Endangered Species Act - Section 7 Consultation

Programmatic Biological Opinion

Addressing

Oil and Hazardous Substance Spill/Release Response Activities in Selected Areas of Idaho, Washington, and Oregon

U.S. Fish and Wildlife Service Reference Number:
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Action Agencies: U.S. Environmental Protection Agency, Region 10
U.S. Coast Guard, 13th Coast Guard District

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Date

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INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (USFWS or FWS) biological opinion (opinion) addressing the consequences of ongoing U.S. Environmental Protection Agency (EPA) and U.S. Coast Guard (USCG) (collectively: "the action agencies") implementation of future emergency response actions (= activities) subject to the provisions of the *Northwest Area Contingency Plan for the Response to Spills of Oil and Hazardous Substances* and other legal requirements on federally listed species and their designated critical habitats. This opinion was prepared in accordance with the requirements of section 7 of the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 et seq.). Your request for formal consultation was received on July 16, 2018.

This opinion is based on information presented in the EPA and USCG's biological assessment (EPA and USCG 2018, entire; BA), as amended, summarized or described herein, and other sources of available information. Any substantive differences between the BA description of proposed activities, as later amended in separate communications from the EPA and USCG, and the proposed action description contained in this opinion are unintentional. A complete decision record of this consultation is on file at the USFWS Columbia-Pacific Northwest Regional Office in Portland, Oregon.

Species and critical habitats addressed in the opinion are as follows: the Spalding's catchfly (*Silene spaldingii*); Bliss Rapids snail (*Taylorconcha serpenticola*); Oregon spotted frog (*Rana pretiosa*) and its critical habitat; bull trout (*Salvelinus confluentus*) and its critical habitat; Kootenai River white sturgeon (*Acipenser transmontanus*) and its critical habitat; marbled murrelet (*Brachyrampus marmoratus*) and its critical habitat; streaked horned lark (*Eremophila alpestris strigata*) and its critical habitat; and the western snowy plover (*Charadrius alexandrinus nivosus*) and its critical habitat.

The action agencies requested our concurrence for their determination that the implementation of the proposed action may affect, but is not likely to adversely affect (NLAA), several additional listed species and their proposed or designated critical habitat. During the consultation period, we evaluated each species and were able to determine that these additional species and their critical habitat did not require formal consultation. These species and critical habitats are listed in Appendix A. Our concurrence that the proposed action may affect, but is not likely to adversely affect these species and their proposed or designated critical habitat, including analysis and justifications for those determinations, are presented in Appendix A, together with conservation measures (CMs) described in the proposed action that serve to avoid adverse consequences to these species and their critical habitat. The National Response Team Memorandum of Agreement (MOA) (consistent with the ESA statute and regulations) clearly states, "During an oil spill event which may affect listed species and/or critical habitat, emergency consultations under the ESA are implemented (50 CFR 402.05) for oil spill response actions…(if) listed species or critical habitat have been adversely affected by oil spill response activities, a formal consultation is required, as appropriate. Informal emergency consultation shall remain active until the case is closed." However, based on our analysis of implementation of the proposed action description, the USFWS programmatic consultation response will resolve 7(a)(2) responsibilities for NLAA listed species and NLAA proposed and designated critical habitats in the action area providing the CMs are fully implemented as described. Therefore, in the action area, additional consultation will not be needed for listed species or proposed or designated critical habitat for which a programmatic NLAA determination was made unless reinitiation is required due to failure to follow prescribed CMs. These listed species and their proposed or designated critical habitats will not be discussed further in this opinion.

Consultation History

On October 8, 2014, USFWS staff attended a Regional Response Team for EPA Region 10 (RRT 10 or RRT) Executive Committee meeting in Portland, Oregon. The meeting focused on a 60-day NOI received by the EPA and USCG on September 3, 2014, from the Center for Biological Diversity (CBD) and Friends of the Columbia River Gorge for failure to consult with the USFWS on the NWACP.

On October 31, 2014, the USFWS received a request from the EPA and USCG for a list of threatened or endangered species and critical habitat that may be present in the project action area.

On November 19, 2014, the USFWS provided a species list to the EPA and USCG.

On January 7, 2015, the USFWS attended a "kick-off" meeting in Portland, Oregon, with the action agencies, and National Marine Fisheries Service (NMFS) and Department of the Interior (DOI) representatives. At this meeting, we discussed NMFS and USCG suggestion to complete consultation for a geographic subset of the plan area. One thought was address only areas adjacent to rail lines, which was the primary concern here for CBD. I referenced the legal issue - failure to consult on the plan as a whole - is the courts would not consider consultation complete. We also discussed NMFS and USCG desire to complete consultation in a manner that would eliminate the need to conduct emergency consultations for individual response events. USFWS staff generally expressed concern that a consultation on the NWACP would not likely eliminate the need for the action agencies to address further 7(a)(2) responsibilities during emergency response events.

On January 24, 2015, the USFWS attended a consultation task force meeting in Portland, Oregon, with the USCG, EPA, and NMFS.

On April 21, 2015, and again, on May 8, 2015, the EPA and USCG presentation, *Spill Response 101,* was attended by USFWS staff POCs from each affected office. We also discussed use of the emergency action notification form prepared by a previous task force effort.

On June 9, 2015, USFWS staff attended the first full task force meeting in Lacey Washington, to "settle on the scope and approach for accomplishing ESA S7 consultation on the Northwest Area Contingency Plan". We covered the following topic areas: action area, analytical framework, plan level consultation, conservation focus, matrix approach for deconstructing the action, and lead office. Notably, the action agencies proposed to focus the action area on a high risk (of spills) area map.

On August 5, 2015, the USFWS received via email from the EPA an update on the EPA and USCG progress on establishing the Statement of Work (SOW) and contracting efforts in general.

On September 15, 2015, the EPA, USCG, USFWS and NMFS met in Lacey, WA, to discuss how to find species information online and review the final SOW for contractor support for the BA. In addition, we discussed efforts of the National Environmental Compliance Subcommittee of the National Response Team (NRT) to provide further guidance for implementation of the national Memorandum of Understanding (MOU) for spill response planning. Lastly, we addressed use of chemical dispersants.

On October 30, 2015, the USFWS received via email from the EPA an update on the action agencies' progress, that they had obtained contractor support to complete a BA.

On December 15, 2015, EPA, USCG and their contractors (BA working group) met with the USFWS, NMFS and DOI in Portland, Oregon. At this first meeting with the contractors, we discussed roles, responsibilities, and components of the BA, including description of the proposed action, species list, extent of the action area, establishing the environmental baseline, the inclusion of spill scenarios, national spill planning, and emergency consultation procedures. The USFWS agreed to provide physical support to the BA by helping to refine the list of potentially affected species presented by the EPA and USCG at the meeting, and by providing information to assist in developing species assessments.

On January 7, 2016, the USFWS emailed EPA and the USCG a technical assistance document titled, *Northwest Area Contingency Plan: WA State Species List & Related Recommendations*.

On January 12, 2016, the BA working group, including USFWS and NMFS, met to discuss work schedule and participation, components of the proposed action, best management practices, interrelated and interdependent actions, action area extent, oil in the baseline, a refined species list, and refined emergency consultation procedures. Notably, the EPA and USCG mentioned they may or may not seek coverage pending internal clarification on what specific actions, such as hazing and preapproved activities we will attempt to address.
On January 25, 2016, the USFWS received, via email, a draft BA template (including a first draft description of the project and action area) for our consideration from the EPA and USCG.

On February 22, 2016, the USFWS received draft action area maps in an email from the EPA and the USCG.

On March 9, 2016, the USFWS emailed an updated species list to the EPA and the USCG.

On March 22, 2016, the USFWS emailed comments and proposed edits to the draft project and action area description to the EPA and the USCG.

On April 26, 2016, the BA working group met with the USFWS and NMFS via phone to discuss progress and next steps with regard to BA development. We discussed how the incident command structure affects the NWACP process, development of Best Management Practices (BMPs), CMs, and the proposed action. Notably, the USFWS requested the EPA and USCG strongly consider the use of a tabular matrix approach to deconstructing the proposed action into specific components, together with our standardized exposure-response-effects of the action analysis support structure, as this approach would go a long way toward providing the details needed for us to complete our biological and conference opinion in a timely manner.

On August 15, 2016, the EPA and the USCG emailed a revised proposed action and action area description to the FWS.

On August 31, 2016, the FWS emailed comments on the revised proposed action and action area descriptions to the EPA and USCG in response to their August 15, 2016, request. In addition, beginning on this date, and for a period ending on October 5, 2016, we provided species status information to the action agencies for use in the BA.

On September 16, 2016, the consulting parties discussed, via a conference call, FWS comments on further refining the proposed action description and draft matrix tables. We also discussed the relationship of the NWACP to geographic response plans (GRPs), components of *in situ* burning, and further refinement of the species list.

On October 11, 2016, the BA team, including FWS and NMFS staff, met to discuss further refinement of the species list and the draft activity matrix. We also discussed 'no effect' determinations under consideration by the EPA and the USCG.

On January 10, 2017, the BA team, including FWS and NMFS staff, met to update the status of various components of the BA. In addition, the need to ensure the matrix approach properly aligns with HQ guidance was discussed.

On March 1, 2017, the EPA and USCG emailed the FWS the environmental baseline section of the BA for our consideration; on March 14, 2017, the FWS emailed the action agencies our first set of comments on this section.

On March 14, 2017, the FWS and NMFS participated on a conference call with the BA team to discuss FWS review comments on the draft environmental baseline section and to discuss the EPA and USCG proposed approach for the effects of the action analysis section of the BA.

On April 20, 2017, the USFWS received a letter from the action agencies requesting an updated species list. The USFWS provided a formal response on May 31, 2017.

On August 8, 2017, the USFWS received an email from EPA and USCG requesting FWS review of the complete first draft of the BA.

On October 12, 2017, the USFWS emailed comments on the draft BA to EPA and the USCG.

On November 29, 2017, the EPA and USCG emailed a document to the FWS titled *USFWS Species Determination Summary*. The summary contained a table presenting: (1) the preliminary effect determination for each species; (2) the rationale for that determination; (3) comments received on the effect determinations; and (4) our interpretation of those comments, as well as clarifying questions and/or discussion points.

On December 4, 2017, the FWS emailed a request to the EPA and USCG encouraging them to initiate consultation at the time the next version of the draft BA was completed.

On January 19, 2018, the BA team, including FWS and NMFS staff, convened a conference call to discuss comments and the schedule for completing the preparation of the BA.

On January 29, 2018, the FWS sent an email to the action agencies requesting clarification regarding whether they intended to request initiation of formal consultation following consideration of FWS comments and guidance to date. Additional guidance and information were also provided by the FWS regarding the next steps in the consultation process.

On July 16, 2018, the EPA and USCG emailed (followed by a hard copy) the final draft BA and a cover letter to the FWS requesting initiation of formal consultation.

On August 29, 2018, the USFWS sent a letter to the EPA and USCG acknowledging their request to initiate formal consultation.

On December 17, 2018, the USFWS provided the action agencies with a revised draft of the proposed action for their consideration. It included corrections made to certain assumptions in the BA, and new information relevant to informing effect determinations.

On March 19-20, 2019, the EPA and USCG emailed a response to the USFWS version of the proposed action description, including several corrections and clarifications. This was followed by an agreement by the USFWS to use the term "Programmatic Consultation" to describe the the nature of this consultation.

On June 26, 2019, the USFWS received a supplemental BA from the action agencies to clarify elements of the proposed action.

On 19 September, 8 and 22 November, and 13 December 2019, the USFWS met with the EPA and USCG to clarify several aspects of the proposed action and expectations surrounding future emergency consultation. At this time, it was mutually agreed that we are engaged in a programmatic consultation, with expectations of future emergency consultations when appropriate.

On February 11, 2020, the USFWS provided a draft biological and conference opinion to the action agencies for their consideration.

On April 24, 2020, the USFWS received an email from EPA containing two documents: one presenting a consultation timeline, and another addressing their concerns with the description of the proposed action.

On April 28, 2020, the USFWS, Department of the Interior-Regional Ecosystem Officer (DOI-REO), EPA, and USCG met to discuss and successfully resolve action agency concerns identified in the April 24 email and attachments referenced above.

On May 29, 2020, the USFWS received EPA and USCG comments on the draft biological opinion.

On June 23, 2020, the USFWS provided a second draft biological opinion for EPA and USCG review.

On September 25, 2020, the USFWS received separate responses on the second draft of the BiOp from the EPA and USCG.

BIOLOGICAL AND CONFERENCE OPINION

Description of the Proposed Action

The proposed action generally addresses EPA and USCG oil spill response activities in the action area in accordance with section V.A. (4) of the National Response Team Memorandum of Agreement (MOA), and the provisions of the Northwest Area Contingency Plan (NWACP). The NWACP provides guidance for spill responses by the USCG and EPA. EPA and USCG authority and responsibility to respond to oil spills are contained in Federal law and regulation, specifically OPA 90, amendments to the CWA and CERCLA, and regulations at 40 CFR 300 (as described below). The NWACP was developed to improve spill response effectiveness and provide consistency between NW spill response protocols and guidance published at local, state, and national scales. Under the NWACP, the EPA and USCG are responsible for coordinating multi-jurisdictional interagency emergency responses to spills of oil or other hazardous material within the NW Area, which is defined as the inland and coastal zones of Washington, Oregon, and Idaho.

The NWACP defines specific protocols that spill responders may use at various levels of an interagency, multi-jurisdictional response organized to facilitate efficient and effective spill response actions. The NWACP also provides decision tools for non-mechanical countermeasures (e.g., chemical dispersion, *in situ* burning) intended to maximize the effectiveness of such measures and to minimize negative consequences to valued resources and human populations. In addition, the NWACP identifies conditions under which the USFWS will be contacted or consulted with on matters of spill response planning, execution, and outcomes.

The underlying assumption of the BA evaluation is that in the event of a spill, implementing an appropriate response action would provide greater protection for ESA-listed species and critical habitats than not responding to the spill. Decisions made during an emergency spill response focus on protecting and reducing risks to human health and the environment, including ESA-listed species and critical habitats, from exposure to a spilled material.

Mechanical countermeasures are the primary response actions, intended to deflect, exclude, or contain and recover oil or other spilled material before it can come into contact with and impact ecological resources. Non-mechanical countermeasures include response actions that alter the physical or chemical properties of the spilled material (specifically petroleum or oil-like materials) such that the options for recovery are improved, or the overall impacts on the environment of spilled material that cannot be recovered are potentially reduced.

Coastal and inland zones are defined in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] 300.5). The coastal zone is defined as all United States (US) waters subject to the tide, US waters of the Great Lakes, specified ports and harbors on inland rivers, waters of the contiguous zone, other waters of the high seas subject to the NCP, and the land surface or land substrata, ground waters, and ambient air proximal to those waters. The inland zone is defined as the environment inland of the coastal zone excluding the Great Lakes and specified ports and harbors on inland rivers. The term inland zone delineates an area of Federal responsibility for response actions. In the NW area, the precise boundaries are determined by agreement between the EPA and USCG as set forth in the NWACP (Section 1320) consistent with the NCP. The coastal zone extends to the limits of the exclusive economic zone (EEZ, 200 nm).

The NWACP was jointly prepared by the EPA, USCG, Washington State Department of Ecology (Ecology), Idaho Office of Emergency Management, Oregon Department of Environmental Quality (ODEQ), and members of the Northwest Area Committee (NWAC) who serve as the EPA Region 10 Regional Response Team (RRT 10).

EPA and USCG regulatory authority to respond to oil spills is defined under the OPA of 1990, which was an amendment to the CWA. This response authority is triggered by a discharge or threat of discharge of oil to surface water. If such a discharge or threat of discharge exists, these action agencies are authorized to direct response actions in order to protect human health and the environment.

The regulatory authority that the EPA and USCG use to respond to hazardous materials incidents comes from the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, also known as "Superfund"). This authority is triggered by a release of hazardous materials that immediately impact human health or the environment. This law includes a petroleum exclusion clause. There does not need to be a tie to surface water for the EPA and USCG to respond to spills of hazardous material.

The NCP is the regulation that defines how the EPA and USCG will exercise the authorities granted within CERCLA and the OPA. The NCP requires the creation of Area Contingency Plans. The NCP is the regulation that defines how the EPA and USCG will exercise the authorities granted within CERCLA and the OPA. Regulations at 40 CFR 300.210 also require the creation of a Regional Contingency Plan to support responders and provide overarching guidance to ACPs. The NWACP is a consolidated plan containing the two Captain of the Port ACPs, the EPA inland ACP, the states' response plan and the regional contingency plan. As described in the NWACP, a decision was made to combine response plans required at the Federal and State levels into one plan to facilitate collaboration and compliance with Federal and State regulations. The scope of this consultation is limited to Federal actions carried out, authorized or funded by the Federal On-Scene Coordinator (FOSC) authority as described above.

Response Planning Under the Northwest Area Contingency Plan

Spill response planning in the NW is accomplished through the development of a series of interrelated plans, for which the NWACP provides overarching sideboards. The NWACP uses the structure and priorities set forth in the NCP (40 CFR 300) and applies them in the NW.

The purpose of the NWACP is described in the BA as follows:

- To provide for orderly and effective implementation of response actions to protect the people, cultural resources, and natural resources of the coastal and inland zones of the NW from the impacts of a discharge of oil or other hazardous substance;
- To promote the coordination of and describe the strategy for a unified and coordinated federal, state, tribal, local, and other involved party response to a discharge of oil or other hazardous substances;
- To provide consistency with the NCP and provide guidance for facility and vessel spill response plans prepared for the NW; and
- To provide guidance to all holders and viewers of facility and vessel response plans to ensure consistency with the NWACP.

The NWACP contains both administrative and technical guidance for all members of the response community to follow during an emergency response to a spill and sets up procedures designed to minimize the imminent threat to human health or the environment from an uncontrolled release of oil or other hazardous substance. The administrative structure for responding to an incident is described herein. However, the action agencies have requested consultation on the potential consequences of spill response actions resulting from implementation of the NWACP as described in the BA, though not on implementation of the administrative aspects (e.g., incident command structure) of the NWACP.

The NWACP guidance is organized by first providing a description of policy (Chapters 1000—8000) organized by the National Incident Management System Incident Command System (ICS) positions. These sections provide administrative guidance that establishes how spill response actions should be organized, managed, and funded. Chapter 9000 contains information on response tools (e.g., identifying wildlife deterrence resources [Section 9311] and derelict vessel BMPs [Section 9330]); these sections are indexed by the ICS position or section most likely to use the information. This technical guidance describes countermeasures that have been approved for use as part of spill response actions.

The NWACP focuses predominantly on oil spill response, with a single section devoted to hazardous materials spill response (Section 7000). The regulatory mandate for Area Contingency Plans is limited to oil response. However, because of the overlap in response agencies, response organization, and personnel, response to hazardous materials incidents is included in the NWACP. With few exceptions, the same response tools are used to respond to spills of both oil and other hazardous materials. The exceptions are discussed in the BA proposed action section, are hereby incorporated by reference, and described below. In addition, hazardous material responses are typically short in duration, lasting only one to two days. Once released, hazardous materials begin to dissipate into the environment and the emergency response action ends when the material can no longer be recovered. Oil, on the other hand, does not mix with water, and response actions can recover oil and remove it from the environment. This recovery typically lasts no more than four days but could extend up to a week, rarely extending more than two weeks, and can involve invasive tactics that are described in Section 2 of the BA and below. EPA and USCG responses that last more than four days are outside the scope of this consultation, and may trigger emergency consultation with the Services.

Response Action Command Structure and Coordination

The type, size, and area of a spill will determine the response, including whether the EPA and USCG will be directly involved. Similarly, the response and ICS structure will be scaled to the appropriate level based upon the incident. As described further later in this document, the majority of spills in the NW are small, the average release is 100 gallons or less, and are often cleaned up by oil spill response organizations or the state without direct involvement by the EPA or USCG. However, in the event of an unplanned release of oil or other hazardous material to the environment, response actions are taken, regardless of the size of the spill, to achieve the following objectives (NWACP Section 4500):

- Ensure the safety of citizens and response personnel;
- Control the source of the spill;
- Maximize protection of environmentally and culturally sensitive areas (including ESA-listed species and designated critical habitats);
- Contain and recover spilled product;
- Recover and rehabilitate injured wildlife;
- Manage a coordinated response effort;
- Remove oil from impacted areas;
- Minimize damage to economically sensitive areas; and
- Keep the public and stakeholders informed.

Most incidents that occur in the U.S. are managed according to the ICS, which provides a standardized structure to command, control, and coordinate emergency response through a common hierarchy and information flow (see Figure 1.1 of the BA). The selection and implementation of site-specific response actions are ultimately at the discretion of the Incident Command (IC). For federalized responses, the IC is led by a FOSC. For incidents occurring in the coastal zone where the USCG maintains and manages Federal emergency response teams, the Sector Captain of the Port or other designated representative is the FOSC. The EPA manages Federal response teams in the inland zone and provides a FOSC for incidents occurring inland.

The ICS can be scaled-up or -down depending upon the size and complexity of the emergency response. In the event of a large incident, an incident command post is established near the incident to direct the overall response. This incident management team is normally structured to include six major functional sections: Command, Operations, Planning, Logistics, Finance and Administration, and the recently added Intelligence and Investigations (FEMA 2008, entire).

Many responses require only an Incident Commander; however, responses to large or complex incidents require management through Unified Command (UC). A UC includes, but is not limited to, an FOSC, a State On-Scene Coordinator, a representative of the Responsible Party, and Local and/or Tribal On-Scene Coordinators (NWACP Section 2000).

The Command, either a UC or a single Incident Commander, is responsible for selecting, prioritizing, and implementing response strategies that will meet the objectives of the NWACP as listed above. During a spill, responses are modified as environmental conditions change or additional information becomes available.

Every response strategy has uncertainties, along with potential environmental tradeoffs, evaluated as part of the action selection process. The spill response community relies on training and exercises to reduce uncertainties. The commanders rely upon their training and/or input from the Environmental Unit (EU) to ensure that at-risk environmental resources, such as threatened or endangered species and designated critical habitats, are properly protected within the scope of response resources available or mobilized during an emergency spill response.

Monitoring is an inherent part of response operations and the scope of the monitoring can be dictated by the EPA or USCG via an Assignment List (ISC 204 form), a section of the Incident Action Plan, which is essentially the work order for the responders. In situations where there may be elevated concerns about potential impacts to listed species (e.g., snowy plover habitat during the nesting season), the EPA and USCG will rely upon USFWS to assist in determining if wildlife monitors are necessary and assist in identifying qualified wildlife monitors to support the response.

The USFWS has been identified as having roles in the response in both the EU and the Wildlife Branch of the Operations section of the incident management team. It is the policy of the NWACP that representatives of the USFWS will assume the positions of Director and Deputy Director of the Wildlife Branch. Representatives from State fish and wildlife departments will assume these positions if designated by a USFWS representative or if a USFWS representative is not available. If there is a significant marine mammal response component to an incident, a representative from the NMFS may be appointed to the position of Deputy Director. Unless otherwise indicated by the

USFWS, the Wildlife Branch Director position will be delegated to the Washington Department of Fish and Wildlife (WDFW) for spills that occur within the legal boundaries of Washington State.

The Wildlife Branch Director is responsible for implementing the operational guidelines and standard of care requirements in both marine and fresh waters, including the following information referenced in the NWACP Section 9310 and 9311: USFWS Best Practices for Migratory Bird Care During Oil Spill Responses (USFWS 2003, entire); the Bird Hazing Manual: Techniques and Strategies for Dispersing Birds from Spill Sites (Gorenzel and Salmon 2008, entire); Washington Sea Otter Response Handbook (WDFW 2009, entire); and the Killer Whale Hazing and Monitoring Plan (NOAA Fisheries 2014, entire). The Wildlife Branch Director will coordinate with technical staff from the National Oceanic and Atmospheric Administration (NOAA) and NMFS for spills within marine environments. At this time, there are limited wildlife operations protocols for inland or fresh water responses (e.g., there is no plan in the NWACP for hazing or moving salmonids that may be affected by a spill in a river). GRPs (described in Section 1.2.2 of the BA) are in the process of being updated to include ESA-listed species and habitats, including inland waters. The coordination of spill response planning and implementation with the requirements of the ESA is also addressed in the *NWACP Section 4314: Endangered Species Act*, and is discussed further in the BA, Section 1.2.2, and below.

The final level of response planning occurs at the local level and includes vessel- and facility-specific plans. The hierarchy and relationships among the various NW spill response plans are shown in Figure 1-2 of the BA and in Appendix D below.

Emergency spill response under the NWACP focuses on the implementation of both mechanical and non-mechanical countermeasures as described in Chapter 9000. The NWACP incorporates guidance on the use of non-mechanical countermeasures because of their greater potential for impacts to the environment and resources. Furthermore, it describes the decision process leading to the selection of a non-mechanical countermeasure to evaluate tradeoffs associated with implementation (i.e., magnitude of environmental harm versus benefit). Additional details are provided in Section 1.2.3 of the BA and in supplemental documents to the NWACP such as GRPs (discussed in Section 1.2.2 of the BA) and are hereby incorporated into this biological opinion and described below. A list of the supplemental documents that may be utilized during a response action, including a list of GRPs, is provided in Appendix A of the BA.

Role of Geographic Response Plans (GRPs)

The NWACP is supplemented by GRPs, which contain spill response strategies for specific coastal and inland waters of Washington, Oregon, and Idaho (BA Figures 1-3a, 1-3b, and 1-3c, respectively). GRPs are plans that guide spill response and include tactical response strategies tailored to a particular shore or waterway. They are considered part of the NWACP but are distributed and revised separately. GRPs are developed at a much smaller scale than the NWACP, with regional GRPs typically covering less than 483 kilometers (km) (300 miles) of shoreline and describe use of individual strategies on a small scale (e.g., a stretch of shoreline). They are intended to facilitate the immediate (i.e., 12 to 24 hours post-spill) response to a release of persistent oil. GRPs can be accessed through the same website that provides the NWACP: www.rrt10nwac.com.

GRPs are developed cooperatively by the EPA, USCG, and members of the NWAC, with the respective states taking the lead. Revisions can be made at any time, and the States have begun working with the USFWS to improve integration of details about listed species and habitats. The Washington marine waters GRPs, including the GRP for the lower Columbia River (LCR), are maintained by Ecology and USCG. GRPs for the Spokane, Snake, and Middle Columbia Rivers are jointly maintained by Ecology and EPA (Region 10). For Oregon, coastal GRPs are maintained by ODEQ and USCG, and the Lower Deschutes River GRP is maintained by EPA (Region 10). GRPs for Idaho are maintained by EPA (Region 10).

GRPs identify natural, cultural, and significant economic resources in a specific region, and describe, and prioritize response strategies to minimize damages to these resources during an emergency response. Within the GRPs, sensitive resources (or "resources at risk") are broadly defined to include human and cultural resources, as well as species and habitats of concern (i.e., not just ESA-listed resources). GRPs are updated periodically in response to changing local conditions and public input. The GRPs are developed as guidelines for response actions at the local scale, and strategies described in GRPs are developed to be consistent with the NWACP and NCP.

As GRPs are written or updated, trustee agencies are consulted to ensure that any information regarding resources at risk is accurate and complete. When a spill happens at a location covered by a GRP, Federal and State responders refer to the GRP to answer several questions, such as whether there are water intakes likely to be involved, where booms should initially be placed, and what resources may be impacted by the spill. Responders do not have the expertise to ensure that spill response actions will not unnecessarily damage resources at risk. Therefore, responders rely on trustee advice to achieve a net environmental benefit; they use the GRPs to ensure that they coordinate with the correct trustee agency regarding response tactics. For example, the Clearwater/ Lochsa GRP specifically identifies summer steelhead as being threatened under the ESA and potentially present in the area. This information triggers responders to contact the NMFS and request assistance in making response decisions.

The approval and implementation of GRPs are not addressed in the BA as a part of the proposed action. However, any and all emergency response activities that are implemented based on the stand-alone GRPs (=local ACPs) are covered herein providing they are included in the BA or developed at a later date in a manner consistent with the BA proposed action description, as amended by the EPA/USCG, and providing their implementation does not result in new effects not previously considered in this opinion.

Coordination of Response Activities with the ESA

A national interagency MOA between the EPA, USCG, and the USFWS (EPA et al. 2001, entire) is included by reference in the NWACP (EPA 2018, entire). The purpose of this MOA is to provide a process to facilitate effective and efficient action agency coordination with the USFWS to protect ESA-listed species and critical habitats during an emergency response. The MOA specifies when and how the USFWS will be engaged and addresses the roles and responsibilities of each agency during the pre-spill planning activities, spill response, and post-spill activities. The purpose of the MOA is to provide a structure to avoid or minimize adverse effects on ESA-listed species and critical habitats from response actions undertaken by the EPA and/or USCG. The MOA also provides a process for conducting ESA Section 7 consultations before and after incidents and recommendations for addressing potential impacts to ESA-listed species or critical habitat.

In accordance with the MOA, prior to an incident, the USFWS is encouraged to participate in developing response methods that are incorporated into the NWACP, guidance documents, and in periodic response training. The USFWS has consistently collaborated with RRT10 to provide technical assistance and participate in training for these purposes, and as a result has greatly strengthened understanding of process and procedures and our collective roles and responsibilities.

Once a spill has occurred, the FOSC may contact the USFWS via the DOI Regional Environmental Officer, who engages USFWS assistance in developing methods to help avoid and minimize impacts to ESA-listed species and their critical habitats (and other sensitive resources) that may be affected by (=that may be exposed to) the response action. The USFWS shall request but cannot require EPA/USCG to consult or reinitiate consultation. The USFWS will not stipulate use of a specific method for initiating additional consultation. While the USFWS and EPA/USCG are mutually responsible for requesting reinitiation of consultation, as appropriate, the Federal action agency is ultimately responsible for meeting ESA section 7(a)(2) responsibilities for actions they undertake.

In most cases, spill response actions do not cause adverse effects to a listed species or critical habitat, therefore, initiation of post-emergency formal consultation is not often required. If, after the emergency is under control, it is determined that response activities likely caused an adverse effect to a listed species or critical habitat, the USCG and/or EPA will provide documentation of the action and activities that occurred, including any adverse effects to listed species or critical habitat, the recommendations that were made to avoid and minimize such effects, and the results of implementing those recommendations. This information will be used to inform, in part, the BA and any subsequent formal consultation that would be conducted as soon as practicable after the spill response is complete (see 50 CFR 402.05; Endangered Species Consultation Handbook, Chapter 8). If a formal consultation is warranted, the USFWS prepares a post-spill biological opinion evaluating the action agencies' response actions, and documenting the information and recommendations exchanged during the emergency consultation. Figure 1-4 of the BA illustrates how response planning is coordinated with the requirements of the ESA.

Although not addressed as part of the proposed action, staff from the USFWS may also be involved with the long-term cleanup phase of spill response to ensure that regulatory mandates are followed. Post-emergency response activities are subject to the standard ESA requirements and are not addressed in this consultation. Long-term post-emergency response actions may include:

- Evaluation of cleanup/decontamination options;
- Implementation of cleanup alternatives; and
- Long-term monitoring or remediation of the impacted area, if necessary.

Decision Process for Use of Non-Mechanical Countermeasures

Spill responses in the NW can be hampered by a number of factors, such as the distance between the spill and response equipment and personnel, access, weather, sea conditions, and topography. Dispersants or *in situ* burning can help minimize the impacts of oil when mechanical recovery is limited and the risk of environmental harm from the oil is great. The use of dispersants (chemical countermeasures) and *in situ* burning (a chemical countermeasure when an accelerant is used) for oil spills requires an additional decision-making process under the NCP and NWACP (EPA 2018, entire) that is not applicable to mechanical countermeasures (see discussion above). The use of dispersants does not apply to hazardous materials other than oil, and the use of *in situ* burning does not apply to hazardous materials other than crude or refined petroleum products.

No other non-mechanical countermeasures have been pre-approved for use in the NWACP. Any proposal for additional countermeasures would require incident-specific RRT10 approval and input from the USFWS to ensure that effects of the action on species or critical habitat are considered during selection of a response action. Those countermeasures include shoreline cleaning agents, herding agents, and solidifiers.

Decisions regarding the use of chemical countermeasures (e.g., dispersants) must take into account the resources at risk, the size of the spill, the physicochemical properties of the type of oil spilled, the feasibility of the response action, and site-specific conditions (e.g., waterbody type, weather conditions, and whether sensitive species are in the vicinity of the oil spill).

Considerations for biological resources and their habitat include:

- The expected duration of the impacts – What is the expected recovery time for potentially oiled habitat or fish and wildlife resources? How long might the oil remain in impacted habitats before reaching a "safe" concentration? What is the duration that listed species are present in potentially oiled habitat; what season(s) are they present; and are they present at the time of the spill (and response)?
- The type(s) of affected substrates – Is it feasible to clean the oiled substrate along the shoreline? Will cleanup result in greater injury to important (e.g., critical) habitat than leaving the hazardous material in place?
- Habitat quality and pattern – Is the potentially oiled habitat isolated and/or sparsely distributed over the landscape (e.g., critical habitat)? Is the habitat of very high quality? Will off shore chemical countermeasures reduce habitat quality more than oil on the shoreline?

Chemical Dispersion

Chemical dispersants have never been used to respond an oil spill in the NW. The overarching criterion for decision-making with regard to the use of dispersants is that the dispersion of oil must be less harmful than allowing oil to reach sensitive areas or to affect marine life at the ocean surface (e.g., sea birds, marine mammals). Figure 1-5 in the BA shows the decision process flow chart regarding the use of dispersants in a Case-by-Case Authorization Zone during an emergency response action.

The dispersant use policy in the NWACP (Sections 4610 through 4616) defines the zones where the use of dispersants is either pre-authorized, decided on a case by-case basis, or not approved. These areas are described below.

By policy, "No Dispersant Use Zones" are areas where dispersants will never be applied. These areas include:

- Marine waters that are both less than 3 nautical miles from the US coastline <u>and</u> less than or equal to 10 fathoms (60 feet [ft.]) in depth;
- Marine waters south of a line drawn between Point Wilson (48º 08' 41" N, 122º45' 19" W) and Admiralty Head (48º 09' 20" N, 122 40' 70" W) (border defining primary entrance to Puget Sound from the Pacific Ocean); and
- Freshwater environments (i.e., the inland zone).
- Case-by-Case Authorization Zones (not covered by this consultation) are areas where RRT 10 must approve each application of dispersants, which is done on the first day after a spill occurs and includes:
- All US marine waters in Puget Sound and the Strait of Juan de Fuca that are both within 3 nautical miles from the coastline or an island shoreline and greater than 10 fathoms (60 ft.) in depth;
- Waters designated as a part of a National Marine Sanctuary and waters that are part of the Makah Tribe Usual and Accustomed marine area and that are also greater than 10 fathoms (60 ft.) in depth;

- The Strait of Juan de Fuca and North Puget Sound from Point Wilson to Admiralty Head and north, and greater than 10 fathoms (60 ft.) in depth; and
- Waters within 5 km (3 miles) of the border of the country of Canada or the Makah Tribe Usual and Accustomed marine area.

In the absence of pre-authorization, the FOSC must formally request to use dispersants in Washington or Oregon's marine waters. Activities that are not pre-approved are not addressed in this consultation. Dispersant Pre-Authorization Zones (covered by this consultation) are areas where the FOSC has the authority to apply dispersants without incident-specific RRT 10 approval. These areas (shown on Figure 1-6 of the BA) include US marine waters 3 to 200 nautical miles from the coastline outside Puget Sound and the Strait of Juan de Fuca or an island shoreline, except for waters designated as a part of a National Marine Sanctuary and the Makah Tribe Usual and Accustomed fishing areas.

Prior to an FOSC exercising their authority to apply dispersants in a pre-authorized area, they must complete a checklist (See Section 9406 of the NWACP) verifying that:

- The oil is dispersible (based on the oil type, location, and state of weathering and sea conditions);
- The planned dispersant is on the NCP Product Schedule of allowed dispersants (currently, only Corexit® EC9500A is stockpiled for use in the NW area, making it the most likely product to be used, although other dispersants on the NCP Product Schedule could be applied);
- Mechanical response options alone will be inadequate to contain and recover spilled oil, and the dispersant application would provide the most environmental protection to potentially exposed wildlife and shorelines;
- Appropriate equipment is available for dispersant application and monitoring;
- If needed, staff will be available to observe wildlife that should be avoided; and
- Natural Resource Trustees, specifically Federal, state, or tribal officials who are to act on behalf of the public to manage and control natural resources, have been contacted regarding threatened and endangered species and essential fish habitat that have the potential to be impacted by the oil spill and dispersant application response action.

Subsea dispersant use is not a response action identified in the NWACP because the NW area has no offshore structures such as oil wells or drilling facilities, and as a result, subsea dispersant applications was not evaluated in the BA.

In Situ Burning

Decision-making regarding *in situ* burning of oil (NWACP Section 4617) should take into account information similar to that considered for dispersant use. Burning of oil may be considered if mechanical countermeasures alone would be ineffective at collecting and removing oil from the aquatic environment; burning is feasible (based on the oil type, location, and state of weathering and sea conditions); and burning can be conducted at a safe distance from populated areas or sensitive resources. Prior to any *in situ* burning operation, the FOSC will use the decision tree shown in

Figure 1-7 of the BA to guide the decision-making process. This decision process includes notification of Trustees and Tribes, as appropriate, and establishing a group of technical experts (e.g., resource trustees, agency representatives, and industry/consultant technical experts) to help evaluate whether the use of *in situ* burning is feasible and appropriate for the specific incident (NWACP Section 9407.1.3). This process will include coordination with the USFWS, who provide recommendations for how to avoid or minimize impacts to threatened and endangered species or critical habitats from burning oil or burning activities.

The NWACP lists two *in situ* burning areas—Pre-Authorization and Case-by-Case Authorization Areas—that delineate locations and conditions under which burning operations may occur.

<u>Pre-Authorization Area</u>

In situ burning is pre-authorized for any on-water area that is more than 5 km (3 miles) from human population, defined as 100 or more people per square mile. A map of *in situ* burn pre-authorization and case-by-case areas intended to assist oil spill responders who are considering the use of in-situ burning of a spill to marine open waters or the inland environment can be viewed at the following link. https://waecy.maps.arcgis.com/apps/webappviewer/index.html?id=13a6c63a1f9a438583726292e0adb816. The EPA does not intend to utilize preauthorization in the inland zone; decisions about use of *in situ* burning in inland areas more than 5 km (3 miles) from human population will be decided on a case-by-case basis. Within the pre-authorization area under proper conditions, FOSCs have the authority to ignite the spilled oil either with or without using burning agents without RRT approval.

<u>Case-by-Case Authorization Areas</u>

In situ burning is decided on a case-by-case basis for any areas within 5 km (3 miles) of human population and in all inland areas under EPA jurisdiction. FOSCs must receive incident-specific RRT approval for *in situ* burns in case-by-case areas where use of burning agents are being considered. Case-by-case *in situ* burning is not a covered activity and will not be addressed further in this consultation.

Emergency Consultation

Emergency consultation is generally triggered for all response actions that may affect listed species or designated critical habitat. The USFWS acknowledges that oil and hazardous spill response actions qualify as an emergency action under the ESA. The ESA, NCP MOA, NWACP, subject BA, and this opinion acknowledge that the nature of an emergency response does not allow for a normal consultation process. Instead, emergency consultation procedures are followed as described in the NCP, and consistent with the ESA and implementing regulations (50 CFR 402). The NCP MOA provides guidance consistent with the ESA section 7 consultation implementing regulations and policies on how the EPA, USCG, USFWS, and NMFS will work collaboratively before, during, and after an emergency and provides templates for required documentation. The Federal action agencies have initiated this consultation to resolve their ESA section 7(a)(2) responsibilities in the proposed action area associated with the implementation of the proposed action (see BA), subject to the provisions of the NWACP. The goal of this consultation is to develop measures that would largely reduce the need for formal emergency consultation when response actions are implemented during spills in the action area. Those response tools are listed and described in Table 2-2 of the BA and Appendix E below.

Only pre-authorized uses of chemical countermeasures and other activities in the action area are considered in the proposed action. The following activities are not considered part of the proposed action, and their potential consequences to listed species and critical habitat are not addressed in this opinion. These activities will remain subject to emergency consultation provisions at the time of an emergency response:

- Spill responses occurring outside the action area.
- Spill response actions lasting greater than 96 hours.
- When the RRT is activated to make a decision on using a chemical countermeasure in navigable water (NCP Subpart J):
    - Use of dispersants in areas outside the dispersant use pre-authorization zone (NWACP Sections 4000 and 4612); see Figure 1-6 for pre-authorized dispersant use area.
    - Use of chemical dispersant formulations other than Corexit® EC9500A.
    - Use of chemicals other than dispersants (i.e., shoreline cleaners, solidifiers, bioremediation) (NWACP Section 4000).
    - Use of burning agents (a.k.a. accelerants) to initiate and/or sustain *in situ* burns in the case-by-case *in situ* burn area and in the inland zone (NWACP Section 9407).

Dispersant use considered in the proposed action is pre-authorized for use only in US marine waters 3 to 200 nautical miles from the coastline outside Puget Sound and the Strait of Juan de Fuca or an island shoreline, except for waters designated as a part of a National Marine Sanctuary and the Makah Tribe Usual and Accustomed fishing areas. Use of dispersants in all other areas require incident-specific RRT approval and will not be addressed further in this opinion. *In situ* burning is approved only on a case-by-case basis for any areas within 3 miles of human population and in all inland areas under EPA jurisdiction.

Summary

The EPA and USCG, as the Federal action agencies, are required under 40 CFR 300 (NCP) to coordinate multi-jurisdictional emergency responses to the spill of oil or hazardous material within waters of the U.S. The NWACP was developed to improve spill response effectiveness and provide consistency between NW spill response protocols and guidance published at local (e.g., GRPs), State, and national (i.e., NCP) scales. The NWACP is a consolidated plan consisting of two USCG Sector ACPs, the EPA inland ACP, the affected States' response plan(s) and the EPA Region 10 response plan.

Spills of hazardous material are regulated under CERCLA, which grants authority to the action agencies to respond to any such spills. Releases of oil that might impact waters of the US are regulated under the CWA, which grants authority to the action agencies to respond. Jurisdiction for spills of oil that will not impact water lies with the state where the spill occurs.

The NWACP is organized in a series of chapters providing recommended protocols (processes on use of schedule J products are required) to be followed by spill responders at various levels of the ICS, including the FOSC. The NWACP, as well as the NRT guidance on ESA consultations, identifies many conditions under which the USFWS is to be contacted or consulted on matters of spill response planning, execution, and outcomes, consistent with the NCP, MOA (EPA et al. 2001, entire), and the ESA and its implementing regulations.

