obvious effect of temporarily removing individual fish from an area in which they were expressing normal behavioral patterns and life histories. Such displacement can lead to higher energy expression as fish seek equilibrium and replace their previous feeding opportunity with a new one. Finally, the mechanical processes of using nets to move fish may cause net contact which also contributes to stress, although such short-term contact is less likely to cause injury or death.

Based upon the above information, NMFS conclude that the adverse impacts to adult salmonids from worksite isolation are limited to temporary displacement. Due to their size they are generally successfully seined out of the construction area. The effects on sub-adult salmonids, are limited to temporary displacement, seining and handling. Sub-adults generally cannot hide in the gravel and thus are easier to seine out. Should they still be in the construction area during gradual dewatering, they are easier to detect than juveniles and thus likely to be rescued with sanctuary nets. Juvenile salmonids (0+) are the only age class that is likely to experience effects from electrofishing and stranding in addition to temporary displacement, seining and handling.

Water Quality--Turbidity and Sediment Deposition. For restoration projects with an in-stream component the COE proposes to have the applicant propose if work in the wet or in isolation from the flowing water would result in less impact to salmonids. NMFS can then review the applicants reasoning in the SPIF and ask for adjustments in work site isolation plans, if necessary. Generally, activities that are conducted below the OHWL result in less turbidity if work is performed in isolation from the flowing water. However, there are cases in which negative impacts from turbidity are less when work is performed in the flowing water. These cases include work in gravel or bedrock substrate and work that has a very short in-stream work component, like placing individual LWD pieces.

The effects of increased suspended solids (SS) on salmonids depend on the extent, duration, timing, and frequency of increased SS at the place where it will occur (Bash et al. 2001) Depending on the level of these parameters, sedimentation can cause lethal, sublethal, and behavioral effects in juvenile and adult salmonids (Newcombe and Jensen 1996). Behavioral effects in response to elevated SS levels include avoidance, sub-lethal effects include reduction in feeding rates, stress, gill flaring, and coughing (Spence et al. 1996).

NMFS expect adults and sub-adults to leave areas with elevated levels of turbidity that would result in significant impairment of respiration and feeding. Thus, they would be mostly affected by the effects of temporary displacement, rather than the direct effects of exposure to increased turbidity. Juveniles on the other hand are more likely to seek cover, rather than leave, and, because they are less mobile, are more likely to be exposed to construction-related turbidity.

The summer in-water work windows are designed to reduce impacts on redds and limit exposure to juvenile salmonids, thus reducing the likelihood for adverse effects to the most vulnerable life history stages from increased sedimentation. However, sedimentation from natural causes, such as rainstorms and slope failure, is mostly correlated with high flow events that occur during winter. Increased sedimentation in the summer is thought to affect salmonids more severely than in winter because fish secrete less protective mucous during that time of year (Bash *et al.* 2001).

The disturbance of the stream bed associated with many restoration actions is likely to result in a second pulse of turbidity with high fall/winter stream flows and velocities. Again, the magnitude of this increase in turbidity is related to the composition of the substrate. Generally, the finer the substrate, the higher the delayed, construction related turbidity. This second increase in turbidity can occur when eggs are in the gravel.

Lapointe et al. (2004) conducted laboratory incubation experiments to test the relative sensitivity of incubating eggs to silt (diameter less than .063 mm) and sand. Their results showed that redds can be extremely sensitive to single digit and even less than one percent increases in silt deposition. Silt loadings over 0.5 percent are detrimental to survival if sand concentrations are above five percent (Lapointe et al. 2004). At 15 percent sand mean survival decreases from 60 percent to 20 percent as silt content increases from zero to four percent (Lapointe et al,. 2004). Wu (2004) used data from previous publications to develop a model to predict embryo survival as a function of parameters that influence the hydraulic gradient and substrate permeability (gravel shape, gravel size composition, sediment deposition, and sediment size distribution). Wu's (2004) results show for a given content of fine deposition an increasing survival rate with increasing sediment diameter. Thus, depending on the sediment and spawning gravel composition eggs may experience a reduced rate of hatching due to suffocation after mobilization of sediment during the first fall/winter rain events following project construction.

In summary, work with an in-stream component in streams with sandy and finer substrate is reasonably certain to expose juvenile salmonids and redds to increased levels of turbidity. For projects constructed in isolation from the flowing water, the increase in turbidity would occur after reintroduction of flow into the work area. The combination of fine substrates and larger flows will result in higher levels of turbidity that will extend further downstream than in situations where the substrates are larger and flows are lower. Generally, the increase in turbidity could last for as little as several hours but may last for several days on larger projects. For projects constructed in the wet in coarse substrates the increase in turbidity is expected to be negligible. However, for projects in finer substrates the turbidity is likely to result in negative effects to juveniles. For projects constructed in the wet with short in-stream action, the increase in turbidity is also expected to be short in duration.

Other programmatic consultations for similar restoration projects with in-stream components assume negative downstream impacts from turbidity of 600 feet per project (USFWS 2006b) and 1000 feet (NMFS 2007). For this consultation, the applicant will report the project length and visible downstream turbidity. NMFS assume that on average within 50 percent of the visible plume significant disturbance of respiration and feeding in juveniles will occur. NMFS assume that on average the same downstream effect will occur with the first fall/winter freshets. The resulting stream miles, project length plus 50 percent of visible downstream turbidity, will be added at the project sites.

General Effects of the Proposed Restoration Activity Categories

1. Fish Passage Restoration. Installing or modifying fish passage structures will address stream blockages from culverts, tide gates, sediment bars and small diversion dams. This project category is not intended to include large scale, mainstem, hydroelectric or flood control dams or other large scale projects, or to provide passage beyond natural barriers. Restoring passage will provide access to historic salmonid spawning and rearing habitat. Long-term habitat improvements also include better bedload and debris movement. Thus, improving fish passage is expected to result in long-term benefits to abundance, productivity and special diversity of salmonids.