The BA focuses on the potential effects of spill response actions carried out by the action agencies within the proposed action area (see Section 2 of the BA for a description of the action area). Within the context of the response activities addressed in the BA, as implemented under the guidelines of the NWACP, any spilled material is considered part of the baseline condition at the time of any future response action, and thus not a proposed activity under the BA subject to this programmatic review, with certain exceptions as follows. For example, dispersed oil or burnt residues generated by non-mechanical countermeasures (i.e., chemical dispersant application, *in situ* burning) are subject to evaluation because exposure of listed species or critical habitat to these products would not occur in the absence of the spill response. Decision tools provided in the NWACP for non-mechanical countermeasures are intended to maximize effectiveness of such measures and to minimize effects of the action to valued resources and human populations. These actions, in addition to all others, are discussed in more detail in Section 2 of the BA and below.

Description of Response Tools and Methods

This section briefly describes the response tools that may be implemented during emergency spill response.

The response tools and activities identified in the NWACP and addressed in this consultation are listed in Table 2-1 of the BA and Appendix D below, along with elements of the response actions that could potentially impact ESA-listed species and designated critical habitat, the habitats where each response action can be effectively employed, and the groups of species that might be affected by the response action.

Table 2-2 of the BA and Appendix E below, describes each response action, including the areas where they may be implemented, the factors affecting where and when they are used, the elements influencing potential exposures of ESA-listed species, the potential stressors, and the CMs used by spill responders to minimize potential effects of the action. Additional information regarding spill response actions is provided below.

In Table 2-2 of the BA and Appendices A and E below, proposed CMs are shown in plain text. Those that are not explicitly included in the NWACP but are standard practices are shown in italics in Table 2-2 and Appendix E. The BA assumed that all CMs pertaining to the selected response action(s) described in Table 2-2 (including those related to supporting actions common to most responses) will be followed in the event of a spill response. In some cases, Table 2-2 of the BA describes the potential for exposure to oil in association with a response action, or stressors generated by the oil during the response; however, the presence of oil and oiled substrates is assumed in the baseline condition. For this reason, the analysis of effects of the action will focus on the response activities themselves and will be considered together with impacts of the oil or spilled materials presented in the environmental baseline section below. Response actions are intended to have a net benefit on the environment in all cases.

Tables 2-1 and 2-2 of the BA (see Appendices D and E below) include several supporting response actions that are common to most spill response strategies (e.g., use of vessels, vehicles, or heavy machinery; waste management); these activities may be conducted in addition to any mechanical or non-mechanical countermeasure(s). As a result, any impacts of the mechanical or non-mechanical countermeasure(s) will be addressed together with the consequences of supporting actions common to most spill responses.

Spill response can be a complex action involving multiple entities and activities (as described in Section 1 of the BA and herein). There are means within the ICS that allow the response to expand as needed. If a response covers a large area, the UC may establish divisions for operations based upon geographical areas. There also may be a need for groups labeled according to the job that they are assigned to (i.e., Sampling Group, Disposal Group, Shoreline Protection Group, etc.). The Operations Section Chief manages operations within a region and works under the Incident Commander (IC) or Unified Command (UC). Finally, there are task forces, which comprise a combination of mixed resources with common objectives operating under the direct supervision of a Task Force Lead. Operational Branches manage operations within a region and work under the IC Section Chief. Finally, there are task forces, which comprise a combination of mixed resources with common objectives operating under the direct supervision of a Task Force Lead.

The point of describing the organization of the ICS implementation structure of the spill response is to demonstrate the complexity of operations and activities that are directed under the UC. The functions and activities implemented by these divisions, groups, and task forces, although under the direction of the UC, do not all involve NWACP implementation decisions related to the response on the ground, which is the action under consultation.

Hazardous Material Spill Response

Chapter 7000 of the NWACP presents guidance on the response to spills of hazardous materials. The tools and techniques used to respond to chemical (non-oil) spills and oil spills are similar. Both response types use comparable supporting actions, deflection and containment, and removal and cleanup (BA Table 2-1 and Appendix D below).

The response to a hazardous material spill depends in large part on the chemical properties of the released material, which affect the transport and fate of the material in soil, sediment, air, and water. When the hazardous material is a gas, typically transported and stored under pressure, the responses focuses on stopping the leak and monitoring impacts as the chemical dissipates. Table 2-1 in the BA and Appendix D below outlines the access and monitoring activities performed during these emergency responses. Chemicals that are hydrophobic and adsorb to solids (soil and sediment) can be cleaned up through removal of the contaminated media, similar to the method used for oil spills. Materials that are immiscible liquids (i.e., substances that do not mix with water) are cleaned up with the same tactics as oil spills.

However, some hazardous materials are miscible or have a high solubility and will readily dissolve in water. When these materials mix with surface water, they are difficult to remove, and there is no other course of action than to allow them to dissipate, as was the case for Gold King Mine in Colorado. In this example, the spill was contained in the river, but it was not possible to remove the liquid waste from the river. In cases where the spilled materials affect the dissolved oxygen or pH of the receiving water, bubblers, lime, or phosphoric acid are used to bring these parameters back into normal range. This typically happens in ponds or ditches where the quantity and flow of water is limited, and therefore both the chemical and treatment have a significant impact. These activities are unique to hazardous material spills.

Supporting Actions Common to Most Response Actions

Several response actions are used in most spill responses, including use of vessels, use of vehicles or heavy machinery, use of aircraft, staging area construction and use, solid waste management, and liquid waste management. Solid and liquid waste management are discussed in Section 2.2.2.3 of the BA.

Use of Vessels, Aircraft, Vehicles, and Heavy Machinery. A variety of vessels, vehicles, and heavy machinery are used in spill response actions to transport materials and individuals, as well as in the execution of response actions such as booming, vacuuming, and skimming, or mechanical excavation. The type and size of vehicle, vessel, or machinery used is determined based on its capabilities relative to spill-specific needs. Small responses may only need to deploy a workboat and a couple support vehicles. Large responses will likely require multiple vessels, including airplanes and helicopters to transport personnel and to monitor the spill and response actions. Planning by the EU regarding the type and number of vessels to deploy will be invaluable when developing response tactics to respond to a large spill.

Staging Area Establishment and Use. Staging areas are locations where incident personnel and equipment are placed awaiting tactical assignment. Staging areas may include on-site storage and transport of hazardous and non-hazardous materials. If possible, staging areas are established in existing large paved areas that provide access to both the spill site and transportation networks. For spills in navigable waters, established boat ramps and piers are used as staging areas if possible. When spills occur in remote areas, staging areas may need to be constructed on developed or undeveloped land (including points of access), but this is avoided when possible.

Waste Management. Solid and liquid waste handling and associated activities are common to all response actions apart from natural attenuation. Response actions produce large volumes of waste (e.g., contaminated soils, used sorbents, personal protection equipment) that must be handled, stored, decontaminated, transported, and/or disposed of properly. Protocols that comply with state and federal regulations are in place for the storage and transfer of all solid, hazardous, or petroleum wastes that may be generated during recovery and cleanup activities to minimize the reintroduction of wastes into the environment and protect habitats, endangered species, and response workers.

Waste handling and storage are required throughout a spill response. Materials (e.g., soil, sediment, and snow) used to construct diversion and exclusion or containment structures may be contaminated by the spilled material due to leaching or other processes, generating additional wastes to be handled and disposed of properly. Some spilled materials may be pumped or suctioned directly into storage tanks or drums for either recovery or treatment and disposal. Pumping and suctioning usually entrain large volumes of water that must also be stored and treated. In the case of viscous oils, reheating might be required prior to pumping.

Land storage of wastes (e.g., in barrels, tanks, or piles) prior to final disposal might contribute to soil compaction or other habitat modification at a spill site. These impacts can be minimized by limiting pumping or suctioning to conditions under which it would entrain the least amount of water, using chemical agents to reduce the volume of water requiring treatment, reducing the storage footprint, and using the least sensitive on-site location to store wastes.

The handling, transport, and disposal of wastes requires the use of heavy machinery and vessel or overland transport. Accidental release is possible during the handling and storage of wastes, as mentioned above, as well as during transport. Extreme weather or other conditions may increase the likelihood of an accidental release during handling or transport. An accidental spill (e.g., transport vehicle accident) may also pose a threat of ignition and/or explosion. Burning may produce particulate and/or toxic gas emissions.

It is possible that the volume of waste produced by the response operations will exceed the capacity of local waste receivers. In this event, disposal at multiple sites will be required. There are also some wastes (e.g., oil emulsions, oily water, and hazardous wastes) that cannot be treated and must be transported. In these cases, longer transport distances could increase the possibility of spills or other accidents.

Under ideal conditions, spilled products can be recovered and reused, reducing the wastes generated by a response action. Some chemical agents can separate oil from water or other materials, allowing the volume of wastewater that requires treatment or disposal to be reduced. Waste disposal involves either direct disposal (i.e., without treatment) or treatment and then disposal.

Wastes can be incinerated (on site or off site), but any incineration of waste in the NW is subject to federal and state air regulations.

Decanting – Decanting during on-water recovery (in open marine water) is a form of liquid waste management that is preauthorized for use within the first 24 hours of a spill and thereafter with UC approval for situations where there is insufficient capacity to store the volume of recovered oil and contaminated water (see NWACP Sections 4620 and 4621). Specifically, the decanting process involves the collection of large volumes of oil and water (e.g., using skimmers, vacuums, or other recovery equipment), allowing the water and oil to separate within a separation tank, and then discharging the water that may contain a small amount of oil. The decanting process separates the water from the oil so that most of the oil is removed from the water and there is no visible sheen during discharge (NWACP Section 4621.2). The criteria are similar to requirements for shipboard oily water separators limiting the discharge of oil into the oceans to 15 parts per million (ppm) and no visible sheen when excess water is discharged (EPA 2011, pg. 3). The NWACP considers the decanting of water from recovered oil and return of excess water into the response area as vital to the efficient mechanical recovery of spilled oil because it allows maximum use of limited storage capacity, thereby increasing recovery operations.

Pre-authorization applies only to decanting on water; shore-side container decanting is not authorized for pre-approval. The decanting form from the NWACP must be completed and approved before shore-side container decanting can proceed. The NWACP stipulates several measures that are intended to control the release of oil in decanted water. For example, decanted water must be discharged into a containment area (e.g., surrounded by a containment boom) where there is additional recovery equipment (e.g., skimmers) to recollect oil.
On-water decanting is pre-authorized for the oil products listed below:

- All crude oils,
- Vacuum gas oils,
- Atmospheric gas oils,
- Recycle oils not containing distillates,
- Bunker fuels,
- No. 6 fuel oils,
- Cutter stocks, and
- Coker gas oils.

Decontamination - During a spill response action, all personnel, hand tools, equipment, vehicles, and vessels must be decontaminated in a manner that does not reintroduce oily wastes into the natural environment. The decontamination process involves a multi-stage flushing procedure that removes and collects such wastes. The wastes are then stored and treated in accordance with state and federal regulations.

Mechanical Countermeasures - Mechanical countermeasures are primary response actions that are intended to deflect, exclude, or contain oil or other spilled material before they can further impact ecological and cultural resources. Mechanical countermeasures include:

- Deflection and containment
- Booming
- Berms, dams, or other barriers; pits and trenches
- Culvert blocking
- Recovery of spilled material
- Skimming/vacuuming
- Passive collection of oil with sorbents
- Removal/cleanup
- Manual and mechanical removal of oil and oiled material (including sediment reworking)
- Vegetation and woody debris removal and disposal
- Ambient temperature, low pressure flooding/flushing
- Pressure washing/steaming or sandblasting
- Physical herding

Deflection and Containment - Deflection or containment actions may involve deploying booms or constructing structures, such as earthen berms, on land to contain and collect a spilled material. In upland environments, the placement and configuration of controls is often based on detailed drainage patterns and topography. The mapping or modeling of winds, currents, and tidal patterns, in conjunction with real-time observations, may be used to support the placement and configuration of booms and sorbents. Section 9302 of the NWACP provides specific guidance on deflection and containment strategies, equipment, and methods across a range of currents.

Deflection booming - A boom is a floating barrier that is used to contain buoyant spilled materials in aquatic environments (i.e., open water, nearshore, rivers, and lakes) until it can be removed, deflect oil away from sensitive areas, divert oil toward recovery sites, or exclude oil from entering a sensitive area. Fire booms are used to concentrate spilled oil in preparation for an *in situ* burn. The use of defensive or containment booms is one of the first response actions called for in the GRPs, which are part of the NWACP (as discussed in Section 1.2). Although GRPs are discussed in the NWACP and will be used, as appropriate, during a spill response, in some cases they are developed independently of the Action Agencies by state agencies. Because of this, GRPs are not evaluated in the BA. This is discussed in greater detail in Section 1.2 of the BA.

Boom designs are specific to the environment in which they will be used; however, booms are less effective in conditions of rough water, high winds, or fast currents (Stevens and Aurand 2008, entire). In current greater than 1 knot, booms are set on angle to allow the oil to flow along the boom rather than become entrained under it (EPA 2018, pg. 2-32). Boom systems consist of floating boom sections ranging from approximately 15 to over 229 centimeters (cm) (6 to over 90 inches) in height (which may include hanging curtains), buoys, and an anchoring system. Configurations vary according to the site-specific conditions and purpose (e.g., containment versus deflection). Booms are set to most effectively collect or move oil at the surface; sizes and configurations are designed to avoid making contact with the substrate, as this could compromise the efficiency of the boom. Generally, shorter-draft booms are used in fresh water and river systems. Deeper-draft booms are used in open water as they provide more stability in the tide, wave and wind influenced areas.

In most cases, deployment involves the use of one or more large vessels and/or small workboats with associated crew(s). Shore-side workers and heavy machinery on barges or piers may also be used if boom ends are anchored onshore. In open water, booms are in most circumstances deployed between two vessels to concentrate the spilled substance or oil slick for recovery actions (e.g., skimming). During deployment, a boom may be moved and repositioned to maximize its effectiveness at containing, excluding, diverting, or deflecting oil, as explained in the NWACP Section 9301.

Berming - Filter fences, berms, dams, pits, and trenches are used to divert or contain spilled materials in terrestrial or riparian environments. These physical barriers are in most circumstances used in conjunction with skimming or other recovery techniques (e.g., sorbents, vacuuming).

The construction of these physical structures in most circumstances requires the use of heavy machinery (or hand construction, depending on location) to install man-made materials (e.g., filter fences, sand bags, air- or water-filled seal booms) or place natural substrates (e.g., soil, snow, ice rubble). If water flow from a bermed area is necessary, an underflow culvert or weir may be included in the construction of a berm or dam. There is also activity associated with construction as equipment and personnel are mobilized to and from the site.

Culvert blocking - Open culverts present a potential route for spilled material to enter otherwise unaffected areas. To eliminate this threat, culverts may be blocked with a temporary or permanent fixture (e.g., plywood, plug, plastic sheeting, and sandbags). Culvert blocking may also be achieved using deflection booming (as discussed above) near the culvert.

Recovery

The recovery of spilled oil is often an important component of an oil spill response action and is typically carried out in conjunction with containment, diversion, deflection, and/or removal actions. In the case of uncontaminated petroleum products, recovered material is reprocessed and refined for commercial use. Several technologies or processes, including skimmers, vacuums, sorbent materials, and manual or mechanical removal, may be used in recovery, depending on the environment in which the spill occurred, the nature and amount of the material spilled, and the behavior of the material following release. Highly refined petroleum products such as gasoline, diesel, and kerosene tend to evaporate from the water very quickly, even during winter months. A significant portion of any crude oil spill in open water will also evaporate if the crude oil is not recovered within the first 24 to 48 hours after a spill (NOAA et al. 2010, pg. 69). Overall, recovery efforts in open water tend to have limited effectiveness. Recovery efforts tend to be most effective in calm waters (e.g., lakes or protected marine areas); the effectiveness of recovery in flowing streams tends to be low.

Skimming. Skimmers are mechanical devices that collect oil or other floating contaminants at the water's surface through suction or sorption. They are designed to minimize the intake of water and maximize the uptake of spilled material but often generate wastewater that requires additional space (on land or shipboard) for storage and treatment. The efficiency of skimmers is limited if the water is rough; if aquatic vegetation, floating debris, or ice is present; or if the floating material is too viscous. Skimmers are used in marine and fresh water. They are most effective in slow water and

are focused on collecting oil at the water's surface. A vessel may be used to tow boom to coral the spilled oil toward the skimmer.

Vacuuming. Vacuums may be small, portable units or truck/vessel-mounted units used to remove pooled or stranded material (typically oil), regardless of the viscosity. Large amounts of water may be entrained during the vacuuming of floating material and require storage, treatment, and disposal. In routine use, vacuuming is limited to the immediate water surface to avoid entrainment of organisms, debris, and substrate as well as excessive volumes of water. Vacuuming may be used, albeit rarely, during recovery of non-floating oil.

Passive Collection of Oil with Sorbents. Sorbents collect spilled materials, particularly petroleum or similar products, through either adsorption (adherence to the sorbent surface) or absorption (penetration of the pores of the sorbent). Natural and mineral sorbents include peat moss, straw, snow, and clay. Synthetic sorbents are inert and insoluble materials that are generally manufactured in particulate form and are designed to be spread over an oil slick or deployed as sheets, rolls, pillows, or booms. They are, in most circumstances, deployed by hand or machine to the spilled material (either floating or on land) and are removed and replaced once coated or saturated. In the case of oil spills, the sorbed material is recovered from the coated/ saturated sorbents to the degree practicable. Used sorbents require collection, handling, and off-site hazardous waste disposal. Sorbents may be re-positioned during collection efforts to maximize effectiveness and minimize the potential for loss of equipment (e.g., due to wind and waves).

Removal/Cleanup

A response action may include the manual or mechanical removal of spilled material, contaminated soil, sediment, vegetation, or debris in terrestrial, shoreline, and nearshore environments. Shorelines or streams that are in the path of a spill may be subject to the pre-emptive removal of debris (including habitat features such as large logs or root balls) to minimize the retention of a spilled material and its subsequent release over time.

Removal may also be augmented by flushing or otherwise washing surfaces (including large vegetation) to which spilled materials have adhered. Water used for flushing may be obtained from the surface water directly next to the impacted shoreline, or trucked in from another source. Flushing or related responses are used in conjunction with containment and recovery actions.

Manual and Mechanical Removal of Oil and Oiled Material. Manual removal is conducted using hand tools (e.g., rakes, shovels, scrapers). Material is collected in containers that are typically transported by vehicle to a storage area for later disposal.

Mechanical removal relies on heavy equipment (e.g., excavators or backhoes) and is usually implemented when the spill area/debris size exceeds the capacity of manual removal.

Vegetation and Woody Debris Removal and Disposal. Vegetation and woody debris that have been heavily contaminated by a spilled product may be a continuing threat to organisms that either forage on that vegetation/ debris or use it as habitat. Vegetation and debris can be removed either manually or mechanically. Debris can be removed pre-emptively (before oiling) to prevent oiling. Unoiled vegetation and debris may be moved above the high tide line to prevent contamination and to facilitate replacement once conditions allow.

Ambient Temperature, Low Pressure Flooding/Flushing. Flooding and flushing are response actions that rely on hydraulic action to remove a spilled material from a solid or semi-solid surface (e.g., rocks, bulkhead, cobble beach), so that the material can be contained and collected. These actions are, in most circumstances, applied in shoreline habitats, especially in riprap. Flooding involves the use of very large quantities of water to flush a spilled product from the sediment to the surface into a containment area. Booms (typically sorbent booms) can be used to contain or direct the spilled material washed from the sediment collection areas. Skimmers and sorbent materials can be used to collect the resulting floating material. Responders are directed to maintain a scheduled replacement of sorbent booms.

Steam Cleaning. Pressure Washing/Steam Cleaning/Sand Blasting – If a constructed or low-value shoreline habitat is contaminated by a floating product, pressure washing, steam cleaning, or sandblasting may be used to remove the product from rocky substrates. This process is very limited in scope but nonetheless effective for oil recovery. This technique is very rarely used in the NW in part because there are few low-value shorelines in this area. Ambient or low-pressure flooding or flushing approaches are preferred. Biota living in areas treated in this manner will likely be destroyed by the high heat, pressure, and/or abrasion.

Physical Herding. Wind or mechanically generated currents may be used to collect and concentrate oil along the shoreline or in a stationary boom attached to the shoreline. High volumes of water (e.g., from a firehose) can be used to mobilize trapped oil into containment areas.

Non-mechanical Countermeasures

Non-mechanical countermeasures are actions that alter the physical or chemical properties of the spilled material (i.e., petroleum or oil-like materials) such that the options for recovery are improved or the overall impacts of spilled material that cannot be recovered are potentially reduced. Several non-mechanical countermeasures may introduce response-related environmental impacts and, accordingly, are subject to RRT 10 approval prior to implementation. Non-mechanical countermeasures include:

- Application of approved chemical dispersants, and
- *In situ* burning

Currently, chemical dispersant application and *in situ* burning are the two non-mechanical countermeasures pre-approved for oil spill response under the NWACP.

Subpart J of the NCP directs the EPA to prepare a product schedule of dispersants or other chemicals or substances that may be used to remove or control oil discharges (currently, no products have been developed or approved for hazardous materials). Use of dispersants in the NW is extremely rare, but oil spill response organizations are required to maintain adequate volumes of dispersant in preparation for a rapid and effective response. Only one dispersant formulation from the EPA's product schedule, Corexit® EC9500A, is currently stockpiled in the NW. Use of dispersants requires authorization from RRT 10 (see Section 1.2.4.1 of the BA). Other chemicals that are currently available for use during an oil spill (i.e., those listed on the NCP product schedule) would also require RRT 10 approval. If or when the current stockpile of Corexit® EC9500A is exhausted, approval of new products may result in re-initiation of consultation with the USFWS.

Chemical Dispersion. Chemical dispersants are mixtures of surfactants and hydrocarbon-based solvents that alter the spatial distribution, chemical fate, and physical transport of spilled oil in aquatic environments. The application of chemical dispersants in marine environments as a response action is restricted to spilled petroleum or other oil-carried or oil-like contaminants. Dispersant use requires RRT 10 approval on a case-by-case basis, except in pre-authorized areas, or in the case of immediate risk of the ignition or inhalation of volatile and poisonous constituents of oil. Spilled oil products may contain poisonous and flammable volatile organic compounds, and oil dispersal is an option to reduce the immediate risk of ignition or inhalation. The FOSC is empowered to use dispersants without obtaining outside consent or consultation only under these circumstances. The use of chemical dispersant as a response option is reserved for occasions when resources are at risk and other response actions are either not feasible or not adequate to contain or control the spill because of field conditions (e.g., remote location, lack of access). Chemical dispersants have never been used to respond an oil spill in the NW.

The purpose of chemical dispersants is to reduce the concentration of oil at the surface of the water by breaking the oil into emulsified droplets that can be suspended and distributed (and thus diluted and degraded) throughout the water column. The dilution of oil is designed to reduce the amount of oil at the sea surface and reduce the likelihood or amount of oil washing ashore in sensitive coastal areas.

Dispersants are applied to the oil's surface via either vessel-mounted equipment or aerial spraying. Subsurface application, as was performed for the Deepwater Horizon (DWH) spill in the Gulf of Mexico, is not considered in the NW because there is no offshore oil drilling. The effectiveness of dispersants depends on the amount of time that has elapsed since the spill (oil weathering), surface oil thickness, oil viscosity, water depth, salinity, temperature, and sea conditions (ITOPF 2011, pp. 3-6). Dispersants require physical mixing for optimum effect. The mixing can be intentionally induced (use of propeller wash) if the sea state is too calm to adequately mix in the dispersant.

There are a total of 21 dispersants listed on the January 2012 NCP product schedule. Of these, only Corexit® EC9500A is stockpiled and available for use in the NW (and evaluated in the BA). Stockpiling of new products may result in re-initiation of consultation with the USFWS. As discussed in Section 1.2.4.1 of the BA and above, specific decision criteria, including areas where they may be used, must be followed regarding the use of dispersants.

The use of dispersants represents a tradeoff in exposure because organisms in the water column such as invertebrates, larval fish, diving birds, and marine mammals, may be more exposed as oil disperses throughout the water column (at least until greater dilution or biodegradation is achieved, which occurs over the course of hours to days [for dilution] or months [for biodegradation]). The potential toxicity of dispersants or dispersed oil is a factor of, among other things, the duration of exposure and the frequency of exposure (e.g., is the animal exposed once or repeatedly). As described elsewhere in this opinion, the timeframe for which the use of dispersants is viable and likely to be successful is very short, so repeated use of dispersants on the same oil slick is not a reasonable tactic. Therefore, open water areas (and associated fish and wildlife) affected by a marine spill will not be repeatedly exposed to dispersants. Because there are no offshore wells in the NW, there will not be continuous spills in marine waters (e.g., caused by a well blowout).

In Situ Burning. *In situ* burning is a response action used to address spilled oil in either aquatic or terrestrial habitats. As discussed in Section 1.2.4.2 of the BA and above, it is necessary to follow specific decision criteria when conducting *in situ* burning. *In situ* burning is a valuable tool to quickly remove oil from open water or terrestrial areas and prevent it from reaching sensitive habitats or populations. Burning is considered "feasible" when spilled oil can be ignited and remain ignited until the oil has been consumed. The burning of weathered or emulsified oils is in most circumstances infeasible because they are not likely to continue burning once ignited. This is due to the emulsion of oil with water, as well as the rapid evaporation of flammable, volatile oil components. Sea and wind conditions also affect the feasibility of *in situ* burning.

Preparation for an *in situ* burn may involve the use of heavy machinery, vehicles or vessels, aircraft, and/or response personnel. Concentrated oil is better able to remain ignited. Typically, a heat-resistant fire booming system or berm is used to contain oil prior to burning; the oil is then ignited from an aerial source (i.e., helicopter-suspended torch) (Alaska Clean Seas 2010, pg. B-3; API 2015, pg. 16).

In situ burning produces viscous residues that will, to the extent possible, be collected and properly disposed of. These residues may be 2.5 cm (1 inch) or thicker, and they can be more or less dense than water (Alaska Clean Seas 2010, pg. B-6). Buoyant residues can be contained in fire booms and collected using nets, hand tools, or other equipment, whereas dense residues may sink and be lost. The residues generated during an in-situ burn contain chemicals with relatively low toxicity (compared to crude oil). The more acutely toxic components of oil are combusted during an *in situ* burn. If multiple burns will be conducted (as a result of more oil being collected in booms), then substantial amounts of buoyant residue from the first burn can be destroyed during subsequent burns. *In situ* burning removes 90 to 98% of the oil within the burn area.

<u>Other Response Actions</u>

Natural Attenuation. Natural attenuation relies on existing physical, chemical, and biological processes to dilute or degrade a spilled material so that it poses minimal harm to human health or the environment during the recovery period (Walther 2014, pg. 22). In some instances, it may be more protective to allow an affected habitat to recover naturally following exposure to a spilled material, without any action apart from monitoring. In these cases, allowing oil or other spilled material to naturally disperse or degrade over time may cause less harm than the response action itself. In most circumstances, this option is selected when there are few species of concern present and the spilled material will rapidly degrade, disperse, or evaporate; the spill has occurred in a high-energy environment; or the spill is very small.

Places of Refuge. Places of refuge are temporary locations for ships in need of assistance (NRT 2007, pg. 1). Places of refuge vary depending on the situation and needs of the ship. Refuge locations can include ports, harbors, open water, and temporary beaching of the ship. The USCG Captain of the Port follows a stepwise process considering multiple factors to, among other considerations, prevent and minimize the short- and long-term impacts to the environment. Factors weighed when determining a place of refuge include multiple criteria such as the ship's location, status of the ship, economic impacts, capability of the crew, and environmental and human health risks, including resources at risk such as threatened or endangered species, seasonal breeding locations, or designated critical habitat.

Non-floating Oil. The expectation is that the presence of non-floating oil will be identified in the initial report of an oil spill to the National Response Center. With the knowledge that the spilled oil is in a non-floating form, professional oil spill responders will be able to identify specialized submerged oil equipment and personnel and bring them to the scene. Appropriate underwater detection, containment, and recovery actions will be identified by the Unified Commanders. See Section 9412 of the NWACP, "Non-floating Oil Spill Response Tool," for details on response techniques, equipment capabilities, and considerations for non-floating oil spill response. The NWAC recommends using the operational guide prepared by the American Petroleum Institute (API 2016, entire).

Hazing and Deterrence. Although Section 9310 of the NWACP says that wildlife deterrence will be covered by the ESA Section 7 Emergency Consultation process unless otherwise authorized by a permit, planned use of hazing and deterrence does not activate the RRT (the criteria in the BA for emergency consultation - Section 1.3). Hazing and deterrence are therefore included.

The Wildlife Branch is responsible for implementing the Wildlife Response Plan for the Northwest Area, provided in Section 9310 of the NWACP, "Northwest Wildlife Response Plan." Wildlife Response Tools are provided in Section 9311, "Northwest Area Wildlife Deterrence (Hazing) Resources." The Wildlife Response Plan describes the roles, responsibilities, and duties of the Wildlife Branch and associated personnel in detail. The Wildlife Branch will be activated when either a federal or state trustee agency, Responsible Party, or UC determines that an oil spill has occurred in the vicinity of wildlife resources (mammals or birds) or has a trajectory that puts wildlife resources at risk. On every spill response, the first action of the Wildlife Branch must be to deploy skilled and experienced observers to the vicinity of spill location to conduct an initial wildlife impact assessment, in order to determine the extent of the initial and potential wildlife impacts in a timely manner. Methods, equipment, and best management practices for hazing are described by Gorenzel and Salmon (2008, entire) and USFWS (2003, entire).

Deterrence actions may be utilized by the Wildlife Branch, in coordination with the appropriate trustee agency, to keep unoiled wildlife away from oil. No Federal permits are required to scare or heard migratory birds (50 CFR 21.41). However, this exemption does not apply to eagles and endangered and threatened species. The ESA does not specifically authorize deterrence and preemptive capture of endangered species. The Wildlife Branch, in consultation with the appropriate trustee agencies, may develop response strategies for deterrence and preemptive capture of endangered species for a specific spill incident. "Take" of endangered species resulting from approved response actions will be deemed incidental to the primary action of the spill response and will be covered by the ESA Section 7 Emergency Consultation process, unless otherwise authorized by a permit. As stated in the NWACP, any take resulting from wildlife deterrence is addressed in the emergency consultation process and is exempted through that process.

It is important to note that emergency response does not include restoration. The responsibility of the FOSC is to clean up the affected environment; each incident response determines how clean is clean. The restoration of an area and the assessment of damages caused by a spill is the role of NRDA, which is a separate process and not part of response actions taken under the NWACP or the current consultation.

Protected Species and Habitat in the Action Area

A total of 37 federally listed species under the jurisdiction of the USFWS, including designated critical habitat for 16 of those species were considered in the BA (Table 3-1; see Appendix B). The species list (current as of June 2017) was developed with input from the USFWS and includes ESA-listed species in the NW with distributions that overlap with the action area (high-risk transportation corridors and associated buffers). Of the species and critical habitats considered, the EPA and USCG determined consultation was needed on 30 species and 16 critical habitats.

When designating or proposing critical habitat, either the NMFS or USFWS identifies elements referred to as physical and biological features (PBFs) or primary constituent elements (PCEs) that are essential to the conservation of the species. As listed in 50 CFR §424.12(b), as amended (84 FR 45053, Aug. 27, 2019), PBFs (=PCEs) are features that may require special management considerations or protection, and specific areas outside the geographical area occupied by the species at the time it was listed and considered essential for the conservation of the species. Special management may be required for loss of habitat due to conversion, use of heavy equipment in suitable habitat (even if being used to control nonnative, invasive species), development, construction and maintenance of roads and utility corridors, predation, habitat modification from successive vegetation, and pest control.

Critical habitats include, but are not limited to, the following PBFs:

- Space for individual and population growth and for normal behavior;
- Food, water, air, light, minerals, or other nutritional or physiological requirements;
- Cover or shelter;
- Sites for breeding, reproduction, or rearing (or development) of offspring, germination or seed dispersal; and
- Habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

Specific PBFs for designated or proposed critical habitat that overlaps with the action area are discussed above in each of the following subsections describing the status of the ESA-listed species and their critical habitat.

Description of Habitats within the Action Area

The information in the following section was provided in the BA:

The NW, covering all of Washington, Oregon, and Idaho, is a large area with a wide variety of habitat types. For the purposes of the evaluation in the BA, those habitats were grouped according to the specific habitat types identified in the NWACP. Habitats in the action area are briefly described below and include:

- Terrestrial
- Riparian
- Riverine and Lacustrine (on water)
- Wetlands
- Shoreline (freshwater and marine)
- Marine Nearshore
- Open Marine Water

Hot springs are a habitat in the NW that is not discussed in detail below because it represents a fairly unique habitat for a single ESA-listed species. The Bruneau hot springsnail (*Pyrgulopsis bruneauensis*) inhabits thermal springs in southwestern Idaho along the Bruneau River and Hot

Creek. Typically, the snails inhabit small geothermal springs, runs, and seeps on basalt bedrock, where they can be found on gravel, silt, sand, mud, or biofilms.

Terrestrial

Because the authority to respond to spilled oil is granted to the EPA and USCG by the CWA, oil spill response actions in terrestrial habitats may only be coordinated by federal agencies so long as there exists a nexus to water (including staging areas and access points). Otherwise, state agencies have the responsibility to respond to terrestrial oil spills.

Terrestrial habitats in the NW include forests (e.g., ponderosa pine, mixed conifer, and lowlands conifer/hardwood forest types), areas of exposed bedrock, rocky cliffs, coastal dunes, shrub-steppe, and grasslands. Terrestrial habitat does not include riparian habitats along streams or other waterbodies. Forests are typically dominated by coniferous and deciduous trees with varying densities of shrubs, forbs, mosses, grasses, and lichens. Terrestrial habitats provide important habitat for many listed species, particularly those managed by the USFWS (excluding freshwater fish). For example, trees and shrubs provide important nesting and denning habitat for listed birds and small mammals and the prey of larger, listed species like grizzly bear (*Ursus arctos horribilis*) and Canada lynx (*Lynx canadensis*).

Riparian

Riparian habitats include any soils and vegetation that are adjacent to freshwater streams (or other waterbodies) and that are influenced by the flow of water from those waterbodies. These habitats are distinct from adjacent terrestrial habitats in terms of hydrology, soil composition, and vegetative community. Riparian soils are generally composed of deposited sediments, often transported away from the main channel during high flows or flood events. Water from the adjacent waterbody tends to permeate into and flow through riparian soils, creating much wetter soils than the surrounding terrestrial habitats. The difference in soil type and water availability alters the type of vegetative community present; riparian plants tend to be adapted to living in wetter soils and are often resilient to flooding and erosion events. Riparian habitats are very common in the NW, present along most riverine and lacustrine habitats. Riparian habitat is often missing in developed areas such as along urbanized or agricultural streams.

Riparian habitats provide many important features and services to fish and wildlife, some of which are described herein. Riparian vegetation stabilizes stream banks and traps sediment (e.g., during flood events), prevents excessive erosion, and sequesters nutrients. Overhanging trees and bushes provide shade, keeping water temperatures cooler and dissolved oxygen levels higher, and insects living on overhanging branches provide an important source of nutrients to aquatic species (e.g., when terrestrial insects fall into the streams). Large woody debris provides habitat complexity as well as channel stability. Vegetation provides nest and forage habitat for birds, and mammals can also burrow into exposed spaces around riparian tree roots.

Riverine and Lacustrine (on Water)

For the purpose of the BA, riverine and lacustrine habitats were defined as all fully inundated portions of streams, rivers, lakes, ponds, or similar freshwater habitats (excluding wetlands, described below). The NW has a complex system of riverine and lacustrine habitats, which are important to freshwater and anadromous fish species, as well as birds, reptiles, mammals, and amphibians. In addition to being a source of drinking water for larger animals, riverine and lacustrine habitats provide forage habitat for fish, birds, and mammals and breeding/spawning, rearing, migration, refuge, and/or forage habitat for aquatic species and amphibians.

Important considerations for spill response in riverine and lacustrine habitats include the influence of flowing water on oil collection (riverine) and habitat destruction and mobilization of oil into sediments (lacustrine). For example, booms need to be positioned and anchored such that they are not dragged by a flowing river or rapidly overtopped by spilled material. In addition, they should be positioned to maintain migration corridors, if possible. Lastly, they should be anchored and positioned to minimize the suspension of sediment, which would reduce water quality.

Wetlands

The term "wetlands" refers to several types of habitats, all of which are seasonally or permanently inundated. Wetlands are also often definable by their unique vegetation communities, which are adapted to living in fully submersed soils. Freshwater wetlands are common in the NW because of heavy precipitation and/or snowmelt in areas with soils of limited permeability or drainage. Wetlands provide important breeding habitat for many fish, amphibians, and birds. Plants associated with wetlands are adapted to permanently or seasonally saturated conditions. The NWACP refers to several types of wetlands, including estuarine, riverine, lacustrine, and palustrine wetlands. These are differentiated by the size of adjacent waterbodies and by the depth of water in the wetlands. For example, riverine and lacustrine wetlands are created near rivers and lakes (or similar waterbodies), respectively, and their waters must be greater than 2 meters (m) (6.6 ft.) deep. Wetlands with waters less than 2 m deep are considered palustrine; this includes marshes, fens, wet meadows, potholes, playas, bogs, swamps, and shallow ponds.

Marsh habitat is difficult to distinguish from shoreline habitat in areas where it immediately fringes rivers, lakes, estuaries, or coastal habitats (e.g., lagoons). In Section 9420, the NWACP refers to marshes as a type of shoreline (Section 2.1.2.5); therefore, it is treated as such in the BA.

Shoreline

Shorelines are locations where aquatic and terrestrial habitats meet in either freshwater or marine environments. The physical and biological characteristics of shorelines in the NW are highly variable. Shorelines support a variety of different organisms, serving important functions for marine mammals and birds in particular (e.g., as haul-out and nesting habitats, respectively).

Response actions that may be employed in freshwater and marine shoreline habitats are selected with consideration for the type of shoreline substrate, exposure to wave and tidal energy, biological productivity or sensitivity, and the ease of cleanup for a given shoreline type. The NWACP describes 14 types of shoreline and identifies countermeasures applicable for each type (NWACP Section 9420):

- Exposed rock shores and vertical, hard man-made structure (e.g., seawalls);
- Sheltered vertical rock shores and vertical hard man-made structures (e.g., seawalls or docks);
- Exposed wave-cut platforms;
- Fine- to medium-grained sand beaches and steep unvegetated river banks;
- Coarse-grained sand beaches;
- Mixed sand and gravel beaches, including artificial fill containing a range of grain size and material;
- Gravel beaches (pebbles to cobble);
- Gravel beaches (cobbles to boulders);
- Exposed rip-rap;
- Exposed tidal flat;
- Sheltered rubble slope;
- Sheltered sand and mud flats;
- Sheltered vegetated low bank; and
- Marshes.

Freshwater shoreline is defined as the area extending from the wetted channel or lake edge to bankfull height. This definition excludes riparian habitat (Section 2.1.2.2).

Marine shoreline is defined as the area between mean lower low water and the highest tide mark along a marine or estuarine body of water. This is difficult to discern in marshlands, where low gradient lands remain inundated for long periods; terrestrial areas may be differentiable from wetlands by local changes in elevation (resulting in a lack of water) or dominant vegetation type.

Shoreline habitats are strongly influenced by adjacent landforms and water bodies and are used by both terrestrial and aquatic species. The shoreline, including the intertidal zone, is also the area where marine plants (including kelp and sea grasses) receive sufficient sunlight to create both habitat and food for other species.

<u>Marine Nearshore</u>

For the purpose of the BA, the marine nearshore was defined as the area between mean lower low water and 20 m (60 ft.) deep, including estuaries and river deltas. This area is strongly influenced by tides and nearshore currents. Nearshore habitats are highly productive and are used as areas of refuge, feeding, and breeding by many ESA-listed species and their prey.

<u>Open Marine Water</u>

Open water is defined as the area adjacent to the coast that is more than 20 m (60 ft.) deep (offshore to the extent of the EEZ, 200 nautical miles). This definition is intended to align with the definitions of dispersant use and *in situ* burn areas; the NWACP does not provide a clear delineation between open water and nearshore habitats. Open marine water provides habitat for numerous marine mammals, sea turtles, and fish. The relative abundances and distributions of these species vary temporally (e.g., seasonally). For the purposes of this consultation, open water is considered to include both coastal and inland marine waters (i.e., the Salish Sea/Puget Sound and the Strait of Juan de Fuca), as long as they exceed 20 m (60 ft.) deep.

Conservation Measures

The proposed action involves responses implemented under the provisions of the NWACP to spills of oil or petroleum to water, or of other hazardous materials that pose a risk of immediate impacts to human health and/or the environment. As referenced throughout this document, the proposed action includes a hierarchy of scaled responses, but the most common and predictable scenarios are generally targeted at constraining the temporal timeframe for most spill responses and spatial extent of spills.

Under the proposed action, where the action agencies command, control, and/or coordinate the selection, prioritization, and implementation of specific countermeasures (also "response actions", "tools", "BMPs", "strategies"), they must do so in compliance with specific administrative and decision-support requirements. These include notification to, and informal consultation (i.e., technical assistance) with, the natural resource Trustees (including the USFWS), Regional Response Team 10 approval or authorization for non-standard and/or non-pre-authorized countermeasures (e.g., use of inland *in situ* burning, use of chemical dispersion outside the pre-authorized off-shore zone), and implementation of emergency Section 7 consultation procedures (EPA and USCG 2018, pp. 1-2 through 1-7, 1-12 through 1-21). The proposed action includes: non-mechanical countermeasures that are pre-approved; and any use of non-mechanical countermeasures that require pre-approval will be addressed via emergency consultation, when appropriate, at the time of the action (EPA and USCG 2018, pg. 1-21).

Responses to spills of hazardous material (oil, petroleum, other) are typically first implemented by and at the direction of local, first responders. The EPA and USCG have described the role of GRPs and how GRPs relate to the NWACP (EPA and USCG 2018, pp. 1-7 through 1-11).

The proposed action includes CMs that have been identified by the EPA and USCG to avoid and minimize impacts to species and habitats during spill response (EPA and USCG 2018, Table 2-2, pp. 2-17 through 2-28; see Appendix A and E herein). For sensitive aquatic species and habitats (freshwater, estuarine, and marine), Appendix A – Conservation Measures, Table A (below), lists and describes the full set of proposed CMs. For sensitive terrestrial/upland species and habitats, the most relevant and important CMs are summarized in Appendix A – Conservation Measures below.

Term of the Action

The term of the action is indefinite.

Action Area

The action area is defined as 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). In delineating the action area, we evaluated the farthest-reaching physical, chemical, and biotic effects of the action on the environment.

The BA describes the action area as follows:

Federalized responses will only occur in areas where the spill may involve navigable waters of the U.S. For the purpose of this consultation, the boundary of the action area has been focused to areas within the NW at higher risk for larger oil spills (>11,000 gallons), the approximate volume of material carried by a large tanker truck, which correlates with hazardous liquid pipelines, high capacity rail corridors (carrying unit trains of crude oil), and commercial shipping waterways. According to the National Contingency Plan (NCP), major oil spills are classified as >100,000 gallons in the marine zone and >10,000 gallons in the inland zone. This metric was used to define the boundary of the action area. This is not to say that the proposed action is limited to spills of 11,000 gallons or more, but rather that this metric has been used to define the boundary of the action area. The BA addresses spills of hazardous material and oil spills that would trigger a federal response in the action area.

In the marine zone, the assumption is that the primary causes of oil spills are vessel grounding or collisions. However, in the NW the majority of spills come from derelict vessels, commercial vessel fuel transfer operations, bilge discharges from recreational and commercial fishing vessels, and non-point source pollution. Although most reported spills in the marine environment are less than 42 gallons and no spills greater than 10,000 gallons occurred between 2002 and 2016, the potential for spills to occur increases in areas with greater vessel traffic, including shipping lanes and shipping activity (e.g., the Port of Seattle, and vessel traffic to Vancouver and other ports in British Columbia). Similarly, in the inland zone although most spills are small and do not threaten surface water, areas at greater risk for spills include areas with increased vessel traffic (e.g., on the Columbia River) and along pipeline and high-capacity rail corridors.

A 1-mile buffer has been extended on both sides of the high-volume transportation corridors (including waterways, pipelines, and railways carrying unit trains) and 1 mile inland along the coast. The buffers are intended to include staging areas that would be utilized during a response action and associated ingress/egress. The buffers will provide a range of staging area and access options to reduce potential impacts on critical habitat during a response. Waters downstream of intersections with high-risk areas are included in the action area because a spill response will not cease at the extent of the 1-mile buffer; rather, the spill response actions will continue downstream as necessary to contain a spill. Species outside of the high-risk corridors are considered less likely to be impacted by the response to spills because of the lower likelihood of a large spill occurring outside of the corridors. Figures 2-1a, 2-1b, and 2 1c (in the BA) and in Appendix F of this opinion show the Washington, Oregon, and Idaho portions of the action area, respectively.

Analytical Framework for the Jeopardy and Destruction/Adverse Modification of Critical Habitat Determinations

The proposed activities and consequences evaluated in the BA are those associated with the implementation of specific spill response actions in the action area, and actions to minimize the risks from the spilled material during an emergency response, and not the material itself. Within the context of the BA, the spilled material is considered part of the baseline condition at the time of response.

The analysis in this biological opinion addresses a programmatic action, allowing for a broad-scale examination of a program's potential impacts on a listed species and critical habitat. The project BA draws from the NWACP, which provides a strategy for a coordinated, multi-jurisdictional emergency response to a discharge of oil or other hazardous substances within the NW.

If it is determined that take incidental to the response action likely occurred, a post-response formal consultation will summarize the amount or extent of take that likely resulted from the emergency response, but no ITS will be included because the USFWS has no authority to authorize incidental take after-the-fact. Emergency response actions covered under the Section 7 regulations for emergencies that involve take of listed species do not create a section 9 liability for the responsible Federal agency(ies).

Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this opinion relies on four components: the Status of the Species, which evaluates the listed species range-wide condition, the factors responsible for that condition, and its survival and recovery needs; the Environmental Baseline, which evaluates the condition of the listed species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the listed species; the Effects of the Action, which determines the beneficial and adverse impacts caused by the proposed Federal action on the listed species; and Cumulative Effects, which evaluates the consequences of future, non-Federal activities in the action area on the listed species and its critical habitat. The survival condition, in which a species continues to exist into the future while retaining the potential for recovery, is characterized by a species with sufficient population, age-class representation, genetic heterogeneity, number of breeding individuals, and in an environment that provides for life-cycle requirements, including reproduction, foraging and sheltering.

The definition of Environmental Baseline is presented in Appendix H. Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (§ 50 CFR 402.02; see § 50 CFR 402.17). 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).

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the species' current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the listed species in the wild.

Pursuant to USFWS policy, when an action impairs or precludes the capacity of a recovery unit from providing both the survival and recovery function assigned to it, that action may represent jeopardy to the species. When using this type of analysis, the opinion describes how the action affects not only the recovery unit's capability, but also the relationship of the recovery unit to both the survival and recovery of the listed species as a whole.

The jeopardy analysis for the species addressed in this opinion uses the above approach and considers the relationship of the action area and associated populations (discussed below under the Status of the Species section) to the affected recovery units, and the relationship of each affected recovery unit to both the survival and recovery of the species as a whole as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Destruction/Adverse Modification Determination

Section 7(a)(2) of the ESA requires that Federal agencies insure that any action they authorize, fund, or carry out, is not likely to destroy or adversely modify designated critical habitat. Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species (84 FR 44976, August 27, 2019).

The DAM analysis in this opinion relies on the following four components: (1) the Status of Critical Habitat section describes the range-wide condition of the critical habitat in terms of the key components (i.e., essential habitat features, primary constituent elements, or physical and biological features) that provide for the conservation of the listed species, the factors responsible for that condition, and the intended value of thecritical habitatoverall for the conservation of the listed species; (2) the Environmental Baseline section, which analyzes the condition of the critical habitat in the action area, the factors responsible for that condition, and the value of the critical habitat in the action area for the conservation of the listed species; the (3) Effects of the Action section, which analyzes the impacts likely to be caused by the proposed Federal action on the key components of critical habitat that provide for the conservation of the listed species, and how those impacts are likely to influence the conservation value of the affected critical habitat; and (4) the Cumulative Effects section, which evaluates the consequences of future non-Federal activities that are reasonably certain to occur in the action area to the key components of critical habitat that provide for the conservation of the listed species and how those impacts are likely to influence the conservation value of the affected critical habitat.

For purposes of making the DAM determination, the USFWS evaluates if the effects of the proposed Federal action, taken together with the status of critical habitat, the environmental baseline and cumulative effects, are likely to impair or preclude the capacity of critical habitat in the action area to serve its intended conservation function to an extent that appreciably diminishes the rangewide value of critical habitat for the conservation of the listed species. The key to making this finding is understanding the value (i.e., the role) of the critical habitat in the action area for the conservation of the listed species based on the environmental baseline analysis below.

The BA prepared by the action agencies evaluated the potential consequences resulting from specific response activities and tools that may be implemented during a spill response (summarized in the Proposed Action section of the BA and above). The BA also evaluated the consequences that are associated with the spilled material itself (see the baseline section below). An oil or hazardous materials spill is not a discretionary action under the influence of the EPA or USCG, and thus is not part of the proposed action. For evaluating a response action under the proposed action, the environmental baseline section below addresses the occurrence of a spill of hazardous substance (e.g., crude oil, diesel fuel) and the interaction of species and their habitats under the conditions of a spill.

Potentially-affected Species and Critical Habitat

Spalding's Catchfly

Rangewide Status of the Spalding's Catchfly

Listing Status

Spalding's catchfly (*Silene spaldingii*) was listed as threatened, without critical habitat, on October 10, 2001 (66 FR 51598), under the ESA. Designation of critical habitat was determined to be prudent; however, it will not be designated until available resources and priorities allow (66 FR 51598). The Recovery Plan for *Silene spaldingii* (Spalding's Catchfly) was finalized on September 6, 2007 (USFWS 2007a, entire). A 5-year status review notice was initiated on April 29, 2008 (73 FR 23264). The 2008 review concluded with no recommended change to the species listing status as minimal information had been gained since 2007, the species status had not changed, and recovery goals had not been met as of the completion of the 5-year review (January 30, 2009). Another 5-year status review and was initiated on February 12, 2016 (81 FR 7571). Threats identified in the listing and 2009 5-year status review have not substantially changed. However, the number of conservation actions and known populations and individuals have substantially increased rangewide. Based on our review of the current information, the Spalding's catchfly retains the potential for recovery because its current range-wide condition conforms to the survival condition as defined by the USFWS (1998, pg. xviii) and summarized in the Analytical Framework section herein.

Reasons for Listing

Identified threats included invasive nonnative plants; problems associated with small geographically isolated populations; changes in the wildfire regime and wildfire effects; land conversion associated with urban and agricultural development; adverse grazing and trampling by domestic livestock and native herbivores; herbicide and insecticide spraying; off-road vehicle (ORV) use; insect damage and disease; impacts from prolonged drought and climate change; and inadequacy of existing regulatory mechanisms. Additional details are available in the Recovery Plan for Spalding's catchfly (USFWS 2007a).

Life History

Spalding's catchfly is a long-lived, herbaceous perennial plant. It is a member of the pink or carnation family, the Caryophyllaceae. It emerges in spring from a caudex (a persistent stem just beneath the soil surface) surmounting a taproot that can be up to 85 cm long and then withers to the ground every fall (USFWS 2007a, pg. 4). Typically, Spalding's catchfly blooms from mid-July through August, but it can begin blooming in mid-June and into September and even October depending on location and seasonality. Fruits mature from August to October and one plant may have flowers, fruits, and mature capsules at the same time. Plants reproduce by seed only. Plants have been observed living as long as 25 years, and likely live many years longer, although data is not available past 25 years (USFWS 2007a, pg. 12).

Spalding's catchfly plants emerge in the spring in one of three different forms: 1) as a rosette (having only basal leaves), 2) as a vegetative (non-flowering) stemmed plant, or 3) as a reproductive (flowering/fruiting) stemmed plant.

Individuals of Spalding's catchfly can remain dormant or appear above ground only briefly for one or more consecutive years (USFWS 2007a, pg. 12). Rates of dormancy appear to vary however. At the Dancing Prairie site in Montana, it has been shown that in any given growing season approximately one-third of Spalding's catchfly plants will remain dormant or go undetected (USFWS 2007a, pg. 14). Similarly, a substantial, but highly variable number of dormant or undetectable plants were documented at one site in Oregon on the Zumwalt Prairie preserve (Taylor et al. 2012, pg. 7). Rates of dormancy appear to be lower at the Craig Mountain site in Idaho, with rates averaging less than 10 percent over 10 years of study (Hill and Garton 2017, pg. 63).

For detailed information regarding the species' listing history and other facts, please refer to the Fish and Wildlife Service's Environmental Conservation On-line System (ECOS) database for threatened and endangered species (http://ecos.fws.gov/tess_public). Please refer to the Recovery Plan for *Silene spaldingii* (Spalding's catchfly) finalized in September of 2007 (USFWS 2007a, entire) and the previous 5-year review for *Silene spaldingii* signed on January 30, 2009 (USFWS 2009a, entire) for additional review of the species' status (including biology and habitat), threats, and management efforts (http://ecos.fws.gov/tess_public).

Population Dynamics and Viability

The long-lived nature of Spalding's catchfly, in conjunction with limited detection caused by prolonged or early dormancy, difficulties identifying seedlings, and the dispersed nature of plants within a population make it challenging to measure changes in numbers of individuals of this species (USFWS 2007a, pg. 56). Seed dispersal studies have not yet been conducted on Spalding's catchfly, nor have there been studies investigating how long Spalding's catchfly seeds may remain dormant in the soil before they lose their viability or if they survive passage through the digestive tract of herbivores. A recent study on the closely related *S. douglasii* found high initial seed germination, but seed viability declines to about 20 percent after seven to eight years (Lofflin and Kephart 2005, pg. 1695).

Studies suggest that Spalding's catchfly reproduces best when outcrossing occurs, pollinators are essential in maintaining the fitness of Spalding's catchfly, adjacent invasive nonnative plants may negatively affect reproduction, and pollinators must consistently visit Spalding's catchfly (Lesica 1993, pp. 195-200; Lesica and Heidel 1996, pp. 8, 9, 11). Studies have also suggested that *Bombus fervidus* (golden northern bumblebee) is the primary pollinator of Spalding's catchfly (Lesica and Heidel 1996, pg. 9). This bee species is common within grasslands, but rare in wooded foothills, and tends to build its nests either on or just below the surface of the ground, generally within the first 0.3 meters (1 foot) of soil (Hobbs 1966, pg. 34). The queen emerges from hibernation in spring and establishes a seasonal colony that can contain over 200 individuals by fall (Hobbs 1966, pg. 37). Activities that disrupt the queens overwintering nest, may cause a reduction in the *Bombus* population, such that pollination of Spalding's catchfly is impacted.

Distribution

Within the United States, Spalding's catchfly is known from four counties in Idaho (Idaho, Latah, Lewis, and Nez Perce), four counties in Montana (Flathead, Lake, Lincoln, and Sanders), one county in Oregon (Wallowa), and five counties in Washington (Adams, Asotin, Lincoln, Spokane, and Whitman) (USFWS 2017a, pp. 47-49). Spalding's catchfly is possible in an additional four counties in Idaho (Adams, Benewah, Clearwater, and Kootenai) and six counties in Washington (Columbia, Ferry, Garfield, Grant, Okanogan, and Stevens) (ECOS 2017). As of 2007, there were 99 populations: 22 in Idaho, 10 in Montana, 17 in Oregon, 49 in Washington, and 1 in British Columbia, Canada (USFWS 2007a, pg. 9). Additional plants and populations have been found throughout its range since 2007. Rangewide population numbers will be updated in the most current 5-year review that the USFWS is currently preparing.

Spalding's catchfly occurs at elevations between 365 to 1,615 meters (1,200 to 5,300 feet) (USFWS 2007a, pg. 23). Spalding's catchfly is usually found in deep, productive loess soils (fine, windblown soils) and glacial soils. Plants are generally found in swales or on northwest to northeast facing slopes where soil moisture is relatively higher, but can be occasionally found on any aspect.

Spalding's catchfly is found primarily within the more mesic grasslands of the Pacific Northwest Bunchgrass association/type. Pacific Northwest bunchgrasses where Spalding's catchfly is found are characterized by either *Festuca idahoensis* (Idaho fescue) or by both *F. idahoensis* and *Pseudoroegneria spicata* (bluebunch wheatgrass) in Idaho, Oregon, and Washington; and with *F. idahoensis* sometimes co- or subdominant with *F. scabrella* (rough fescue) in Montana (Tisdale 1983, pg. 225). The summer drought across the species' range typically prevents tree species from establishing in most Spalding's catchfly habitats and results in a climax grassland community (Daubenmire 1968, pp. 432, 437-438). Exceptions where trees are established along with grasslands, include the Dancing Prairie in Montana and Turnbull National Wildlife Refuge in Washington.

Physiographic Regions for Recovery

The recovery plan divides the occupied habitat of Spalding's catchfly into five physiographic regions that are characterized by distinctive physical features (USFWS 2007a, pg. 21), including:

climate, plant composition, historical fire frequencies, and soil characteristics. These differences are significant in that they may translate into differences in life histories, habitat trends, consequences of fire suppression, and types of weed control as they apply to conservation of catchfly. The five physiographic regions described for Spalding's catchfly are Blue Mountain Basins (northeastern Oregon), Canyon Grasslands (along the Snake, Salmon, Clearwater, Grande Ronde, and Imnaha Rivers in Idaho, Oregon, and Washington); Channeled Scablands (east-central Washington); Intermontane Valleys (northwestern Montana); and Palouse Grasslands (southeastern Washington and adjacent west central Idaho).

Status of the Spalding's Catchfly in the Action Area

Appendix H contains general information about the environmental baseline that applies to all species and critical habitats addressed in this opinion, including the regulatory definition of environmental baseline, a discussion of *Oil (and Hazardous Substance) Facilities and Transport in the Action Area, Size and Types of Spills in the NW, Typical Response Time and Type, Influence of Spilled Material on Species Habitats in the Action Area,* and *Influence of Climate Change on Species Habitats in the Action Area*.

The action area contains high risk corridors associated with a petroleum pipeline(s) and rail corridors. Spalding's catchfly is found in Idaho, Latah, Lewis and Nez Perce Counties in Idaho, Wallowa County in northeastern Oregon, and Adams, Asotin, Lincoln, Spokane, and Whitman Counties in Washington. The pipeline and rail corridors pass through or near some of these counties. Spalding's catchfly plants have been located directly on the pipeline corridor (BA, pg. 4-88) and information available to the USFWS indicates additional occurrence within the identified corridor. Additionally, the species may occur anywhere where the habitat characteristics support growth.

Of the five physiographic regions for recovery mentioned above, all or part of three regions (Canyon Grasslands, Channeled Scablands, and Palouse Grasslands) occur in the action area.

The Canyon Grasslands including the Snake, Salmon, Clearwater, Grande Ronde, and Imnaha Rivers in Idaho, Oregon, and Washington: Of the five physiographic regions where Spalding's catchfly is found, the habitat of the Canyon Grasslands is the most intact, largely because the canyon walls are steep and do not lend themselves to agricultural or urban developments. Within the Canyon Grasslands, Spalding's catchfly is found at the lowest and highest elevations rangewide from 365 to 1,615 meters (1,200 to 5,300 feet) (USFWS 2007a, pg. 22) generally on northerly slopes that support more mesic *F. idahoensis* communities. At higher elevations (over approximately 1,525 meters [5,000 feet]) in the Canyon Grasslands the northern slopes are inhabited by tree species and Spalding's catchfly is found on southern slopes where bunchgrass communities reside. Because of their steep topography, the Canyon Grasslands are the most under-surveyed area for Spalding's catchfly, and also represent the area where large populations of Spalding's catchfly may be most easily conserved because they are more removed from human influence.

The Palouse Grasslands in southeastern Washington and adjacent west central Idaho: The Palouse Grasslands are extremely fertile and may comprise the world's best wheat land (Alt and Hyndman

1989, pg. 190). An underlying basalt layer is covered with deep deposits of loess and ash, which can reach depths of 105 to 140 meters (350 to 450 feet), although generally less (Mueller and Mueller 1997, pg. 25), and have high moisture-holding capacity and water infiltration rates (Johnson and Simon 1987, pg. 8). Estimates indicate that only 0.1 percent of the grasslands remain in a natural state (Noss *et al.* 1995, pg. 2). Spalding's catchfly within the Palouse Grasslands is restricted to small fragmented populations ("eyebrows," field corners, cemeteries, rocky areas, and steptoes) on private lands, and in larger remnant habitats such as research lands owned by Washington State University. Elevations occupied by Spalding's catchfly within the Palouse Grasslands range from 700 to 1,340 meters (2,300 to 4,400 feet). Of all the places where Spalding's catchfly resides, those in the Palouse Grasslands are the most threatened, and care is needed to maintain occupied sites and representative genetic material from these sites.

The Channeled Scablands of east-central Washington: The Channeled Scablands are similar to the Palouse Grasslands with an underlying basalt layer covered by deep deposits of loess and ash, forming long undulating dune-like plains of rich soils. Like the Palouse Grasslands, the large loess islands that remain in the Channeled Scablands are fertile and consequently have been largely converted to agriculture. Spalding's catchfly plants occur in the non-forested microsites, and relict flood channels located within the Channeled Scablands. More specifically, Spalding's catchfly is generally found on northern facing slopes below talus or rock outcroppings, gentle northern slopes just above valley floors, or on the northern sides of biscuits (B. Benner, *in litt*. 1993, pp. 1-5). It is found at elevations from 472 to 747 meters (1,550 to 2,450 feet) within the Channeled Scablands. Since we lack earlier botanical surveys, we do not know how much Spalding's catchfly may have formerly occurred within the loess islands between channels. However, its affinity for deep soils elsewhere indicates that habitat conversion has most likely reduced the number of plants found on these loess islands.

Summary

Based on our review of the current information regarding the species status in the action area, the Spalding's catchfly populations in the action area retain sufficient resiliency and redundancy to offset patchy, temporary adverse impacts caused by natural or anthropogenic sources.

Effects of the Action on the Spalding's Catchfly

Appendix I contains general information regarding the potential effects of the action for all species and critical habitat addressed in this opinion, including the *Analytical Approach Used in the BA*.

The proposed action consists of federalized responses to spills of oil or petroleum into water, or spills of other hazardous materials that pose a risk of immediate impacts to human health and/or other components of the human environment. The proposed action includes a hierarchy of scaled responses to spill events, but the most common and predictable scenarios are generally on constrained temporal and spatial scales (i.e., most spill responses are limited in geographic scope, and durations, for the purpose of this consultation, are limited to up to 4 days (EPA and USCG 2019, pg. 1). Appendix A contains a complete list of expected response and conservation actions.

Many of the spill response activities have the potential to cause crushing or removal of individual Spalding's catchfly plants. Foot traffic and vehicle access in an area occupied by this species may crush all growth forms (rosette, vegetative stemmed plant, and reproductive stemmed plant). Establishing staging areas could result in complete removal of some plants. Depending on the intensity of the response activity in an area, crushing could result in the death of individual plants and/or a loss or reduction of seed production for that year.
Compaction or movement of soil may expose or crush all growth forms of Spalding's catchfly, including dormant plants, resulting in death or injury of individual plants and/or a loss or reduction of seed production for that year. Compaction or movement of soil may crush or otherwise disturb shallow soil overwintering areas or nesting areas of important catchfly pollinator species, causing disruption in pollination of nearby catchfly plants. Movement of soil also may encourage germination of noxious weed seeds known to compete with the Spalding's catchfly and vehicles or equipment used for response activities may introduce noxious weed seed to the affected area.

In general, the proposed action has the potential to result in significant beneficial effects to the environment (inclusive of any affected Spalding's catchfly-occupied habitat) caused by timely containment, control, and removal in areas affected by spilled material with corresponding immediate and long-term benefits to fish and wildlife, water, soil, and sediment quality.

Because of the limited distribution of the Spalding's catchfly in the action area, and because the proposed action includes specific conservation measures designed to: limit soil disturbance; locate staging areas and support facilities in the least sensitive areas possible; restrict foot traffic, vehicles, and heavy machinery from sensitive areas; and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E), the potential for the proposed action to cause adverse effects to the Spalding's catchfly is reduced. Additionally, covered spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response.

Cumulative Effects

Appendix J contains the cumulative effects analysis presented in the BA. This analysis covers all species and critical habitats considered in this opinion, and all non-Federal activities reasonably certain to occur in the action area, including *Water Management, Urban and Agricultural Development,* and *Permitted Discharges.* Additional anticipated effects are presented below.

Livestock grazing and chemical treatments for weed or insect control are likely to occur on both State and private lands in the action area. These actions may result in some degree of crushing and/or removal of Spalding's catchfly plants, alteration of native grassland habitat, increased wildfire frequency, and changes to insect pollinator populations. Residential, commercial, industrial, and agricultural development on private lands also may occur in parts of the action area. All of these actions may result in some degree of crushing and/or removal of Spalding's catchfly plants, and alteration of native grassland habitat through habitat conversion, increased noxious and invasive weed invasions, increased ORV use, increased wildfire frequency, changes to insect pollinator populations, and increased habitat fragmentation.

Conclusion

After reviewing the current status of the Spalding's catchfly, the environmental baseline, the potential effects of the proposed action (inclusive of conservation measures), and cumulative effects, it is our biological opinion that the proposed action, as described in the BA and above in this opinion, is not likely to jeopardize the continued existence of the Spalding's catchfly for the reasons summarized below.

In general, the proposed action has the potential to result in significant beneficial effects to the environment (inclusive of any affected Spalding's catchfly-occupied habitat) caused by timely containment, control, and removal in areas affected by spilled material with corresponding immediate and long-term benefits to fish and wildlife, water, soil, and sediment quality.

Because of the limited distribution of the Spalding's catchfly in the action area, and because the proposed action includes specific conservation measures designed to limit soil disturbance; locate staging areas and support facilities in the least sensitive areas possible; restrict foot traffic, vehicles, and heavy machinery from sensitive areas; and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E), the potential for the proposed action to cause adverse effects to the Spalding's catchfly is reduced. Additionally, spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response. For these reasons, there is a high potential for any adverse effects to the Spalding's catchfly caused by spill response activities to be localized, limited in scale and duration, and to be offset by future reproduction of Spalding's catchfly following spill response activities.

Bliss Rapids Snail

Rangewide Status of the Bliss Rapids Snail

<u>Listing Status</u>

The USFWS listed the Bliss Rapids snail (*Taylorconcha serpenticola*) as threatened effective January 13, 1993 (57 FR 59244, December 14, 1992). No critical habitat has been designated for this species. A recovery plan for the Bliss Rapids snail was published by the USFWS as part of the Snake River Aquatic Species Recovery Plan (Recovery Plan) (USFWS 1995a, entire). The target recovery area for this species is the Snake River, from River Mile (RM) 547 to RM 585, and includes tributary cold-water spring complexes (USFWS 1995a, pg. 31).

On September 16, 2009, the USFWS published a 12-month finding in response to a petition proposing to remove the Bliss Rapids snail from the Federal List of Endangered and Threatened Wildlife (74 FR 47536). The 12-month finding determined that the Bliss Rapids snail continued to meet the definition of a threatened species under the Act, and that removing the Bliss Rapids snail from the List was not warranted at the time.

Beginning January 22, 2018, a 5-year review was conducted by the USFWS, based on current, available information obtained prior to and since the 2009 finding. This review indicated no change in classification was necessary (USFWS 2018, pg. 33).

Based on our 5-year review of the current information (USFWS 2018, pg. 2), the Bliss Rapids snail remains subject to a moderate degree of threat, but is rated high in terms of recovery potential. Therefore, the species retains the potential for recovery because its current range-wide condition conforms to the survival condition as defined by the USFWS (1998, pg. xviii) and summarized in the Analytical Framework section herein.

Reasons for Listing

The free-flowing, cold-water environments required by the Bliss Rapids snail have been affected by, and are vulnerable to, continued adverse habitat modification and deteriorating water quality from one or more of the following: hydroelectric development, fluctuating river levels resulting from hydroelectric project operations, water withdrawal and diversions, water pollution, inadequate regulatory mechanisms which have failed to provide protection to the habitat used by the listed species, and adverse impacts from exotic species (USFWS 1995a, pg. 17).

Species Description

The Bliss Rapids snail is a member of the class Gastropoda, and has been placed in the family Hydrobiidae. It was first collected live and recognized as a new taxon in 1959, and was not formally described until 1994. The Bliss Rapids snail is 2.0 to 2.5 mm (0.1 in) in height, with three whorls, and is roughly ovoid in shape. There can be two color variants: the colorless form and the orange-red form (USFWS 1995a, pg.10).

Life History

This snail occurs on stable cobble-boulder size substrate in flowing waters of unimpounded reaches of the mainstem Snake River and in a few spring habitats. The river populations of the Bliss Rapids snail occur only in areas associated with spring influences or rapids-edge environments and tend to flank shorelines. They are found at varying depths if dissolved oxygen and temperature requirements persist and are found in shallow (< 1 centimeter (cm), 0.5 in) depth, permanent, cold springs. The species is considered moderately negatively phototoxic and resides on the lateral sides and undersides of rocks during daylight. The species can be locally quite abundant, especially on smooth rock surfaces with common encrusting red algae (USFWS 1995a, pg. 10).

Bliss Rapids snails primarily consume epilithic periphyton (diatom films that primarily grow on rock surfaces). They may also consume quantities of detritus, bacteria, and protozoa embedded in the periphyton on surfaces of benthic substrates (74 FR 47537).

The river population of Bliss Raid snail has generally shown an increase from a low of 350 individuals in 2011 to a high of 2,500 in 2016, with a median of just over 1,100 over that period (USFWS 2018, pg. 10). Fluctuations in population densities of Bliss Rapid snail occur for a variety of reasons, including seasonality and habitat disturbance. Population densities undergo seasonal fluctuations, with population numbers being at their lowest during winter months and typically reaching peaks during the summer and fall months (USFWS 2018, pg. 8). Habitat disturbance can occur due to human activity or natural causes, like high instream flows. Human activities can alter habitat by physical disturbance of substrate or impacts to water quality or quantity, which can cause death, or displacement of individual snails. High water events can temporarily limit Bliss Rapid snail populations by flushing or scouring effects to the snails. Monitoring has shown that populations of Bliss Rapid snails can rebound to healthy levels if disturbed habitat is returned to pre-disturbance condition within certain timeframes and water quality is not permanently impaired by the disturbance (USFWS 2018, pg. 7).

Distribution

The Bliss Rapids snail was known historically from the mainstem Snake River and associated springs between King Hill and Twin Falls, Idaho. Based on live collections, the species currently exists as discontinuous populations within its historic range (USFWS 1995a, pg. 10). Bliss Rapid snail populations are unevenly distributed throughout approximately 35 kilometers (22 miles) of the middle Snake River and in 14 springs or tributaries on the north bank (USFWS 2018, pp. 7, 14).

Status of the Bliss Rapids Snail in the Action Area

Appendix H contains general information about the environmental baseline that applies to all species and critical habitats addressed in this opinion, including the regulatory definition of environmental baseline, a discussion of *Oil (and Hazardous Substance) Facilities and Transport in the Action Area, Size and Types of Spills in the NW, Typical Response Time and Type, Influence of Spilled Material on Species Habitats in the Action Area,* and *Influence of Climate Change on Species Habitats in the Action Area*.

An oil pipeline and the associated 1-mile buffer which defines the action area runs south of the Snake River near Bliss Rapids snail habitat, coming within approximately 0.4 km (0.25 mile) of the nearest known population. The same pipeline crosses several tributaries that feed into the Snake River, including Salmon Falls Creek. The Dolman Rapids population is approximately 6.2-miles downstream of Salmon Falls Creek. The large Snake River populations are located approximately 15-miles downstream of Salmon Falls Creek (EPA and USCG 2018, pg. 4-96). The river population appears to have generally shown an increase over 8 years of monitoring, while the monitored spring populations have varied over time (USFWS 2018, pp. 10-11).

Factors Affecting the Species in the Action Area

Within the action area, the Bliss Rapids snail is affected by habitat modification and loss, deteriorating water quality, and declining water quantity. Throughout the range of the Bliss Rapids snail springs have been modified for use in fish production. Many fish production facilities are located at or near the spring source and have permanently altered habitats that would likely have been occupied by Bliss Rapid snails prior to development. Habitat has also been modified or lost due to recreational use of springs. Moving and stacking of stream cobbles has resulted in population declines and extirpation of some small populations (USFWS 2018, pp. 16-17). Habitat is also modified by fluctuating river levels resulting from hydroelectric project operations.

Hydropower shutdowns, when flows from conveyance flumes are diverted back into the river, cause large and instantaneous increases in river flow volume. These and naturally occurring high flow events cause scouring and move sediment, altering snail habitat (USFWS 2018, pg. 9).

Water quality continues to be impacted by irrigation return flows to the Snake River. Over 9,000 square miles of irrigated agricultural lands are located in the Snake River drainage. Pesticides and fertilizers applied to these agricultural lands make their way into the Snake River via irrigation return flows. Additionally concentrated animal feeding operations have increased in south central Idaho. Wastewater from these operations is a major contributor to water quality degradation (USFWS 2018, pp. 22-23).

Increased use of groundwater for irrigation has led to a decline in spring discharges. Numerous spring sources have been captured and diverted for uses such as fish farming or power generation. Increased demand for water is likely to cause continued declines of spring discharges (USFWS 2018, pg. 18).

In summary, the Bliss Rapids snail is known from two locations in the action area, including both river and spring habitats. Threats to the water source upon which the species depends, have increased since the species listing and spring discharge has decreased while water contaminants (nitrates) are increasing. Based on our review of the current information regarding the species status in the action area, the Bliss Rapids snail populations in the action area retain sufficient resiliency and redundancy to offset patchy, temporary adverse impacts caused by natural or anthropogenic sources.

Effects of the Action on the Bliss Rapids Snail

Appendix I contains general information regarding effects of the action for all species and critical habitat addressed in this opinion, including the *Analytical Approach Used in the BA*.

When implementing countermeasures as part of spill response, the EPA and USCG will also implement all of the relevant, practicable, and effective CMs (Appendix A – Conservation Measures; also see BA Table 2-2 and Appendix E below).

Spills that occur from the city of Twin Falls, west to Salmon Falls Creek have a relatively high probability of reaching the Snake River via Salmon Falls Creek, Rock Creek, Mud Creek, Cedar Draw, or multiple irrigation canals that network through this area. In this area, the pipeline comes within 0.2 mile of the Snake River. A significant spill or a spill that occurs when river flows and velocity are high (generally March through June), could swiftly move oil, and thus response actions, into the recovery area of this species.

Based on our review of the proposed action and conservation measures, the USFWS anticipates the following response activities could impact the Bliss Rapids snail: deflection/containment, including booming, construction of berms or other barriers, and culvert blocking; recovery of spilled material, including skimming, vacuuming, and passive collection; and removal/cleanup, including manual or mechanical removal of oiled substrate, cutting/removal of vegetation, flushing, and physical herding. Support for response activities would require the presence of responders and could include use of vessels and/or use of vehicles or heavy equipment. The most likely impacts to Bliss Rapids snails are expected to be related to crushing of individual snails, eggs, and larvae and potential changes to water quality caused by sediment or contaminants.

Direct Injury

If a large spill were to occur in the area and response activities took place in Bliss Rapids snail habitat, direct injury could occur. Individual snails would likely be crushed by responders during any response activity that requires walking in the streams and/or springs. This effect will be limited to areas of shallow water (where it is safe for responders to wade). Response activities could require anchoring of equipment in Bliss Rapids snail habitat, which has the potential to crush snails with boom anchors or anchor chains and disturb cobble substrates occupied by snails. Impacts to Bliss Rapids snails caused by booming could be minimized by placing the boom anchors outside the Snake River to avoid crushing during anchor placement.

Vacuuming to recover spilled materials has the potential to entrain Bliss Rapids snails, their eggs, and larvae, if any are present when this response activity occurs. Routinely, vacuuming will occur at the water surface. Because Bliss Rapids snails are associated with the stream substrate, they are not likely to be affected by vacuuming the water surface and effects are expected to be discountable. Rarely, vacuuming may be used for the recovery of non-floating oil, meaning vacuuming may occur at or near the river bottom. Bliss Rapids snails, eggs, and larvae would be susceptible to entrainment, depending on the proximity of the response activity to the snails. Conservation measures state that the intake will be positioned to minimize entrainment of aquatic organisms to the extent practicable and vacuuming will be closely monitored in sensitive areas.
Manual or mechanical removal of oiled vegetation could directly affect Bliss Rapids snails, causing removal and death of individual snails or snail larvae or eggs located in and around vegetation being removed.

Flushing with water to remove/clean up spilled material could disturb cobble substrates occupied by snails. Similar to disturbance of substrate caused by naturally occurring high water events, individual snails may be crushed or displaced by flushing or scouring effects. Conservation measures stipulate that flushing avoid sensitive areas, so use of this treatment would be unlikely in Bliss Rapid snail habitats.

Change in Behavior

The Bliss Rapids snail is moderately negatively phototoxic. This sensitivity to lights could impact the behavior of the species if lighting is required during response activities. The effect to individual snails will vary. Snails may modify their foraging behavior during nighttime spill response activities. Reduced foraging could result in reduced overall fitness. The effect of modified behavior is expected to vary from insignificant to adverse, depending on the condition of the individual snails affected and the duration of the response activity.

Contaminant Effects

Response activities such as decontamination, solid and liquid waste management, and passive collection with sorbents have the potential to re-release the spilled oil and affect Bliss Rapids snails. The proposed action includes monitoring requirements, standard protocols, the requirement for maintaining adequate response equipment on site, and other measures that reduce the likelihood of this occurring. Consequently, effects to Bliss Rapids snails from re-release of contaminants are expected to be discountable.

Additionally, response activities that disturb the riverbed have the potential to liberate existing contaminants from the riverbed and disperse them into the Snake River, resulting in subsequent contaminants-related effects to Bliss Rapids snails. The level of effect to Bliss Rapids snails will vary depending on the size of the area disturbed and the type of contaminant liberated as a result of the response activity and the proximity of the response activity to the Bliss Rapids snail and its habitat. Effects would vary from insignificant when only a small area of riverbed is disturbed, contaminants liberated have low toxicity, and/or occupied snail habitat is far from the response activity, to adverse when a large area of riverbed is disturbed, contaminants have high toxicity, and/or occupied snail habitat is near the response activity.

Sediment Effects

Some response activities will cause temporary increases in sediment input and turbidity in the Snake River in the vicinity of each response. Specifically, sediment input is expected to increase where response activities result in disturbance of surface soils and may occur during construction of access points, construction of barriers and booms, manual or mechanical removal of oiled substrate, and cutting or removal of vegetation. The level of effect to Bliss Rapids snails will vary depending on the amount of sediment entering the river as a result of the response activity and the proximity of the response activity to occupied Bliss Rapid snail habitat.

Depending on flows in the river, sediment may be flushed out of Bliss Rapid snail habitat rapidly. In that case, effects to snails are expected to be temporary and short term. However, large increases in sediment that cover stream substrate for an extended time may disrupt feeding, breeding, or sheltering behaviors or cause the death of snails, larvae, and eggs. Increased turbidity may result in low-magnitude, short-term decreases in dissolved oxygen and increases in water temperatures. The proposed action includes conservation measures designed to reduce sediment input to the river during a response activity. Depending on the location and type of response activity, the level of effect to Bliss Rapid snails could range from insignificant to adverse.

Summary

The limited distribution of the Bliss Rapids snail in the action area reduces the risk of exposure. Furthermore, the proposed action includes specific conservation measures designed to limit disturbance from crushing of individual snails, eggs, and larvae and limit potential changes to water quality caused by sediment or contaminants. Additionally, covered spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response.

Cumulative Effects

Appendix J contains cumulative effects analysis prepared for the BA that applies to all species and critical habitats contained in this opinion, including *Water Management, Urban and Agricultural Development,* and *Permitted Discharges.*

Private lands within the action area are primarily used for livestock grazing and agriculture. As the human population in the State of Idaho continues to grow, private lands could be developed for residential use. However, the USFWS is not aware of any plans to convert private rangelands or croplands within the action area to residential developments at this time. The USFWS assumes that future non-Federal activities in the action area will continue into the immediate future at present intensities, maintaining current levels of impacts to water quality and groundwater-surface water interactions.

Conclusion

The action agencies determined that the proposed action may effect, but was not likely to adversely affect the Bliss Rapids snail due to limited distribution in the Snake River 0.4 km (0.25 miles) or farther from an oil pipeline. However, as discussed above, spills have a relatively high probability of reaching the Snake River where the pipeline in the action area comes within 0.2 mile of the Snake River. A significant spill or a spill that occurs when river flows and velocity are high (generally March through June), could swiftly move oil, and thus response actions, into the recovery area of this species. After reviewing the current status of the Bliss Rapids snail, the environmental baseline, the effects of the proposed action and conservation measures, and the cumulative effects, it is our biological opinion that the proposed action, as described in the BA and above in this opinion, is not likely to jeopardize the continued existence of the Bliss Rapids snail.

The USFWS's rationale for this determination is presented below.

Impacts to the Bliss Rapids snail are expected to occur due to a variety of response activities. The level of impact will vary depending on the location, timing, and type of response activity. Adverse effects include crushing of snails, eggs, and larvae resulting from in-water work activities in occupied Bliss Rapids snail habitat. Some level of adverse effect is also expected from impacts to water quality.

However, response activities in Bliss Rapids snail habitat are not expected to occur repeatedly (i.e., spills are an unusual event) and response activities would be short duration. Response activities are unlikely to occur in much of the occupied Bliss Rapids snail habitat because many occupied springs are separated from the Snake River. CMs are included in the proposed action to minimize the potential for adverse effects and all Bliss Rapids snail habitat would be identified as sensitive areas where some response activities would be precluded (e.g., establishment of staging areas). Adverse effects would not occur evenly throughout snail habitat; adverse effects would be localized and limited in scale and duration. Additionally, Bliss Rapid snail population have been shown to have the ability to rebound to healthy levels if disturbed habitat is returned to pre-disturbance condition within certain timeframes and water quality is not permanently impaired by the disturbance.

For the above reasons, the USFWS concludes that the anticipated level of effects caused by the proposed action, taking into account the environmental baseline and cumulative effects in the action area, is unlikely to appreciably diminish the reproduction, numbers, or distribution of the Bliss Rapids snail.

Oregon Spotted Frog

Rangewide Status of the Oregon Spotted Frog

On August 29, 2014, the USFWS listed the Oregon spotted frog (*Rana pretiosa*; OSF) as a threatened species under the ESA (79 FR 51657). For a detailed account of Oregon spotted frog biology, life history, threats, demography, and conservation needs, see Appendix G: Status of the Species – Oregon Spotted Frog. Threats identified in the listing have not substantially changed since this time. However, based on our review of the current information (see Appendix G), the Oregon spotted frog retains the potential for recovery because its current range-wide condition conforms to the survival condition as defined by the USFWS (1998, pg. xviii) and summarized in the Analytical Framework section herein.

Status of the Oregon Spotted Frog in the Action Area

Appendix H contains general information about the environmental baseline that applies to all species and critical habitats addressed in this opinion, including the regulatory definition of environmental baseline, a discussion of *Oil (and Hazardous Substance) Facilities and Transport in the Action Area, Size and Types of Spills in the NW, Typical Response Time and Type, Influence of Spilled Material on Species Habitats in the Action Area,* and *Influence of Climate Change on Species Habitats in the Action Area*.

The action area includes portions of the current range of the OSF in Washington and Oregon: (Washington) Chilliwack, Nooksack, Samish, Skagit, Snohomish, and Black/Chehalis River basins; and, (Oregon) Deschutes River, Big Springs Creek, Wood River, and Seven Mile Creek basins. The action area includes designated OSF critical habitat from four CHUs, including the following: (Washington) Lower Chilliwack River/Whatcom County, Black River/Thurston County; and, (Oregon) Upper Deschutes River/Deschutes County, Little Deschutes River/ Deschutes and Klamath Counties. The action area includes a substantial amount of breeding, rearing, and overwintering habitat for the OSF. Figure OSF-1 depicts the current and historic range of the OSF and the locations of designated OSF critical habitat.

The OSF is highly aquatic; it is almost always found in or near a perennial body of water that includes zones of shallow water and abundant emergent or floating aquatic plants, which they use for basking and cover. Watson et al. (2003, pg. 298) summarized the conditions required for completion of the OSF life cycle as shallow water areas for egg and tadpole survival, perennially deep, moderately vegetated pools for adult and juvenile survival in the dry season, and perennial water for protecting all age classes during cold wet weather.

Modeling across a variety of amphibian taxa suggests that pond-breeding frogs have high temporal variances of population abundances and high local extinction rates relative to other groups of amphibians, with smaller frog populations undergoing disproportionately large fluctuations in abundance (Green 2003, pp. 339-341). The vulnerability of OSF egg masses to fluctuating water levels (Hayes et al. 2000, pp. 10-12; Pearl and Bury 2000, pg. 10), the vulnerability of post-metamorphic stages to predation (Hayes 1994, pg. 25), and low overwintering survival (Hallock and Pearson 2001, pg. 8) can contribute to relatively rapid population turnovers, suggesting spotted frogs are particularly vulnerable to local extirpations from stochastic events and chronic sources of mortality (Pearl and Hayes 2004, pg. 11).

Figure OSF-1. Current and historic range of the OSF.

OSFs concentrate their breeding activities in relatively few locations (Hayes et al. 2000, pp. 5, 6; McAllister and White 2001, pg. 11). For example, Hayes et al. (2000, pp. 5, 6) found that two percent of breeding sites accounted for 19 percent of the egg masses at the Conboy Lake National Wildlife Refuge. Similar breeding concentrations have been found elsewhere in Washington and in Oregon. Moreover, OSF exhibit relatively high fidelity to breeding locations, using the same seasonal pools every year and often using the same egg-laying sites. In years of extremely high or low water, they may use alternative sites.