The loss of accessible habitat resulting from structures that block fish passage is one factor responsible for the low abundance and productivity of Washington's salmon and bull trout populations. Removing fish passage barriers is identified as a primary recovery tool in all of the salmonid recovery plans. Thus, NMFS expect significant, long-term habitat benefits to result from this project category. We expect the long-term benefits of restoring fish passage to far outweigh the short-term construction related negative impacts that will result from this project category.

The construction process for replacing culverts and removing tide gates involves significant in-stream work. It will adversely affect water quality by increasing instream turbidity during construction, and shortly thereafter. With increased turbidity, increased substrate embeddedness and pool filling are possible during and after construction, until equilibrium in and around the new structure has been established. Finally, construction for projects on larger streams and in finer substrate material will in many cases involve worksite isolation to avoid salmonid exposure to the acute effects of instream construction. While worksite isolation is a minimization practice, consisting of several measures meant to decrease fish exposure to the effects of construction activities, it likely will injure or kill some juvenile salmonids.

Worksite isolation practices include methods as simple as stream seining to "herd" fish out of the worksite, dip netting to physically remove fish, and electrofishing to shock, locate and remove those few residual juveniles that might have successfully "hidden" from other removal techniques. These techniques are meant to locate and remove all fish from worksites prior to diverting water around the construction site. None of these techniques is likely to be completely successful. Therefore, some fish are reasonably certain to be stranded during dewatering, in addition to any stress they incur during removal techniques.

2. Installation of Instream Structures. Installing instream structures will increase spawning, rearing and resting habitat for salmonids, provide places of refugia from high instream flow, and increase interstitial spaces for benthic (salmonid food) organisms. These habitats for fish are created, because each piece of wood or engineered log jam that is installed will increase the structural complexity and diversity of instream habitat. In-stream wood creates cover, pools, reduces sediment deposition in spawning gravel, and increases oxygen levels caused by turbulence as water flows over and through the structures. In areas where the width/depth ratio of the stream has been altered by removal of LWD, channelization, and land use change, the addition of in-stream wood restores historic function. Finally, instream structures can restore historic hydrologic regimes, decrease high flow velocities, and deflect flows into adjoining flood plain areas, restoring connections to juvenile refugia and rearing habitat in wetlands, old channels, and the floodplain at large.

The construction process for adding instream structure will adversely affect water quality by increasing instream turbidity during construction, and shortly thereafter. With increased turbidity, increased substrate embeddedness and pool filling are possible during and after construction, at least until equilibrium in and around the new structure establishes, after which deposition is likely to be flushed away. Finally, construction could involve worksite isolation to avoid salmonid exposure to the acute effects of instream construction. While worksite isolation is a minimization practice, consisting of several measures meant to decrease fish exposure to the effects of construction activities, it likely will injure or kill some juvenile salmonids. Worksite isolation practices are discussed above.

3. Levee Removal and Modification. Removing, lowering, breaching and setting back levees will improve floodplain and estuarine processes. Improvements are expected to increase the quality and abundance of rearing and winter habitat for salmonids, mainly juveniles. In estuarine areas in Puget Sound, the mouth of the Columbia River and the Olympic Peninsula, the removal and breaching of levees will result in improved tidal circulation and establishment of marsh/tidal channels that provide important rearing habitat for salmonid smolts.

In freshwater areas, the removal, lowering and setting back of dikes will result in improved floodplain processes, including increased floodplain connectivity, flood storage and increased availability of floodplain rearing habitat.

As shown above, this project category, in estuarine and freshwater areas, is directly linked to addressing limiting factors and improving salmonid habitat. This gives NMFS high confidence in expecting large, long-term habitat benefits to result from this project category. We expect these benefits to by far outweigh the short-term construction related negative impacts that will result from this project category.

Removing, breaching and lowering dikes and regarding/restoring hydrology in the proposed marsh areas involves the use of heavy equipment in the floodplain. Regrading of topography in the area to be re-opened area usually can be done prior to and in isolation from the water. However, dike work, even if done at low tides, will involve some water contact towards the end of construction. This will adversely affect water quality by increasing turbidity during construction. Increases in turbidity will periodically occur with major flow events and tidal cycles, till marsh vegetation is fully established. For some salt marshes increased turbidity during major flow events may persist for several years.

4. Side Channel/Off-Channel Habitat Restoration and Reconnection. Restoring access to and improving the condition of side channel habitat will increase the availability of rearing habitat and refugia from high instream flow, enhance hydrologic moderation of instream flow, and enhance habitat diversity and complexity. These functions will be accomplished by removing existing blockages to secondary channels (removing built up sediments, for example), adding structures that enhance connectivity by maintaining a functional flow regime into existing secondary channels, and constructing/revitalizing side channels.

As detailed in the associated CM 1, side channel restoration will be accomplished in isolation from the main channel with establishing a connection to the main channel being the last step. This final step is likely to result in a short-term increase in turbidity in the main-stem.

Installing in-stream structures for grade control at the outlet of the side channel will result in impacts described under "Installation of In-stream structures".

9. Debris and Structure Removal. The removal of debris including bank protection as well as the replacement of bank protection with softer bank stabilization methods will improve riparian habitat conditions including cover and shade. In addition, the installation of some bank protection structures like ELJs, root wad toes and wood groins will also provide increased rearing habitat and cover. The removal of bank protection will be combined with some riparian restoration/re-vegetation.

Thirty-three percent of Puget Sound shorelines have been modified with bulkheads or other armoring. The creation of additional estuarine habitat in the major river deltas and the restoration of shoreline processes which both can be achieved through removal of shoreline armoring is one of seven key actions the recovery plan for Puget Sound proposes, Chapter 6 (Shared Strategy 2007). Another of the seven key actions outlined by the Puget Sound Recovery Plan (Shared Strategy 2007a) is the protection and restoration of freshwater quantity. This goal will be furthered by the debris removal proposed under this action category.