Movement studies suggest OSF are limited in their overland dispersal and potential to recolonize sites. OSF movements are associated with aquatic connections (Watson et al. 2003, pg. 295; Pearl and Hayes 2004, pg. 15). OSF rely on an aquatic connection between breeding sites to maintain population viability.

Current Conditions and Limiting Factors in the Action Area

Large historical losses of wetland habitat have occurred across the range of the OSF. Wetland losses have directly influenced the current fragmentation and isolation of remaining populations. Loss of natural wetland and riverine disturbance processes as a result of human activities has and continues to result in degradation of OSF habitat. Historically, a number of disturbance processes created early successional wetlands favorable to OSF throughout the Pacific Northwest, including Rivers freely meandered over their floodplains, removing trees and shrubs and baring patches of mineral soil; beavers created a complex mosaic of aquatic habitat types for year-round use; and summer fires burned areas that would be shallow water wetlands during the OSF breeding season the following spring. Today, all of these natural processes are greatly reduced, impaired, or have been permanently altered as a result of human activities, including stream bank, channel, and wetland modifications; operation of water control structures (e.g., dams and diversions); beaver removal; and fire suppression.

The historical loss of OSF habitats and changes in natural disturbance processes are exacerbated by the introduction of reed canarygrass (*Phalaris arundinacea*), nonnative predators, and potentially climate change. In addition, current regulatory mechanisms and voluntary incentive programs designed to benefit fish species have inadvertently led to the continuing decline in quality of OSF habitats at some locations in Washington. The current wetland and stream vegetation management paradigm is generally a no-management or restoration approach that often results in succession to a tree- and shrub-dominated community that unintentionally degrades or eliminates remaining or potentially suitable habitat for OSF breeding. Furthermore, incremental wetland loss or degradation continues under the current regulatory mechanisms. If left unmanaged, these factors may result in the eventual elimination of remaining suitable OSF habitats and/or populations. The persistence of habitats required by the species is now largely management dependent.

The USFWS determined that the threatened status of the OSF is influenced by one or more of the following factors (79 FR 51658; August 29, 2014):

- Habitat necessary to support all life stages continues to be impacted and/or destroyed by human activities that result in the loss of wetlands to land conversions; hydrologic changes resulting from operation of existing water diversions/manipulation structures, new and existing residential and road developments, drought, and removal of beavers (*Castor canadensis*); changes in water temperature and vegetation structure resulting from reed canarygrass invasions, plant succession, and restoration plantings; and increased sedimentation, increased water temperatures, reduced water quality, and vegetation changes resulting from the timing and intensity of livestock grazing (or in some instances, removal of livestock grazing at locations where it maintains early seral stage habitat essential for breeding);

- Predation by nonnative species, including nonnative trout and bull frogs (*Lithobates catesbeianus*);
- Inadequate existing regulatory mechanisms that result in significant negative impacts such as habitat loss and modification; and
- Other natural or manmade factors including small and isolated breeding locations, low connectivity, low genetic diversity within occupied sub-basins, and genetic differentiation between sub-basins.

All occupied sub-basins are subjected to multiple threats, which cumulatively pose a risk to individual populations. Many of these threats are intermingled, and the magnitude of the combined threats to the species is greater than the individual threats (79 FR 51658; August 29, 2014).

The overall reproductive success of the OSF is directly influenced by the timing and availability of water in habitats that support all life stages and maintaining aquatic connectivity within suitable habitat areas and between populations. Of equal importance is maintaining low emergent wetland vegetative structure with a high level of solar exposure (low canopy closure) during breeding and the early stages of rearing. Maintaining and restoring complex wetland habitats of variable water depths and native vegetation structure and diversity will provide quality habitat that is suitable for all life stages. These habitats should be without nonnative predators such as bullfrog (*Lithobates catesbeianus*).

Currently, OSF are mostly found in small isolated sites occupied by a small number of individuals in a very small portion of its historic range. Therefore, re-establishing and maintaining adequate areas of high quality, connected wetland and aquatic habitat is a conservation need. Conservation efforts focused on improving water management to create habitats that are suitable for all life stages and reducing or removing nonnative plant and animal species that reduce the suitability of habitat or result in direct predation are necessary.

Conservation Role of the Action Area

The action area includes a substantial amount of breeding, rearing, and overwintering habitat for the OSF. OSF are mostly found today in small isolated sites, occupied by a small or relatively small number of individuals, and across a small portion of the historic range. Therefore, re-establishing and maintaining adequate areas of high quality, connected wetland and aquatic habitat is a conservation need. Conservation efforts focused on improving water management and reducing or removing nonnative plant and animal species are necessary.

Climate Change Effects

Although predictions of climate change impacts do not specifically address OSF, short and long-term changes in precipitation patterns and temperature regimes will likely affect wet periods, winter snow pack, and flooding events (Chang and Jones 2010). These changes are likely to affect amphibians through a variety of direct and indirect pathways, such as range shifts, breeding success, survival, dispersal, breeding phenology, aquatic habitats availability and quality, food webs, competition, spread of diseases, and the interplay among these factors (Blaustein et al. 2010 entire; Hixon et al. 2010, pg. 274; Corn 2003 entire). Amphibians have species-specific temperature tolerances, and exceeding these thermal thresholds is expected to reduce survival (Blaustein et al. 2010, pp. 286–287). Earlier spring thaws and warmer ambient temperatures may result in earlier breeding, especially at lower elevations in the mountains where breeding phenology is driven more by snow pack than by air temperature (Corn 2003, pg. 624). Shifts in breeding phenology may also result in sharing breeding habitat with species not previously encountered and/or new competitive interactions and predator/prey dynamics (Blaustein et al. 2010. pp. 288, 294). OSF are highly aquatic and reductions in summer flows may result in summer habitat going dry, potentially resulting in increased mortality or movement to lower quality habitats where there is greater susceptibility to predation.

Amphibians are susceptible to many types of pathogens including trematodes, copepods, fungi, oomycetes, bacteria, and viruses. Changes in temperature and precipitation could alter host-pathogen interactions and/or result in range shifts resulting in either beneficial or detrimental impacts on the amphibian host (Blaustein et al. 2010, pg. 296). Kiesecker et al. (2001a, pg. 682) indicate climate change events, such as El Nino/Southern Oscillation, that result in less precipitation and reduced water depths at egg-laying sites results in high mortality of embryos because their exposure to UV-B and vulnerability to infection (such as Saprolegnia) is increased. Warmer temperatures and less freezing in areas occupied by bullfrogs is likely to increase bullfrog winter survivorship, thereby increasing the threat from predation. Uncertainty about climate change impacts does not mean that impacts may or may not occur; it means that the risks of a given impact are difficult to quantify (Schneider and Kuntz-Duriseti 2002, pg. 54; Congressional Budget Office 2005, entire; Halsnaes et al. 2007, pg. 129). OSF occupy habitats at a wide range of elevations, and all of the occupied sub-basins are likely to experience precipitation regime shifts; therefore, the response to climate change is likely to vary across the range and the population-level impacts are uncertain. The interplay between OSF and their aquatic habitat will ultimately determine their population response to climate change. Despite the potential for future climate change throughout the range of the species, the USFWS has not identified, nor are we aware of any data on, an appropriate scale to evaluate habitat or population trends for the OSF or to make predictions about future trends and whether the species will be significantly impacted.

<u>Summary</u>

Based on our review of the current information regarding the species status in the action area, we have determined the Oregon spotted frog populations in the action area retain sufficient resiliency and redundancy to offset patchy, temporary adverse impacts caused by natural or anthropogenic sources.

Effects of the Action on the Oregon Spotted Frog

Appendix I contains general information regarding effects of the action for all species and critical habitat addressed in this opinion, including the *Analytical Approach Used in the BA*.

When implementing countermeasures as part of spill response, the EPA and USCG will also implement all of the relevant, practicable, and effective CMs (see Appendix A – Conservation Measures below).

The EPA and USCG have described which response actions and countermeasures are likely to directly or indirectly affect or have impacts to suitable riparian and wetland habitats (EPA and USCG 2018, Table 2-1, pp. 2-11 through 2-15; see Appendix D below): use of vessels; use of vehicles or heavy machinery; staging area establishment and use; foot traffic; booming; berms, dams, or other barriers (pits and trenches, etc.); culvert blocking; skimming; vacuuming; manual removal of oil and oiled substrate using hand tools; mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking); woody debris removal, terrestrial and aquatic cutting/removal of vegetation (before or after oiling); ambient temperature, low pressure flooding/flushing; pressure washing/steam cleaning or sand blasting; physical herding; and [non-mechanical] natural attenuation with monitoring.

In general, the proposed overall action has the potential to result in significant beneficial effects to the environment (inclusive of any affected OSF-occupied habitat) caused by timely containment, control, and removal of oil in areas affected by spilled material with corresponding immediate and long-term benefits to fish and wildlife, water, soil, and sediment quality.

The proposed action also has the potential to negatively affect the OSF in the following ways: adverse effects in the form of direct physical injury or mortality; adverse effects in the form of physical or chemical alteration, damage, or destruction of habitat; and other forms of adverse exposure and effects resulting in a significant disruption of normal OSF behaviors.

With full and successful implementation of the CMs, some of these response actions and countermeasures will be a source of insignificant or discountable OSF exposures and effects, while others are still likely in some instances (or in most or many instances) to cause or result in measurable, adverse exposures and effects to OSF and their habitat. Even with implementation of all the relevant and practicable CMs, some of these response actions and countermeasures have the potential to result in the following measurable forms of adverse exposure and effect: direct physical injury or mortality (e.g., as a result of physical entrainment, trapping, or stranding); physical or chemical alteration, damage, or destruction of habitat; and/or other forms of adverse exposure and effect resulting in a significant disruption of normal OSF behaviors (i.e., the ability to successfully feed, move, and/or shelter) (e.g., exposures to degraded water quality, turbidity and sedimentation).

Because of the limited distribution of the OSF in the action area, and because the proposed action includes specific CMs designed to limit habitat disturbance, locate staging areas and support facilities in the least sensitive areas possible, restrict foot traffic, vehicles, and heavy machinery from sensitive areas, and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E), the potential for the proposed action to cause adverse effects to the OSF is significantly reduced. Additionally, spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response. For these reasons, there is a high potential for any adverse effects to the OSF caused by spill response activities to be localized, limited in scale and duration, and to be offset by future reproduction of OSFs following spill response activities.

<u>Response Actions and Countermeasures with Insignificant or Discountable Effects</u>

The action area includes breeding, rearing, and overwintering habitat for the OSF. All life history stages (eggs/egg masses, larvae, tadpoles, juvenile and adult frogs) are present in the action area and likely to be exposed to the effects of the proposed action. Owing, in part, to the extreme vulnerability of OSF eggs/egg masses to most every form of disturbance (even temporary disturbance), all (or nearly all) of the response actions and countermeasures pose a risk of measurable adverse effects to the OSF.

The OSF is a medium-sized frog, ranging from 44 to 100 millimeters (1.74 to 4 inches) in body length. The majority of egg masses are laid communally in groups of a few to several hundred (Licht 1971, pg. 119; Nussbaum et al. 1983, pg. 186; Cook 1984, pg. 87; Hayes et al. 1997 pg. 3; Engler and Friesz 1998, pg. 3), typically in shallow (often temporary) pools of water; gradually receding shorelines; on benches of seasonal lakes and marshes; and in wet meadows. These sites are generally no more than 14 inches (35 centimeters) deep (Pearl and Hayes 2004, pp. 19-20). Breeding microenvironments are often located in seasonally inundated shallows, and are usually hydrologically connected to permanently wetted areas, such as creeks, wetlands, and springs (Licht 1971, pg. Licht, 1974, pg. 614). Eggs are laid where the vegetation is low or sparse, such that vegetation structure does not shade the eggs (McAllister and Leonard 1997, pg. 17).

Nautural attenuation with monitoring has the potential to directly or indirectly affect or have impacts to suitable riparian and wetland habitats occupied by OSF or designated OSF critical habitat. However, with full and successful implementation of the CMs, we conclude that a response action or countermeasure invoving only natural attenuation with monitoring monitoring is unlikely to result in measurable effects to the OSF or significantly disrupt normal OSF behaviors (i.e., the ability to successfully feed, move, and/or shelter), because these measures are likely to avoid and minimize the adverse effects of response actions on the OSF.

<u>Spill Response Actions and Countermeasures with Potentially Significant Adverse Effects to the OSF</u>

Direct Physical Injury or Mortality. The following response actions and countermeasures will directly or indirectly affect or have impacts to suitable riparian and wetland habitats. Furthermore, even with implementation of all the relevant and practicable CMs, the following response actions and countermeasures are still likely to result in instances of direct physical injury or mortality for OSF as a result of physical entrainment, trapping, stranding, and/or crushing: use of vessels; use of vehicles or heavy machinery; foot traffic; booming, berms, dams, or other barriers (pits and trenches, etc.); culvert blocking; skimming; vacuuming; manual removal of oil and oiled substrate using hand tools; mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking); woody debris removal, terrestrial and aquatic cutting/ removal of vegetation (before or after oiling); and physical herding.

When spill responses are conducted in suitable habitats occupied by OSF and include these response actions or countermeasures, they pose a risk of physical entrainment, trapping, stranding, and/or crushing that cannot be fully discounted. Implementation of all the relevant and practicable CMs will reduce, but cannot fully avoid these outcomes.

Owing, in part, to the vulnerability of OSF eggs/egg masses, larvae, and tadpoles, the risk of physical injury or mortality is heightened when these life stages are present. Breeding occurs in February or March at lower elevations and between early April and early June at higher elevations (Leonard et al. 1993, pg. 132). Eggs usually hatch within three weeks after oviposition. Tadpoles metamorphose during their first summer.

In general, the proposed action has the potential to result in significant beneficial effects to the environment (inclusive of any affected OSF-occupied habitat) because of timely containment, control, and removal in areas affected by spilled material with corresponding immediate and long-term benefits to fish and wildlife, water, soil, and sediment quality.

Because of the limited distribution of the OSF in the action area, and because the proposed action includes specific CMs designed to limit habitat disturbance, to locate staging areas and support facilities in the least sensitive areas possible, to restrict foot traffic, vehicles, and heavy machinery from sensitive areas, and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E), the potential for the proposed action to cause adverse effects to the OSF is significantly reduced. Additionally, spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response. For these reasons, there is a high potential for any adverse effects to the OSF caused by spill response activities to be localized, limited in scale and duration, and to be offset by future reproduction of OSFs following spill response activities. We further conclude that use and/or implementation of the response actions and countermeasures listed above will result in relatively few instances of physical injury or mortality of OSFs.

Physical or Chemical Alteration, Damage, or Destruction of Habitat. The following response actions and countermeasures will directly or indirectly affect or have impacts to suitable riparian and wetland habitats. Furthermore, even with implementation of all the relevant and practicable CMs, the following response actions and countermeasures are still likely to result in instances of adverse physical or chemical alteration, damage, or destruction of OSF habitat: use of vehicles or heavy machinery; staging area establishment and use; berms, dams, or other barriers (pits and trenches, etc.); mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking); woody debris removal, terrestrial and aquatic cutting/ removal of vegetation (before or after oiling); ambient temperature, low pressure flooding/flushing; and pressure washing/steam cleaning or sand blasting. When spill responses are conducted in suitable OSF habitat and include these response actions or countermeasures, they pose a risk of adverse habitat alteration, damage, or destruction that cannot be fully discounted.

Implementation of all the relevant and practicable CMs will reduce, but cannot fully avoid these outcomes. We do conclude that instances of adverse OSF habitat alteration, damage, or destruction will be uncommon. Most of the unavoidable impacts will be limited in spatial and temporal extent (i.e., most spill responses are limited in geographic scope, and durations, for the purpose of this consultation, are limited to up to 4 days), and these impacts and adverse effects will (in most, if not all, instances) be small in comparison to the significant beneficial effects resulting from containment, control, removal, and recovery of spilled hazardous material (i.e., restored and/or improved water, soil, and sediment quality; reduced or eliminated long term potential for exposure).

Physical containment, control, removal, and recovery of spilled hazardous material (oil, petroleum, other) cannot be achieved in all instances without some likelihood of impacts to riparian and wetland habitats, with corresponding potential for measurable adverse effects to OSF habitat conditions and functions. When conducted in suitable OSF habitat, and/or designated OSF critical habitat, the above-described response actions and countermeasures will, in some instances, have unavoidable adverse effects to habitat and/or the natural processes that function to establish and maintain habitat over time. Furthermore, while in some instances these unavoidable impacts and effects will be limited in spatial and temporal extent (i.e., most spill responses are limited in geographic scope, and durations, for the purpose of this consultation, are limited to up to 4 days), there could and likely will be instances where these impacts and effects extend to scales sufficient to significantly disrupt normal OSF behaviors (i.e., the ability to successfully feed, move, and/or shelter). Moreover, the affected OSF habitat conditions and functions may require months or years to fully recover.

We consider spills of oil, petroleum, or other hazardous material to be part of the baseline environmental conditions; i.e., not an element of the proposed action. However, decanting represents a conscious and deliberate decision to release materials back into the environment that are not completely "clean" or benign. All decanting will be conducted in a designated response area within a collection area, vessel collection well, recovery belt, weir area, or directly in front of a recovery system; a containment boom will be deployed around the collection area, where feasible, to prevent the loss of decanted oil or entrainment of species in recovery equipment. Decanting shall be monitored at all times, so that discharge of oil in the decanted water is promptly detected. Where feasible, decanting will be done just ahead of a skimmer recovery system so that discharges of oil in decanting water can be immediately recovered. We do agree that resulting impacts and adverse effects are small in comparison to the significant beneficial effects that are attributable to removal and recovery of spilled hazardous material (including reduced or eliminated long-term potential for exposure).

In general, the proposed action has the potential to result in significant beneficial effects to the environment (inclusive of any affected OSF-occupied habitat) due to timely containment, control, and removal in areas affected by spilled material with corresponding immediate and long-term benefits to fish and wildlife, water, soil, and sediment quality.

Because of the limited distribution of the OSF in the action area, and because the proposed action includes specific CMs designed to limit habitat disturbance, to locate staging areas and support facilities in the least sensitive areas possible, to restrict foot traffic, vehicles, and heavy machinery from sensitive areas, and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E), the potential for the proposed action to cause adverse effects to the OSF is significantly reduced. Additionally, spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response. For these reasons, there is a high potential for any adverse effects to the OSF caused by spill response activities to be localized, limited in scale and duration, and to be offset by future reproduction of OSFs following spill response activities. We further conclude that use and/or implementation of the response actions and countermeasures listed above will result in relatively few and limited instances of adverse physical or chemical alteration, damage, or destruction of OSF habitat. The specific instances where these impacts and effects extend to scales sufficient to significantly disrupt normal OSF behaviors (i.e., the ability to successfully feed, move, and/or shelter) will be even less common.

Other Adverse Exposures and Effects: Turbidity and Sedimentation

The following response actions and countermeasures will have unavoidable impacts to suitable riparian and wetland habitats: use of vehicles or heavy machinery; staging area establishment and use; berms, dams, or other barriers (pits and trenches, etc.); mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking); woody debris removal, terrestrial and aquatic cutting/ removal of vegetation (before or after oiling); ambient temperature, low pressure flooding/flushing; and pressure washing/steam cleaning or sand blasting. Even with implementation of all the relevant and practicable CMs, these response actions and countermeasures are still likely to result in significant temporary turbidity and sedimentation. When these response actions or countermeasures (above) are conducted in suitable and occupied OSF habitat, individuals (adults, tadpoles, larvae) are likely to be exposed and may in some instances experience a significant disruption of their normal behaviors (i.e., the ability to successfully feed, move, and/or shelter).

Factors influencing suspended sediment concentration, exposure intensity, and duration include waterbody size, volume of flow, the nature of the construction or spill response activity, erosion controls, and substrate and sediment particle size. Factors influencing the biological response(s) and severity of effect include duration and frequency of exposure, concentration, and life stage. Availability and access to refugia are other important considerations.

We expect that elevated turbidity and sedimentation will be intermittent/episodic and managed pursuant to the state water quality standards (e.g., Water Quality Standards for Surface Waters of the State of Washington, effective March 5, 2020, Chapter 173-201A WAC). Therefore, most spill responses are likely to expose and affect only relatively low numbers of individuals.

The proposed action will, in all cases of response to spill, result in significant beneficial effects to the environment; containment, control, removal, and recovery of spilled hazardous material (oil, petroleum, other), with corresponding immediate and long term benefits to water, soil, and sediment quality. Turbidity and sedimentation resulting temporarily from the response actions and countermeasures listed above (i.e., in this sub-section) will result in comparatively minor adverse exposures and effects compared to the foreseeable beneficial effects (i.e., improved water, soil, and sediment quality).

Cumulative Effects

Appendix J contains cumulative effects analysis prepared for the BA that applies to all species and critical habitats contained in this opinion, including *Water Management, Urban and Agricultural Development,* and *Permitted Discharges.*

Actions on private lands may influence OSF populations in the action area. Water management can affect recruitment of OSF; early drawdowns or excessive water level fluctuations can result in higher egg and larval stage mortality. Grazing activities, transportation activities, and development on adjacent City, County, and private lands may affect water quality and quantity. These activities may increase sediment and nutrient inputs, may impact flow and water levels, and increase the risk of non-native, invasive species introductions. Other ongoing non-Federal actions may include implementation of Total Maximum Daily Loads and watershed-scale water quality improvement programs, and habitat restoration programs.

Taken as a whole, the foreseeable future State, tribal, local, and private actions will have both beneficial effects and adverse effects to the OSF and its habitat.

Conclusion

After reviewing the current status of the Oregon spotted frog, the environmental baseline, the effects of the proposed action (inclusive of proposed conservation measures), and the cumulative effects, it is our biological opinion that the proposed action, as described in the BA and this opinion, is not likely to jeopardize the continued existence of the Oregon spotted frog. We reached this conclusion for the following reasons.

In general, the proposed action has the potential to result in significant beneficial effects to the environment (inclusive of any affected OSF-occupied habitat) caused by timely containment, control, and removal in areas affected by spilled hazardous material (such as oil) with corresponding immediate and long-term benefits to fish and wildlife, water, soil, and sediment quality.

Because of the limited distribution of the OSF in the action area, and because the proposed action includes specific CMs designed to limit habitat disturbance, to locate staging areas and support facilities in the least sensitive areas possible, to restrict foot traffic, vehicles, and heavy machinery from sensitive areas, and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E), the potential for the proposed action to cause adverse effects to the OSF is significantly reduced. Additionally, spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response. For these reasons, there is a high potential for any adverse effects to the OSF caused by spill response activities to be localized, limited in scale and duration, and to be offset by future reproduction of OSFs following spill response activities.

Oregon Spotted Frog Critical Habitat

Rangewide Status of Oregon Spotted Frog Critical Habitat

The Fish and Wildlife Service designated critical habitat for the Oregon spotted frog on 65,038 acres and 20.3 stream miles in Washington and Oregon on May 11, 2016 (81 FR 29336). Critical habitat for Oregon spotted frog was designated within 14 units, delineated by river sub-basins where spotted frogs are extant: (1) Lower Chilliwack River; (2) South Fork Nooksack River; (3) Samish River; (4) Black River; (5) White Salmon River; (6) Middle Klickitat River; (7) Lower Deschutes River; (8) Upper Deschutes River; (9) Little Deschutes River; (10) McKenzie River; (11) Middle

Fork Willamette River; (12) Williamson River; (13) Upper Klamath Lake; and (14) Upper Klamath.

The final rule for critical habitat provides descriptions of ownership, acreages and threats for each unit (81 FR 29336, pp. 29356 – 29360).

Three primary constituent elements (PCEs) of OSF critical habitat were identified in the final rule:

PCE 1: Nonbreeding, Breeding, Rearing, and Overwintering Habitat

PCE 2: Aquatic Movement Corridors

PCE 3: Refugia Habitat

All of the PCEs of OSF critical habitat are found within each of the units referenced above, but are adversely impacted by one or more of the following factors: invasive plants (e.g., reed canarygrass), native woody vegetation encroachment, beaver removal efforts, the presence of non-native predaceous fish and bullfrogs, livestock grazing, loss or modification of habitat from conversion to other uses, and irrigation water management activities. See also Appendix G below.

In general, the condition and function of each of the PCEs within OSF critical habitat at the rangewide scale vary between mostly intact and undisturbed to substantially disturbed and impaired. In general, the current condition and function of OSF critical habitat PCEs are moderately impaired.

Status of Oregon Spotted Frog Critical Habitat in the Action Area

The current condition of OSF critical habitat in the action area is generally the same as described above for the rangewide condition. See also Appendix H, which contains general information about the environmental baseline that applies to all species and critical habitats addressed in this opinion.

Effects of the Action on Oregon Spotted Frog Critical Habitat

Note: Appendix I contains general information regarding effects of the action on all species and critical habitats addressed in this opinion.

As discussed above under the Description of the Proposed Action, the proposed action involves federalized responses to spills of oil or petroleum to water, or of other hazardous materials that pose a risk of immediate impacts to human health and/or the human environment. In general, the proposed action is likely to result in significant beneficial effects to the environment (inclusive of any affected OSF critical habitat) caused by containment, control, and removal of spilled hazardous material (such as oil) with corresponding immediate and long-term benefits to water, soil, and sediment quality.

Because of the limited distribution of the OSF critical habitat in the action area, and because the proposed action includes specific CMs designed to limit habitat disturbance, to locate staging areas and support facilities in the least sensitive areas possible, to restrict foot traffic, vehicles, and heavy machinery from sensitive areas, and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E), the potential for the proposed action to cause adverse effects to OSF critical habitat is significantly reduced. Additionally, spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response. For these reasons, there is a high potential for any adverse effects to the OSF critical habitat caused by spill response activities to be localized, and limited in scale and duration.

PCE 1: OSF Nonbreeding, Breeding, Rearing, and Overwintering Habitat. For the reasons discussed above, unavoidable adverse effects caused by potential spill response actions are likely to be limited in spatial extent (i.e., most spill responses are limited in geographic scope, and durations, for the purpose of this consultation, are limited to up to 4 days). Although affected habitat conditions and functions will require months or years to fully recover,

PCE 2: Aquatic Movement Corridors. For the reasons discussed above, unavoidable adverse effects caused by potential spill response actions are likely to be limited in spatial extent. Affected habitat conditions and functions will require months or years to fully recover.

PCE 3: Refugia Habitat. For the reasons discussed above, unavoidable adverse effects caused by potential spill response actions are likely to be limited in spatial extent. Affected habitat conditions and functions will require months or years to fully recover.

Cumulative Effects

Appendix J contains cumulative effects analysis prepared for the BA that applies to all species and critical habitats contained in this opinion, including *Water Management, Urban and Agricultural Development,* and *Permitted Discharges.* See *Cumulative Effects* section for the Oregon spotted frog above.

Actions on private lands have the potential to adversely affect the PCEs of OSF critical habitat in the action area. Water management can adversely affect recruitment of OSF by altering habitat conditions; early drawdowns or excessive water level fluctuations can result in higher egg and larval stage mortality, and lack of flows in the winter can expose spotted frogs to desiccation and freezing. Grazing activities, transportation activities, and development on adjacent City, County, and private lands may affect water quality and quantity. These activities may increase sediment and nutrient inputs, may impact flow and water levels, and increase the risk of non-native, invasive species introductions. Other ongoing non-Federal actions may include implementation of Total Maximum Daily Loads and watershed-scale water quality improvement programs, and habitat restoration programs.

Taken as a whole, the foreseeable future State, tribal, local, and private actions will have both beneficial effects and adverse effects to OSF critical habitat.

Conclusion

After reviewing the current status of Oregon spotted frog critical habitat, the environmental baseline, the effects of the proposed action (inclusive of conservation measures), and cumulative effects, it is our biological opinion that the Northwest Are Contingency Plan, as described in this opinion, is not likely to destroy or adversely modify designated critical habitat for the Oregon spotted frog. We reached this conclusion for the following reasons.

In general, the proposed action has the potential to result in significant beneficial effects to the environment (inclusive of affected OSF critical habitat) caused by timely containment, control, and removal in areas affected by spilled material with corresponding immediate and long-term benefits to fish and wildlife, water, soil, and sediment quality.

Because of the limited distribution of OSF critical habitat in the action area, and because the proposed action includes specific CMs designed to limit habitat disturbance, to locate staging areas and support facilities in the least sensitive areas possible, to restrict foot traffic, vehicles, and heavy machinery from sensitive areas, and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E), the potential for the proposed action to cause adverse effects to OSF critical habitat is significantly reduced. Additionally, spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response. For these reasons, there is a high potential for any adverse effects to OSF critical habitat caused by spill response activities to be localized, and limited in scale and duration.

Bull Trout

Rangewide Status of the Bull Trout

On November 1, 1999, the bull trout (*Salvelinus confluentus*) was listed as a threatened species for the coterminous United States population on (64 FR 58910). Throughout its range, bull trout are threatened by the combined consequences of habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, grazing, the blockage of migratory corridors by dams or other diversion structures, poor water quality, incidental angler harvest, entrainment, and introduced non-native species. Since the listing of bull trout, there has been very little change in the general distribution of bull trout in the coterminous United States, and we are not aware that any known, occupied bull trout core areas have been extirpated (USFWS 2015, pg. 7).

The 2015 recovery plan for bull trout identifies six proposed recovery units within the listed range of the species (USFWS 2015, pg. 36). Each of the recovery units are further organized into multiple bull trout core areas, which are mapped as non-overlapping watershed-based polygons, and each core area includes one or more local populations. Within the coterminous United States, we currently recognize 109 occupied core areas, which comprise 600 or more local populations of bull trout (USFWS 2015, pg. 34). Core areas are functionally similar to bull trout metapopulations, in that bull trout within a core area are much more likely to interact, both spatially and temporally, than are bull trout from separate core areas.

The USFWS has also identified a number of marine or mainstem riverine habitat areas outside of bull trout core areas that provide foraging, migration, and overwintering (FMO) habitat that may be shared by bull trout originating from multiple core areas. These shared FMO areas support the viability of bull trout populations by contributing to successful overwintering survival and dispersal among core areas (USFWS 2015, pg. 35).

For a detailed account of bull trout biology, life history, threats, demography, and conservation needs, refer to Appendix G below. Based on this information, threats identified in the listing have not substantially changed. Sufficient representation, resilience, and redundancy of bull trout populations are retained to ensure the potential for recovery, indicating the current range-wide condition conforms to the survival condition as defined by the USFWS (1998, pg. xviii) and summarized in the Analytical Framework section herein.

Status of the Bull Trout in the Action Area

Appendix H of this opinion contains general information about the environmental baseline that applies to all species and critical habitats addressed in this opinion, including the regulatory definition of environmental baseline, a discussion of *Oil (and Hazardous Substance) Facilities and Transport in the Action Area, Size and Types of Spills in the NW, Typical Response Time and Type, Influence of Spilled Material on Species Habitats in the Action Area,* and *Influence of Climate Change on Species Habitats in the Action Area*.

The action area includes portions of the current range of the bull trout in Washington, Oregon, and Idaho: (Washington) inland marine waters of the Puget Sound and Strait of Juan de Fuca; major tributaries to the Puget Sound; major tributaries to the Strait of Juan de Fuca and Washington Coast; and, lower and middle mainstem Columbia River and tributaries; (Oregon) lower and middle mainstem Columbia River and tributaries; and Willamette River and tributaries; and (Idaho) Kootenai, Pend Oreille, Clark Fork, and Snake Rivers and tributaries. The action area includes portions of four bull trout Recovery Units (i.e., the Coastal, Mid-Columbia, Columbia Headwaters, and Upper Snake Recovery Units) (see Figure BT-1 in Appendix G).

The action area includes core and non-core foraging, migrating, and overwintering (FMO) habitat for bull trout (including marine FMO). There is little or no bull trout spawning and early rearing habitat in the action area.

Connectivity between spawning and rearing habitat and downstream FMO habitat is necessary for the expression of migratory life history patterns. In core areas where multiple local populations exist, interaction among local populations through movement of migratory individuals is critical to maintaining genetic diversity and recolonizing local populations that become extirpated. When connectivity is impaired or blocked, bull trout populations tend to become restricted to isolated local populations, which may have low genetic diversity, are vulnerable to extirpation, and cannot be readily recolonized. Barriers to connectivity may consist of natural physical features such as waterfalls; river reaches that create mortality risks or prevent movement of adult fish because of entrainment, excessively warm water, or poor water quality; instream structures such as culverts or weirs; or dams (USFWS 2015, pg. 27).

Lack of suitable FMO habitat, including shared FMO habitat in mainstem, estuarine, and nearshore areas, can increase mortality of migratory individuals or discourage movement through these areas, resulting in reduced connectivity among local populations or core areas. Therefore, impaired FMO areas should be identified and habitat improvement measures should be implemented where feasible (USFWS 2015, pg. 28).

Promoting and restoring connectivity, both within core areas and within FMO habitat, should encourage the full expression of migratory life history strategies (fluvial, adfluvial, anadromous, amphidromous), and allow appropriate genetic interaction and demographic exchange among core areas (USFWS 2015, pp. 51, 52).

Current Conditions and Limiting Factors in the Action Area

There are six Recovery Units for the bull trout in the coterminous U.S. (USFWS 2015, pg. 34). The action area includes portions of four of these Recovery Units (i.e., the Coastal, Mid-Columbia, Columbia Headwaters, and Upper Snake Recovery Units). The action area includes core and non-core FMO habitat for bull trout (including marine FMO). There is little or no bull trout spawning and early rearing habitat in the action area.

Coastal Recovery Unit. The Coastal Recovery Unit includes approximately 20 core areas, and numerous local populations, located in major tributaries to the Puget Sound, Strait of Juan de Fuca, and Washington Coast; tributaries to the lower mainstem Columbia River; and, tributaries to the Willamette River. The major tributaries to the Puget Sound, Strait of Juan de Fuca, and Washington Coast support anadromous, fluvial, adfluvial, and resident life history forms; they support large and moderately sized local bull trout populations, including the largest (and only) anadromous bull trout populations found anywhere in the entire listed range of the species. Across the Puget Sound, Strait of Juan de Fuca, and Washington Coast, most of these local populations (from 14 bull trout core areas; USFWS 2015b, pg. A-2) appear to be relatively stable, with some year-to-year variation in the measured indices for abundance and reproduction (*Biological Opinion – Programmatic Consultation for Shellfish Activities in Washington State Inland Marine Waters*; USFWS Ref. No. 01EWFW00-2016-F-0121, August 26, 2016).

The Coastal Recovery Unit extends along the lower Columbia River (as far as John Day Dam) to include core areas located in several major tributaries (i.e., the Lewis and Klickitat Rivers in Washington, the Willamette River and its major tributaries in Oregon, and the Hood and Deschutes Rivers in Oregon). Within the action area, tributaries to the lower mainstem Columbia River support bull trout from approximately eight core areas, including the re-established Clackamas River population (USFWS 2015b, pg. A-2). There are fewer occurrences of bull trout in the Columbia River where poorer habitat conditions and passage barriers exist. Greater use of the mainstem Columbia River is expected as habitat conditions improve and bull trout population abundances increase through implementation of the recovery plan (USFWS 2015b, pg. A-4).

The Lewis River core area supports three known, local populations, all of them located higher in the basin above the Merwin and Yale Dams. The Klickitat River core area supports a single, small and depressed local population. The Lower Deschutes River bull trout core area supports an abundant bull trout population and has been used as donor stock for re-establishing the Clackamas River population (USFWS 2015b, pg. A-6). Inter-population connectivity impairment threatens two core areas (Hood River and Upper Willamette River) (USFWS 2015b, pg. A-28).

Status is highly variable, with one relative stronghold (Lower Deschutes River bull trout core area) existing on the Oregon side of the Columbia River. The Coastal Recovery Unit also contains three additional watersheds (North Santiam River, Upper Deschutes River, and White Salmon River) that could potentially become re-established core areas. The *Coastal Recovery Unit Implementation Plan* (USFWS 2015b) provides more complete information to describe current conditions, limiting factors, and threats; those descriptions are incorporated here by reference.

Mid-Columbia Recovery Unit. The Mid-Columbia Recovery Unit includes portions of central Idaho, eastern Washington, and eastern Oregon (USFWS 2015c, pp. C-2, C-4). Major drainages include the Yakima River, Wenatchee River, John Day River, Umatilla River, Walla Walla River, Grande Ronde River, Imnaha River, Clearwater River, and smaller sub-watersheds along the Snake and Columbia Rivers. The Mid-Columbia Recovery Unit encompasses 24 core areas, two historically occupied areas, and one research needs area (USFWS 2015c, pg. C-4). Bull trout throughout this Recovery Unit co-exist with salmon and steelhead.

The status of bull trout in the Mid-Columbia Recovery Unit is variable. Some core areas, such as the Umatilla and Yakima River core areas, contain very small, threatened populations. However, other core areas are strong (e.g., the Imnaha, Clearwater, and Wenatchee River bull trout core areas). The stronghold populations tend to occur within intact habitat areas, such as wilderness and protected forestlands. Throughout the Mid-Columbia Recovery Unit, primary threats include upland/riparian land management, habitat loss, fish passage barriers, and water quality and quantity concerns (USFWS 2015c). Connectivity between core areas is key to the persistence and genetic stability of bull trout.

Baseline conditions are more easily summarized for the smaller geographic regions that align with the *Mid-Columbia Recovery Unit Implementation Plan* (USFWS 2015c, entire). These include the Lower Mid-Columbia (John Day, Umatilla, and Walla Walla basins), Lower Snake (Clearwater, Tucannon, Asotin, Grande Ronde, and Imnaha basins), and Upper Mid-Columbia (Yakima River upstream to the Canadian border), regions. Several federal and non-federal dams operate along the mainstem Columbia and lower Snake Rivers throughout the Mid-Columbia Recovery Unit (i.e., the federal McNary, Chief Joseph, Grand Coulee, Ice Harbor, Lower Monumental, Little Goose, and Lower Granite Dams; the non-federal Priest Rapids, Wanapum, Rock Island, Rocky Reach, and Wells Dams) (Appendix G; Figures BT-2 and BT-3). The *Mid-Columbia Recovery Unit Implementation Plan* (USFWS 2015c) provides more complete information to describe current conditions, limiting factors, and threats; those descriptions are incorporated here by reference.

Columbia Headwaters Recovery Unit. The Columbia Headwaters Recovery Unit includes portions of western Montana, northern Idaho, and northeastern Washington. Major drainages include the Clark Fork River basin, including the Clark Fork River, Lake Pend Oreille, the Pend Oreille River, the Flathead River, Flathead Lake, and the Kootenai River basin. The Recovery Unit is a stronghold for bull trout, as many of the headwater tributaries provide cold-water refugia and are located in high elevation wilderness or protected areas (USFWS 2015d). There are 35 core areas within the Columbia Headwaters Recovery Unit. Fifteen of the 35 are referred to as "complex core areas", as they represent large interconnected habitats, each with multiple spawning streams. These 15 complex core areas contain the majority of individual bull trout within the Columbia Headwaters Recovery Unit (USFWS 2015d). With the exception of much of the headwaters of the Clark Fork River and portions of the Coeur d'Alene River system, which were severely degraded by contamination with heavy metals, bull trout continue to be present (sometimes in low numbers) in most basins where they likely occurred historically throughout the Columbia Headwaters Recovery Unit. The *Columbia Headwaters Recovery Unit Implementation Plan* (USFWS 2015d) provides more complete information to describe current conditions, limiting factors, and threats; those descriptions are incorporated here by reference.

Upper Snake Recovery Unit. The Upper Snake Recovery Unit includes portions of central Idaho, northern Nevada, and eastern Oregon. Major drainages include the Salmon River, Malheur River, Jarbidge River, Little Lost River, Boise River, Payette River, and the Weiser River. The Recovery Unit contains 22 core areas (USFWS 2015e, pg. E-1). Large areas of intact habitat exist primarily in the Salmon River, as this is the only sub-basin that still flows directly into the Snake River; most other sub-basins no longer have direct connectivity due to irrigation uses and/or instream barriers (USFWS 2015e, pg. E-1, E-2). The *Upper Snake Recovery Unit Implementation Plan* (USFWS 2015e) provides more complete information to describe current conditions, limiting factors, and threats; those descriptions are incorporated here by reference.

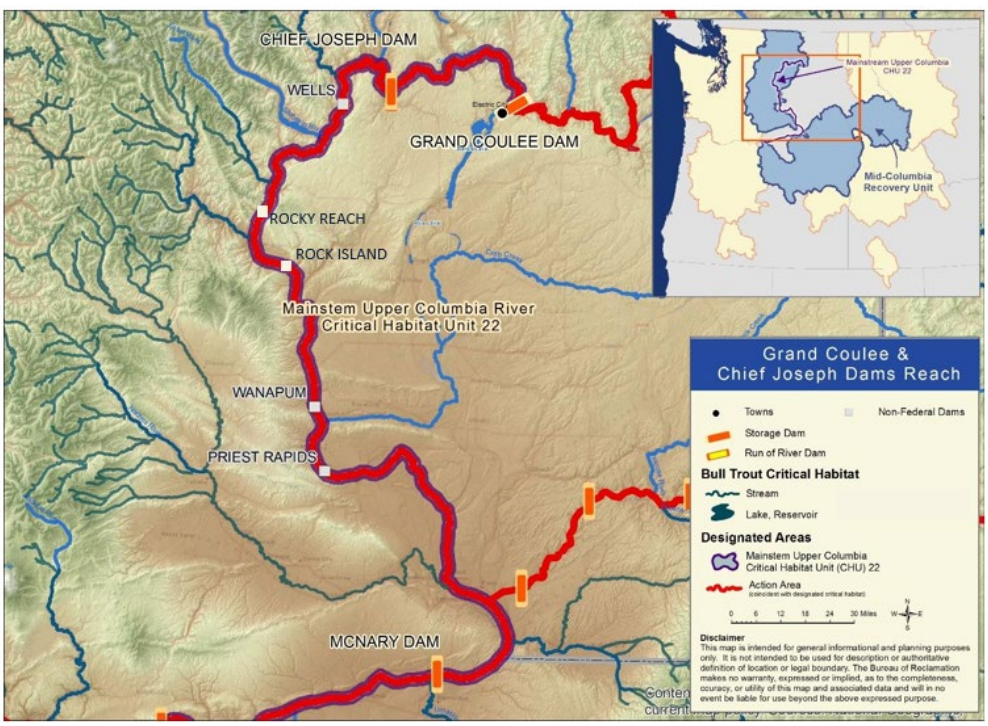


Figure BT-2. Dams along the mainstem Columbia River.

Figure BT-3. Dams along the lower Snake River.

The Status of the Species section provides a fairly comprehensive assessment of the environmental baseline and of the factors influencing bull trout survival and recovery. Among the most important of these are the combined effects of habitat degradation and fragmentation, the blockage of migratory corridors, poor water quality, angler harvest and poaching, and entrainment. Land management activities that contribute to habitat degradation and fragmentation include the recent and past effects from dams and other diversion structures, forest management practices, livestock grazing, agriculture, road construction and maintenance, mining, and urban and rural development. Climate change is likely to play an increasingly important role.

Table BT-1 summarizes baseline conditions for the four bull trout Recovery Units included, or partially included, in the action area.

Table BT-1. Summary of baseline conditions for the bull trout.