The construction process for removing debris and bank protection will in some cases adversely affect water quality by resulting in a short-term increase in turbidity during construction, and shortly thereafter. As discussed above, in the freshwater environment increased turbidity can result in increased substrate embeddedness and pool filling during and after construction. In the estuarine and marine environment increased turbidity in the near-shore may impact juvenile salmonids. Finally, construction for some projects will involve partial worksite isolation (lateral coffer dams) to avoid salmonid exposure to the acute effects of instream construction. While worksite isolation is a minimization practice, consisting of several measures meant to decrease fish exposure to the effects of construction activities, it likely will injure or kill some juvenile salmonids. Worksite isolation practices are discussed above.

2.4.2 Effects on Salmon and Steelhead Critical Habitat

The NMFS established above that the only significant adverse effects on habitat would be short-term and construction related, mainly water quality effects in the form of increased suspended fine sediment and sediment deposition. The critical habitat analysis begins with a summary of the effects of the proposed restoration activity categories on critical habitat PCEs. An evaluation of how changes in PCEs affect conservation value at the watershed scale and then the species-wide scale follows.

Freshwater Spawning Sites. Hood Canal summer-run chum salmon spawn in the lower portions of natal rivers including the Duckabush River. There is no freshwater spawning for PS Chinook salmon or steelhead in the action area for any of the three PSNERP restoration projects.

Water quantity: The proposed activity categories will not reduce water quantity with the exception of short-term construction actions that require work area isolation. In these cases, water quantity in a very small area, typically a maximum of several thousand square feet may be reduced for a maximum of several days. In the long-term some projects will improve late season stream and hydraulic processes related to tidal flow in, and just upstream of the estuary. Projects that are designed to improve stream-floodplain connection such as levee removal and modification and side channel/off channel habitat restoration will result in greater storage of water in the floodplain. This water will then be available for late season in-stream recharge.

Water quality: Short-term adverse effects to water quality will occur when near or in-water construction occurs. Increased turbidity resulting from construction will last for a few hours to a maximum of a few years (levee setbacks). Minor inputs of chemical herbicides as described earlier will degrade water quality for a period of hours to days.

In the long term, many proposed restoration activities are designed to improve water quality. Planting riparian areas creates shade which will incrementally reduce summer stream temperatures. Fencing off riparian areas from livestock use will reduce chronic streambank erosion and decrease turbidity.

Substrate: Fine sediments mobilized by construction activities will settle out in downstream substrates resulting in a minor, short-term increase in substrate embededdness. Over the long term, many restoration activity categories like riparian plantings are designed to reduce inputs of fine sediment.

Freshwater Rearing Sites. Water quantity will be affected as described above. NMFS do not expect construction related adverse effects to floodplain connectivity. Long-term beneficial effects are the intent of several activity categories including levee removal and modification and side channel/off-channel habitat restoration and are the heart of each of the three PSNERP projects. These actions will restore or improve the interaction between the stream and its floodplain. They are likely to result in improved floodplain storage and incremental elevation of the water table. Water quality will be affected as described above. Minor reductions in invertebrate forage will occur as a result of short-term, small scale construction related increase in fine sediment or worksite isolation. NMFS expect that the affected construction area will be recolonized by invertebrates within a few months. Invertebrates will quickly move into restored stream areas by drift from upstream and by eggs from adults. Short-term reductions in algae and macroinvertebrates will occur as described in the analysis of herbicide effects. In the long term, all of the restoration activity categories that improve riparian function reduce inputs of fine sediments, and help to encourage establishment of healthy riparian plant community, will resulting in increased terrestrial and aquatic forage. Riparian disturbance caused by construction activities for access and site preparation will result in some minor reduction of overhead cover at project sites. In the long term, many restoration activity categories such as large wood and boulder placement, riparian fencing, and riparian planting will improve cover for salmonids and steelhead.

Freshwater Migration Corridors. Fish passage: Construction activities may temporarily impede fish passage for a maximum of a few days. In the long-term the proposed culvert replacement, tide gate removal, and removal of irrigation diversions will all improve fish passage. Water quantity will be affected as described above. Water quality will be affected as described above. Natural cover will be affected as described above.

Estuarine Areas. Construction activities in estuarine areas may temporarily impede fish passage for a maximum of a few days. In the long-term several proposed activities like the removal of tide gates, the replacement of culverts and levee removal or modification will improve fish passage, allowing access to previously blocked estuary and areas. The proposed estuary restoration projects will improve water quality, primarily by reconnecting the estuary to tidal waters. The proposed estuary restoration actions will not affect water quantity, other than by reestablishing tidal influence. The proposed removal of tidegates and levees will reestablish tidal influence and allow periodic inundations of saltwater. This will restore natural salinity levels to historic estuarine areas. The restoration of tidal influence and natural plant communities will provide more cover for salmonids and steelhead. Juvenile salmon and steelhead feed primarily on small to mid-sized invertebrates while in estuaries (Groot and Margolis 1991). Estuary restoration projects that restore natural vegetation and tidal influence will increase the amount of forage available for juvenile salmonids. Adult salmon and steelhead feed on small fish and invertebrates in estuary areas (Groot and Margolis 1991). Reestablishment of natural vegetation, tidal influence, and estuary function improves habitat for salmonids, steelhead, and their forage species. The proposed estuary restoration will increase the amount of forage available for adult salmonids and steelhead.

Relevance of Effects on Primary Constituent Elements to the Conservation Value of Critical Habitat.

NMFS used the watershed or subbasin (fifth field HUC) to evaluate effects to critical habitat. Organizing information at this scale is especially relevant to salmonids, since their innate homing ability allows them to return to their natal watersheds. Across Washington, there are several hundred watersheds with designated critical habitat for one or more listed salmonid. Most of the watersheds with critical habitat outside of Federal lands were rated as having medium conservation value.

As summarized above, the proposed restoration actions will all have long-term beneficial effects on critical habitat PCEs at the watershed scale (see also, section 2.4.3, below). The construction related adverse effects to PCEs are expected to be minor and persist for a short time (typically a few weeks). At each project site where the COE carries out restoration actions, the incremental improvements to the condition of PCEs will improve the ability of these watersheds' habitat to contribute to the conservation of listed salmonids and steelhead.

At the species-wide scale, NMFS expect that the incremental improvements to watershed condition resulting from the proposed actions will collectively enhance the habitat and VSP parameters of the listed salmonids and steelhead. All of the proposed actions are supported by either recovery plans or other major watershed analysis and thus we expect them to further recovery.

2.4.3 Effects of Planned Restoration for the Three PSNERP Actions

The following section divides the effects analysis into three separate sections. Each section focuses on one of the proposed restoration actions. The first element of each section describes the effects of each action in terms of the proposed restoration actions and their intended outcomes for processes that make and maintain habitat for listed species in each action area. Thereafter, each section briefly describes the relevance of these actions to listed species and to designated critical habitat in each action area. Because the COE submitted each action requesting consultation at the conceptual (10 percent design) stage of development, neither NMFS nor the COE possess information from which to derive a more specific analysis. By integrating the prescriptive aspects of NMFS No. NWR-2008-3593, the COE would ensure that the construction effects of each action would be minimized to the maximum practicable extent.

Duckabush River Delta Restoration

Highway 101 cuts across the intertidal river delta and estuary wetland complex. Where it crosses the wetland and small distributary channels, the highway is presently elevated on fill, with only two small culverts, thus severely affecting water flow, sediment transport, and morphology. To improve estuary processes, the COE proposes to replace existing structures with elevated structures, reconnect distributary channels, place large woody debris structures, remove fill (training berms, embankments, developed areas), and revegetate areas.

Reconnection of the north distributary channel would improve estuary processes by restoring delivery of fresh water and fluvial sediment. Removal/bridging of existing surface streets (Duckabush River Road, Shorewood Road) would reconnect freshwater and tidal flows to remnant distributary, tidally influenced channels, and tributary wetlands.

Removal of training berms along the active river channel would reconnect the river to its intertidal floodplain and wetlands, restoring floodplain and estuary wetland processes and increasing channel density. Removing these multiple stressors would restore dynamics and promote greater diversity and acreage of delta wetland habitats.

Installation of caissons or cofferdams will be required where bridge piers would be located in water prior to drilling shafts to isolate the work zone. These devices will be installed and removed during the in-water work window. Removal of piles from existing bridges will require measures to contain sediment. The most appropriate methods will be selected during the pre-construction engineering and design phase (PED). Due to the disruptive nature of pile removal and installation and the potential need for temporary fill for access, it is best to isolate the work to minimize stress and harm of salmonids. Other in-water work associated with dike breaches and rehabilitation of channels will be sequenced and timed during the summer work window to minimize exposure to salmonids, and industry standard best management practices would be used.

The need for isolation of training berm, road embankment, and road removal work and specific measures of the in-water work plan will be determined during PED. Drilling and casting the pier in place for pier installation and vibratory pile driving for ground testing and pile removal are expected to be the best methods (COE 2015). If other methods are determined to be necessary during the PED phase, then the COE will discuss with the Services whether reinitiating consultation is necessary. No blasting is anticipated, as the foundation soils are composed of soft materials. The need for and number of temporary crossings will be determined during PED phase. Because conceptual design does not afford NMFS the detail needed to analyze the effects of these elements, we assumed the complete application of the appropriate measures in Appendix A of NMFS No. NWR-2008-3598, as needed. Departure from those measures would be a basis for the COE and NMFS to consider the need to reinitiate consultations (per Section 2.10 of this opinion).

Finally, temporary crossings may be needed at the new bridge construction, culvert removal, new roadway approach sections, and two bridge removals. Most channel excavation, embankment removal, and fill removal will be accomplished with land-based heavy construction equipment. Large-diameter casing shoring may be required to keep water out and allow access to the top of the drilled bridge pier shafts. A crane will be required to set the girders in place. The temporary trestle or earth fill can then be removed. The project is expected to take two to three years to construct. Table 5 summarizes the extent of removal of stressors to hydraulic function under this proposed action.

Table 5. Stressors Removed under Full Restoration

Stressor	Full Restoration
Tidal Barrier (LF)	1,950
Fill (area) Channels	5.7 acres
Fill (area) Training Berms	0.7 acre
Fill (area) Development	2.5 acres
Nearshore Roads (LF)	Same as tidal barrier

Removing the major tidal barrier created by the presence of Highway 101 on bedload fill across the Duckabush Estuary will require activities commonly seen in transportation actions on which NMFS consults. These include, but are not limited to road removal; bridge and culvert removal; excavation to remove fill, levees and berms; and excavation to create connections to relict and other distributaries in and around the old road location. These also include building the new elevated roadway and drilling and pouring of caissons for piers on which the new elevate road will lie.

Each of these activities can cause environmental effects to which listed fish present in the action area would be exposed. The most prominent of these effects is increased turbidity in waterways receiving any overland transport of sediment disturbed by any of the activities identified above. The extent of these effects would be constrained by the application of the measures in Appendix A as was analyzed in NMFS No. NWR-2008-3593.

The effects of increased suspended solids (SS) on salmonids depend on the extent, duration, timing, and frequency of increased SS at the place where it will occur (Bash et al. 2001). Depending on the level of these parameters, sedimentation can cause lethal, sublethal, and behavioral effects in juvenile and adult salmonids (Newcombe and Jensen 1996). Behavioral effects in response to elevated SS levels include avoidance, sub-lethal effects include reduction in feeding rates, stress, gill flaring, and coughing (Spence et al. 1996).

NMFS expect adults and sub-adults to leave areas with elevated levels of turbidity that would result in significant impairment of respiration and feeding. Thus, they would be mostly affected by the effects of temporary displacement, rather than the direct effects of exposure to increased turbidity. Juveniles on the other hand are more likely to seek cover, rather than leave, and, because they are less mobile, are more likely to be exposed to construction-related turbidity. The summer in-water work windows are designed to reduce impacts on redds and limit exposure to juvenile salmonids, thus reducing the likelihood for adverse effects to the most vulnerable life history stages from increased sedimentation. However, sedimentation from natural causes, such as rainstorms and slope failure, is mostly correlated with high flow events that occur during winter.