Recovery Unit	Core Areas	# of Local Pops	Status	Presence / Use of Action Area
Columbia Head Waters	Lake Koocanusa	2	Stable	Year-round use. Documented entrainment through Libby Dam at unknown quantities.
	Kootenai	8	Depressed	Year-round use. Access to spawning areas impacted by dam operations.
	Hungry Horse Reservoir	10	Stable	Year-round use. Large numbers of bull trout utilize reservoir and entrainment through the dam is likely, annual catch and harvest records total over 7000 individuals between 2004 and 2010.
	Flathead Lake	17	Depressed	Year-round use. Populations declining. Data indicates between 1300 and 1600 adults within reservoir.
	Swan River	9	Stable	Entrained into action area at low numbers, unable to return to Core Area due to natural and manmade barriers.
	Bull Lake	1	Stable	Entrained into action area at low numbers, unable to return to Core Area due to natural and manmade barriers.
	Lake Pend Oreille A	15	Depressed	Entrained into action area at low numbers over Cabinet Gorge Dam
	Lake Pend Oreille B	19	Stable	All life stages are present year round
	Lake Pend Oreille C	1	Depressed	Up to 100 individuals, living within mainstem Pend Oreille River entrained over Albeni Falls Dam. Passage barrier until construction in 2022 for sub-adults and adults.
	Priest Lake	5	Depressed	Occasional entrainment into action area, unable to return to Core Area due to natural and manmade barriers.
Mid-Columbia	NE WA RNA	0	Depressed	Occasional adult individuals present, likely entrained from upstream Core Areas, but source populations are unknown. Fewer than 25 observed over last 10 years.
	Methow	10	Stable	Regular year-round use of mainstem Columbia River. Observed at most mainstem non-federal dams.
	Entiat	2	Depressed	Regular year-round use of mainstem Columbia River. Observed at most mainstem non-federal dams.
	Wenatchee	7	Stable	Regular year-round use of mainstem Columbia River. Observed at most mainstem non-federal dams.
	Yakima	15	Depressed	Potential for downstream movement into Columbia River through entrainment. Historical use was likely, no current observations. If present, likely at very low numbers due to small population size.
	NF Clearwater	12	Stable	Year-round use of Dworshak Reservoir. Low levels of entrainment at Dworshak Dam documented.

Recovery Unit	Core Areas	# of Local Pops	Status	Presence / Use of Action Area
	SF Clearwater	5	Stable	Likely seasonal migratory use of mainstem Clearwater below Dworshak Dam at unknown levels.
	Selway	10	Stable	Likely seasonal migratory use of mainstem Clearwater below Dworshak Dam at unknown levels.
	Lochsa	17	Stable	Likely seasonal migratory use of mainstem Clearwater below Dworshak Dam at unknown levels.
	Imnaha	8	Stable	Regular year-round use of the Snake River upstream of Action Area. Estimates of 800 to 1200 individuals from basin in Snake River per year.
	Grande Ronde Basin (4 Core Areas)	17	Stable	No documented use of Snake River; however, 7 of 17 local populations support migratory life histories that may use Action Area at low numbers.
	Asotin	1	Depressed	Documented movement to Snake River at low numbers, likely due to small population size.
	Tucannon	5	Depressed	Regular use of Mainstem Snake and Columbia rivers, presence expected year-round at unknown quantities. Documented passage at all four Snake River dams and McNary Dam.
	Walla Walla	3	Depressed	Documented movements to Columbia River year-round, peaking in September through February.
	Touchet	3	Stable	Not documented leaving Touchet/Walla Walla basin. No barriers to movement into Action Area, some use expected at very low numbers.
	Umatilla	1	Depressed	Occasional observations at Columbia River Dams, low use likely due to small population size and seasonal barriers.
	MF John Day	3	Depressed	Limited information on use of mainstem Columbia River, but likely at very low numbers based on observations at mainstem dams.
	Up Main John Day	2	Depressed	Limited information on use of mainstem Columbia River, but likely at very low numbers based on observations at mainstem dams.
	NF John Day	7	Depressed	Limited information on use of mainstem Columbia River, but likely at very low numbers based on observations at mainstem dams.
Upper Snake River	Salmon River Basin (10 Core Areas)	123	Stable	No documented use of mainstem Snake River, however, no barriers to downstream movement into Action Area. Presence likely at low numbers.
Coastal	Lower Deschutes	5	Stable	Not well documented, but use of the Columbia River is likely at low numbers based on occasional observations at mainstem dams.
	Klickitat	1	Depressed	Low likelihood of presence based on resident life history and small population numbers.
	Hood River	1	Depressed	Not well documented, but use of the Columbia River is likely at low numbers based on occasional

Recovery Unit	Core Areas	# of Local Pops	Status	Presence / Use of Action Area
				observations at mainstem dams and Clear Branch Dam.
	Lewis River	3	Depressed	Occasional entrainment into action area possible, unable to return to Core Area due to natural and manmade barriers.

Conservation Role of the Action Area

On September 28, 2015, the USFWS announced the availability of a *Recovery Plan for the Coterminous U.S. Population of Bull Trout* (USFWS 2015). The Recovery Plan updates the recovery criteria proposed in the 2002 and 2004 draft recovery plans, to focus on effective management of threats, and de-emphasize the achievement of targeted population numbers (i.e., numbers of adult bull trout in specific areas) (USFWS 2015).

Between 2002 and 2004, three separate bull trout recovery plans were drafted. The previous 2002 and 2004 bull trout recovery plans required that all recovery criteria be achieved in each of 27 Recovery Units. Although these previous draft recovery plans have served to identify recovery actions and provide the framework for implementing numerous recovery actions, they were never finalized.

The final Recovery Plan is based on new information regarding bull trout life history, ecology, distribution, and persistence, including the benefits of various conservation actions implemented on behalf of the bull trout, along with an improved understanding of the various threat factors. The Recovery Plan is intended to promote and support cooperative work with our partners, and serves to focus and implement effective conservation actions in those areas that offer the greatest long-term benefit and where recovery can be achieved (USFWS 2015).

The previous 2002 and 2004 draft bull trout recovery plans proposed adult abundance levels (demographics) as recovery targets for each identified bull trout core area, considering theoretical estimates of effective population size, historic census information, and the professional judgment of recovery unit team members. In developing the final Recovery Plan, the USFWS recognizes that bull trout continue to be found in suitable habitats and generally remain geographically widespread across 110 core areas in five states. The Recovery Plan identifies conservation needs for bull trout in each of the 110 core areas. However, the USFWS acknowledges, that despite the best conservation efforts, it is likely that bull trout will become locally extirpated from some core areas within the foreseeable future. Factors responsible for declining populations and/or local extirpations include impacts of stochastic events on existing small populations, climate change, and isolation (35 of 110 extant core areas comprise a single local population). Moreover, the availability of survey data for accurate population estimates is problematic, and in certain core areas, the geographic limitations on available habitat may inherently constrain the ability of bull trout populations to achieve the earlier demographic targets (USFWS 2015).

The strategy set forth in the Recovery Plan has five key elements (USFWS 2015, Executive Summary pg. v):

1. Conserve bull trout so that they are geographically widespread across representative habitats and demographically stable in six recovery units;
2. Effectively manage and ameliorate the primary threats in each of six recovery units at the core area scale so that bull trout are not likely to become endangered in the foreseeable future;
3. Build upon the numerous and ongoing conservation actions implemented on behalf of bull trout, and improve our understanding of how various threat factors potentially affect the species;
4. Use that information to work with partners to design, fund, prioritize, and implement effective conservation actions in those areas that offer the greatest long term benefit to sustain bull trout, and where recovery can be achieved; and,
5. Apply adaptive management principles to implementing the bull trout recovery program to account for new information.

The final Recovery Plan includes individual Recovery Unit Implementation Plans for each recovery unit. The Recovery Unit Implementation Plans were developed through collaboration with federal, Tribal, State, private, and other partners prior to completion of the plan (USFWS 2015).

The USFWS does not expect, plan, or intend to fully recover all bull trout populations in each of the currently occupied core areas identified by the final Recovery Plan. We recognize that accomplishing recovery at the scale of the recovery units will require that we improve the status of bull trout local populations, and their habitats, in some core areas relative to the time of listing. However, in other core areas it may only be necessary to maintain bull trout local populations and their habitats, more or less in their current condition, into the foreseeable future.

If the threats described in the final Recovery Plan are effectively managed, the USFWS expects that bull trout populations in each recovery unit will respond accordingly, reflecting the biodiversity principles of resiliency, redundancy, and representativeness. Specifically, achieving the proposed recovery criteria in each recovery unit would result in geographically widespread and demographically stable local bull trout populations, and would protect their essential cold water habitats to allow all diverse life history forms to persist into the foreseeable future (USFWS 2015, Executive Summary pg. viii).

The Recovery Plan identifies the following recovery actions (USFWS 2015, pp. 51-53):

- Protect, restore, and maintain suitable habitat conditions for bull trout.
- Minimize demographic threats to bull trout by restoring connectivity or populations where appropriate to promote diverse life history strategies and conserve genetic diversity.
- Prevent and reduce the impacts of non-native fishes and other non-native taxa on bull trout.
- Work with partners to conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery actions, and considering the effects of climate change.

The action area includes core and non-core FMO habitat for bull trout (including marine FMO). There is little or no bull trout spawning and early rearing habitat in the action area. FMO habitat is essential for maintaining life history diversity and connectivity within and between bull trout core areas, and provides opportunities for genetic exchange, demographic support, and recolonization. FMO habitat also provides important foraging opportunities, particularly in the form of seasonally abundant salmonid prey, and thereby supports enhanced growth and productivity.

The action area includes the lower and middle mainstem Columbia River, and the inland marine waters of the Puget Sound and Strait of Juan de Fuca (and their major tributaries). The action area includes essential migratory corridors for all anadromous salmonid populations of the interior Columbia River and greater Puget Sound basins. As such, the action area plays an irreplaceable role in the recovery and conservation of the bull trout. Juvenile salmonids are a key bull trout prey resource throughout these basins. The health and productivity of this prey resource base fundamentally depends upon migratory corridors that function well to enable and support successful juvenile salmonid outmigrations and adult returns to their natal watersheds.

Climate Change

Future climate change impacts on bull trout will require development of a decision framework to help inform where climate change effects are most likely to impact bull trout. The identification of core areas and watersheds that are most likely to maintain habitats suitable for bull trout over the foreseeable future, and under probable climate change scenarios, will help guide the allocation of bull trout conservation resources to improve the likelihood of recovery (USFWS 2015, pg. 53).

The Recovery Plan summarizes our current knowledge of potential future climate change scenarios, and their significance for bull trout recovery (USFWS 2015, pp. 17-19, 30, 31). Bull trout are vulnerable to the effects of warming climates and changing precipitation and hydrologic regimes. Climate change in the Pacific Northwest will include rising air temperatures, changes in the timing and volume of streamflow, increases in extreme precipitation events, and other changes that are likely to degrade bull trout habitat and increase competition with non-native warmwater fish (Mote et al. 2014).

Several climate change assessments or studies have been published (Rieman et al. 2007; Porter and Nelitz 2009; Rieman and Isaak 2010; Isaak et al. 2010, 2011; Wenger et al. 2011; Eby et al. 2014) or are currently underway assessing the possible effects of climate change on bull trout. The results of these efforts will allow us to better understand how climate change may influence bull trout, and help to identify suitable conservation actions to improve the status of bull trout throughout their range. Issues include: the effects of rising air temperatures and lower summer flows on range contractions; changing stream temperatures, influenced by stream characteristics (e.g., amount of groundwater base flow contribution to the stream, stream geomorphology, etc.) affecting suitable bull trout spawning and rearing habitat; threats to redds and juvenile habitat from stream scouring caused by increased winter precipitation extreme events and increased rain in lower elevations; and lower summer flows inhibiting movement between populations, and from spawning and rearing habitat to foraging habitat (USFWS 2015, pg. 18).

A study of changing stream temperatures over a 13-year period in the Boise River basin estimated an 11 to 20 percent loss of suitable coldwater bull trout spawning and early juvenile rearing habitats (Isaak et al. 2010). These results suggest that a warming climate is already affecting suitable bull trout instream habitats. This is consistent with the conclusions of Rieman et al. (2007) and Wenger et al. (2011) that bull trout distribution is strongly influenced by climate, and predicted warming effects could result in substantial loss of suitable bull trout habitats over the next several decades. Wenger et al. (2011) also noted that bull trout already seem to inhabit the coldest available streams in some study areas, and in several watersheds bull trout do not have the potential to shift upstream with warming stream temperatures at lower elevations (USFWS 2015, pg. 18).

Sensitivity of stream temperature to changes in air temperature is complex and is influenced by geological and vegetational factors such as topography, groundwater recharge, glaciation history, and riparian vegetation (Isaak et al. 2010; Isaak and Rieman 2013). A new stream temperature data collection, modeling and mapping project, NorWeST, provides a much-improved foundation for assessing bull trout coldwater habitat (USFS 2014). Stream temperature data have been compiled from dozens of resource agencies at more than 15,000 unique stream sites. These temperature data

are being used with spatial statistical stream network models to develop an accurate and consistent set of climate scenarios for all streams (USFWS 2015, pg. 19).

Fine-scale assessments of the current and projected future geographic distribution of coldwater streams and suitable bull trout habitat have been recently developed through the NorWeST (Isaak et al. 2015) and Bull Trout Vulnerability Assessment (Dunham 2015) processes. These assessments model probability of presence using the NorWeST stream temperature data and models, and map suitable habitat "patches" using fish presence, local threats, migratory connectivity, and climate sensitivity. The climate sensitivity parameters and data that will be linked to patches include flow variability (e.g., percent high frequency of winter floods), thermal variability (percent very cold), fire history (percent severely burned relative to patch area), and snowpack (snow cover frequency). Other factors include composite indicators of human impacts and non-native presence. Connectivity parameters include data among patches (stream/lake/sea distance to nearest occupied patch), migratory connectivity (distance to lake/sea), local barriers (culverts, diversions), and natural geomorphic features (USFWS 2015, pg. 19).

Climate change is an independent threat to bull trout, but also one that exacerbates many of the other threats. The USFWS expects the threat to increase in severity over coming decades. Increasing air temperatures and other changes to hydrology, modified by local habitat conditions, will tend to result in increased water temperatures, and reduce the amount of habitat with suitable cold water conditions. Warm dry conditions are also likely to increase the frequency and extent of forest fires, with a potential to increase sedimentation and eliminate riparian shading. Projected lower instream flows and warmer water in FMO habitats will exacerbate the lack of connectivity within and between bull trout core areas. Moreover, we expect that increased water temperatures will alter competitive interactions between bull trout and other fish species that are better adapted to warm conditions. Climatic warming will change seasonality of streamflow, and increased spring runoff from rain-on-snow events will increase scouring of spawning gravels. Glacial retreat and reduction of summer snowpack will reduce cold water flows during summer months. Sea level rise will result in the loss of, and changes to, nearshore and estuarine habitat. Although addressing the root causes of greenhouse gas emissions and climate change is not within our jurisdiction, management planning should account for these increased threats and proactively protect those habitats that we expect will best maintain cold water conditions suitable for bull trout (USFWS 2015, pp. 30, 31).

Summary

Based on our review of the current information regarding the species status in the action area, we have determined the bull trout populations in the action area retain sufficient resiliency and redundancy to offset patchy, temporary adverse impacts caused by natural or anthropogenic sources.

Effects of the Action on the Bull Trout

Appendix I of this opinion contains general information regarding effects of the action for all species and critical habitat addressed in this opinion, including the *Analytical Approach Used in the BA*, and *Environmental Fate and Toxicity of Dispersant and Dispersed Oil*. To date, dispersants have not been used within the action area in the Pacific Ocean, and criteria that must be met for use as described in the NWACP substantially limits the likelihood of future use. Use of dispersants are an environmental trade-off, having the effect of sinking surface oil into the water column in an effort to limit the likelihood that a spill will reach and contaminate the shoreline. The extent of bull trout anadromy (use of marine habitat) is fairly well documented with detections of bull trout traveling great distances between rivers and along the shoreline. The result of pre-approved dispersant use no closer than 3 miles from the shoreline (in Federal waters) is expected to limit oil or dispersed oil reaching nearshore habitat where most bull trout are expected to occur in waters up to 10 m in depth (photic zone) (USFWS 2010, entire). Therefore, we anticipate bull trout in estuaries and marine habitat adjacent to the Pacific coast of Washington State are unlikely to be affected by dispersed oil.

The proposed action includes a hierarchy of scaled responses, but the most common and predictable scenarios are generally on constrained temporal and spatial scales (i.e., most spill responses are limited in geographic scope, and durations, for the purpose of this consultation, are limited to up to 4 days).

The proposed action will, in all cases of response to spill, result in significant beneficial effects to the environment; containment, control, removal, and recovery of spilled hazardous material (oil, petroleum, other), with corresponding immediate and long term benefits to water, soil, and sediment quality. Site- and event-specific risks of spill have not been quantified (EPA and USCG 2018), and may not be quantifiable with available information.

When implementing countermeasures as part of spill response, the EPA and USCG will also implement all of the relevant, practicable, and effective CMs (see Appendix A – Conservation Measures below).

The EPA and USCG have described which response actions and countermeasures are likely to directly or indirectly affect or have impacts to suitable riparian, wetland, shoreline, riverine/lacustrine, and nearshore marine habitats (EPA and USCG 2018, Table 2-1, pp. 2-11 through 2-15; see Appendix D below): use of vessels; use of vehicles or heavy machinery; staging area establishment and use; foot traffic; liquid waste management; booming; berms, dams, or other barriers (pits and trenches, etc.); culvert blocking; skimming; vacuuming; manual removal of oil and oiled substrate using hand tools; mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking); woody debris removal, terrestrial and aquatic cutting/ removal of vegetation (before or after oiling); ambient temperature, low pressure flooding/flushing; pressure washing/steam cleaning or sand blasting; physical herding; and [non-mechanical] natural attenuation with monitoring.

With full and successful implementation of the CMs, some of these response actions and countermeasures will be a source of insignificant or discountable bull trout exposures and effects, while others are still likely in some instances (or in most or many instances) to cause or result in measurable, adverse exposures and effects to bull trout and their habitat. Even with implementation of all the relevant and practicable CMs, some of these response actions and countermeasures are still likely to result in the following measurable forms of adverse exposure and effect: direct physical injury or mortality (e.g., as a result of physical entrainment, trapping, or stranding); physical or chemical alteration, damage, or destruction of habitat; and/or other forms of adverse exposure and effect resulting in a significant disruption of normal bull trout behaviors (i.e., the ability to successfully feed, move, and/or shelter) (e.g., exposures to degraded water quality, turbidity and sedimentation).

Because the proposed action includes a hierarchy of scaled responses, with many (but not all) spill responses involving a limited volume of spilled/released material, and many (but not all) spill responses are completed over the course of a few days, the scope and scale of each spill and spill response (spatial and temporal) will have a strong influence on what specific exposures and effects are likely to occur. Unfortunately, the Federal action agencies and the USFWS have no reliable means to predict spill/spill response location(s), volume(s)/size(s), or duration(s).

The sub-sections that follow discuss the foreseeable effects of the proposed action on the bull trout and its habitat, with specific attention to the following: 1) insignificant or discountable bull trout exposures and effects, 2) adverse effects in the form of direct physical injury or mortality, 3) adverse effects in the form of physical or chemical alteration, damage, or destruction of habitat, and 4) other forms of adverse exposure and effect resulting in a significant disruption of normal bull trout behaviors.

Response Actions and Countermeasures with Insignificant or Discountable Effects

The following response actions and countermeasures will directly or indirectly affect or have impacts to suitable riparian, wetland, shoreline, riverine/lacustrine, and nearshore marine habitats: use of vessels; foot traffic; booming; skimming; vacuuming; manual removal of oil and oiled substrate using hand tools; physical herding; and natural attenuation with monitoring.. However, with full and successful implementation of the CMs, and even if located in or adjacent to suitable and potentially occupied bull trout habitat, we conclude that the following response actions and countermeasures will be sources of insignificant or discountable bull trout exposures and effects because these measures are likely to avoid and minimize the adverse effects of response actions on the bull trout.

There is little or no bull trout spawning and early rearing habitat in the action area. The action area includes core and non-core FMO habitat for bull trout only, and therefore does not support bull trout spawning, redds, eggs, alevins, fry, or parr. Only adult and subadult bull trout (i.e., fish greater than 150 mm in length) are present in the action area and likely to be exposed to the effects of the proposed action.

Adult and subadult bull trout are vigorous swimmers and are capable of detecting and avoiding adverse conditions and threats. At all life stages, bull trout commonly seek out and utilize complex cover (e.g., large wood, overhanging or undercut banks), but only the youngest and smallest life stages (e.g., alevins, fry) routinely seek cover within small- and medium-sized, coarse substrates (i.e., sand to small- and medium-sized gravels).

Even where conducted in or adjacent to suitable habitats that are occupied by adult and subadult bull trout, use of vessels, foot traffic, booming, skimming, vacuuming, manual removal of oil and oiled substrate using hand tools, physical herding, and natural attenuation with monitoring are unlikely to result in measurable adverse effects to bull trout or to significantly disrupt normal bull trout behaviors (i.e., the ability to successfully feed, move, and/or shelter) because these measures avoid and minimize the potential for adverse effects to occur in conjunction with spill response actions. For those reasons, the effects of these response actions and countermeasures on the bull trout are likely to be insignificant.

Booming, skimming, and vacuuming present a discountable risk of physical entrainment, trapping, or stranding for adult and subadult bull trout. These effects and outcomes (i.e., direct physical injury or mortality resulting from booming, skimming, and vacuuming) are extremely unlikely, and therefore considered discountable.

Use of vessels, foot traffic, booming, skimming, vacuuming, manual removal of oil and oiled substrate using hand tools, physical herding, and natural attenuation with monitoring may result in temporary effects to bull trout habitat (e.g., mild or moderate impacts to natural substrates, riparian and/or aquatic vegetation, water quality), but are unlikely to result in permanent or temporary effects at scales sufficient to significantly disrupt normal bull trout behaviors (i.e., the ability to successfully feed, move, and/or shelter).

Use of vessels, foot traffic, booming, skimming, vacuuming, manual removal of oil and oiled substrate using hand tools, physical herding, and natural attenuation with monitoring have the potential to cause insignificant and discountable consequences to the bull trout and its habitat because these measures avoid and minimize exposure of bull trout to spilled oil.

Response Actions and Countermeasures with Significant Adverse Effects

These sub-sections discuss response actions and countermeasures that have foreseeable adverse effects to bull trout and their habitat.

Direct Physical Injury or Mortality. The following response actions and countermeasures are likely to directly or indirectly affect or have impacts to suitable wetland, shoreline, riverine/lacustrine, and nearshore marine habitats. Furthermore, even with implementation of all the relevant and practicable CMs, the following response actions and countermeasures are still likely to result in instances of direct physical injury or mortality for adult and subadult bull trout as a result of physical entrainment, trapping, and/or stranding: berms, dams, or other barriers (pits and trenches, etc.); and culvert blocking. When spill responses include use of berms, dams, or other barriers (pits and trenches, etc.) and/or culvert blocking in suitable habitats occupied by adult and subadult bull trout, they pose a risk of physical entrainment, trapping, and/or stranding that cannot be fully discounted.

Temporary constructed berms, dams, pits, trenches, and culvert blockages pose a significant risk of physical entrainment, trapping, and/or stranding of bull trout. Implementation of all the relevant and practicable CMs will reduce, but cannot fully avoid these outcomes. However, instances of direct physical injury or mortality of adult and subadult bull trout are likely to be uncommon because the CMs are likely to avoid and minimize bull trout exposure to these stresors.

Because the proposed action includes a hierarchy of scaled responses, with many (but not all) spill responses involving a limited volume of spilled/released material, and many (but not all) spill responses completed over the course of a few days, the scope and scale of each spill and spill response (spatial and temporal) will have a strong influence on what specific exposures and effects are likely to occur. With consideration for the species' habitat and habitat requirements, current geographic distribution, presence in the action area, known locations in the action area, and with effective implementation of the CMs, we conclude that use and/or implementation of these response actions and countermeasures (i.e., berms, dams, or other barriers; culvert blocking) will result in relatively few instances of physical injury or mortality for adult and subadult bull trout because the CMs are likely to avoid and minimize bull trout exposure to these stresors.

Physical or Chemical Alteration, Damage, or Destruction of Habitat. The following spill response actions and countermeasures are likely to directly or indirectly affect or have impacts to suitable riparian, wetland, shoreline, riverine/lacustrine, and nearshore marine habitats. Furthermore, even with implementation of all the relevant and practicable CMs, the following response actions and countermeasures are still likely to result in instances of adverse physical or chemical alteration, damage, or destruction of bull trout habitat: use of vehicles or heavy machinery, staging area establishment and use, liquid waste management, mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking), woody debris removal, terrestrial and aquatic cutting/ removal of vegetation (before or after oiling), ambient temperature, low pressure flooding/flushing, and pressure washing/steam cleaning or sand blasting. When spill responses are conducted in suitable bull trout habitat and include these response actions or countermeasures, they pose a risk of adverse habitat alteration, damage, or destruction that cannot be fully discounted.

Implementation of all the relevant and practicable CMs will reduce, but cannot fully avoid these outcomes. Most instances of adverse bull trout habitat alteration, damage, or destruction will be uncommon, that most of the unavoidable impacts will be limited in spatial and temporal extent (i.e., most spill responses are limited in geographic scope, and durations, for the purpose of this consultation, are limited to up to 4 days), and these impacts and adverse effects will (in most, if not all, instances) be small in comparison to the significant beneficial effects resulting from the containment, control, removal, and recovery of spilled hazardous material (i.e., restored and/or improved water, soil, and sediment quality; reduced or eliminated long term potential for exposure).

The following response actions and countermeasures are likely to have unavoidable impacts and adverse effects to suitable riparian, wetland, and/or shoreline habitats: use of vehicles or heavy machinery; staging area establishment and use; mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking); woody debris removal; terrestrial and aquatic cutting/ removal of vegetation (before or after oiling); ambient temperature; low pressure flooding/flushing; and pressure washing/steam cleaning or sand blasting.

Physical containment, control, removal, and recovery of spilled hazardous material (oil, petroleum, other) cannot be achieved in all instances without some likelihood of impacts to riparian, wetland, and/or shoreline habitats, with corresponding potential for measurable adverse effects to bull trout habitat conditions and functions. When conducted in or adjacent to suitable bull trout habitat, the above-described response actions and countermeasures will, in some instances, have unavoidable adverse effects to habitat complexity and/or the natural processes that function to establish and maintain habitat complexity over time (e.g., channel development, large wood recruitment, etc.). Furthermore, while in some instances these unavoidable impacts and effects will be limited in spatial and temporal extent (i.e., most spill responses are limited in geographic scope, and durations, for the purpose of this consultation, are limited to up to 4 days), there could and likely will be instances where these impacts and effects extend to scales sufficient to significantly disrupt normal bull trout behaviors (i.e., the ability to successfully feed, move, and/or shelter). Moreover, the affected bull trout habitat conditions and functions may require months or years to fully recover.

Liquid waste management actions and countermeasures will have unavoidable impacts and adverse effects to suitable riverine/lacustrine and nearshore marine habitats. Liquid waste management refers to the handling, storage, and transport of recovered liquid wastes, and sometimes includes decanting to open waters (EPA and USCG 2018, pp. 2-11, 2-19, 2-31):

"Decanting of oily water may be necessary during operations involving recovery of oil … Water may be mixed with the oil during recovery and [will] need to be returned to the response area to preserve storage space for recovery of the maximum amount of oil" (EPA and USCG 2018, pg. 2-19).

"The decanting process involves the collection of large volumes of oil and water … allowing the water and oil to separate within a separation tank, and then discharging water that may contain a small amount of oil … The decanting process separates the water from the oil so that … there is no visible sheen [upon] discharge (per EPA requirements)… On-water decanting is pre-authorized for … all crude oils, vacuum gas oils, atmospheric gas oils, recycle oils not containing distillates, bunker fuels, [etc.]" (EPA and USCG 2018, pg. 2-31).

We consider spills of oil, petroleum, or other hazardous material to be part of the baseline environmental conditions (i.e., not an element of the proposed action). However, liquid waste management with open-water decanting represents intentional release materials back into the environment that are not completely "clean" or benign. All decanting in a designated "Response Area" within a collection area, vessel collection well, recovery belt, weir area, or directly in front of a recovery system; a containment boom will be deployed around the collection area, where feasible, to prevent the loss of decanted oil or entrainment of species in recovery equipment. Decanting shall be monitored at all times, so that discharge of oil in the decanted water is promptly detected. Where feasible, decanting will be done just ahead of a skimmer recovery system so that discharges of oil in decanting water can be immediately recovered. We do agree that resulting impacts and adverse effects are small in comparison to the significant beneficial effects caused by the removal and recovery of spilled hazardous material (including reduced or eliminated long-term potential for exposure).

Because the proposed action includes a hierarchy of scaled responses, with many (but not all) spill responses involving a limited volume of spilled/released material, and many (but not all) spill responses completed over the course of a few days, the scope and scale of each spill and spill response (spatial and temporal) will have a strong influence on what specific exposures and effects are likely to occur. With consideration for the species' habitat and habitat requirements, current geographic distribution, presence in the action area, known locations in the action area, and with effective implementation of the CMs, we conclude that use and/or implementation of the response actions and countermeasures listed above (i.e., in this sub-section) is likely to result in relatively few and limited instances of adverse physical or chemical alteration, damage, or destruction of bull trout habitat. The specific instances where these impacts and effects extend to scales sufficient to significantly disrupt normal bull trout behaviors (i.e., the ability to successfully feed, move, and/or shelter) will be even less common.

Other Adverse Exposures and Effects: Turbidity and Sedimentation. The following response actions and countermeasures have the potential to cause unavoidable impacts to suitable riparian, wetland, and/or shoreline habitats: use of vehicles or heavy machinery; staging area establishment and use; berms, dams, or other barriers (pits and trenches, etc.); mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking); woody debris removal, terrestrial and aquatic cutting/ removal of vegetation (before or after oiling); ambient temperature, low pressure flooding/flushing; and pressure washing/steam cleaning or sand blasting. Even with implementation of all relevant and practicable CMs, these response actions and countermeasures are still likely to result in significant, but temporary (i.e., in pulses for up to 4 days), turbidity and sedimentation. When these response actions or countermeasures (above) are conducted in suitable and occupied bull trout habitat, individuals (adult and subadult bull trout) are likely to be exposed and may in some instances experience a significant,disruption of their normal behaviors (i.e., the ability to successfully feed, move, and/or shelter).

Although few studies have specifically examined the effects of suspended sediment on the bull trout, increases in suspended sediment are known to affect salmonids in several ways. These effects can be characterized as lethal, sublethal, or behavioral (Bash et al. 2001, pg. 10; Newcombe and MacDonald 1991, pp. 72-73; Waters 1995, pp. 81-82). Lethal effects include gill trauma (physical damage to the respiratory structures) and smothering (Curry and MacNeill 2004, pg. 140). Sublethal effects include physiological stress reducing the ability to perform vital functions (Cederholm and Reid 1987, pp. 388, 390), severely reduced respiratory function and performance (Waters 1995, pg. 84), increased metabolic oxygen demand (Servizi and Martens 1991, pg. 497), susceptibility to disease and other stressors (Bash et al. 2001, pg. 6), and reduced feeding efficiency (Newcombe and MacDonald 1991, pg. 73). Sublethal effects can act separately or cumulatively to reduce growth rates and increase fish mortality over time. Behavioral effects include avoidance, loss of territoriality, and related secondary effects to feeding rates and efficiency (Bash et al. 2001, pg. 7). Fish may be forced to abandon preferred habitats and refugia, and may enter less favorable conditions and/or be exposed to additional hazards (including predators) when seeking to avoid elevated concentrations of suspended sediment.

Factors influencing suspended sediment concentration, exposure intensity, and duration include waterbody size, volume of flow, the nature of the construction or spill response activity, erosion controls, and substrate and sediment particle size. Factors influencing the biological response(s) and severity of effects include the duration and frequency of exposure, the concentration of suspended sediments, and the affected life stage. The availability of and bull trout access to refugia are other important considerations influencing the severity of effects of suspended sediment on the bull trout.

We expect that elevated turbidity and sedimentation resulting from response activities will be subject to the State water quality standards (e.g., Water Quality Standards for Surface Waters of the State of Washington, effective March 5, 2020, Chapter 173-201A WAC). Based on the analysis presented in USFWS sedimentation white-paper (2010, entire), we find that elevated turbidity and suspended sediment levels have the potential to cause a significant behavioral response (e.g., avoidance) and minor injury (e.g., gill abrasion) of exposed bull trout. The action area includes larger streams and the lower reaches of some smaller streams that provide FMO habitat for the bull trout, but does not include spawning and rearing streams where eggs, redds and fry may be present. In larger streams (e.g., Columbia River mainstem), the effects of a spill response action would not include the whole river, but would only be a wedge of sediment along the bank (assuming that is where the work is occurring). Most fish would simply be able to move away to other parts of the river, thereby limiting the temporal extent of exposure and the consequences of elevated turbidity. In situations where response activities involve ground disturbance along the shoreline or in nearshore substrates, the mixing zone would be approximately 300 feet in a large river, and 150 feet for marine shoreline and lakes, but for large heavy equipment operating in the water to clean up contaminants, that distance would be much further (J. Muck, pers. com., June 5, 2020). Most spill responses of the duration considered herein are likely to be intermittent/episodic and have the potential to typically expose and affect only relatively low numbers of adult and subadult bull trout.

The proposed action, in all cases of response to spills, has the potential to result in significant beneficial effects to the environment due to containment, control, removal, and recovery of spilled hazardous material (oil, petroleum, other), with corresponding immediate and long-term benefits to water, soil, and sediment quality. Temporary pulses of turbidity and suspended sediments caused by spill response actions and the countermeasures listed above in this sub-section are most likely to cause comparatively minor adverse exposures and effects compared to the foreseeable beneficial effects (i.e., improved water, soil, and sediment quality) associated with containment, control, removal, and recovery of spilled hazardous material.

<u>Summary</u>

The action area includes core and non-core FMO habitat for the bull trout, including marine FMO habitat. There is little or no bull trout spawning and early rearing habitat in the action area. FMO habitat is essential for maintaining life history diversity and connectivity within and between bull trout core areas, and provides opportunities for genetic exchange, demographic support, and recolonization. FMO habitat also provides important foraging opportunities, particularly in the form of seasonally abundant salmonid prey, and thereby supports enhanced growth and productivity of bull trout.

The action area includes the lower and middle mainstem Columbia River, and the inland marine waters of the Puget Sound and Strait of Juan de Fuca (and their major tributaries). The action area includes essential migratory corridors for all anadromous salmonid populations of the interior Columbia River and greater Puget Sound basins. As such, the action area plays an irreplaceable role in the recovery and conservation of the bull trout. Juvenile salmonids are a key bull trout prey resource throughout these basins. The health and productivity of this prey resource base fundamentally depends upon migratory corridors that function well to enable and support successful juvenile salmonid outmigrations and adult returns to their natal watersheds.

Spill response actions and countermeasures have the potential to directly or indirectly impact suitable riparian, wetland, shoreline, riverine/lacustrine, and nearshore marine habitats. When spill response actions include use of berms, dams, or other barriers (e.g., pits and trenches) and/or culverts that block fish movement within suitable habitats occupied by adult and subadult bull trout, they pose a risk of physical entrainment, trapping, and/or stranding that cannot be fully discounted. However, with effective implementation of the CMs, we expect relatively few instances of physical injury or mortality of adult and subadult bull trout. Effective implementation of the CMs is likely to also limit the extent of physical or chemical alteration and damage of bull trout habitat potentially caused by spill response actions. With effective implementation of the CMs, instances where these impacts and effects occur at scales sufficient to significantly disrupt normal bull trout behaviors (e.g., the ability to successfully feed, move, and/or shelter) are likely to be uncommon. With implementation of the CMs, the proposed action, in all cases of spill responses, is likely to result in significant beneficial effects to the environment due to containment, control, removal, and recovery of spilled hazardous material (oil, petroleum, other hazardous materials), with corresponding immediate and long-term benefits to water, soil, and sediment quality. The proposed action includes specific CMs designed to: limit habitat disturbance; locate staging areas and support facilities in the least sensitive areas possible; restrict foot traffic, vehicles, and heavy machinery in sensitive areas; and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E). For these reasons, we find that the potential for the proposed action to cause adverse effects to the bull trout is reduced. Additionally, spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing bull trout exposure to response activities. For these reasons, there is a high potential for any adverse effects to the bull trout caused by spill response activities to be localized, limited in scale and duration, and to be offset by future reproduction of the bull trout following spill response activities.

Cumulative Effects

Appendix J contains cumulative effects analysis prepared for the BA that applies to all species and critical habitats contained in this opinion, including *Water Management, Urban and Agricultural Development,* and *Permitted Discharges.*

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area. 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 Act.

Numerous non-Federal actions unrelated to the proposed action are reasonably certain to occur in the action area. Many, if not most, of these non-Federal actions are related to projected population growth. Increased population growth will continue to generate numerous non-federal actions that could affect conditions for listed species. These will include development projects without federal funding or federal permit requirements, timber harvest operations on State and private lands, mining activities that do not require Federal permitting and do not occur on Federal land, agricultural activities (excluding federally permitted water diversions or federally subsidized operations), fish harvest (commercial, sporting), and recreational activities.

Each of these future, non-Federal actions could contribute to cumulative effects on the bull trout (and designated bull trout critical habitat). However, most or all of these future actions will be subject to State and local regulations and requirements, which should substantially reduce impacts and effects to ecological functions and conditions that are important to bull trout, their habitat, and prey resources.

Future local actions will include planned growth, development, and re-development consistent with land use and growth management plans (i.e., urban and suburban development and re-development). Additional residential, commercial, and industrial development (or re-development) is certain to occur in the action area. Over the long-term, this planned growth consistent with land use and growth management plans will result in additional effects to watershed conditions and functions, floodplain conditions and functions, water and sediment quality, and nearshore marine and estuarine habitat conditions. However, with effective implementation of shoreline management programs, in conjunction with other State and local (city, county) environmental permit requirements (including those requirements established for the protection of wetlands and for the regulation of private and municipal stormwater discharges), effects to ecological functions and conditions should be reduced.

We expect that watershed councils, Tribes, local municipalities, conservation groups, and others will continue to carry out restoration projects in support of salmon and bull trout recovery. Many, but not all, of these actions will have Federal funding or be subject to Federal permit requirements. However, future State and local actions may also include implementation of Total Maximum Daily Loads and other, non-Federal, watershed-scale water quality improvement programs. We expect that these actions will measurably improve ecological functions and conditions, and thereby provide significant long-term benefits to the bull trout, and its habitat and prey resources.

Taken as a whole, the foreseeable future State, Tribal, local, and private actions may have both beneficial effects and adverse effects to the bull trout. Some of these actions (e.g., effective implementation of land use and growth management plans, Total Maximum Daily Load clean-up plans, and habitat restoration programs) will be essential, and must be successful, to ensure that the action area will continue to provide for the conservation and recovery of the bull trout.

Conclusion

After reviewing the current status of the bull trout, the environmental baseline, the effects of the proposed action and conservation measures, and the cumulative effects, it is our biological opinion that the proposed action, as described in the BA and this opinion, is not likely to jeopardize the continued existence of the bull trout. We made this determination for the following reasons:

In general, the proposed action is likely to result in significant beneficial effects to the environment (inclusive of any affected bull trout-occupied habitat) caused by the timely and effective containment, control and removal of spilled hazardous material (such as oil) with corresponding immediate and long-term benefits to fish and wildlife, water, soil, and sediment quality.

Spill response actions and countermeasures will directly or indirectly impact suitable riparian, wetland, shoreline, riverine/lacustrine, and nearshore marine habitats. When spill responses include use of berms, dams, or other barriers (e.g., pits and trenches) and/or culverts that block fish movement within suitable habitats occupied by adult and subadult bull trout, they pose a risk of physical entrainment, trapping, and/or stranding that cannot be fully discounted. However, with effective implementation of the CMs, we expect relatively few instances of physical injury or mortality of adult and subadult bull trout. Effective implementation of the CMs will also limit physical or chemical alteration and damage of bull trout habitat potentially caused by spill response actions. With effective implementation of the CMs, instances where these impacts occur at scales sufficient to significantly disrupt normal bull trout behaviors (e.g., the ability to successfully feed, move, and/or shelter) are likely to be uncommon. The proposed action, in all cases of spill responses, has the potential to cause significant beneficial effects to the environment by containing, controlling, removing, and recovering spilled hazardous material that are likely to have immediate and long-term beneficial effects water, soil, sediment quality, and fish and wildlife resources.

The proposed action includes specific CMs designed to: limit habitat disturbance; locate staging areas and support facilities in the least sensitive areas possible; restrict foot traffic, vehicles, and heavy machinery from sensitive areas; and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E). These CMs reduce the potential for the proposed action to cause adverse effects to the bull trout. Additionally, spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure of the bull trout and its habitat to response actions. For these reasons, there is a high potential for any adverse effects to the bull trout caused by spill response activities to be localized, limited in scale and duration, and to be offset by future reproduction of bull trout in affected and adjacent areas following spill response activities.

Bull Trout Critical Habitat

Rangewide Status of Bull Trout Critical Habitat

On October 18, 2010, the USFWS published a final critical habitat designation for the coterminous United States population of the bull trout (70 FR 63898); the rule became effective on November 17, 2010. Critical habitat is defined as the specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but that will be needed for its recovery. Designated critical CHUs for the bull trout are described in Figure BTCH-1. A justification document describes occupancy and the rationale for why these habitat areas are essential for the conservation of bull trout was developed to support the rule and is available on our website (https://www.fws.gov/pacific/bulltrout/crithab/Jusitfication%20Docs.html).

The scope of the designation involved the species' coterminous range. Rangewide, the USFWS designated reservoirs/lakes and stream/shoreline miles as bull trout critical habitat (Table BTCH-1). Designated bull trout critical habitat is of two primary use types: 1) spawning and rearing, and 2) foraging, migration, and overwintering (FMO).

Table BTCH-1. Miles/Kilometers of Stream/Shoreline and Acres/Hectares of Reservoir/Lake area designated as bull trout critical habitat by State.

State	Stream/Shoreline Miles	Stream/Shoreline Kilometers	Resevoir/ Lake Acres	Reservoir/ Lake Hectares
Idaho	8,771.6	14,116.5	170,217.5	68,884.9
Montana	3,056.5	4,918.9	221,470.7	89,626.4
Nevada	71.8	115.6	-	-
Oregon	2,835.9	4,563.9	30,255.5	12,244.0
Oregon/Idaho	107.7	173.3	-	-
Washington	3,793.3	6,104.8	66,308.1	26,834.0
Washington (marine)	753.8	1,213.2	-	-
Washington/ Idaho	37.2	59.9	-	-
Washington/Oregon	301.3	484.8	-	-
Total	19,729.0	31,750.8	488,251.7	197,589.2

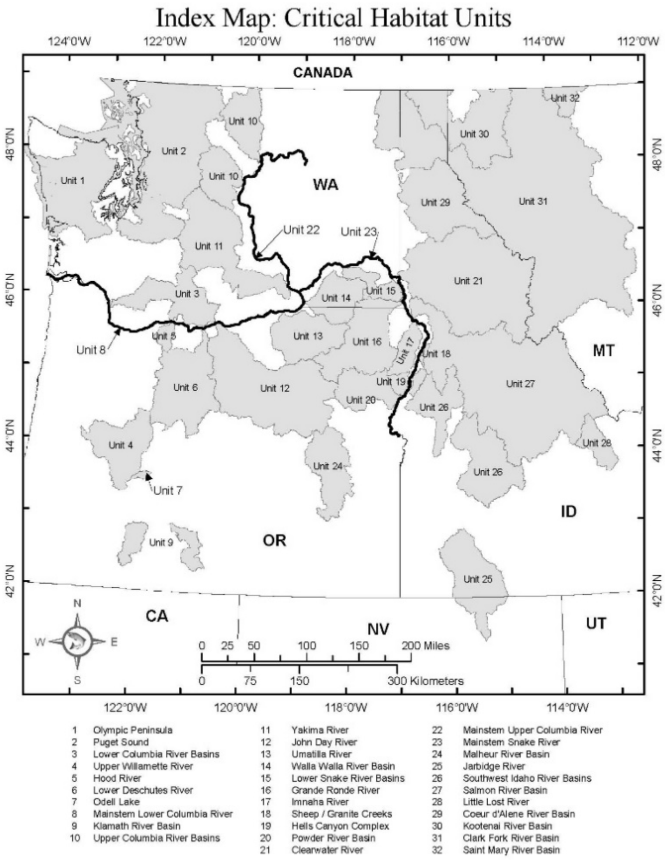


Figure BTCH-1. Index map of bull trout designated critical habitat units (CHUs).

This rule also identifies and designates as critical habitat approximately 1,323.7 km (822.5 miles) of streams/shorelines and 6,758.8 ha (16,701.3 acres) of lakes/reservoirs of unoccupied habitat to address bull trout conservation needs in specific geographic areas in several areas not occupied at the time of listing. These unoccupied areas were determined by the USFWS to be essential for restoring functioning migratory bull trout populations based on currently available scientific information. These unoccupied areas often include lower main stem river environments that can provide seasonally important migration habitat for bull trout. This type of habitat is essential in areas where bull trout habitat and population loss over time necessitates reestablishing bull trout in currently unoccupied habitat areas to achieve recovery.

The final rule continues to exclude some proposed critical habitat segments based on a careful balancing of the benefits of inclusion versus the benefits of exclusion. Critical habitat does not include: (1) waters adjacent to non-Federal lands covered by legally operative incidental take permits for habitat conservation plans (HCPs) issued under section 10(a)(1)(B) of the ESA of 1973, as amended (Act), in which bull trout is a covered species on or before the publication of this final rule; (2) waters within or adjacent to Tribal lands subject to certain commitments to conserve bull trout or a conservation program that provides aquatic resource protection and restoration through collaborative efforts, and where the Tribes indicated that inclusion would impair their relationship with the USFWS; or (3) waters where impacts to national security have been identified (75 FR 63898). Excluded areas represent approximately 10 percent of the stream/shoreline miles and 4 percent of the lakes and reservoir acreage of designated critical habitat. Each excluded area is identified in the relevant CHU text, as identified in paragraphs (e)(8) through (e)(41) of the final rule. Fewer than 2,000 stream miles and 20,000 acres of lake and reservoir surface area were excluded from the designation of critical habitat. It is important to note that the exclusion of waterbodies from designated critical habitat does not negate or diminish their importance for bull trout conservation, nor reduce authorities that protect the species under the ESA. Because exclusions reflect the often complex pattern of land ownership, designated critical habitat is often fragmented and interspersed with excluded stream segments.

Conservation Role and Description of Critical Habitat

The intended recovery support function of bull trout critical habitat is to support viable core area populations (75 FR 63898, October 18, 2010). The core areas reflect the metapopulation structure of bull trout and are the closest approximation of a biologically functioning unit for the purposes of recovery planning and risk analyses. CHUs generally encompass one or more core areas and may include FMO areas, outside of core areas, that are important to the survival and recovery of bull trout.

As shown in Figure BTCH-1, thirty-two CHUs within the geographical area occupied by the species at the time of listing are designated under the final critical habitat rule. Twenty-nine of the CHUs contain all of the physical or biological features identified in this final rule and support multiple life-history requirements. Three of the mainstem river units in the Columbia and Snake River basins contain most of the physical or biological features necessary to support the bull trout's particular use of that habitat, other than those physical biological features associated with Primary Constituent Elements (PCEs) 5 and 6, which relate to breeding habitat.

The primary function of individual CHUs is to maintain and support core areas, which (1) contain bull trout populations with the demographic characteristics needed to ensure their persistence and contain the habitat needed to sustain those characteristics (Rieman and McIntyre 1993, pg. 19); (2) provide for persistence of strong local populations, in part, by providing habitat conditions that encourage movement of migratory fish (MBTSG 1998, pp. 48-49; Rieman and McIntyre 1993, pp. 22-23); (3) are large enough to incorporate genetic and phenotypic diversity, but small enough to ensure connectivity between populations (Hard 1995, pp. 314-315; Healey and Prince 1995, pg. 182; MBTSG 1998, pp. 48-49; Rieman and McIntyre 1993, pp. 22-23); and (4) are distributed throughout the historic range of the species to preserve both genetic and phenotypic adaptations (Hard 1995, pp. 321-322; MBTSG 1998, pp. 13-16; Rieman and Allendorf 2001, pg. 763; Rieman and McIntyre 1993, pg. 23).

The Olympic Peninsula and Puget Sound CHUs are essential to the conservation of amphidromous bull trout, which are unique to the Coastal-Puget Sound population segment. These CHUs contain marine nearshore and freshwater habitats, outside of core areas, that are used by bull trout from one or more core areas. These habitats, outside of core areas, contain PCEs that are critical to adult and subadult foraging, overwintering, and migration.

Primary Constituent Elements of Bull Trout Critical Habitat

Within the designated critical habitat areas, the PCEs for bull trout are those habitat components that are essential for the primary biological needs of foraging, reproducing, rearing of young, dispersal, genetic exchange, or sheltering. Based on our current knowledge of the life history, biology, and ecology of the bull trout and the characteristics of the habitat necessary to sustain its essential life-history functions, we determined in our final designation that the following PCEs are essential for the conservation of bull trout.

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.
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.
3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
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.
5. Water temperatures ranging from 2 °C to 15 °C (36 °F to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.
6. In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.
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.
8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
9. Sufficiently low levels of occurrence of non-native predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

PCE 9 addresses the presence of nonnative predatory or competitive fish species. Although this PCE applies to both the freshwater and marine environments, currently no non-native fish species are of concern in the marine environment, though this could change in the future.

Note that only PCEs 2, 3, 4, 5, and 8 apply to marine nearshore waters identified as critical habitat. Also, lakes and reservoirs within the CHUs also contain most of the physical or biological features necessary to support bull trout, with the exception of those associated with PCEs 1 and 6. Additionally, all except PCE 6 apply to FMO habitat designated as critical habitat.

Critical habitat designated within each CHU includes the stream channels within the designated stream reaches and has a lateral extent as defined by the bankfull elevation on one bank to the bankfull elevation on the opposite bank. Bankfull elevation is the level at which water begins to leave the channel and move into the floodplain and is reached at a discharge that generally has a recurrence interval of 1 to 2 years on the annual flood series. If bankfull elevation is not evident on either bank, the ordinary high-water line must be used to determine the lateral extent of critical habitat. The lateral extent of designated lakes is defined by the perimeter of the waterbody as mapped on standard 1:24,000 scale topographic maps. The USFWS assumes in many cases this is the full-pool level of the waterbody. In areas where only one side of the waterbody is designated (where only one side is excluded), the mid-line of the waterbody represents the lateral extent of critical habitat.

In marine nearshore areas, the inshore extent of critical habitat is the mean higher high water (MHHW) line, including the uppermost reach of the saltwater wedge within tidally influenced freshwater heads of estuaries. The MHHW line refers to the average of all the higher high water heights of the two daily tidal levels. Marine critical habitat extends offshore to the depth of 10 meters (m) (33 ft.) relative to the mean lower low water (MLLW) line (zero tidal level or average of all the lower low water heights of the two daily tidal levels). This area between the MHHW line and minus 10 m MLLW line (the average extent of the photic zone) is considered the habitat most consistently used by bull trout in marine waters based on known use, forage fish availability, and ongoing migration studies and captures geological and ecological processes important to maintaining these habitats. This area contains essential foraging habitat and migration corridors such as estuaries, bays, inlets, shallow subtidal areas, and intertidal flats.

Adjacent shoreline riparian areas, bluffs, and uplands within CHUs are not designated as critical habitat. However, it should be recognized that the quality of marine and freshwater habitat along streams, lakes, and shorelines is intrinsically related to the character of these adjacent features, and that human activities that occur outside of the designated critical habitat within the CHUs can have significant effects on physical and biological features of the aquatic environment.

Activities that are likely to cause adverse effects to critical habitat are evaluated to determine if they are likely to “destroy or adversely modify” critical habitat such that the critical habitat will no longer serve the intended conservation role for the species or retain those PCEs that relate to the ability of the area to at least periodically support the species. Activities that may destroy or adversely modify critical habitat are those that alter the PCEs to such an extent that the conservation value of critical habitat is appreciably reduced (75 FR 63898). The USFWS’s evaluation must be conducted at the scale of the entire critical habitat area designated, unless otherwise stated in the final critical habitat rule (USFWS and NMFS 1998, pp. 4-39). Thus, adverse modification of bull trout critical habitat is evaluated at the scale of the final designation, which includes the critical habitat designated for the Klamath River, Jarbidge River, Columbia River, Coastal-Puget Sound, and Saint Mary-Belly River population segments. However, we consider all 32 CHUs to contain features or areas essential to the conservation of the bull trout (75 FR 63898, 63944). Therefore, if a proposed action would alter the physical or biological features of critical habitat to an extent that appreciably reduces the conservation function of one or more CHUs for bull trout, a finding of adverse modification of the entire designated critical habitat area may be warranted (75 FR 63898).

Current Critical Habitat Condition Rangewide

The condition of bull trout critical habitat varies across its range from poor to good. Although still relatively widely distributed across its historic range, the bull trout occurs in low numbers in many areas, and populations are considered depressed or declining across much of its range (67 FR 71240). This condition reflects the condition of bull trout habitat. The decline of bull trout is primarily due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management practices, impoundments, dams, water diversions, and the introduction of nonnative species (63 FR 31647, June 10 1998; 64 FR 17112, April 8, 1999).

There is widespread agreement in the scientific literature that many factors related to human activities have impacted bull trout habitat function, and continue to do so. Among the many factors that contribute to degraded PCEs, those which appear to be particularly significant and have resulted in a legacy of degraded habitat conditions are as follows: (1) fragmentation and isolation of local populations due to the proliferation of dams and water diversions that have eliminated habitat, altered water flow and temperature regimes, and impeded migratory movements (Dunham and Rieman 1999, pg. 652; Rieman and McIntyre 1993, pg. 7); (2) degradation of spawning and rearing habitat and upper watershed areas, particularly alterations in sedimentation rates and water temperature, resulting from forest and rangeland practices and intensive development of roads (Fraley and Shepard 1989, pg. 141; MBTSG 1998, pp. ii - v, 20-45); (3) the introduction and spread of nonnative fish species, particularly brook trout and lake trout, as a result of fish stocking and degraded habitat conditions, which compete with bull trout for limited resources and, in the case of brook trout, hybridize with bull trout (Leary et al. 1993, pg. 857; Rieman et al. 2006, pp. 73-76); (4) in the Coastal-Puget Sound region where amphidromous bull trout occur, degradation of mainstem river FMO habitat, and the degradation and loss of marine nearshore foraging and migration habitat due to urban and residential development; and (5) degradation of FMO habitat resulting from reduced prey base, roads, agriculture, development, and dams.

Effects of Climate Change on Bull Trout Critical Habitat

One objective of the final critical habitat rule was to identify and protect those habitats that provide resiliency for bull trout use in the face of climate change. Over a period of decades, climate change may directly threaten the integrity of the essential physical or biological features described in PCEs 1, 2, 3, 5, 7, 8, and 9. Protecting bull trout strongholds and cold water refugia from disturbance and ensuring connectivity among populations were important considerations in addressing this potential impact. Additionally, climate change may exacerbate habitat degradation impacts both physically (e.g., decreased base flows, increased water temperatures) and biologically (e.g., increased competition with non-native fishes). For more discussion regarding impacts of climate change, see the status of the species and environmental baseline sections above.

Consulted-on Effects to Critical Habitat

The USFWS has formally consulted on the effects to bull trout critical habitat throughout its range. Section 7 consultations include actions that continue to degrade the environmental baseline in many cases. However, long-term restoration efforts are also proposed and have been implemented, which provides some stability or improvement in the existing functions within some of the CHUs. For about a detailed analysis of prior consulted-on effects in the action area, see the environmental baseline section.

Status of Bull Trout Critical Habitat in the Action Area

Appendix H contains general information about the environmental baseline that applies to all species and critical habitats addressed in this opinion, including the regulatory definition of environmental baseline, a discussion of *Oil (and Hazardous Substance) Facilities and Transport in the Action Area, Size and Types of Spills in the NW, Typical Response Time and Type, Influence of Spilled Material on Species Habitats in the Action Area,* and *Influence of Climate Change on Species Habitats in the Action Area*.

The action area includes designated bull trout critical habitat from 13 CHUs (see Figure BTCH-2 in Appendix G), including the following: Unit 1 (Olympic Peninsula), Unit 2 (Puget Sound), Unit 3 (Lower Columbia River Basins), Unit 5 (Hood River), Unit 6 (Lower Deschutes River), Unit 8 (Mainstem Lower Columbia River), Unit 13 (Umatilla River), Unit 14 (Walla Walla River Basin), Unit 16 (Grande Ronde River), Unit 20 (Powder River Basin), Unit 23 (Mainstem Snake River), Unit 30 (Kootenai River Basin), and Unit 31 (Clark Fork River Basin).

With our revised designation of bull trout critical habitat (75 FR 63935; October 18, 2010) the USFWS identified a number of marine and mainstem river habitats outside of bull trout core areas that provide the PCEs of critical habitat. These areas do not provide spawning and rearing habitat, but do provide FMO habitat that is typically shared by bull trout originating from multiple core areas. These shared FMO areas support the viability of bull trout populations by contributing to successful overwintering survival and dispersal among core areas (USFWS 2015, pg. 35).

Factors that degrade designated bull trout critical habitat within the action area are the same as those that affect critical habitat rangewide: lack of access to upstream habitat due to dams and other barriers; degradation of spawning and rearing habitat in upper watersheds; the introduction and spread of nonnative invasive species; and degradation of mainstem river and nearshore marine FMO habitat.

There is widespread agreement in the scientific literature that many factors (mostly related to human activities) have impacted bull trout and their habitat, and continue to do so. Among the many factors that individually and cumulatively degrade the current function of the PCEs of designated bull trout critical habitat, those that appear to be particularly significant and have resulted in a legacy of degraded habitat conditions are as follows:

- Fragmentation and isolation of local populations due to the proliferation of dams and water diversions that have eliminated habitat, altered water flow and temperature regimes, and impeded migratory movements (Dunham and Rieman 1999, pg. 652; Rieman and McIntyre 1993, pg.7);
- Degradation of spawning and rearing habitat in upper watershed areas, particularly alterations in sedimentation rates and water temperature, resulting from forest and rangeland practices and intensive development of roads (Fraley and Shepard 1989, pg. 141; The Montana Bull Trout Scientific Group 1998, pp. ii-v, 20-45);
- The introduction and spread of nonnative fish species, particularly brook trout (*S. fontinalis*) and lake trout (*S. namaycush*), as a result of fish stocking and degraded habitat conditions, which compete with bull trout for limited resources and, in the case of brook trout, hybridize with bull trout (Leary et al. 1993; Rieman et al. 2006);
- Degradation of mainstem river FMO habitat, and the degradation and loss of marine nearshore FMO habitat due to urban and residential development; and
- Degradation of FMO habitat resulting from reduced prey base, roads, agriculture, development, and dams.

The following discussion describes generically the current condition and function of designated bull trout critical habitat in the action area; the current condition and function of the PCEs of designated bull trout critical habitat:

1) *Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.*

Within the action area, floodplain and hydrologic functions are variable. Conditions range between mostly intact and undisturbed, and substantially disturbed and impaired. Temperature regimes range between mostly undisturbed and substantially disturbed. The current condition and function of this PCE in the action area may be described generically as moderately impaired.

2) *Migratory 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.*

Within the action area, migratory habitat functions are variable. Conditions range between mostly intact and undisturbed, and substantially disturbed and impaired. The current condition and function of this PCE in the action area may be described generically as moderately impaired.

3) *An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.*

Within the action area, food base functions are variable. Conditions range between mostly intact and undisturbed, and substantially disturbed and impaired. The current condition and function of this PCE in the action area may be described generically as moderately impaired.
4) *Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and*

processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure.

Within the action area, shoreline environments, processes, and functions are variable. Conditions range between mostly intact and undisturbed, and substantially disturbed and impaired. The current condition and function of this PCE in the action area may be described generically as moderately impaired.

5) *Water temperatures ranging from 2 °C to 15 °C (36 °F to 59 °F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence.*

Within the action area, water temperatures and thermal refugia functions are variable. Conditions range between mostly intact and undisturbed, and substantially disturbed and impaired. The current condition and function of this PCE in the action area may be described generically as moderately impaired.

6) *Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount (e.g., less than 12 percent) of fine substrate less than 0.85 mm (0.03 inch) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions.*

There is little or no core bull trout spawning and early rearing habitat in the action area. This PCE is mostly or entirely absent from the action area.

7) *A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph.*

Within the action area, conditions range between mostly intact and undisturbed, and substantially disturbed and impaired. The current condition and function of this PCE in the action area may be described generically as moderately impaired.

8) *Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.*

Within the action area, conditions range between mostly intact and undisturbed, and substantially disturbed and impaired. The current condition and function of this PCE in the action area may be described generically as moderately impaired.

9) *Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present.*

Within the action area, conditions range between mostly intact and undisturbed, and mildly disturbed. The current condition and function of this PCE in the action area may be described generically as mildly impaired.

Effects of the Action on Bull Trout Critical Habitat

Appendix I contains general information regarding effects of the action for all species and critical habitat addressed in this opinion, including the *Analytical Approach Used in the BA*, and *Environmental Fate and Toxicity of Dispersant and Dispersed Oil*.

An earlier section identified the PCEs that define designated bull trout critical habitat and described their baseline condition in the action area. This section discusses the effects of the proposed action with specific reference to the nine PCEs.

The proposed action consists of federalized responses to spills of oil or petroleum to water, or of other hazardous materials that pose a risk of immediate impacts to human health and/or the environment. The proposed action will, in all cases of responses to spills, result in significant beneficial effects to the environment; containment, control, removal, and recovery of spilled oil or hazardous material is likely to have corresponding immediate and long-term benefits to water, soil, sediment quality, and fish and wildlife resources. The proposed action includes specific CMs designed to limit habitat disturbance, to locate staging areas and support facilities in the least sensitive areas possible, to restrict foot traffic, vehicles, and heavy machinery from sensitive areas, and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E), the potential for the proposed action to cause adverse effects to the bull trout critical habitat is reduced. Additionally, spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response. For these reasons, there is a high potential for any adverse effects to bull trout critical habitat caused by spill response activities to be localized, and limited in scale and duration.

The action area includes designated bull trout critical habitat in which eight of the nine PCEs of critical habitat (PCE #s 1-5, and 7-9) are present. PCE #6 (suitable spawning substrates) is not present in the action area and will not be affected. Changes to current critical habitat recovery function due to the proposed action for the nine PCEs are described below.

1) *Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.*

The current condition and function of this PCE in the action area may be described generically as moderately impaired. The proposed action will have insignificant and discountable effects to the current condition and function of this PCE, because proposed spill response activities are not likely to expose this PCE to measurable or detectable consequences. Within the action area, PCE #1 will remain moderately impaired with implementation of the proposed action.

2) *Migratory 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 current condition and function of this PCE in the action area may be described generically as moderately impaired. When spill responses include use of berms, dams, or other barriers (pits and trenches, etc.) and/or culvert blocking in suitable habitats occupied by adult and subadult bull trout, they will create a temporary impediment to migration. Additional, temporary, adverse effects to the function of migratory habitat may result from unavoidable impacts to water quality (see below, effects to PCE #8). At the scale of the action area, PCE #2 will remain moderately impaired.

3) *An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.*

The current condition and function of this PCE in the action area may be described generically as moderately impaired. When spill responses include use of vehicles or heavy machinery, staging area establishment and use, mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking), or woody debris removal (or terrestrial and aquatic cutting/ removal of vegetation), they may have unavoidable impacts and adverse effects to suitable riparian, wetland, and/or shoreline habitats. Unavoidable adverse effects to prey productivity and availability will be limited in spatial and temporal extent (i.e., most spill responses are limited in geographic scope, and durations, for the purpose of this consultation, are limited to up to 4 days). However, in some instances, the affected habitat conditions and functions may require months or years to fully recover. At the scale of the action area, PCE #3 will remain moderately impaired with implementation of the proposed action.

4) *Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure.*

The current condition and function of this PCE in the action area may be described generically as moderately impaired. When spill responses include use of vehicles or heavy machinery, staging area establishment and use, mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking), or woody debris removal (or terrestrial and aquatic cutting/ removal of vegetation), they may have unavoidable impacts and adverse effects to suitable riparian, wetland, and/or shoreline habitats. Unavoidable adverse effects to habitat complexity and/or the natural processes that function to establish and maintain habitat complexity over time (e.g., channel development, large wood recruitment, etc.) will be limited in spatial and temporal extent because impacts are likely to be localized, meaning the recovery support function of the affected PCE will likely remain in adjacent areas, and short in duration due to pulse frequency of impacts and the 4-day limit placed on the proposed action. However, in some instances, the affected habitat conditions and functions may require months or years to fully recover. At the scale of the action area, PCE #4 will remain moderately impaired with implementation of the proposed action.

5) *Water temperatures ranging from 2 °C to 15 °C (36 °F to 59 °F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence.*

The current condition and function of this PCE in the action area may be described generically as moderately impaired. The proposed action will have insignificant and discountable effects to the current condition and function of this PCE because proposed spill response activities are not likely to expose this PCE to measurable or detectable consequences. Within the action area, PCE #5 will remain moderately impaired.

6) *Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount (e.g., less than 12 percent) of fine substrate less than 0.85 mm (0.03 inch) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions.*

There is little or no core bull trout spawning and early rearing habitat in the action area. This PCE is mostly or entirely absent from the action area. For that reason, the proposed action is likely to have insignificant and discountable effects to the current condition and function of this PCE.

7) *A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph.*

The current condition and function of this PCE in the action area may be described generically as moderately impaired. The proposed action will have insignificant and discountable effects to the current condition and function of this PCE because proposed spill response activities are not likely to expose this PCE to measurable or detectable consequences. Within the action area, PCE #7 will remain moderately impaired with implementation of the proposed action.

8) *Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.*

The current condition and function of this PCE in the action area may be described generically as moderately impaired. When spill responses include use of vehicles or heavy machinery, staging area establishment and use, berms/dams/other barriers, mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking), woody debris removal (or terrestrial and aquatic cutting/ removal of vegetation), ambient temperature low pressure flooding/flushing, or pressure washing/steam cleaning (or sand blasting) they may result in significant temporary turbidity and sedimentation. We expect that elevated turbidity and sedimentation will be managed pursuant to the state water quality standards (e.g., Water Quality Standards for Surface Waters of the State of Washington, effective March 5, 2020, Chapter 173-201A WAC).

We consider spills of oil, petroleum, or other hazardous material to be part of the baseline environmental conditions; i.e., not an element of the proposed action. However, liquid waste management with open-water decanting represent conscious and deliberate decisions to release materials back into the environment that are not completely "clean" or benign. All decanting in a designated "Response Area" within a collection area, vessel collection well, recovery belt, weir area, or directly in front of a recovery system; a containment boom will be deployed around the collection area, where feasible, to prevent the loss of decanted oil or entrainment of species in recovery equipment. Decanting shall be monitored at all times, so that discharge of oil in the decanted water is promptly detected. Where feasible, decanting will be done just ahead of a skimmer recovery system so that discharges of oil in decanting water can be immediately recovered.

Unavoidable adverse effects to water quality and quantity will be limited in spatial and temporal extent because impacts are likely to be localized, meaning the recovery support function of the affected PCE will likely remain in adjacent areas, and short in duration due to pulse frequency of impacts and the 4-day limit placed on the proposed action. . At the scale of the action area, PCE #8 will remain moderately impaired with implementation of the proposed action.

9) *Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present.*

The current condition and function of this PCE in the action area may be described generically as mildly impaired. The proposed action will have insignificant and discountable effects to the current condition and function of this PCE because because proposed spill response activities are not likely to expose this PCE to measurable or detectable consequences. Within the action area, PCE #9 will remain mildly impaired with implementation of the proposed action.

Summary

The proposed action will have temporary adverse effects to the PCEs of designated bull trout critical habitat (PCE #s 2, 3, 4, and 8) because the proposedaction is likely to result in unavoidable impacts and adverse effects to suitable riparian, wetland, and/or shoreline critical habitat function. These adverse effects will be limited in both spatial and temporal extent because impacts are likely to be localized, meaning the recovery support function of these PCEs will likely remain in adjacent areas, and short in duration due to pulse frequency of impacts and the 4-day limit placed on the proposed action. Based on these effects, at the scale of the action area, designated bull trout critical habitat is likely to retain most or all of its current level of recovery support function.

Cumulative Effects

Appendix J contains a cumulative effects analysis prepared for the BA that applies to all species and critical habitats contained in this opinion, including *Water Management, Urban and Agricultural Development,* and *Permitted Discharges.* See the *Cumulative Effects* section for the bull trout above.

Conclusion

After reviewing the current status of critical habitat for the bull trout, the environmental baseline, the effects of the proposed action (inclusive of conservation measures), and cumulative effects, it is our biological opinion that the proposed action, as described and analyzed in this opinion, is not likely to destroy or adversely modify designated critical habitat for the bull trout. We have made this determination for the reasons stated below.

Within the action area, the PCEs of designated bull trout critical habitat retain the potential to remain functional, and serve the intended recovery support function of critical habitat (see discussion below). The anticipated direct and indirect effects of the action, combined with the effects of interrelated and interdependent actions, and the cumulative effects associated with future State, tribal, local, and private actions will not prevent the PCEs of critical habitat from being maintained, and will not degrade the current ability to establish functioning PCEs at the scale of the action area. Critical habitat within the action area will continue to serve the intended conservation role for the species at the scale of the core areas, Recovery Units (Coastal, Mid-Columbia, Columbia Headwaters, Upper Snake), and coterminous range.

In general, the proposed action has the potential to result in significant beneficial effects to the environment (inclusive of any affected bull trout critical habitat) caused by the timely containment, control, and removal of hazardous materials in areas affected by spills of such material (e.g., oil) with corresponding immediate and long-term benefits to fish and wildlife, water, soil, and sediment quality.

The proposed action includes specific CMs designed to: limit habitat disturbance; locate staging areas and support facilities in the least sensitive areas possible; restrict foot traffic, vehicles, and heavy machinery from sensitive areas, and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E). These CMs serve to reduce the potential for the proposed action to cause adverse effects to bull trout critical habitat. Additionally, spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response. For these reasons, there is a high potential for any adverse effects to the bull trout critical habitat caused by spill response activities to be localized, and limited in scale and duration.

Kootenai River White Sturgeon

Rangewide Status of the Kootenai River White Sturgeon

On June 11, 1992, the USFWS received a petition from the Idaho Conservation League, North Idaho Audubon, and the Boundary Backpackers to list the Kootenai River white sturgeon (*Acipenser transmontanus*; Kootenai sturgeon) as threatened or endangered under the Act. The petition cited lack of natural flows affecting juvenile recruitment as the primary threat to the continued existence of the wild Kootenai sturgeon population. Pursuant to section 4(b)(A) of the Act, the USFWS determined that the petition presented substantial information indicating that the requested action may be warranted, and published this finding in the Federal Register on April 14, 1993 (58 FR 19401). A proposed rule to list the Kootenai sturgeon as endangered was published on July 7, 1993 (58 FR 36379), with a final rule following on September 6, 1994 (59 FR 45989).

Threats identified in the listing and 2018 5-year status review have not substantially changed since the prior status review in 2011, with the wild adult population declining at a rate of 15% per year. However, recovery actions that address the needs of Kootenai River white sturgeon, including the release of hatchery-origin Kootenai River white sturgeon into the river. In the spring of 2018, the first instance of a hatchery-origin Kootenai River white sturgeon reaching sexual maturity was documented. As time passes, additional hatchery-origin Kootenai River white sturgeon are expected to begin contributing to the spawning population, such that the negative trend is expected to reverse during the time frame of proposed action implementation. Based on our review of the current information, the Kootenai River sturgeon retains the potential for recovery because its current range-wide condition conforms to the survival condition as defined by the USFWS (1998, pg. xviii) and summarized in the Analytical Framework section herein.

Reasons for Listing

The Kootenai sturgeon is threatened by habitat modifications that primarily stem from a significantly altered annual hydrograph. Significant levels of natural recruitment ceased after 1974, which coincides with commencement of Libby Dam operations. Changes in the hydrograph, particularly from Libby Dam and the Corra Linn Dam (in Canada), have altered Kootenai sturgeon spawning, egg incubation, and rearing habitats, and reduced overall biological productivity of the Kootenai River. These factors appear to be adversely affecting the early life stages of the Kootenai sturgeon. Other potential threats to the Kootenai sturgeon include removal of side-channel habitats (important early life stage habitats) and a loss/reduction of ecosystem functions such as riparian function and nutrient inputs from flooding. Paragamian (2002, pg. 375) reported that "Reduced productivity because of [a] nutrient sink effect in Lake Koocanusa, river regulation, the lack of flushing flows, power peaking and changes in river temperature may have led to changes in fish community structure." Changes in the fish community structure may have favored an increase in fish species that prey on Kootenai sturgeon eggs and free-embryos (that life stage after hatching through active foraging larvae with continued dependence upon yolk materials for energy).

Species Description

Kootenai sturgeon are included in the family Acipenseridae, which consists of 4 genera and 24 species of sturgeon. Eight species of sturgeon occur in North America with Kootenai sturgeon being one of the five species in the genus *Acipenser*. Kootenai sturgeon are a member of the species *Acipenser transmontanus*.

White sturgeon were first described by Richardson in 1863 from a single specimen collected in the Columbia River near Fort Vancouver, Washington (Scott and Crossman 1973, as cited in NWPCC 2005, pg. 371). White sturgeon are distinguished from other *Acipenser* by the specific arrangement and number of scutes (bony plates) along the body (Scott and Crossman 1973, as cited in NWPCC 2005, pg. 371). The largest white sturgeon on record, weighing approximately 1,500 pounds was taken from the Snake River near Weiser, Idaho in 1898 (Simpson and Wallace 1978, pg. 51). The largest white sturgeon reported among Kootenai sturgeon was a 159 kilogram (350-pound) individual, estimated at 85 to 90 years of age, captured in Kootenay Lake during September 1995 (RL&L 1999, pg. 8). White sturgeon are generally long-lived, with females living from 34 to 70 years (PSMFC 1992, pg. 19).

Life History

As noted in the Kootenai Sturgeon Recovery Plan (USFWS 1999a, pg. 4), Kootenai sturgeon are considered opportunistic feeders. Partridge (1983, pp. 23-28) found Kootenai sturgeon more than 70 centimeters (28 inches) in length feeding on a variety of prey items including clams, snails, aquatic insects, and fish. Andrusak (pers. comm., 1993) noted that kokanee (*Oncorhynchus nerka*) in Kootenay Lake, prior to a dramatic population crash beginning in the mid-1970s, were once considered an important prey item for adult Kootenai sturgeon.

In the spring, reproductively active Kootenai sturgeon respond to increasing river depth and flows by ascending the Kootenai River. Historically (prior to Libby Dam construction and operation), spawning areas for Kootenai sturgeon were reported to be in the roughly one mile stretch of the Kootenai River below Kootenai Falls (river mile [RM] 309.7) (USACE 1971; MFWP 1974). However, Kootenai sturgeon monitoring programs conducted from 1990 through 1995 revealed that during that five year period, sturgeon spawned within an 11.2 RM reach of the Kootenai River, from Bonners Ferry downstream to below Shorty's Island (RM 143.0). Through 2018, most spawning continues to occur downstream of Bonners Ferry over sandy substrates. As river flow and stage increase, Kootenai sturgeon spawning tends to occur further upstream, near the gravel substrates which now occur at and upstream of Bonners Ferry (Paragamian et al. 1997, pg. 30). Although about a third of Kootenai sturgeon in spawning condition migrate upstream to the Bonners Ferry area annually, few remain there to spawn (Rust and Wakkinen 2013, pg. 10). Kootenai sturgeon have spawned in water ranging in temperature from 37.3 to 55.4 °Fahrenheit (F). However, most Kootenai sturgeon spawn when the water temperature is near 50 °F (Paragamian et al. 1997, pg. 30).

The size or age at first maturity for Kootenai sturgeon in the wild is quite variable (PSMFC 1992, pg. 11). In the Kootenai River system, females have been estimated (based upon age-length relationships) to mature at age 30 and males at age 28 (Paragamian et al. 2005, pg. 525). Only a portion of Kootenai sturgeon are reproductive or spawn each year, with the spawning frequency for females estimated at 4 to 6 years (Paragamian et al. 2005, pg. 525). Spawning occurs when the physical environment permits egg development and cues ovulation. Kootenai sturgeon spawn during the period of historical peak flows, from May through July (Apperson and Anders 1991, pg. 50; Marcuson 1994, pg. 18). Spawning at near peak flows with high water velocities disperses and prevents clumping of the adhesive, demersal (sinking) eggs.

Following fertilization, eggs adhere to the rocky riverbed substrate and hatch after a relatively brief incubation period of 8 to 15 days, depending on water temperature (Brannon et al. 1985, pp. 58-64). Here they are afforded cover from predation by high near-substrate water velocities and ambient water turbidity, which preclude efficient foraging by potential predators.

Upon hatching the embryos become free-embryos. Free-embryos initially undergo limited downstream redistribution(s) by swimming up into the water column and are then passively redistributed downstream by the current. This redistribution phase may last from one to six days depending on water velocity (Brannon et al. 1985, pp. 58-64; Kynard and Parker 2005, pg. 3). The inter-gravel spaces in the substrate provide shelter and cover during the free-embryo “hiding phase.”

As the yolk sac is depleted, free-embryos begin to increase feeding, and ultimately become free-swimming larvae, entirely dependent upon forage for food and energy. At this point the larval Kootenai sturgeon are no longer highly dependent upon rocky substrate or high water velocity for survival (Brannon et al. 1985, pp. 58-64; Kynard and Parker, 2005, pg. 3). The timing of these developmental events is dependent upon water temperature. With water temperatures typical of the Kootenai River, free-embryo Kootenai sturgeon may require more than seven days post-hatching to develop a mouth and be able to ingest forage. At 11 or more days, Kootenai sturgeon free-embryos would be expected to have consumed much of the energy from yolk materials, and they become increasingly dependent upon active foraging.

The duration of the passive redistribution of post-hatching free-embryos, and consequently the linear extent of redistribution, depends upon near substrate water velocity, where free-embryos enter the hiding phase earlier when river currents are higher (Brannon et al. 1985, pg. 58). This adaptive behavior prevents prolonged exposure of free-embryos to potential predators (Brannon et al. 1985, pg. 58). Working with Kootenai sturgeon, Kynard and Parker (2005, pg. 3) found that under some circumstances this dispersal phase may last for up to 6 days. A prolonged dispersal phase among free-embryos would increase the risk of predation on the embryo and diminish energy reserves, whereas entering the hiding phase earlier would reduce these risks. Multiple years of field sampling of juveniles and adults indicates that juvenile and adult Kootenai sturgeon primarily rear in the lower Kootenai River and in Kootenay Lake (Flory 2011, pg. 16).

Population Dynamics and Viability

Paragamian et al. (2005, pg. 518) indicated that the wild population of Kootenai sturgeon consists of an aging cohort of large, old fish. Beamesderfer et al. (2014, pg. 6) estimated that wild adult Kootenai sturgeon population abundance had declined from approximately 3,000 individuals in 1990 to about 1,000 individuals in 2011 and that annual survival rates (estimated by the mark-recapture analysis) appeared to have declined from "around 97 percent" prior to 2008 to 85 percent from 2007 to 2010.

Beamesderfer et al. (2014, pg. 40) also found that "very low levels of natural recruitment continue to be documented based on low sample numbers of juvenile fish". The same analysis also showed that applying capture probabilities (from capture of hatchery fish) indicates that approximately 13 wild juveniles are recruited into the population annually. This suggests that high levels of mortality are now occurring in habitats used for egg incubation and free-embryo development, which are unlikely to sustain a wild population of the Kootenai sturgeon. Natural reproduction at this level cannot be expected to provide any population level benefits (Anders 2017, pg. 6), nor would reproduction at this level have been adequate to sustain the population of 6,000 to 8,000 sturgeon estimated to exist in 1980 (Anders 2017, pg. 16). The last year of significant natural recruitment was 1974.

Distribution

The Kootenai sturgeon is one of 18 land-locked populations of white sturgeon known to occur in western North America (USFWS 1999a, pg. 3). Kootenai sturgeon occur in Idaho, Montana, and

British Columbia and are restricted to approximately 167.7 RM of the Kootenai River extending from Kootenai Falls, Montana (31 RM below Libby Dam, Montana), downstream through Kootenay Lake to Corra Linn Dam, which was built on Bonnington Falls at the outflow from Kootenay Lake in British Columbia (RM 16.3). Approximately 45 percent of the species' range is located within British Columbia.

Bonnington Falls in British Columbia, a natural barrier downstream from Kootenay Lake, has isolated the Kootenai sturgeon since the last glacial advance roughly 10,000 years ago (Apperson 1992, pg. 2). Apperson and Anders (1990, pp. 35-37; 1991, pp. 48-49) found that at least 36 percent (7 of 19) of the Kootenai sturgeon tracked during 1989 over-wintered in Kootenay Lake. Adult Kootenai sturgeon forage in and migrate freely throughout the Kootenai River downstream of Kootenai Falls at RM 193.9. Juvenile Kootenai sturgeon also forage in and migrate freely throughout the lower Kootenai River downstream of Kootenai Falls and within Kootenay Lake. Apperson and Anders (1990, pp. 35-37; 1991, pp. 48-49) observed that Kootenai sturgeon no longer commonly occur upstream of Bonners Ferry, Idaho. However, there are no structural barriers preventing Kootenai sturgeon from ascending the Kootenai River up to Kootenai Falls, and this portion of the range remains occupied as documented by Ireland (2005, pg. 1), Stephens et al. (2010, pp. 14-16), and Stephens and Sylvester (2011, pp. 21-34).

Consulted-on Effects

Consulted-on effects are those effects that have been analyzed through section 7 consultation as reported in a biological opinion. These effects are an important component of objectively characterizing the current condition of the species. To assess consulted-on effects to Kootenai sturgeon, we analyzed all of the relevant biological opinions prepared by USFWS Offices from the time of listing until January 2018.

The USFWS issued jeopardy opinions on the effects of Libby Dam operations on Kootenai sturgeon in 1995, 2000, and 2006 (the 1995 and 2000 opinions included the effects of the Federal Columbia River Power System (FCRPS), and are referred to as the "FCRPS Opinions"). In 2008, in response to litigation over the 2006 jeopardy opinion, a settlement agreement was signed between the Center for Biological Diversity, the USFWS, the U.S. Army Corps of Engineers (USACE), the State of Montana, and the Kootenai Tribe of Idaho. In December 2008, in compliance with the terms of the settlement agreement, the USFWS clarified the Reasonable and Prudent Alternative (RPA) from the 2006 jeopardy opinion (2008 Clarification).

The RPA from the 2006 jeopardy opinion directed the action agencies (the USACE and Bonneville Power Administration [BPA]) to implement pilot habitat projects in the braided and meander reaches of the Kootenai River. The 2008 Clarification directed the action agencies to "cooperate in good faith with and support the Kootenai Tribe of Idaho's good-faith efforts to implement the Kootenai River Restoration Project Master Plan, including developing a funding strategy to implement the Plan".

In June of 2011, the USFWS issued a biological opinion on the implementation of Phase 1 of the Kootenai River Habitat Restoration Project (USFWS Reference: 14420-2011-F-0181). In that opinion, the USFWS concurred with BPA's conclusion that the project "may affect", but is "not likely to adversely affect" bull trout and bull trout critical habitat. Also in that opinion, the USFWS determined that implementation of the project was neither likely to jeopardize the continued existence of Kootenai sturgeon, nor likely to adversely modify Kootenai sturgeon critical habitat. The project was implemented and completed in the summer and fall of 2011.

In July of 2012, the USFWS issued a biological opinion on the implementation of Phase 2 of the Kootenai River Habitat Restoration Project (USFWS Reference: 14420-2012-FC-0388). In that opinion, the USFWS concurred with BPA's conclusion that the project "may affect", but is "not likely to adversely affect" bull trout and bull trout critical habitat. Also in that opinion, the USFWS determined that implementation of the project was neither likely to jeopardize the continued existence of Kootenai sturgeon, nor likely to adversely modify Kootenai sturgeon critical habitat. The project was implemented and completed in the summer and fall of 2012.

In April of 2013, the USFWS issued a biological opinion on the construction of the Twin Rivers Aquaculture Facility as well as BPA's continued funding of the Kootenai sturgeon conservation aquaculture program (USFWS Reference: 01EIFW00-2013-FC-0207). In that opinion, the USFWS determined that construction of the new facility and operation of the conservation aquaculture program is not likely to jeopardize the continued existence of Kootenai sturgeon or bull trout, nor are they likely to adversely modify designated Kootenai sturgeon and bull trout critical habitat.

In July of 2013, the USFWS issued a programmatic biological opinion on the implementation of additional projects under the Kootenai River Habitat Restoration Program (USFWS Reference: 01EIFW00-2013-F-0278). In that opinion, the USFWS concurred with BPA's conclusion that the project "may affect", but is "not likely to adversely affect" bull trout and bull trout critical habitat. Also in that opinion, the USFWS determined that implementation of the project was neither likely to jeopardize the continued existence of Kootenai sturgeon, nor likely to adversely modify Kootenai sturgeon critical habitat. Projects covered under the programmatic opinion began to be implemented in 2013, and continue to be implemented annually.

Conservation Needs

Based on the best scientific information currently available, the habitat needs for successful spawning and recruitment of Kootenai sturgeon are described below.