North Fork Skagit River Delta

The proposed NF Skagit River restoration action is less environmentally demanding than the Duckabush River Estuary project in that the NF Skagit project does not require wholesale removal and replacement of a major transportation causeway. Conceptual plans combine multiple elements intended to restore the natural hydrologic, sediment, and ecological processes to a substantial portion of the North Fork Skagit River delta. These activities consist mostly of topographical changes through excavation of ground that would become exposed to the river and estuary after completing levee and berm removal, breeching, or setting-back.

The proposed restoration activities include lowering and breaching levees; constructing new levee to maintain existing level of flood risk management; excavating tidal channel network; removing shore armor, buildings, pavement, boat ramp, and roads; and vegetation planting. The need for and number of temporary crossings will be determined during the PED phase. Unlike the Duckabush restoration action, the proposed action involves no large scale roadway removal or replacement. Therefore, temporary crossings will not be necessary. Most tidal channel excavation, levee modification and construction, debris and structure removal, and planting will be accomplished with land-based heavy construction equipment. In-water work associated with levee breaches will be sequenced and timed during the summer work window to minimize exposing salmonids to turbidity or other disturbance, and industry standard best management practices would be used. Some limited earthwork with water-based equipment (i.e., from a barge) may be needed for shore armor removal, but this will be verified during PED. Need for isolation during in-water work and specific measures of the in-water work plan will be determined during PED. The project is expected to take one to two years to construct.

Table 6 summarizes the extent of removal of stressors to hydraulic function under this proposed action.

Table 6. Stressors Removed under Full Restoration

Stressor	Full Restoration
Tidal Barrier (LF)	Lower existing dike (16,140 LF)
Armor (LF)	Remove 16,140 LF of armor on dike along North Fork
Marinas (area)	Remove Blake's Resort ~ 7.5 acres

<u>Nooksack River Delta Restoration</u>

Like the proposed NF Skagit River Delta Restoration action, the Nooksack River Delta Restoration involves less demanding construction activities on the ground to complete. However, the project covers a larger area and a greater number of activities to complete.

The proposed Nooksack River restoration combines multiple elements intended to restore the natural hydrologic, sediment, and ecological processes to a substantial portion of the Nooksack delta. The proposed restoration activities include levee removals, breaches, and setbacks; channel creation and rehabilitation; hydraulic modifications (engineered diversion at the Lummi River connection to the Nooksack River); substantial property acquisition; alterations to bridges and other transportation elements; and vegetation planting.

The need for and number of temporary crossings will be determined during the PED phase. Temporary crossings may be needed at all six bridge replacements and the regrading and installation of a diversion device at the Lummi River.

Most channel excavation, embankment removal, and fill removal will be accomplished with land-based heavy construction equipment. All activities will comply with the appropriate measures identified in Section 1.3 of the opinion. Temporary trestle structures and/or local filling may be required along portions of the proposed bridge alignments to provide access for heavy equipment during construction. Large-diameter casing shoring may be required to keep out water and allow access to the top of the drilled bridge pier shafts. A crane will be required to set the girders in place. The temporary trestle or earth fill can then be removed. Drilling and cast in place for pier installation and vibratory pile driving for pile removal and ground testing are expected to be the best methods.

If other methods are determined to be necessary during the PED phase, then the COE will discuss whether reinitiating consultation is necessary. No blasting is anticipated, as the foundation soils are composed of soft materials. Construction duration for each of the six bridge replacements ranges from 10 to 18 months. The project is expected to take two to four years to construct.

2.5 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Because these activities will occur in and around waters of the U.S. regulated by the COE, we expect no direct in-water cumulative effects as defined by the ESA that are expected to occur within any of the three action areas for the three PSNERP proposed actions. Federally controlled actions (COE permit actions in the aquatic action area) dominate current and future impacts in the action area and Federal actions would require section 7(a)(2) consultation under the ESA. NMFS is not aware of any specific future non-Federal activities within the action area.

Future actions will be regulated by state and local government. These regulations are intended to restrict, but do not eliminate, increased input of pollutants and other degrading factors to low levels, although chronic low level inputs are still likely, including input of unregulated compounds such as pharmaceuticals and cosmetic elements, the effects of which are not well documented. The regulatory restrictions on water quality degradation will become increasingly important for the conservation of ESA listed species as human population increases and contaminant input levels rise over time. Regardless of the efficacy of regulatory restrictions in place, even with regulatory oversight of chronic low-level inputs of both regulated and unregulated contaminants will continue to impair water quality into the future and reduce the likelihood of successful growth to maturity for ESA listed species in the Puget Sound.

Although state, tribal and local governments have developed plans and initiatives to benefit ESA listed salmon and steelhead, NMFS cannot consider them reasonably certain to occur in its analysis of cumulative effects until more concrete steps are taken in their implementation. Government actions are subject to political, legislative and fiscal uncertainties. These complexities make analysis of cumulative effects difficult. To the extent that recovery plan actions are implemented and regulatory mechanisms are applied to on-going actions, adverse cumulative effects may be minimized, but will not be completely avoided.

There are some impacts that we predict are reasonably certain to occur into the future, such as limited upland construction, in-water traffic and commercial activities, and other habitat altering activities. As these actions all occur within the floodplain of each river system, those actions would occur under the overlay created by implementation of the FEMA National Flood Insurance Program in Western Washington, which itself has been the subject of ESA section 7 interagency consultation (NMFS No. NWR-2006-472). Therefore, although the main factor driving cumulative effects on listed salmonids in Puget Sound is population growth and associated development, that development is moderated by the results of that consultation. Accordingly, NMFS assumes that future private and state actions will continue within each action area, but at a diminished pace and with additional requirements to protect and conserve habitat quantity and quality in each action area.

The NMFS expects climate change to increasingly affect certain habitat variables such as temperature and stream volumes. Habitat conditions will also be impacted by increased flood risk as more precipitation falls as rain instead of snow, causing increased frequency and volumes of flood events that will scour eggs in the gravel and diminish available habitat for salmon (Beechie et al. 2006). These effects would be more pronounced in the upper watershed where spawning occurs, and ocean-type fish like PS Chinook salmon are less likely to be exposed to these effects because they typically out-migrate from their natal stream and rivers well before the onset of summer when water temperatures begin to increase (Battin et al. 2007). At the other end of the life cycle, adult prespawn survival and fertility may decline due to higher temperatures (Crozier et al. 2008). However, while the studies cited above project negative impacts from climate change there is still some uncertainty regarding how climate change will affect salmonids in the action area.