<u>Primary Productivity</u>

In many fish species, white sturgeon included, production of year classes is largely dependent on larval survival, with the primary causes of larval mortality being starvation and predation (Muir et al. 2000, pg. 25). As a result, the availability of suitable prey for larval sturgeon is crucial. However, due to the presence and operations of Libby Dam, construction of dikes along the mainstem Kootenai River, agriculture, human development, and other factors, the historic river conditions that allowed for the production of prey species important to larval sturgeon have been greatly diminished (KTOI 2009, pp. 2-4). As noted in Flory 2011 (p. 10), sturgeon managers have hypothesized that Kootenai sturgeon are experiencing a second bottleneck at the larval-to-age-2 stage, and that the cause of this bottleneck is nutrient/food related (i.e., there is an insufficient food supply for larval and age-1 sturgeon). Field data have indicated that there is very little benthic zooplankton and macroinvertebrate production in the Kootenai River (Flory 2011, pg. 10). Macroinvertebrate densities in the Kootenai River are consistent with ecosystems that have low nutrient levels (Snyder and Minshall 1998, as cited in NPCC 2005, pp. 402-403). Hopkins and Lester (1995, as cited in NPCC 2005, pg. 402) found invertebrate densities in Lower Granite Reservoir of the Snake River, Idaho (which has a naturally spawning and recruiting white sturgeon population) that were nearly threefold greater than in the Kootenai River.

<u>Water Velocity</u>

High "localized" water velocity is one of the common factors of known sites where white sturgeon spawn and successfully recruit in the Columbia River Basin. Mean water velocities exceeding 3.3 feet per second (ft/s) are important to spawning site selection. These water velocities provide cover from predation; normal free-embryo behavior and redistribution; and shelter (living space) for eggs and free-embryos through the duration of the incubation period.

<u>Suspended Sediment/Turbidity</u>

There has been an approximately 80 percent reduction in suspended sediment and turbidity in the Kootenai River since Libby Dam began operations (Barton 2004, pg. 13). Prior to impoundment by Libby Dam, turbidity remained high during the incubation period. White sturgeon are found in large rivers along the Pacific Coast between Monterey, California and Alaska (Page and Burr 1991, pg. 27). Such large river systems typically carry large suspended sediment loads and are highly turbid, particularly during the spring runoff period (Cole 1983, pp. 154-155). In response, white sturgeon have evolved specific life strategies to persist in these conditions. Hildebrand et al. (1999, pg. 165) states about Columbia River white sturgeon in British Columbia:

"White sturgeon are broadcast spawners and the eggs and post-hatch larvae are relatively large and black in colour. Post-hatch white sturgeon larvae undergo a passive downstream migration to rearing habitats. Turbid water conditions during the egg incubation and early pelagic larval stage would provide protection from visual predators for these life stages and also for the early benthic feeding stage of sturgeon fry. This suggests historical spawning habitats may have been situated in systems that had a high suspended sediment load such as the upper Columbia River or the lower Pend d'Oreille River."

Additional white sturgeon adaptations to higher turbidity and suspended sediment levels include: 1) influencing spawning site selection, with higher levels being associated with spawning in shallower habitats (likely due to increased cover) (Perrin et al. 2003, pg. 163; Hildebrand et al., 1999, pg. 167); 2) hatching and emergence into the water column occurring in low-light conditions (Brannon et al. 1985, pg. 24); and 3) larval white sturgeon being photophobic (Brannon et al. 1985, pg. 24). The latter two adaptations appear to be related to predator avoidance. Gadomski and Parsley (2005, pg. 371) found that significantly more white sturgeon larvae were eaten by prickly sculpins (*Cottus asper*) at lower turbidity levels in a controlled laboratory experiment.

Water Depth

The best information currently available indicates that water depth is a factor affecting both migratory behavior and spawning site selection among Kootenai sturgeon.

Rocky Substrate

Rocky substrate and associated inter-gravel spaces provide both structural shelter and cover for egg attachment, embryo incubation, and normal free-embryo incubation and behavior involving downstream redistribution by the current.

Water Temperature/Quality

Suitable water and substrate quality are necessary for the viability of early life stages of Kootenai sturgeon, including both incubating eggs and free-embryos, and for normal breeding behavior. Lower than normal water temperatures in the spawning reach may affect spawning behavior, location, and timing. Preferred spawning temperature for the Kootenai sturgeon is near 50 °F, and sudden drops of 3.5 to 5.5 °F cause males to become reproductively inactive, at least temporarily. Water temperatures also affect the duration of incubation of both embryos (eggs) and free-embryos.

Status of the Kootenai River White Sturgeon in the Action Area

Appendix H contains general information about the environmental baseline that applies to all species and critical habitats addressed in this opinion, including the regulatory definition of environmental baseline, a discussion of *Oil (and Hazardous Substance) Facilities and Transport in the Action Area, Size and Types of Spills in the NW, Typical Response Time and Type, Influence of Spilled Material on Species Habitats in the Action Area,* and *Influence of Climate Change on Species Habitats in the Action Area*.

A final report by Beamesderfer et al. (2014, pg. 6) concluded that "the wild Kootenai adult sturgeon population [has] declined from 2,968 (2,713-3,226) individuals in 1990 to 990 (773-1,375) in 2011". The report also concluded that the annual survival rate of the wild adult population "appears to have declined from around 97% prior to 2008 to 85% from 2007 to 2010", and that with the current negligible level of natural recruitment (approximately 13 wild fish per year (p. 40)) "extinction [of the wild population] will be the inevitable outcome without effective recovery measures".

Factors Affecting the Species in the Action Area

Libby Dam Construction. Libby Dam was authorized for hydropower, flood control, and other benefits by Public Law 516, Flood Control Act of May 17, 1950, substantially in accordance with the report of the Chief of Engineers dated June 28, 1949 (Chief's Report) as contained in the House Document No. 531, 81st Congress, 2nd session. The USACE began construction of Libby Dam in 1966 and completed construction in 1973. Commercial power generation began in 1975. Libby Dam is 422 ft. tall and has three types of outlets: three sluiceways; five penstock intakes, three of which are currently inoperable; and a gated spillway. The crest of Libby Dam is 3,055 ft. long, and the widths at the crest and base are 54 ft. and 310 ft., respectively. A selective withdrawal system was installed on Libby Dam in 1972 to control water temperatures in the dam discharge by selecting various water strata in the reservoir forebay.

Koocanusa Reservoir (known also as Lake Koocanusa or Libby Reservoir) is a 90-mile-long storage reservoir (42 miles extend into Canada) with a surface area of 46,500 acres at full pool. The reservoir has a usable storage of approximately 4,930,000 acre-feet and gross storage of 5,890,000 acre-feet.

The authorized purpose of Libby Dam is to provide power, flood control, and navigation and other benefits. With the five units currently installed, the electrical generation capacity is 525,000 kilowatts. The maximum discharge with all five units in operations is about 26,000 cubic feet per second (cfs). The surface elevation of Koocanusa Reservoir ranges from 2,287 feet to 2,459 feet at full pool. The spillway crest elevation is 2,405 feet.

Libby Dam Operations. Presently, Libby Dam operations are dictated by a combination of power production, flood control, recreation, and special operations for the recovery of ESA-listed species, including the Kootenai sturgeon, bull trout, and salmon in the mid-and lower Columbia River.

The USACE currently manages Libby Dam operations not to volitionally exceed 1,764 mean sea level at Bonners Ferry, the flood stage designated by the National Weather Service (USACE 1999, pp. 19-20). In accordance with the National Marine Fisheries Service (NMFS) biological opinion, the USACE manages Libby Dam to refill Lake Koocanusa to an elevation of 2,459 feet (full pool) by July 1, when possible (NMFS 2000, pg. 3-2).

The USFWS's 1995 FCRPS biological opinion recommended a flow regime that approached average annual pre-dam conditions, and would result in a pattern more closely resembling the pre-dam hydrograph (Figure KS-1) (USFWS 1995b, pp. 6-10). The USFWS's 2000 FCRPS opinion and 2006 opinion on Libby Dam continued this recommendation (USFWS 2000). However, the actual volume of these augmented freshets has been relatively insignificant when compared to the magnitude of the natural pre-dam freshet.

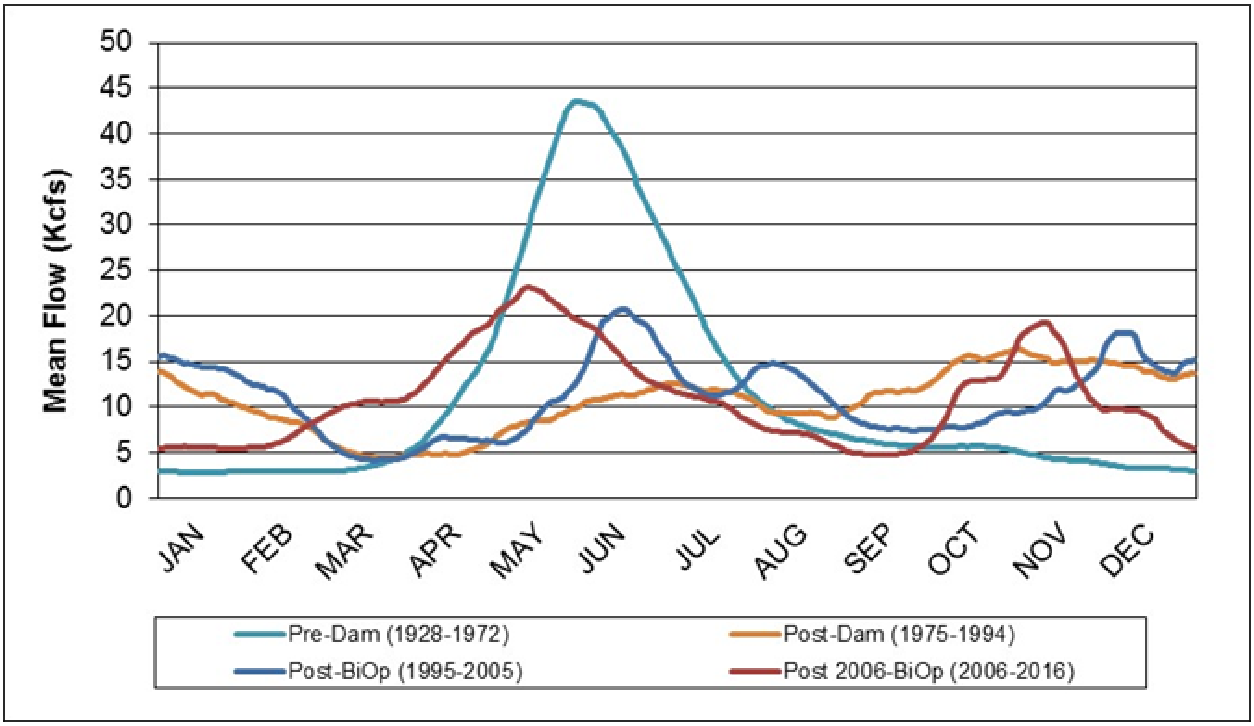


Figure KS-1 Mean seasonal (May through July) hydrograph (calculated; Bonners Ferry) for pre-dam (1957 – 1974), pre-biological opinion (opinion) (1975-1994), and opinion (1995-2004)

The USFWS's 2000 FCRPS opinion and 2006 opinion on Libby Dam included RPAs that recommended the implementation of Variable-Flow Flood Control (VARQ) operations at Libby Dam. In 2002, VARQ operations at Libby Dam began and continued on an "interim" basis until the completion of an Environmental Impact Statement in April 2006, and the signing of a Record of Decision to implement VARQ operations in June 2008.

The USFWS's 2006 opinion on Libby Dam also recommended that Libby Dam operations provide for minimum tiered volumes of water, based on the seasonal water supply, for augmentation of Kootenai River flows during periods of sturgeon spawning and early life stage development. Figure KS-2 shows the sturgeon volume tiers for different seasonal water supply forecasts. Less volume is dedicated for sturgeon flow augmentation in years of lower water supply. Measurement of sturgeon volumes excludes the 4,000 cfs minimum flow releases from the dam.

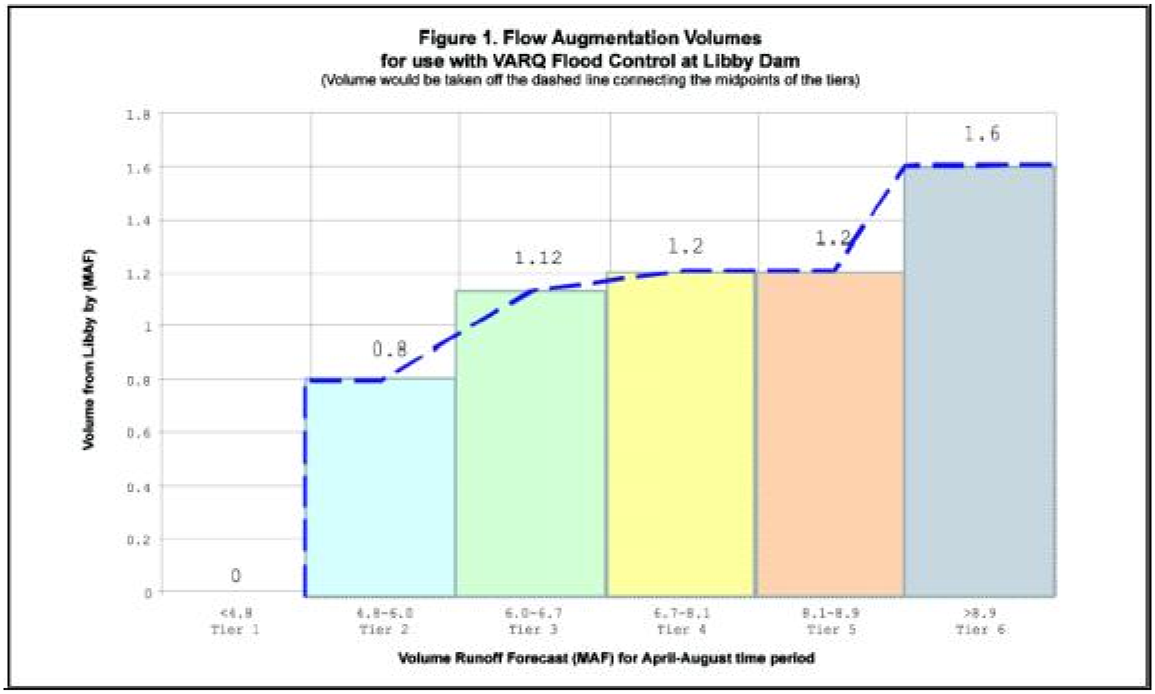


Figure KS-2 The "tiered" flow strategy for Kootenai sturgeon flow augmentation.

Northwest Power and Conservation Council Proposed Libby Dam Operational Changes. In its 2000 Columbia River Basin Fish and Wildlife Program, the first revision of the program since 1995, the Northwest Power and Conservation Council (Council) committed to revise the 1995 program's recommendations regarding mainstem Columbia and Snake River dam operations in a separate rulemaking. That rulemaking commenced in 2001. On April 8, 2003, the Council adopted the new mainstem amendments which included operations of these projects. These amendments are advisory and call for the following at Libby Dam:

- Continue to implement the VARQ flood control operations and implement Integrated Rule Curve operations as recommended by Montana Fish, Wildlife and Parks.
- With regard to operations to benefit Kootenai sturgeon, the Council recommended a refinement to operations in the 2000 FCRPS biological opinion that specify a "tiered" strategy for flow augmentation from Libby Dam to simulate a natural spring freshet.

- Refill should be a high priority for spring operations so that the reservoirs have the maximum amount of water available during the summer.
- Implement an experiment to evaluate the following interim summer operation:
  - Summer drafting limits at Libby Dam should be 10 ft. from full pool by the end of September in all years except during droughts when the draft could be increased to 20 ft.
- Draft Koocanusa Reservoir as stable or "flat" weekly average outflows from July through September, resulting in reduced drafting compared to the NMFS FCRPS biological opinion.

In November 2007, the Council again requested written recommendations regarding amendments to the Columbia River Basin Fish and Wildlife Program. In February 2009, the Council adopted the final revised Fish and Wildlife Program that included maintaining the above mainstem amendments.

Kootenay Lake and Backwater Effect. Corra Linn Dam located downstream on the Kootenay River (the outlet of Kootenay Lake) in British Columbia, controls lake level for much of the year with the notable exception occurring during periods of high flows, such as during the peak spring runoff season. During the spring freshet, Grohman Narrows (RM 23), a natural constriction upstream from the dam near Nelson, British Columbia regulates flows out of the lake. Kootenay Lake levels are managed in accordance with the International Joint Commission Order of 1938 that regulates allowable maximum lake elevations throughout the year. During certain high flow periods when Grohman Narrows determines the lake elevation, Corra Linn Dam passes inflow in order to maximize the flows through Grohman Narrows. Regulation of lake inflows by Libby Dam and Duncan Dam (on the Duncan River flowing into the north arm of the lake) maintains Kootenay Lake levels generally lower during the spring compared to pre-dam conditions.

Historically, during spring freshets, water from Kootenay Lake backed up as far as Bonners Ferry and at times further upstream (Barton 2004, pg. 4). However, since hydropower and flood control operations began at Corra Linn and Libby Dams, the extent of this "backwater effect" has been reduced an average of over 7 ft. during the spring freshet (i.e., water from Kootenay Lake currently extends further downstream than historically) (Barton 2004, pg. 5).

Other Factors Affecting Species Environment within the Action Area

Beginning in the early 1900s to 1961, in order to provide a measure of protection from spring floods, a series of dikes were constructed along the Kootenai River (below Libby Dam) and its tributaries. Other factors affecting the Kootenai sturgeon within the action area include floodplain development, contaminant runoff from mining activities, over-harvest, municipal water use, livestock grazing, and timber harvest (NPCC 2005, pg. 110).

Summary

Based on our review of the current information regarding the species status and ongoing conservation actions in the action area, the Kootenai River sturgeon populations in the action area retain sufficient resiliency and redundancy to offset temporary adverse impacts caused by natural or anthropogenic sources.

Effects of the Action on the Kootenai River White Sturgeon

Appendix I contains general information regarding effects of the action for all species and critical habitat addressed in this opinion, including the *Analytical Approach Used in the BA*.

Based on our review of the proposed action and conservation measures, the USFWS anticipates the following response activities could impact Kootenai sturgeon: deflection/containment, including booming, construction of berms or other barriers, and culvert blocking; recovery of spilled material, including vacuuming and passive collection; and removal/cleanup, including manual or mechanical removal of oiled substrate and cutting/removal of vegetation. Support for response activities would require the presence of responders and could include use of vessels and/or use of vehicles or heavy equipment. The most likely impacts to Kootenai sturgeon are expected to be related to displacement and potential changes to water quality caused by sediment or contaminants. Additionally, vacuuming to recover spilled material could entrain plankton, fish eggs, or larval fish.

Displacement and Avoidance

In general, fish that are near an activity in a river may be repeatedly disturbed by the activity and modify their behavior in response to the disturbance. Disturbance can cause increased exposure to predation, injury, and stress. Response activities will cause temporary increases in noise levels and human presence. If a response activity occurs in the Kootenai River and Kootenai sturgeon are in the area, behavioral effects are anticipated. The level of disturbance will vary, depending on the response activity; therefore, the level of effect is expected to vary. Effects could range from temporary, short term movement of Kootenai sturgeon away from the activity to disruption of spawning and abandonment of spawning areas. The level of effect would range from insignificant, in the case of temporary short term movements of Kootenai sturgeon, to adverse in the case of disruption of spawning.

Response activities could require anchoring of equipment and vessels in Kootenai sturgeon habitat which has the potential to cause disturbance to benthic habitat, including in coarse substrates (e.g., gravel and cobbles). As a result, Kootenai sturgeon eggs and free-embryos, as well as benthic invertebrate communities, may be affected. The area where coarse substrate is disturbed is expected to be relatively small and limited to the portion of the river bottom where the anchor(s) and anchor chains are deployed. Disturbance of coarse river substrates could result in adverse effects to Kootenai sturgeon through crushing of eggs and free-embryos that may be in the disturbed area, depending on the time of year a response activity occurs. Other effects to Kootenai sturgeon would vary depending on the age of the fish affected. Kootenai sturgeon present in the work areas would likely avoid the disturbed habitat and seek other areas for feeding and sheltering, potentially increasing energy expenditure. The effect of the increased energy expenditure to adult sturgeon is expected to be insignificant because sturgeon are opportunistic feeders and adult food supply has not been demonstrated to be limiting. Consequently, the USFWS anticipates adult sturgeon would move to adjacent undisturbed habitat with a suitable food supply. However, the effect to larval sturgeon is expected to be adverse because larval sturgeon feed primarily on benthic zoo plankton and macroinvertebrates; production of these is very limited in the Kootenai River and habitat with an adequate food supply is likely not available nearby, requiring larval fish to move longer distances to find suitable undisturbed habitat.

Sediment Effects

Some response activities will cause temporary increases in sediment input and turbidity in the Kootenai River in the vicinity of each response. Specifically, sediment input is expected to increase where response activities result in disturbance of surface soils and may occur during construction of access points, construction of barriers and booms, manual or mechanical removal of oiled substrate, and cutting or removal of vegetation. The level of effect to Kootenai sturgeon will vary depending on the amount of sediment entering the river as a result of the response activity and the proximity of the response activity to Kootenai sturgeon and its habitat.

Large increases in sediment that cover stream substrate may cause the death of incubating eggs (Kock et al. 2005, pg. 137) or larval Kootenai sturgeon that live within interstitial spaces of substrate. Increased turbidity (suspended solids) can provide rearing sturgeon larvae with additional cover, thus reducing predation (Gadomski and Parsley 2005, pg. 375), but can also increase water temperatures and decrease dissolved oxygen levels in the river. The proposed action includes conservation measures designed to reduce sediment input to the river during a response activity. Depending on the location and type of response activity, the level of effect to Kootenai sturgeon could range from beneficial (i.e., provide additional cover) to adverse (i.e., cause mortality of eggs or larvae).

Contaminant Effects

Response activities such as decontamination, solid and liquid waste management, and passive collection with sorbents have the potential to re-release the spilled material and effect Kootenai sturgeon. However, the proposed action includes monitoring requirements, standard protocols, the requirement for maintaining adequate response equipment on site, and other measures that reduce the likelihood of this occurring. Consequently, effects to Kootenai sturgeon from re-release of contaminants are expected to be insignificant.

Additionally, response activities that disturb the riverbed have the potential to liberate existing contaminants from the riverbed and disperse them into the Kootenai River. However, a 2012 U.S. Geological Survey analysis of sediment chemistry in the braided reach of the Kootenai River found that concentrations of organochlorine pesticides, polynucleararomatic hydrocarbons, polychlorinated biphenyls, metals, total organic carbon, and asbestos were lower than established sediment quality guidelines (Barton et al. 2012, pp. 17-21). Therefore, potential effects to Kootenai sturgeon from liberation of contaminants during response activities are expected to be insignificant.

Entrainment

Vacuuming to recover spilled materials has the potential to entrain plankton, fish eggs, and larval fish, if any are present when this response activity occurs. Routinely, vacuuming will occur at the water surface. Because all life stages of Kootenai sturgeon are associated with the river bottom, they are not likely to be affected by vacuuming the water surface and effects are expected to be discountable. Rarely, vacuuming may be used for the recovery of non-floating oil, meaning vacuuming may occur at or near the river bottom. Conservation measures state that the intake will be positioned to minimize entrainment of plankton, fish eggs, and larval fish to the extent practicable. Kootenai sturgeon eggs and larval fish would be susceptible to entrainment, depending on the proximity of the response activity to the sturgeon. Entrainment of plankton in Kootenai sturgeon habitat is likely to adversely affect Kootenai sturgeon to some extent because larval sturgeon feed primarily on benthic zoo plankton and macroinvertebrates and production of these is very limited in the Kootenai River. Adult Kootenai sturgeon do not feed on plankton; therefore, the effect to adult Kootenai sturgeon from entrainment of plankton would be discountable. The potential effect to Kootenai sturgeon will vary depending on the time of year the response activity occurs and the proximity of the response activity to Kootenai sturgeon.

Cumulative Effects

Appendix J contains cumulative effects analysis prepared for the BA that applies to all species and critical habitats contained in this opinion, including *Water Management, Urban and Agricultural Development,* and *Permitted Discharges.*

Conclusion

After reviewing the current status of the Kootenai River white sturgeon, the environmental baseline, the effects of the proposed action (inclusive of conservation measures), and cumulative effects, it is our biological opinion that the Northwest Are Contingency Plan, as described and analyzed in this opinion, is not likely to jeopardize the continued existence of the Kootenai River white sturgeon. We reached this conclusion for the following reasons.

In general, the proposed action is likely to result in significant beneficial effects to the environment (inclusive of any affected Kootenai River white sturgeon habitat) caused by timely containment, control, and removal in areas affected by spilled material with corresponding immediate and long-term benefits to fish and wildlife, water, soil, and sediment quality.

The proposed action includes specific CMs designed to limit habitat disturbance, to locate staging areas and support facilities in the least sensitive areas possible, to restrict foot traffic, vehicles, and heavy machinery from sensitive areas, and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E), the potential for the proposed action to cause adverse effects to the sturgeon is reduced.

Additionally, spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response. For these reasons, there is a high potential for any adverse effects to the Kootenai River white sturgeon caused by spill response activities to be localized, and limited in scale and duration.

Impacts to Kootenai sturgeon are expected to occur due to a variety of response activities. The level of impact will vary depending on the location, timing, and type of response activity. Adverse effects primarily impact recruitment into the population. Adverse effects include disruption of spawning caused by disturbance resulting from increased noise or human presence; crushing of eggs or free-embryos when coarse river substrates are disturbed; loss of feeding opportunities for larval sturgeon; and mortality of eggs or larvae caused by excessive sedimentation. Effects leading to adult sturgeon mortality are expected to be insignificant and discountable, so the existing adult population would not be reduced by implementation of the proposed action.

Adverse effects to early life stages of Kootenai sturgeon are problematic because very low levels of natural recruitment have already been documented. However, response activities in Kootenai sturgeon habitat are not expected to occur repeatedly (i.e., spills are an unusual event), conservation measures are included in the proposed action to minimize the potential for adverse effects, and adverse effects would not occur evenly throughout sturgeon habitat. Any adverse effects are expected to be localized and limited in scale and duration.

Kootenai River White Sturgeon Critical Habitat

Rangewide Status of the Kootenai River White Sturgeon Critical Habitat

On September 6, 2001, the USFWS issued a final rule designating critical habitat for the Kootenai River white sturgeon (66 FR 46548). The critical habitat designation extends from ordinary high water line to ordinary high water line on the right and left banks, respectively, along approximately 11.2 miles of the mainstem Kootenai River from RM 141.4 to RM 152.6 in Boundary County, Idaho, (Figure KSCH-1). On February 10, 2006, the USFWS issued an interim rule designating the braided reach (RM 152.6 to RM 159.7) as critical habitat (71 FR 6383) (Figure KSCH-1). On June 9, 2008, the USFWS issued a final rule designating the braided reach as critical habitat (73 FR 39506). Both the meander and the braided reach are located entirely within Boundary County, Idaho, respectively downstream and upstream of Bonners Ferry. A total of 18.3 RM is designated as critical habitat for Kootenai sturgeon.

Physical or Biological Features

Four physical or biological features (PBFs) are defined for Kootenai sturgeon critical habitat (73 FR 39506). These PBFs are specifically focused on adult migration, spawning site selection, and survival of embryos and free-embryos, the latter two of which are the life stages now identified as limiting the reproduction and numbers of the Kootenai sturgeon. The PBFs are defined as follows:

1. A flow regime, during the spawning season of May through June, that approximates natural variable conditions and is capable of producing depths of 23 feet (ft.) (7 meters [m]) or greater when natural conditions (for example, weather patterns, water year) allow. The depths must occur at multiple sites throughout, but not uniformly within, the Kootenai River designated critical habitat.
2. A flow regime, during the spawning season of May through June, that approximates natural variable conditions and is capable of producing mean water column velocities of 3.3 ft/s (1.0 m per second) or greater when natural conditions (for example, weather patterns, water year)

allow. The velocities must occur at multiple sites throughout, but not uniformly within, the Kootenai River designated critical habitat.

3. During the spawning season of May through June, water temperatures between 47.3 and 53.6 °F (8.5 and 12 °Celsius [C]), with no more than a 3.6 °F (2.1 °C) fluctuation in temperature within a 24-hour period, as measured at Bonners Ferry.
4. Submerged rocky substrates in approximately 5 continuous river miles (8 river kilometers) to provide for natural free-embryo redistribution behavior and downstream movement.
5. A flow regime that limits sediment deposition and maintains appropriate rocky substrate and inter-gravel spaces for sturgeon egg adhesion, incubation, escape cover, and free-embryo development. Note: the flow regime described above under PBFs 1 and 2 should be sufficient to achieve these conditions.

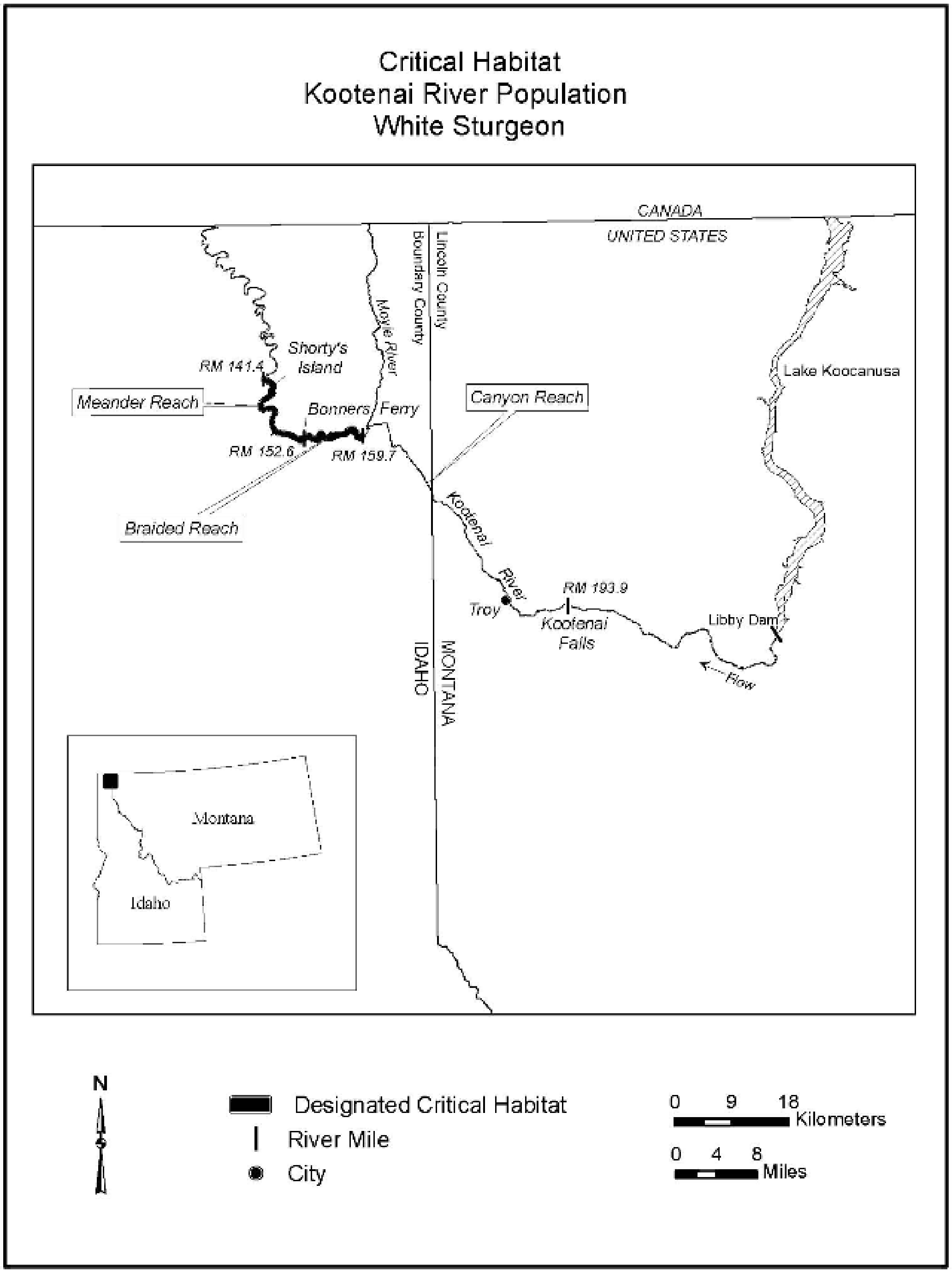


Figure KSCH-1 Geographic reaches within Kootenai sturgeon critical habitat.

Current Condition of Critical Habitat

<u>Meander Reach</u>

The meander reach is characterized by sandy substrate, a low water-surface gradient, a series of deep holes, and water velocities that rarely reach 3.3 ft/s. The morphology of the meander reach has changed relatively little over time (Barton 2004, pg. 1). Significant changes to this reach caused by the construction and operation of Libby Dam include: 1) a decrease in suspended sediment; 2) the initiation of cyclical aggradation and degradation of the sand riverbed in the center of the channel; 3) a reduction in water velocities (Barton 2004, pg. 1); and 4) reductions in floodplain interactions and riparian function, which negatively affect primary and secondary productivity in the river.

The upstream-most segment of the meander reach (approximately 0.6 RM in length) has rocky substrate and water velocities in excess of 3.3 ft/s under present river operations (Berenbrock 2005, pg. 7). However, due to a reduction of average peak flows by over 50 percent caused by flood control operations of Libby Dam and the reduction of the average elevation of Kootenay Lake by approximately 7.2 ft. (and the resultant backwater effect), the PBF for water depth is infrequently achieved in this reach of the Kootenai River (Berenbrock 2005, pg. 7). A deep hole (49.9 ft.) that is frequented by sturgeon in spawning condition exists near Ambush Rock at approximately RM 151.9 (Barton et al. 2005, pg. 36).

In 2014, as part of the Kootenai River Habitat Restoration Project, small patches (approximately 0.5 to 1.0 acre each) of rocky substrates were placed in documented spawning areas in the Shorty's Island (RM 143.6) and Myrtle Creek (RM 145.5) areas. Rocky substrates were also placed in the straight reach (RM 152) in 2016. These substrate enhancement projects were implemented as pilot projects to test whether the substrates would persist (i.e., remain clear of sand and silt) and whether Kootenai sturgeon would continue to spawn at those specific sites. Current monitoring of both the substrates and spawning sturgeon indicate that the pilot projects have been successful in those specific regards (KTOI 2016, pg. 21).

<u>Braided Reach</u>

The braided reach of the Kootenai River was selected for designation because it contains: 1) sites with seasonal availability of adequate water velocity in excess of 3.3 ft/s; and 2) rocky substrate necessary for normal spawning, embryo attachment and incubation, and normal free embryo dispersal, incubation and development. Within this reach, the valley broadens, and the river forms an intermediate-gradient braided reach as it courses through multiple shallow channels over gravel and cobbles (Barton 2004, pg. 7).

Similar to the 0.6 RM upstream-most segment of the meander reach, the lower end of the braided reach has also become shallower during the sturgeon reproductive period for the same reasons discussed above. Additionally, a loss of energy and bed load accumulation has resulted in a large portion of the middle of the braided reach becoming wider and shallower (Barton et al. 2005, pg. 18).

The net result of the changes described above may adversely affect Kootenai sturgeon in the following ways: 1) Kootenai sturgeon may generally avoid spawning in areas upstream of Bonners Ferry that have suitable rocky substrates; 2) Kootenai sturgeon may instead spawn at sites that have unsuitable substrates and low water velocity (i.e., the meander reach); 3) the loss of floodplain interaction and riparian function may negatively affect primary and secondary productivity in the river, thereby reducing available food sources during sturgeon early life stages. While suitable water depth is still achieved under current operations at the downstream end of the braided reach, significant special management is needed to adequately address the PBFs for substrate and water velocity in this area.

Beginning in 2011, multiple habitat restoration projects have been implemented in the braided reach, as part of the Kootenai River Habitat Restoration Program. Projects implemented to date include side channel restoration, bank stabilization, island construction, pool construction, construction of pool-forming structures, riparian restoration and enhancement, and floodplain reconnection and enhancement.

Status of the Kootenai River White Sturgeon Critical Habitat in the Action Area

Appendix H contains general information about the environmental baseline that applies to all species and critical habitats addressed in this opinion, including the regulatory definition of environmental baseline, a discussion of Oil (and Hazardous Substance) Facilities and Transport in the Action Area, Size and Types of Spills in the NW, Typical Response Time and Type, Influence of Spilled Material on Species Habitats in the Action Area, and Influence of Climate Change on Species Habitats in the Action Area.

Meander Reach

The meander reach is characterized by sandy substrate, a low water-surface gradient, a series of deep holes, and water velocities that rarely reach 3.3 ft/s. The morphology of the meander reach has changed relatively little over time (Barton 2004, pg. 1). Significant changes to this reach caused by the construction and operation of Libby Dam include: a decrease in suspended sediment; the initiation of cyclical aggradation and degradation of the sand riverbed in the center of the channel; a reduction in water velocities (Barton 2004, pg. 1); and reductions in floodplain interactions and riparian function, which negatively affect primary and secondary productivity in the river.

The upstream-most segment of the meander reach (approximately 0.6 RM in length) has rocky substrate and water velocities in excess of 3.3 ft/s under present river operations (Berenbrock 2005, pg. 7). However, due to a reduction of average peak flows by over 50 percent caused by flood control operations of Libby Dam and the reduction of the average elevation of Kootenay Lake by approximately 7.2 ft. (and the resultant backwater effect), the PBF for water depth is infrequently achieved in this reach of the Kootenai River (Berenbrock 2005, pg. 7). A deep hole (49.9 ft.) that is frequented by sturgeon in spawning condition exists near Ambush Rock at approximately RM 151.9 (Barton et al. 2005, pg. 36).

In 2014, as part of the Kootenai River Habitat Restoration Project, small patches (approximately 0.5 to 1.0 acre each) of rocky substrates were placed in documented spawning areas in the Shorty's

Island (RM 143.6) and Myrtle Creek (RM 145.5) areas. Rocky substrates were also placed in the straight reach (RM 152) in 2016. These substrate enhancement projects were implemented as pilot projects to test whether the substrates would persist (i.e., remain clear of sand and silt) and whether Kootenai sturgeon would continue to spawn at those specific sites. Current monitoring of both the substrates and spawning sturgeon indicate that the pilot projects have been successful in those specific regards (KTOI 2016, pg. 21).

Braided Reach

The braided reach of the Kootenai River was selected for designation because it contains: 1) sites with seasonal availability of adequate water velocity in excess of 3.3 ft/s; and 2) rocky substrate necessary for normal spawning, embryo attachment and incubation, and normal free embryo dispersal, incubation and development. Within this reach, the valley broadens, and the river forms an intermediate-gradient braided reach as it courses through multiple shallow channels over gravel and cobbles (Barton 2004, pg. 7).

Similar to the 0.6 RM upstream-most segment of the meander reach, the lower end of the braided reach has also become shallower during the sturgeon reproductive period for the same reasons discussed above. Additionally, a loss of energy and bed load accumulation has resulted in a large portion of the middle of the braided reach becoming wider and shallower (Barton et al. 2005, pg. 18).

The net result of the changes described above may adversely affect Kootenai sturgeon in the following ways: (1) Kootenai sturgeon may generally avoid spawning in areas upstream of Bonners Ferry that have suitable rocky substrates; (2) Kootenai sturgeon may instead spawn at sites that have unsuitable substrates and low water velocity (i.e., the meander reach); and (3) the loss of floodplain interaction and riparian function may negatively affect primary and secondary productivity in the river, thereby reducing available food sources during sturgeon early life stages. While suitable water depth is still achieved under current operations at the downstream end of the braided reach, significant special management is needed to adequately address the PBFs for substrate and water velocity in this area.

Beginning in 2011, multiple habitat restoration projects have been implemented in the braided reach, as part of the Kootenai River Habitat Restoration Program. Projects implemented to date include side channel restoration, bank stabilization, island construction, pool construction, construction of pool-forming structures, riparian restoration and enhancement, and floodplain reconnection and enhancement.

Effects of the Action on the Kootenai River White Sturgeon Critical Habitat

Appendix I contains general information regarding effects of the action for all species and critical habitat addressed in this opinion, including the Analytical Approach Used in the BA.

The proposed action includes conservation measures designed to minimize impacts to Kootenai sturgeon habitat. These conservation measures are considered in the analysis of impacts to the PBFs of Kootenai sturgeon critical habitat below.

PBF 1: A flow regime, during the spawning season of May through June, that approximates natural variable conditions and is capable of producing depths of 23 ft. (7 m) or greater when natural conditions (for example, weather patterns, water year) allow. The depths must occur at multiple sites throughout, but not uniformly within, the Kootenai River designated critical habitat.

Some response activities, such as vacuuming, may withdraw a large amount of water from the river during use. Depending on the time of year a response activity occurs, there may be impacts to this PBF. However, conservation measures are designed to minimize the amount of water taken in and response activities are anticipated to be short duration. There may be minor, short-term impacts to flow regime in the Kootenai River and effects to PBF 1 are expected to be insignificant.

PBF 2: A flow regime, during the spawning season of May through June, that approximates natural variable conditions and is capable of producing mean water column velocities of 3.3 ft/s (1.0 meters per second) or greater when natural conditions (for example, weather patterns, water year) allow. The velocities must occur at multiple sites throughout, but not uniformly within, the Kootenai River designated critical habitat.

Some response activities, such as vacuuming, may withdraw a large amount of water from the river during use. Depending on the time of year a response activity occurs, there may be impacts to this PBF. However, conservation measures are designed to minimize the amount of water taken in and response activities are anticipated to be short duration. There may be minor, short-term impacts to flow regime in the Kootenai River and effects to PBF 2 are expected to be insignificant.

PBF 3: During the spawning season of May through June, water temperatures between 47.3 and 53.6 °F (8.5 and 12 °Celsius [C]), with no more than a 3.6 °F (2.1 °C) fluctuation in temperature within a 24-hour period, as measured at Bonners Ferry.

Pressure washing/steam cleaning may result in heated water entering the river. Depending on the time of the year a response activity occurs, and the amount and temperature of heated water that enters the river, there may be impacts to this PBF. Pressure washing/steam cleaning is typically of short duration (1 day to 1 week) and conservation measures include avoiding the use of power washing/steam cleaning in sensitive areas, such as spawning areas. Because pressure washing/steam cleaning is rarely used in the NW, spawning areas are to be avoided, and this response activity would have to occur from May through June to impact this PBF, effects to PBF 3 are expected to be discountable.

PBF 4: Submerged rocky substrates in approximately 5 continuous river miles (8 river kilometers) to provide for natural free embryo redistribution behavior and downstream movement.

Some response activities, such as vacuuming and activities that require anchoring of equipment and vessels in Kootenai sturgeon habitat have the potential to disturb or destroy benthic habitat, including in coarse rocky substrates. Vacuuming may disturb rocky substrate over a relatively large area, but it is unlikely that the substrate would be destroyed. Therefore, adverse effects to substrate are expected to be temporary and limited to the time period when the response activity is occurring (up to 4 days) (EPA and USCG 2019, pg. 1). Rocky substrate may be destroyed by anchoring of vessels or equipment. If rocky substrate were destroyed in the 5 continuous river miles, there would be adverse effects to PBF 4. The area where rocky substrate is destroyed is expected to be relatively small and limited to the portion of the river bottom where the anchor(s) and anchor chains are deployed.