2.6 Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.4) to the environmental baseline (Section 2.3) and the cumulative effects (Section 2.5), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species.

The COE proposes to carry out three discrete restoration projects within the river estuaries of three rivers in Puget Sound: the Duckabush River Estuary in Jefferson County, the North Fork Skagit River Estuary in Skagit County, and Nooksack/Lummi River estuary in Whatcom County. The projects include a variety of road removal, road replacement and elevation above bedload, culvert removal and replacement with bridges, berm and levee removal and setbacks, and reconstruction of connections between extant waters of the U.S. and former distributaries and other forms of off-channel habitat.

Conditions in the environmental baseline (Section 2.3) at each of the three action areas are consistent with each other. In each action area, estuary wetland function is presently constrained by lack of hydraulic exchange and lack of connectivity to existing and former off-channel distributary habitat. The proposed actions would eliminate those baseline constraints and enable processes to occur that would continue to improve habitat conditions in each place into the foreseeable future.

To conduct these actions, contractors will have to engage in a number of excavation and other soil moving or disturbing activities, near or in waters of the U.S. that could experience occasional increases in turbidity for short distances up and downstream of the source of soil to the water. In addition, the COE would be using techniques to reduce fish exposure to construction activities such as worksite isolation, which although reducing overall exposure are reasonably certain to injure or kill a limited number individual listed fish unless they can be executed during the prescribed windows during which few, if any vulnerable individuals would be exposed to those activities.

The desired outcome of the planned restoration activities is increased function of the processes that create and maintain estuary wetland habitat (see Section 2.4.3). The benefits over time of increased functionality would be increased hydraulic exposure and interchange of estuary waters within each estuary. In addition, these changes would create added fish access to new and former off-channel distributary habitat. This habitat supports juvenile rearing for ocean-type Puget Sound Chinook salmon populations in the Nooksack and Skagit Rivers that spend more time rearing in the estuarine life history of their life cycle than do stream type Chinook populations. Increased function in the estuary would improve the capacity of the affected estuaries to support the rearing life history of affected populations in these systems, increasing their capacity to survive their subsequent, ocean life history.

Similarly, benefits of the Duckabush River Estuary restoration would accrue directly to HC Summer-run chum salmon in the Duckabush River. They rear in their natal estuary and estuary restoration is named as a priority in the Hood Canal Summer-run Chum recovery plan (HCCC 2005). The amount of potential increase in population abundance is greatest through restoration of freshwater reaches and connectivity with natal sub-estuary; full restoration of estuarine-marine waters and the natal sub-estuary appear to offer similar levels of benefit (HCCC 2005). Increases in abundance of this population would obviously help ensure against the adverse effects of other factors bearing on the conservation prospects of the ESU; prominently, poor ocean conditions (HCCC 2005).

In contrast, PS steelhead move quickly through the estuary as they emigrate to Puget Sound. Therefore, they will experience less of the benefit of increased estuary function. But the long term benefits of these actions clearly outweigh the short term detriments imposed by short bursts of increased turbidity and implementation of worksite isolation measures (PSNERP 2012). In fact, take of individual fish of during the one- to four-year construction periods for these three project would be dramatically outweighed by the increased estuarine function for each project. That increased function would enable increased productivity in all three systems which would lead to increased abundance, all other factors being equal (PSNERP 2012, HCCC 2005, NMFS 2007). Increased productivity, leading to increased abundance of individual fish comprising the populations of the ESUs of salmon and the DPSs of steelhead that spawn and rear in these three systems, will improve the conservation prospects of those ESUs and DPSs, beginning as soon as these systems' estuarine processes are restored.

The estuarine PCEs of critical habitat (Section 2.3.2) include areas free of obstruction and excessive predation with: (i) Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and (iii) Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation. Section 2.4.3 provides a description of how the proposed restoration activities would improve estuarine hydraulic interaction in ways that would improve conditions for rearing and transition to saltwater life history, before affected salmonids head to Puget Sound or the Pacific for their ocean life history. Improving the capacity of these places to better support a larger number of individual fish from the affected populations would improve the conservation prospects of those fish the ESUs and DPS. As such, this would be evidence of increasing the conservation value of these three estuaries and improving their conservation role (Hogarth 2005).

2.7 Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent activities, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of Hood Canal Summer-run chum salmon, Puget Sound Chinook salmon, and Puget Sound steelhead. Furthermore, the proposed action will not destroy or adversely modify its designated critical habitat for Hood Canal Summer-run chum salmon, Puget Sound Chinook salmon, or Puget Sound steelhead.

2.8 Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this incidental take statement.

2.8.1 Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take would occur as follows:

The proposed action will modify habitat to an extent that causes harm of some exposed fish, as defined above. Therefore, the proposed action is reasonably certain to cause take of listed fish. The habitat modification causing take will do so by impairing normal rearing behavior. The source of harm assessed in this consultation is temporary turbid conditions in all three action areas. Other sources of take include capture and handling of fish from isolated work areas in all three action areas.

The NMFS' ability to quantify the amount of take in numbers of fish depends on whether NMFS has sufficient information to determine the number of fish that will be exposed, the manner in which each exposed fish will respond to exposure, and whether those responses will fall into one of the categories of take, listed above. For take in the form of harm, this assessment can be difficult if not impossible to accomplish because of the range of individual fish responses to habitat change. Some fish will encounter changed habitat and merely react by seeking out a different place in which to express their present life history. Others might change their behavior, causing them to express more energy, suffer stress, or otherwise respond in ways that impair their present or subsequent life histories. Yet others will experience changed habitat in a way that kills them.

For the short term effects of the action, NMFS cannot predict the number of fish that would be exposed to the effects of construction. Estimates of the effects of the predicted bursts of turbid water and the worksite isolation and fish handling measures are impossible at the conceptual design phase as the precise number of fish affected by conditions resulting exclusively from the proposed maintenance of the levee cannot be determined. We can appreciate incremental changes from temporary decreases in water quality in each action area, but cannot ascertain an exact amount or location where the changes occur and to what degree it affects individual adult or juvenile salmonids.

While this uncertainty makes it impossible to quantify take in the form of harm in terms of numbers of animals injured or killed, the extent of habitat change to which present and future generations of fish will be exposed is readily discernable and presents a reliable measure of the extent of take that can be monitored and tracked. Therefore, when the specific number of individuals “harmed” cannot be predicted, NMFS quantifies the extent of take based on the extent of habitat modified (51 FR 19926 at 19954; June 3, 1986).

The extent of take from the exposure of individual PS Chinook salmon, HC summer-run chum salmon, and PS steelhead to the short term effects of the action (capture and handling, and turbidity) NMFS assessed the likely extent of habitat affected by these factors for each instance, without knowing the total number or location of those instances. However, knowing the likely outcome of each activity regardless of when or where those instances arise is the basis for programmatic assessment of take in programmatic consultation such as that in NMFS No. NWR-2008-3598 which frames the scope of these three batched consultations.

For take in the form of turbidity, water quality changes will be short in duration and result from a visible plume no larger than 300 feet downstream from the construction site. This distance of turbidity plume represents the absolute largest extent of modified habitat causing harm of listed fish that would occur under the exemption provided in this statement.

For take in the form of worksite isolation, we expect that no more than 1,000 juvenile salmonids (PS steelhead, HC chum salmon. and PS Chinook salmon) will be captured at each project site. Based on previous experience with work area isolation carried out with the proposed protective measures, we expect no more than 5% of these fish will be injured or killed.

2.8.2 Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.8.3 Reasonable and Prudent Measures

"Reasonable and prudent measures" are nondiscretionary measures to minimize the amount or extent of incidental take (50 CFR 402.02). "Terms and conditions" implement the reasonable and prudent measures (50 CFR 402.14). These must be carried out for the exemption in section 7(o)(2) to apply.

Reasonable and prudent measures are nondiscretionary measures to avoid or minimize take that must be carried out by cooperators for the exemption in Section 7(o)(2) to apply. The COE has the continuing duty to regulate the activities covered in this incidental take statement where discretionary Federal involvement or control over the action has been retained or is authorized by law.

The NMFS believes that full application of conservation measures included as part of the proposed action, together with use of the reasonable and prudent measures and terms and conditions described below, are necessary and appropriate to minimize the likelihood of incidental take of listed species due to completion of the proposed action.

The COE shall:

1) Minimize incidental take from construction activities (fish capture and handling, and increased turbidity).

2) Prepare and provide NMFS with plan(s) and report(s) describing how listed species in the action area would be protected and/or monitored and to document the effects of the action on listed species in the action areas.

2.8.4 Terms and Conditions

The terms and conditions described below are non-discretionary, and the COE or any applicant must comply with them in order to implement the reasonable and prudent measures (50 CFR 402.14). The COE or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following terms and conditions implement reasonable and prudent measure 1:

a. The COE shall implement each minimization element of NMFS No. NWR-2008-3598 by incorporation into project design as the COE proceeds from the concept to 30, 60, and 90 percent design phase as described in section 1.4 of this opinion.

1) for all three PSNERP actions, the COE shall submit to NMFS additional information on the design and construction plan for each action as the COE proceeds through the design process and prior to initiating construction.

2) information the COE provides under 1(a)(1) must include an express description of measures the COE determinations it cannot implement along with a rationale for not incorporating the measure into the restoration design. All such information must be sufficient to provide the agencies a basis to determine whether they need to reinitiate consultation under section 2.10 of the opinion.

2. The following terms and conditions implement reasonable and prudent measure 2:

Track and monitor the project to ensure that the conservation/minimization measures are meeting the objective of avoiding and minimizing take, including turbidity monitoring during construction. The COE shall monitor turbidity levels and erosion control activities, including minimization measures and BMPs, to ensure that the project complies with Washington State water quality standards (this consultation does not exempt take associated with exceeding water quality standards). The COE shall report the results of the turbidity monitoring and the effectiveness of the erosion control BMPs and other minimization measures, to NMFS within 60 days of project completion, including the following information at a minimum:

a) Starting and ending dates of construction including starting and ending dates of in-water work;
b) Total length of repair;
c) As-built drawings if any construction elements were not installed per plan;
d) Results of turbidity monitoring and BMP effectiveness.
e) Number of fish captured, injured, or killed during work area isolation.

2.9 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). NMFS makes no additional conservation recommendations in these consultations.

2.10 Reinitiation of Consultation

As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) the amount or extent of incidental taking specified in the incidental take statement is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

2.11 "Not Likely to Adversely Affect" Determinations

The NMFS considered whether the proposed actions are likely to adversely affect SRKW in the context of effects of the proposed actions will have on PS Chinook salmon, a primary food item of the SRKW. The proposed restoration actions will cause adverse effects in the habitat of PS Chinook salmon that NMFS has determined could injure or kill individual PS Chinook salmon. However, the number of individual fish that could be injured or killed by the proposed actions is so small that NMFS does not anticipate the proposed action would decrease the extent of available food for SRKW in any measureable or meaningful way. To be sure, any decrease in the amount of fish available attributable to the effects of the proposed actions would be far too small a number to actually injure a single SRKW for lack of food. Therefore the effects of the action on SRKW would be insignificant in the short term before the restoration actions are completed. Stated another way, the action will not cause take of SRKW.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the consultation information provided by the **COE** and descriptions of EFH for Pacific coast salmon (PFMC 1999) contained in the fishery management plans developed by the Pacific Fishery Management Council and approved by the Secretary of Commerce.

3.1 Essential Fish Habitat Affected by the Project

The proposed action will adversely affect EFH for Pacific Coast salmon.

3.2 Adverse Effects on Essential Fish Habitat

The relevant effects of each of the three PSNERP restoration actions include temporary and spatially constrained increases in turbid water as described in Sections 2.4.1 and 2.4.2. Other effects that bear only on fish and not fish habitat (i.e. fish handling for worksite isolation) are not included here.

3.3 Essential Fish Habitat Conservation Recommendations

The measures required in the ESA consultation to minimize the effects of construction on water quality would have a similarly conservative effect on EFH. Therefore, NMFS recommends the COE implement Term and Condition 1(a)(1), above, in its entirety. Fully implementing these EFH conservation recommendations would protect, by avoiding or minimizing the adverse effects described in Section 3.2, above, approximately 20 acres of designated EFH for Pacific coast salmon.

3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, COE must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5 Supplemental Consultation

The COE must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1 Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the COE and others with an interest salmonid conservation in and around Puget Sound. The format and naming adheres to conventional standards for style.

4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, ‘Security of Automated Information Resources,’ Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3 Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this document contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA consultation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
7600 Sand Point Way N.E., Bldg. 1
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Refer to NMFS No:
WCR-2015-3719

April 11, 2016

Evan Lewis
Chief, Environmental and Cultural Resources Branch
Seattle District, Corps of Engineers
P.O. Box 3755
Seattle, Washington 98124-3755

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Puget Sound Nearshore Restoration Project (PSNERP), consisting of three Civil Works ecosystem restoration actions in the Duckabush, Nooksack/Lummi, and North Fork Skagit River Estuaries (Jefferson, Skagit, and Whatcom Counties, Washington)

Dear Mr. Lewis:

Thank you for contacting our North Puget Sound Branch Chief regarding our recently completed consultation on the action identified above. We appreciate your candor regarding the Army Corps of Engineers (COE), Seattle District's requirements for securing funding for the underlying projects. With this letter, NMFS clarifies elements of our cover letter and biological opinion to fully assure the COE that the completed consultation provides full compliance with Section 7 of the Endangered Species Act for the three sites recommended for Corps approval, authorization, and construction under the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP).

On November 13, 2015, the COE sent NMFS three individual actions (which taken together represent the recommended plan for PSNERP) to be processed under the NMFS's 2008 Programmatic Consultation with the COE on Fish Passage and Restoration actions in Puget Sound (NMFS Nos. NWR-2008-3598, expired in 2013, and WCR-2014-10665, expired in 2014). The COE's expectation was that the pending consultation on habitat restoration actions intended to replace the 2008 Programmatic Consultations would be (1) similar in process requirements to the 2008 processes, and (2) conclude on a schedule that would accommodate the project timeline of the Corps proposed action. This consultation on habitat restoration actions was initiated by a letter from the COE to NMFS on December 10, 2014).

As devised in early 2015, the proposed consultation strategy was to conclude the new programmatic consultation on various applicable habitat restoration actions, and thereby analyze the PSNERP proposed actions under the new framework. That strategy was expected to result in a streamlined Section 7 consultation process for PSNERP. The new programmatic consultation is still in process as of the date of our PSNERP Biological Opinion. To meet Section 7 consultation requirements and since the COE submitted information covering these three actions in the format dictated in NMFS No. NWR-2008-3598, NMSF coordinated with the COE to determine the most efficient method for conducting ESA section 7 interagency consultation on the three actions. As a result of those discussions, NMFS and the COE determined to batch all three actions into a single biological opinion for PSNERP. This biological opinion is to include project-specific consultations on the actions and incorporate all relevant information from the expired restoration programmatic opinion. NMFS relied on available design information, measures present in the PSNERP program, and the prescriptive and some analytical elements in NMFS No. NWR-2008-3598, for the consultation, which commenced on January 22, 2016.

On February 11, 2016, formal consultation was completed for these thee PSNERP actions (NMFS Biological Opinion No. WCR-2015-3719). In the final opinion, NMFS considered each of the three PSNERP actions on their merits via batching those considerations for efficiency and to streamline reviews.

In the incidental take statement (ITS), the terms and conditions are described to implement the reasonable and prudent measures. The ITS is structured to ensure the record is completed over time, accounting mainly for the lack of important construction details available during the feasibility phase of the project. According to information available on the PSNERP, the program is structured such that after completing the planning phase, further detail regarding project plans will be captured in subsequent phases at 30, 60, and 90 percent design. That information will be essential in showing that the COE has integrated the specific prescriptive elements described in section 1.3 of the biological opinion (the COE's Proposed Action). The most efficient method for doing so is for the COE to submit to NMFS additional information on the design and construction plan for each action as the COE proceeds through the design process and prior to initiating construction. That information will enable the COE to work collaboratively with NMFS to discern whether or not the provisions of section 2.10 (Reinitiation), which are described by statute, have been triggered. Note that this type of interagency collaboration is typical on projects during the design phase and provides the opportunity to catch issues early that could otherwise trigger reinitiation if not identified until later. The main emphasis is to communicate on the project to move through design and into construction in an efficient manner that is consistent with the scope of the completed Section 7 consultation. Note that, absent one of the standard triggers to reinitiate consultation, the collaboration outlined in the ITS does not provide NMFS with an opportunity to add new RPMs, Terms and Conditions, or other additional requirements to the project.

As for the second Term and Condition in Section 2.8.4 of the BiOp), it contained one inadvertent clause that is not relevant to PSNERP, and we therefore incorporate the following in place of that subsection of the ITS:

a) Starting and ending dates of construction including starting and ending dates of in-water work;
b) As-built drawings if any construction elements were not installed per plan;

c) Results of turbidity monitoring and BMP effectiveness.
d) Number of fish captured, injured, or killed during work area isolation.

The National Marine Fisheries Service, Oregon-Washington Coast Area Office appreciates this opportunity to clarify our agencies' understanding of the opinion and to ensure the adjustments mentioned herein are part of our record. Thanks for your open and collaborative approach to addressing them. If you have further questions or comments, please do not hesitate to contact David Hirsh, North Puget Sound Branch, at 206-526-4506 or david.hirsh@noaa.gov.

Sincerely,

Elizabeth Babcock for

William W. Stelle, Jr.
Regional Administrator