PBF 5: A flow regime that limits sediment deposition and maintains appropriate rocky substrate and inter-gravel spaces for sturgeon egg adhesion, incubation, escape cover, and free embryo development. Note: the flow regime described above under PBFs 1 and 2 should be sufficient to achieve these conditions.

Some response activities, such as vacuuming, may withdraw a large amount of water from the river during use and may affect this PBF. Additionally, some response activities will cause temporary increases in sediment input to the river. Response activities are anticipated to be short duration (up to 4 days) (EPA and USCG 2019, pg. 1), and conservation measures are designed to minimize the amount of water taken in when vacuuming and minimize sediment input to the river. Impacts to the flow regime are expected to be minor and short term, but the impact of sediment entering the river as a result of a response activity is expected to vary depending on the activity and the proximity to Kootenai sturgeon critical habitat. Effects to PBF 5 are expected to vary from insignificant to adverse, depending on the location and type of response activity.

Cumulative Effects

Appendix J presents the cumulative effects analysis prepared for the BA that applies to all species and critical habitats contained in this opinion, including Water Management, Urban and Agricultural Development, and Permitted Discharges. No additional cumulative effects have been identified in this consultation.

Conclusion

After reviewing the current status of the Kootenai River white sturgeon critical habitat, the environmental baseline, the effects of the proposed action and conservation measures, and cumulative effects, it is our biological opinion that the proposed action, as described above in this opinion, is not likely to destroy or adversely modify designated critical habitat for the Kootenai River white sturgeon. The USFWS's rationale for this determination is presented below.

In general, the proposed action is likely to result in significant beneficial effects to the environment (inclusive of any affected Kootenai River white sturgeon critical habitat) caused by timely containment, control, and removal in areas affected by spilled hazardous material (such as oil) with corresponding immediate and long-term benefits to fish and wildlife, water, soil, and sediment quality.

The proposed action includes specific CMs designed to limit habitat disturbance, to locate staging areas and support facilities in the least sensitive areas possible, to restrict foot traffic, vehicles, and heavy machinery from sensitive areas, and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E), the potential for the proposed action to cause adverse effects to the Kootenai River white sturgeon critical habitat is reduced. Additionally, spill response activities are likely to be localized (not occurring along the entire length of the pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response. For these reasons, there is a high potential for any adverse effects to Kootenai River white sturgeon critical habitat caused by spill response activities to be localized, and limited in scale and duration.

The USFWS anticipates insignificant effects to PBFs 1 and 2 from minor, short-term impacts of response activities. Impacts to PBF 3 are unlikely to occur because of the combination of circumstances (specific activity, timing, and location) that would have to occur for an impact to occur. Adverse effects to PBF 4 may occur, but impacts are expected to be limited, leaving much of the rocky substrate in the 5 mile reach unaffected. Impacts to the flow regime are expected to be minor and short-term, but the impact of increased sediment input to the river as a result of a response activity could adversely affect PBF 5. However, the area affected by the increased sediment input is expected to be localized, leaving portions of the critical habitat unaffected by increased sediment levels.

The USFWS concludes that adverse effects to Kootenai River white sturgeon critical habitat in the action area are likely to be limited and localized and much of the critical habitat would be unaffected by impacts of the response activities. Kootenai River white sturgeon critical habitat is likely to maintain its value and recovery support function to conserve the Kootenai River white sturgeon.

Marbled Murrelet

Rangewide Status of the Marbled Murrelet

On October 1, 1992, the marbled murrelet (*Brachyramphus marmoratus*) (murrelet) was listed by the USFWS as a threatened species in Washington, Oregon, and California, under the ESA (57 FR 45328). The primary reasons for listing included extensive loss and fragmentation of old-growth forests which serve as nesting habitat for murrelets and human-induced mortality in the marine environment from gillnets and oil spills. Although some threats such as gillnet mortality and loss of nesting habitat on Federal lands have been reduced since the 1992 listing, the primary threats to species persistence continue (USFWS 2019, pg. 65).

The most recent population estimate for the entire Northwest Forest Plan area in 2017 was 23,000 murrelets (McIver et. al 2019, pg. 3). The long-term trend derived from marine surveys for the period from 2001 to 2017 indicate that the murrelet population across the Northwest Forest Plan area has increased at a rate of 0.34 percent per year (McIver et. al 2019, pg. 3). While the overall trend estimate across this time period is slightly positive, the evidence of a detectable trend is not conclusive because the confidence intervals for the estimated trend overlap zero (95% -0.9 to 1.6 percent) (McIver et. al 2019, pg. 3).

Murrelet population size and marine distribution during the summer breeding season is strongly correlated with large contiguous patches of suitable nesting habitat in adjacent terrestrial landscapes (Falxa and Raphael 2016, pg. 109). The loss of nesting habitat was a major cause of murrelet decline over the past century and may still be contributing as nesting habitat continues to be lost to fires, logging, and wind storms (Miller et al. 2012, pg. 778). Monitoring of murrelet nesting habitat within the Northwest Forest Plan area indicates nesting habitat has declined from an estimated 2.53 million acres in 1993 to an estimated 2.23 million acres in 2012, a total decline of about 12.1 percent (Falxa and Raphael 2016, pg. 72). The largest and most stable murrelet subpopulations now occur off the Oregon and northern California coasts, while subpopulations in Washington declined at a rate of approximately -3.9 percent per year for the period from 2001 to 2017 (McIver et al. 2019, pg. 3). Rates of nesting habitat loss have also been highest in Washington, primarily due to timber harvest on non-Federal lands (Falxa and Raphael 2016, pg. 37), which suggests that the loss of nesting habitat continues to be an important limiting factor for the recovery of murrelets.

Factors affecting murrelet fitness and survival in the marine environment include: reductions in the quality and abundance of murrelet forage fish species, harmful algal blooms, toxic contaminants; murrelet by-catch in gillnet fisheries; murrelet entanglement in derelict fishing gear; oil spills, and human disturbance in marine foraging areas (USFWS 2019, pp. 29-61). While these factors are recognized as stressors to murrelets in the marine environment, the extent that these stressors affect murrelet populations is unknown. As with nesting habitat loss, marine habitat degradation is most prevalent in the Puget Sound area where anthropogenic activities (e.g., shipping lanes, boat traffic, shoreline development) are an important factor influencing the distribution and abundance of murrelets in in nearshore marine waters (Falxa and Raphael 2016, pg. 106).

Abundance, Distribution, Trend, and Reproduction

A statistically significant decline was detected in Conservation Zones 1 and 2 for the 2001-2017 period (Table MAMU-1). The overall population trend from the combined 2001-2017 population estimates (Conservation Zones 1 - 5) indicates a potentially stable population with a 0.34 percent increase per year (McIver et al. 2019, pg. 3). Because the confidence intervals for this estimate overlap 0, there is not clear evidence of either or a positive or negative trend. At the state-scale, significant declines have occurred in Washington, while subpopulations in Oregon and California show a statistically meaningful increase (McIver et al. 2019, pg. 3).

Table MAMU-1. Summary of murrelet population estimates and trends (2001-2017/2018) at the scale of Conservation Zones and states.

Zone	Year	Estimated number of murrelets	95% CI Lower	95% CI Upper	Average density (at sea) (murrelets /km^2)	Average annual rate of change (%)	95% CI Lower	95% CI Upper
1	2018	3,837	1,911	6,956	1.097	-4.9	-7.3	-2.4
2	2017	1,758	1,041	2,623	1.065	-3.0	-6.8	+0.9
3	2018	8,414	5,866	12,183	5.274	+1.4	-0.4	+3.3
4	2017	8,574	6,358	11,155	7.397	+3.7	+1.4	+6.1
5	2017	868	457	1,768	0.983	+7.3	-4.4	+20.3
Zones 1-5	2017	23,040	18,527	27,552	2.623	+0.34	-0.9	+1.6
Zone 6	2018	370	250	546	na	na	na	na
WA	2017	5,984	3,204	8,764	1.16	-3.9	-5.1	-2.0
OR	2017	10,945	8,018	13,872	5.28	2.0	0.5	3.6
CA Zones 4 & 5	2017	6,111	4,473	7,749	3.90	4.5	2.2	6.9

Sources: (McIver et al. 2019, pp. 8-17, Felis et al. 2019, pg. 7).

The current ranges of estimates for fecundity and for **Ŕ**, the juvenile to adult ratio, are below the level assumed to be necessary to maintain or increase the murrelet population. Whether derived from radio-telemetry, marine surveys or from population modeling (**Ŕ** = 0.02 to 0.13, Table MAMU-2), the available information is in general agreement that the current ratio of hatch-year birds to after-hatch year birds is insufficient to maintain stable numbers of murrelets throughout the listed range. The current estimates for **Ŕ** also appear to be well below what may have occurred prior to the murrelet population decline (Beissinger and Peery 2007, pg. 298).

The reported stability of the population at the larger scale (Zones 1 through 5) and growth of subpopulations in Oregon and California appear to be at odds with the sustained low reproductive rates reported throughout the listed range. A number of factors could contribute to this discrepancy. For example, population increases could be caused by an influx of murrelets moving from the Canadian population into Oregon and California, or into Washington and displacing Washington birds to Oregon and California. The possibility of a population shift from Washington to Canada has previously been dismissed, based on nest-site fidelity and the fact that both Washington and British Columbia populations are declining simultaneously (Falxa et al. 2016, pg. 30), but these arguments do not rule out the possibility that non-breeding murrelets originating in Canada may be spending time foraging in Oregon or California waters.

Table MAMU-2. Rangewide murrelet demographic parameter values based on four studies all using Leslie Matrix models.

Demographic Parameter	Beissinger 1995	Beissinger and Nur 1997*	Beissinger and Peery (2007)	McShane et al. 2004
Juvenile Ratio (Ŕ)	0.10367	0.124 or 0.131	0.089	0.02 - 0.09
Annual Fecundity	0.11848	0.124 or 0.131	0.06-0.12	-
Nest Success	-	-	0.16-0.43	0.38 - 0.54
Maturation	3	3	3	2 - 5
Estimated Adult Survivorship	85 % – 90%	85 % – 88 %	82 % - 90 %	83 % – 92 %

*In U.S. Fish and Wildlife (1997).

Another possibility is the proportion of birds present on the water during surveys, rather than inland at nest sites, may be increasing. If so, this would artificially inflate population estimates. If so, this could be driven by low nesting rates, as were observed in Oregon in 2017 (Adrean et al. 2018, pg. 2; Horton et al. 2017, pg. 77); or by shifts toward earlier breeding, for which there is anecdotal evidence (for example, Havron 2012, pg. 4; Pearson 2018, in litt.; Strong 2019, pg. 6); or a combination of both factors. In either case, individuals that would in earlier years have been incubating an egg or flying inland to feed young, and therefore unavailable to be counted, would now be present at sea and would be observed during surveys. For the same number of birds in the population, the population estimate would increase as adults spend more of the survey period at sea.

Finally, the shift that occurred in 2015 to sampling only half of the Conservation Zones in each survey year (McIver et al. 2019, pg. 5) is increasing the uncertainty in how to interpret the survey results, especially in light of large-scale movements that can occur during the breeding season, sometimes involving numerous individuals (Horton et al. 2018, pg. 77; Peery et al. 2008a, pg. 116). Murrelets that move into or out of the zone being sampled during the breeding season could artificially inflate or deflate the population estimates.

Some of these factors would also affect measures of fecundity and juvenile ratios. For example, if murrelets are breeding earlier on average, then the date adjustments applied to juvenile ratios may be incorrect, possibly resulting in inflated estimates of **Ŕ**. If current estimates of **Ŕ** are biased high, this would mean that the true estimates of **Ŕ** are even lower, exacerbating, rather than explaining, the discrepancy between the apparently sustained low reproductive rates and the apparently stable or increasing subpopulations south of Washington.

Considering the best available data on abundance, distribution, population trend, and the low reproductive success of the species, the USFWS concludes the murrelet population within the Washington portion of its listed range currently has little or no capability to self-regulate, as indicated by the significant, annual decline in abundance the species is currently undergoing in Conservation Zones 1 and 2. Populations in Oregon and California are apparently more stable, but reproductive rates remain low in those areas, and threats associated with habitat loss and habitat fragmentation continue to occur. The USFWS expects the species to continue to exhibit further reductions in distribution and abundance into the foreseeable future, due largely to the expectation that the variety of environmental stressors present in the marine and terrestrial environments (discussed in the *Threats to Murrelet Survival and Recovery* section) will continue into the foreseeable future.

Climate Change

Marbled murrelets are likely to experience changes in foraging and breeding ecology as the climate continues to change. Although studies are not available that directly project the effects of marine climate change on marbled murrelets, several studies have been conducted within and outside the listed range regarding ocean conditions and marbled murrelet behavior and fitness. Additionally, numerous studies of other alcids from Mexico to British Columbia indicate that alcids as a group are vulnerable to climate change in the northeastern Pacific.

These studies suggest that the effects of climate change will be to reduce marbled murrelet reproductive success, likely mediated through climate change effects to prey. In British Columbia, there is a strong negative correlation between sea surface temperature and the number of marbled murrelets observed at inland sites displaying behaviors associated with nesting (Burger 2000, pg. 728). In central California, marbled murrelet diets vary depending on ocean conditions, and there is a trend toward greater reproductive success during cool water years, likely due to the abundant availability of prey items such as euphausiids and juvenile rockfish (Becker et al. 2007, pp. 273-274). Across the northern border of the listed range, in the Georgia Basin, much of the yearly variation in marbled murrelet abundance from 1958 through 2000 can be explained by the proportion of fish (as opposed to euphausiids or amphipods) in the birds' diet (Norris et al. 2007, pg. 879). If climate change leads to further declines in forage fish populations (see above), those declines are likely to be reflected in marbled murrelet populations.

The conclusion that climate change is likely to reduce marbled murrelet breeding success via changes in prey availability is further supported by several studies of other alcid species in British Columbia and California. Common murres, Cassin's auklets, rhinoceros auklets, and tufted puffins in British Columbia; pigeon guillemots (*Cepphus columba*), common murres, and Cassin's auklets in California; and even Cassin's auklets in Mexico all show altered reproductive rates, altered chick growth rates, or changes in the timing of the breeding season, depending on sea surface temperature or other climatic variables, prey abundance, prey type, or the timing of peaks in prey availability (Abraham and Sydeman 2004, pp. 239-243; Ainley et al. 1995, pp. 73-77; Albores-Barajas 2007, pp. 85-96; Bertram et al. 2001, pp. 292-301; Borstad et al. 2011, pp. 291-299; Gjerdrum et al. 2003, pp. 9378-9380; Hedd et al. 2006, pp. 266-275; Sydeman et al. 2006, pp. 2-4). The abundance of Cassin's auklets and rhinoceros auklets off southern California declined by 75 and 94 percent, respectively, over a period of ocean warming between 1987 and 1998 (Hyrenbach and Veit 2003, pp. 2546, 2551). Although the details of the relationships between climate variables, prey, and demography vary between bird species and locations, the consistent demonstration of such relationships indicates that alcids as a group are sensitive to climate-related changes in prey availability, prompting some researchers to consider them indicator species for climate change (Hedd et al. 2006, pg. 275; Hyrenbach and Veit 2003, pg. 2551).

In addition to effects on foraging ecology and breeding success, climate change may expose adult and juvenile marbled murrelets to health risks. For example, it is likely that they will experience more frequent domoic acid poisoning, as this toxin originates from harmful algae blooms in the genus *Pseudo-nitzchia*, which are expected to become more prevalent in the listed range (see above).

In summary, marbled murrelets are expected to experience effects of climate change in both their nesting habitat and marine foraging habitat. Natural disturbances of nesting habitat are expected to become more frequent, leading to accelerated habitat losses that may outpace ingrowth even in protected landscapes. Marine food chains are likely to be altered, and the result may be a reduction in food resources for marbled murrelets. Even if food resources remain available, the timing and location of their availability may shift, which may alter marbled murrelet nesting seasons or locations. In addition, health risks from harmful algal blooms, anthropogenic toxins, and perhaps pathogens are likely to increase with climate change.

Within the marine environment, effects on the murrelet food supply (amount, distribution, quality) provide the most likely mechanism for climate change impacts to murrelets. Studies in British Columbia (Norris et al. 2007) and California (Becker and Beissinger 2006) have documented long-term declines in the quality of murrelet prey, and one of these studies (Becker and Beissinger 2006, pg. 475) linked variation in coastal water temperatures, murrelet prey quality during pre-breeding, and murrelet reproductive success. These studies indicate that murrelet recovery may be affected as long-term trends in ocean climate conditions affect prey resources and murrelet reproductive rates. While seabirds such as the murrelet have life-history strategies adapted to variable marine environments, ongoing and future climate change could present changes of a rapidity and scope outside the adaptive range of murrelets (USFWS 2009b, pg. 46).

Conservation Needs of the Species

Reestablishing an abundant supply of high quality murrelet nesting habitat is a vital conservation need given the extensive removal during the 20th century. Even following the establishment of the NWFP, habitat continued to be lost between 1993 and 2012, and the rate of loss on non-federal lands has been 10 times greater than on federal lands (Raphael et al. 2016b, pp. 80-81). If this rate of loss continues, the conservation of the murrelet may not be possible because almost half of the higher-suitability nesting habitat is on non-federal lands (Raphael et al. 2016b, pg. 86). Therefore, recovery of the murrelet will be aided if areas of currently suitable nesting habitat on non-federal lands are retained until ingrowth of habitat on federal lands provides replacement nesting opportunities (USFWS 2019, pg. 21).

There are also other conservation imperatives. Foremost among the conservation needs are those in the marine and terrestrial environments to increase murrelet fecundity by increasing the number of breeding adults, improving murrelet nest success (due to low nestling survival and low fledging rates), and reducing anthropogenic stressors that reduce individual fitness or lead to mortality. The overall reproductive success (fecundity) of murrelets is directly influenced by nest predation rates (reducing nestling survival rates) in the terrestrial environment and an abundant supply of high quality prey in the marine environment before and during the breeding season (improving breeding rates, potential nestling survival, and fledging rates). Anthropogenic stressors affecting murrelet fitness and survival in the marine environment are associated with commercial and tribal gillnets, derelict fishing gear, oil spills, and high underwater sound pressure (energy) levels generated by pile-driving and underwater detonations (which can be lethal or reduce individual fitness). Anthropogenic activities, such as coastline modification and nutrient inputs in runoff, also affect prey availability and harmful algal blooms, which in turn affect murrelet fitness.

Further research regarding marine threats, general life history, and marbled murrelet population trends in the coastal redwood zone may illuminate additional conservation needs that are currently unknown (USFWS 2019, pg. 66).

Detailed accounts of murrelet biology, life history, threats, demography, and conservation needs are presented in the *Recovery Plan for the Marbled Murrelet* (USFWS 1997, entire), and in the *Northwest Forest Plan—The first 20 years (1994-2013): Status and Trend of Marbled Murrelet Populations and Nesting Habitat* (Falxa and Raphael 2016, entire).

Threats identified at the time of listing have not substantially changed and known populations and individuals have indicated a continued decline in parts of its range. However, based on our review of the current information, the marbled murrelet retains the potential for recovery because its current range-wide condition conforms to the survival condition as defined by the USFWS (1998, pg. xviii) and summarized in the Analytical Framework section herein.

Status of the Marbled Murrelet in the Action Area

Appendix H contains general information about the environmental baseline that applies to all species and critical habitats addressed in this opinion, including the regulatory definition of environmental baseline, a discussion of *Oil (and Hazardous Substance) Facilities and Transport in the Action Area, Size and Types of Spills in the NW, Typical Response Time and Type, Influence of Spilled Material on Species Habitats in the Action Area, and Influence of Climate Change on Species Habitats in the Action Area.*

The action area includes portions of the current range of the marbled murrelet in Washington and Oregon: (Washington) nearshore marine and open water marine habitats in Puget Sound, Strait of Juan de Fuca, and coastal Washington; and, lowermost portions of the Columbia River; and, (Oregon) nearshore marine and open water marine habitats in coastal Oregon; and, lowermost portions of the Columbia River. The action area includes portions of four marbled murrelet Recovery Units (or "Conservation Zones"): Conservation Zone 1 – Puget Sound, Conservation Zone 2 – Western Washington Coast Range, Conservation Zone 3 – Oregon Coast Range, and Conservation Zone 4 – Siskiyou Coast Range (Figure MAMU-1).

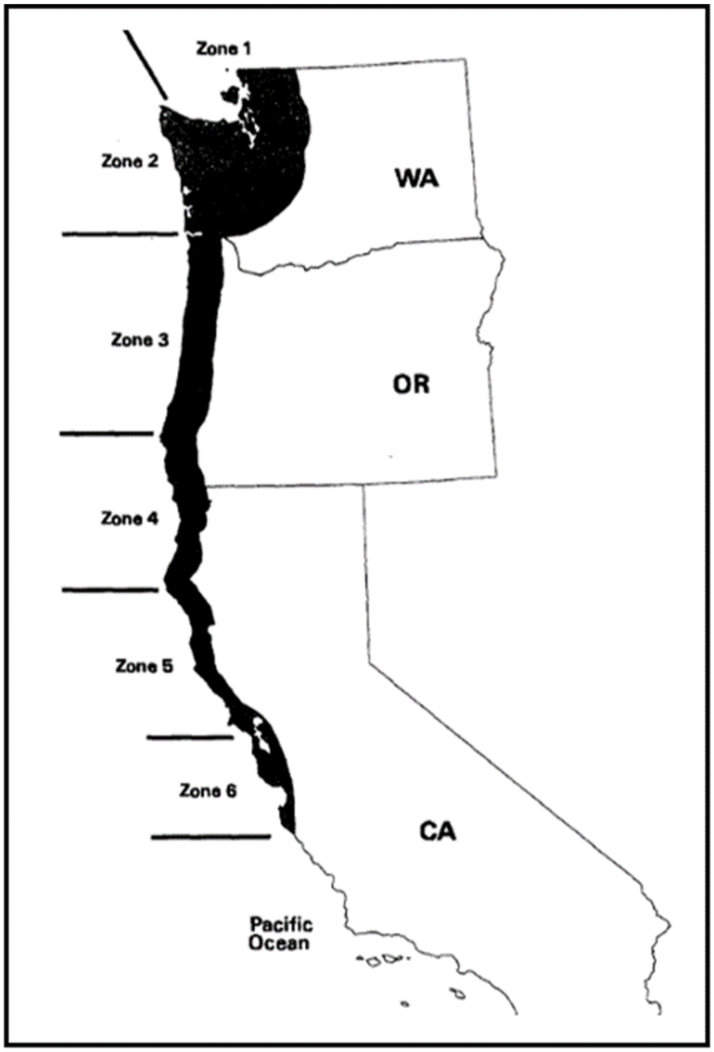


Figure MAMU-1. Marbled Murrelet Conservation Zones (USFWS 1997, pg. 114).
The action area includes all of the nearshore marine and open water marine habitats of Puget Sound, Strait of Juan de Fuca, and coastal Washington and Oregon.

Conservation Zone 1 (Puget Sound) includes all the waters of Puget Sound and most waters of the Strait of Juan de Fuca south of the U.S.-Canadian border. Within the Inland Water Subunit, marbled murrelets tend to forage in well-defined areas during the breeding season. They are found in the highest densities in the nearshore waters of the San Juan Islands, Rosario Strait, the Strait of Juan de Fuca, Admiralty Inlet, and Hood Canal. They are more sparsely distributed elsewhere in Puget Sound, with smaller numbers observed within the Nisqually Reach, Possession Sound, Skagit Bay, Bellingham Bay, and along the eastern shores of Georgia Strait. In the most southern end of Puget Sound, they occur in extremely low numbers. During the non-breeding season, marbled murrelets typically disperse and are found farther from shore (Strachan et al. 1995, pp. 247-253). Marbled murrelets from Vancouver Island, British Columbia may move into more sheltered waters in Puget Sound and the Strait of Georgia during the non-breeding season, which may contribute to increased numbers of marbled murrelets in Puget Sound in fall and winter (Beauchamp et al. 1999, entire; Burger 1995, pg. 297; Ralph et al. 1995, pg. 9; Speich and Wahl 1995, pg. 325).

Conservation Zone 2 (Western Washington Coast Range) includes marine waters within 1.2 miles (2 km) of the Pacific Ocean shoreline, with the northern terminus immediately south of the U.S.-Canadian border near Cape Flattery along the midpoint of the Olympic Peninsula, and extending to the southern border of Washington (the Columbia River) (USFWS 1997, pg. 126). During the breeding season (April through September), marbled murrelet density in the Offshore Area Subunit is lower than in the nearshore coastal and inland waters. During the summer, it is assumed that 5 percent of marbled murrelets detected by the Northwest Forest Plan Effectiveness Monitoring Program are offshore (the survey effort detects approximately 95 percent of the population, and the remaining 5 percent are assumed to be offshore), but not beyond the continental shelf (37 km, or 20 nm).

Conservation Zone 3 (Oregon Coast Range) extends from the Columbia River south to North Bend, Coos County, Oregon, includes waters within 1.2 miles (2 km) of the Pacific Ocean shoreline, and extends inland a distance of approximately 35 miles (56 km). The boundary encompasses all of the designated marbled murrelet CHUs (USFWS 1997, pp. 126, 127).

Conservation Zone 4 (Siskiyou Coast Range) extends from North Bend, Coos County, Oregon, south to the southern end of Humboldt County, California. It includes waters within 1.2 miles (2 km) of the Pacific Ocean shoreline (including Humboldt and Arcata bays) and, in general, extends inland a distance of 35 miles (56 km) (USFWS 1997, pg. 127).

Current Conditions and Limiting Factors in the Action Area

Current conditions and limiting factors in the action area are the same as those described rangewide:

- The loss of nesting habitat was a major cause of decline over the past century and may still be contributing as nesting habitat continues to be lost to fires, logging, and wind storms (Miller et al. 2012, pg. 778). Due mostly to historic timber harvest, only a small percentage (approximately 11 percent) of the habitat-capable lands within the listed range contain potential nesting habitat (Raphael et al. 2016b, pg. 69).
- While the direct causes for population declines are unknown, potential factors include the loss of nesting habitat, including cumulative and time-lag effects of habitat losses over the past 20 years, changes in the marine environment reducing the availability or quality of prey, increased densities of nest predators, and emigration (Miller et al. 2012, pg. 778). Marine habitat degradation is most prevalent in the Puget Sound, where human activities (e.g., shipping lanes, boat traffic, shoreline development) are an important factor influencing the marine distribution and abundance in Conservation Zone 1 (Falxa and Raphael 2016, pg. 110).
- Populations are declining in Washington, stable in Oregon, and stable in California where there is a non-significant but positive population trend (McIver et al. 2019, pg. 3). Population size and distribution is strongly and positively correlated with the amount and pattern of suitable nesting habitat (i.e., large contiguous patches); population trend is most strongly correlated with trend in

nesting habitat, although marine factors also contribute to this trend (Raphael et al. 2016a, pg. 115).

- While terrestrial habitat amount and configuration (including fragmentation), and the terrestrial human footprint (i.e., cities, roads, development), appear to be strong factors influencing distribution in Zones 2-5; terrestrial habitat and the marine human footprint (i.e., shipping lanes, boat traffic, shoreline development) appear to be the most important factors that influence marine distribution and abundance in Zone 1 (Raphael et al. 2016a, pg. 106).
- As a marine bird, survival is dependent on the ability to successfully forage in the marine environment. Despite this, it is apparent that the location, amount, and landscape pattern of nesting habitat are the strongest predictors of spatial and temporal distributions at sea during the nesting season (Raphael et al. 2015, pg. 20). Various marine habitat features (e.g., shoreline type, depth, temperature, etc.) apparently have only a minor influence on distribution at sea. Despite this relatively weak spatial relationship, marine factors, and especially any decrease in forage species, likely play an important role in explaining the apparent population declines, but the ability to model these relationships is currently limited (Raphael et al. 2015, pg. 20).

When the marbled murrelet was listed under the ESA in 1992, several threats were identified as the likely causes for the species' dramatic decline (57 FR 45328; October 1, 1992):

- Habitat destruction and modification in the terrestrial environment, from timber harvest and human development, resulting in a severe reduction in the amount of available nesting habitat;
- Unnaturally high levels of predation resulting from forest "edge effects";
- Manmade factors, such as mortality from oil spills and entanglement in fishing nets; and
- Existing regulatory mechanisms, such as land management plans, which were considered inadequate to ensure protection of the remaining nesting habitat and reestablishment of future nesting habitat.

The regulatory mechanisms implemented since 1992 that affect land management in Washington, Oregon, and California (for example, the Northwest Forest Plan; NWFP), and new gill-netting regulations in northern California and Washington, have reduced these threats (USFWS 2004, pp. 11-12). However, the following additional threats were identified by the USFWS's 2009, 5-year review (USFWS 2009b, pp. 27-67).

- Habitat destruction, modification, or curtailment of the marine environmental conditions necessary to support marbled murrelets, due to elevated levels of contaminants in prey, changes in prey abundance and availability, changes in prey quality, climate change in the Pacific Northwest, and harmful algal blooms that produce biotoxins and cause marbled murrelet mortalities.
- Other human caused factors and stressors in the marine environment, including derelict fishing gear leading to mortality from entanglement, and various forms of disturbance (e.g., lethal and sub-lethal exposures to elevated underwater sound

pressure levels caused by impact pile driving and underwater detonations; high vessel traffic).

Conservation Role of the Action Area

The action area in Washington includes the inland marine waters of the Puget Sound and Strait of Juan de Fuca; the nearshore and offshore marine waters of the Washington coast; major tributaries to the Puget Sound, Strait of Juan de Fuca, and Washington coast; and, lower mainstem Columbia River and tributaries. The action area in Oregon includes the lower mainstem Columbia River and tributaries, the nearshore and offshore marine waters of the Oregon coast, and major tributaries to the Oregon coast.

Marbled murrelets spend most of their lives in the marine environment where they consume a diversity of prey species, including small fish and invertebrates. They occur primarily in nearshore marine waters within 5 km of the coast, but have been documented up to 300 km off the coast of Alaska in winter (Nelson 1997, pg. 3). The inland nesting distribution is strongly associated with the presence of mature and old-growth coniferous forests. Marbled murrelets have been detected more than 100 km inland in Washington (70 miles). The inland distribution in the southern portion of the range is associated with the extent of the hemlock/tanoak vegetation zone, which extends 16 to 51 km inland (10 to 32 miles) (Evans Mack et al. 2003, pg. 4).

With consideration for the best available data describing marbled murrelet abundance, distribution, population trends, and reproductive success, the USFWS has concluded that the marbled murrelet populations in the Washington portion of the range currently have little or no ability to self-regulate (as indicated by the significant, annual decline in abundance for Conservation Zones 1 and 2) (USFWS 2019, pg. 12). Populations in Oregon and California are apparently more stable, but threats associated with habitat loss and habitat fragmentation continue to occur in those portions of the range. The USFWS expects the species to continue to exhibit further reductions in distribution and abundance into the foreseeable future, largely because threats and stressors present in the marine and terrestrial environments will continue into the foreseeable future (USFWS 2019, pg. 12).

The action area is critically important to marbled murrelet populations in Conservation Zones 1 through 4 (Figure MAMU-2), and by extension, is also critically important to the rangewide conservation and recovery of the species. The action area provides prey resources that are essential to the health and productivity of marbled murrelet populations in Conservation Zones 1 through 4. The action area also supports individuals from other Conservation Zones and/or British Columbia (i.e., those that seasonally forage and migrate to the north and south, respectively).

The USFWS's recovery plan identifies five marine areas (four in the action area) that support the highest concentrations during the breeding season; these marine areas provide marbled murrelet foraging and loafing opportunities that are regarded as essential and must be protected (USFWS 1997, pg. 135):

- All waters of Puget Sound and the Strait of Juan de Fuca in Washington, including the waters of the San Juan Islands and river mouths.

- Nearshore waters (within 1.2 miles of the shore) along the Pacific Coast from Cape Flattery to Willapa Bay in Washington, including river mouths.
- Nearshore waters (within 1.2 miles of the shore) along the Pacific Coast from Newport Bay to Coos Bay in Oregon, including Yaquina Bay and river mouths.
- Nearshore waters (within 1.2 miles of the shore) along the Pacific Coast from the Oregon-California border south to Cape Mendocino in northern California, including Humboldt and Arcata Bays, and river mouths (e.g., mouths of the Smith River, Klamath River, Redwood Creek, and Eel River).

The marine environment will play an essential role in the recovery of the marbled murrelet. Protecting the quality of the marine environment is identified in the recovery plan as an integral part of the recovery effort (USFWS 1997, pg. 120). Marbled murrelets spend the majority of their lives in marine areas, usually within five kilometers of the shoreline, where forage fish and other marine prey resources are most abundant (USFWS 1997, pg. 120). If marine areas are degraded and do not provide sufficient prey resources, individual fitness and reproductive success will be reduced.

Climate Change Effects

Marbled murrelets are expected to experience effects of climate change in both their nesting habitat and marine foraging habitat. Natural disturbances of nesting habitat are expected to become more frequent, leading to accelerated habitat losses that may outpace ingrowth even in protected landscapes. Marine food chains are likely to be altered, and the result may be a reduction in food resources for marbled murrelets. Even if food resources remain available, the timing and location of their availability may shift, which may alter marbled murrelet nesting seasons or locations. In addition, health risks from harmful algal blooms, anthropogenic toxins, and perhaps pathogens are likely to increase with climate change.

Within the marine environment, effects on the marbled murrelet food supply (amount, distribution, quality) provide the most likely mechanism for climate change impacts to marbled murrelets. Studies in British Columbia (Norris et al. 2007, entire) and California (Becker and Beissinger 2006, entire) have documented long-term declines in the quality of marbled murrelet prey, and one of these studies (Becker and Beissinger 2006, pg. 475) linked variation in coastal water temperatures, marbled murrelet prey quality during pre-breeding, and marbled murrelet reproductive success. These studies indicate that marbled murrelet recovery may be affected as long-term trends in ocean climate conditions affect prey resources and marbled murrelet reproductive rates. While seabirds such as the marbled murrelet have life-history strategies adapted to variable marine environments, ongoing and future climate change could present changes of a rapidity and scope outside the adaptive range of marbled murrelets (USFWS 2009b, pg. 46).

Summary

The marbled murrelet is generally in decline in the action area (Conservation Zones 1 and 2), and threats and stressors present in the marine and terrestrial environments will continue into the foreseeable future. Based on our review of the current information regarding the species status in the action area, the marbled murrelet populations in the action area are not likely to retain sufficient resiliency and redundancy to offset patchy, temporary adverse impacts caused by natural or anthropogenic sources.

Effects of the Action on the Marbled Murrelet

Appendix I contains general information regarding effects of the action for all species and critical habitat addressed in this opinion, including the *Analytical Approach Used in the BA*, and *Environmental Fate and Toxicity of Dispersant and Dispersed Oil*.

The proposed action consists of federalized responses to spills of oil or petroleum to water, or of other hazardous materials that pose a risk of immediate impacts to human health and/or the environment. The proposed action includes a hierarchy of scaled responses, but the most common and predictable scenarios are generally on constrained temporal and spatial scales (e.g., spill response durations for the purpose of this consultation are limited to up to 4 days).

The proposed action, in all cases of response to spills, has the potential to result in significant beneficial effects to the environment associated with the containment, control, removal, and recovery of spilled hazardous material (oil, petroleum, other), with corresponding immediate and long-term benefits to water, soil, and sediment quality. Site- and event-specific risks of spill have not been quantified, and may not be quantifiable with available information.

When implementing countermeasures as part of spill response, the EPA and USCG will also implement all of the relevant, practicable, and effective CMs (see Appendix A – Conservation Measures below).

The EPA and USCG have described which response actions and countermeasures are likely to directly or indirectly affect or have impacts to suitable terrestrial/upland, riparian, shoreline, nearshore marine, and "open" or offshore marine habitats (EPA and USCG 2018, Table 2-1, pp. 2-11 through 2-15; see Appendix D below): use of vessels, vehicles or heavy machinery; staging area establishment and use; foot traffic; use of aircraft; liquid waste management; booming; berms, dams, or other barriers (pits and trenches, etc.; culvert blocking; skimming and vacuuming; manual removal of oil and oiled substrate using hand tools; mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking); woody debris removal, terrestrial and aquatic cutting/ removal of vegetation (before or after oiling); ambient temperature, low pressure flooding/flushing; pressure washing/steam cleaning or sand blasting; physical herding; [non-mechanical] chemical dispersion; [non-mechanical] *in situ* burning; and [non-mechanical] natural attenuation with monitoring.

With full and successful implementation of the CMs, some of these response actions and countermeasures will be a source of insignificant or discountable marbled murrelet exposures and effects, while others are still likely in some instances (or in most or many instances) to cause or result in measurable, adverse exposures and effects to marbled murrelets and their habitat (including designated marbled murrelet critical habitat). Even with implementation of all the relevant and practicable CMs, some of these response actions and countermeasures are still likely to result in the following measurable forms of adverse exposure and effect: direct physical injury or mortality; physical or chemical alteration, damage, or destruction of habitat; and/or other forms of adverse exposure and effect resulting in a significant disruption of normal marbled murrelet behaviors (i.e., the ability to successfully feed, move, and/or shelter, for example, due to exposures to in-air and underwater sound, and/or visual disturbance.

Because the proposed action includes a hierarchy of scaled responses, with many (but not all) spill responses involving a limited volume of spilled/released material, and many (but not all) spill responses are completed over the course of a few days, the scope and scale of each spill and spill response (spatial and temporal) will have a strong influence on what specific exposures and effects are likely to occur. Unfortunately, the federal action agencies and USFWS have no reliable means to predict spill/spill response location(s), volume(s)/size(s), or duration(s).

The sub-sections that follow discuss the foreseeable effects of the proposed action, to marbled murrelets and designated marbled murrelet critical habitat, with specific attention to the following: insignificant or discountable marbled murrelet exposures and effects; adverse effects in the form of direct physical injury or mortality; adverse effects in the form of physical or chemical alteration, damage, or destruction of habitat; other forms of adverse exposure and effect resulting in a significant disruption of normal marbled murrelet behaviors (e.g., exposures to in-air and underwater sound, and/or visual disturbance); and effects to the PCEs of designated marbled murrelet critical habitat.

Response Actions and Countermeasures with Insignificant or Discountable Effects

The following response actions and countermeasures will directly or indirectly affect or have impacts to suitable terrestrial/upland, riparian, shoreline, nearshore marine, and offshore marine habitats. However, with full and successful implementation of the CMs, and even if located in or adjacent to suitable and potentially occupied marbled murrelet habitat, we conclude that the following response actions and countermeasures have the potential to be sources of insignificant or discountable marbled murrelet exposures and effects associated with foot traffic, skimming, vacuuming, manual removal of oil and oiled substrate using hand tools, physical herding, and natural attenuation with monitoring.

Even where conducted in or adjacent to habitats that are occupied by marbled murrelets, the actions of foot traffic, skimming, vacuuming, manual removal of oil and oiled substrate using hand tools, physical herding, and natural attenuation with monitoring are unlikely to result in measurable effects to marbled murrelets or to significantly disrupt normal marbled murrelet behaviors (i.e., the ability to successfully feed, move, and/or shelter) because the CMs are likely to avoid and minimize murrelet exposure to these stresors. For these reasons, the effects of these response actions and countermeasures on the marbled murrelet are considered insignificant.

Skimming and vacuuming present a discountable risk of physical entrainment or trapping for marbled murrelets. These effects and outcomes (i.e., direct physical injury or mortality resulting from skimming and vacuuming) are extremely unlikely because the CMs are likely to avoid murrelet exposure to these stresors, and therefore are considered discountable.

Foot traffic, skimming, vacuuming, manual removal of oil and oiled substrate using hand tools, physical herding, and natural attenuation with monitoring may result in temporary effects to marbled murrelet habitat (e.g., mild or moderate impacts to natural substrates, riparian and/or aquatic vegetation, water quality), but are unlikely to result in permanent or temporary effects at scales sufficient to significantly disrupt normal marbled murrelet behaviors (i.e., the ability to successfully feed, move, and/or shelter) because the CMs are likely to avoid and minimize murrelet exposure to these stresors. [Note: A sub-section that follows specifically addresses exposures to in-air and underwater sound, and/or visual disturbance, in terrestrial/upland (i.e., forested), nearshore marine, and offshore marine habitats.]

Foot traffic, skimming, vacuuming, manual removal of oil and oiled substrate using hand tools, physical herding, and natural attenuation with monitoring have the potential to cause insignificant and discountable effects to the marbled murrelet and designated marbled murrelet critical habitat because the CMs are likely to avoid and minimize murrelet exposure to these stresors.

Response Actions and Countermeasures with Significant Adverse Effects

These sub-sections discuss response actions and countermeasures that have foreseeable adverse effects to the marbled murrelet, their habitat, and designated critical habitat.

Direct Physical Injury or Mortality. The following response actions and countermeasures will directly or indirectly affect or have impacts to suitable terrestrial/upland, riparian, shoreline, nearshore marine, and offshore marine habitats. Furthermore, even with implementation of all the relevant and practicable CMs, the following response actions and countermeasures are still likely to result in instances of direct physical injury or mortality for marbled murrelets: use of vessels, use of aircraft, booming, and chemical dispersion. When spill responses include use of vessels in nearshore or offshore marine habitats, use of aircraft, booming in nearshore or offshore marine habitats, and/or chemical dispersion, they pose a risk of direct physical injury or mortality for marbled murrelets that cannot be fully discounted. Implementation of all the relevant and practicable CMs will reduce, but cannot fully avoid these outcomes. We do conclude that instances of resulting direct physical injury or mortality for marbled murrelets will be very uncommon because the CMs are likely to avoid and minimize bull trout exposure to these stresors.

According to the action agencies, "Vessels and aircraft associated with spill response actions could strike individual [marbled] murrelets, resulting in injuries and [mortalities] … However, [marbled] murrelets will likely be deterred … by the noise of equipment and the presence of responders … Potential effects from encounters with vessels and aircraft will be further minimized by monitoring for wildlife" (EPA and USCG 2018, pg. 4-133).

Like most other birds that utilize the nearshore marine environment, marbled murrelets are accustomed to at least low levels of human activity. Therefore, in fact, many (perhaps most) individuals are unlikely to leave, or discontinue foraging, in response to the sound and visual disturbance that results temporarily from activities. Marbled murrelets will generally perceive an approaching vessel(s) as a threat, and their primary response will be to dive.

The USFWS has previously assessed a variety of rotor and fixed-wing aircraft operations in marine environments (*Biological Opinion – U.S. Department of the Navy, Northwest Training and Testing Activities*; 01EWFW00-2015-F-0251-R001, December 11, 2018) (*Biological Opinion – Naval Air*

Station Whidbey Island Complex EA-18G "Growler" Airfield Operations; 01EWFW00-2017-F-0826, June 14, 2018).

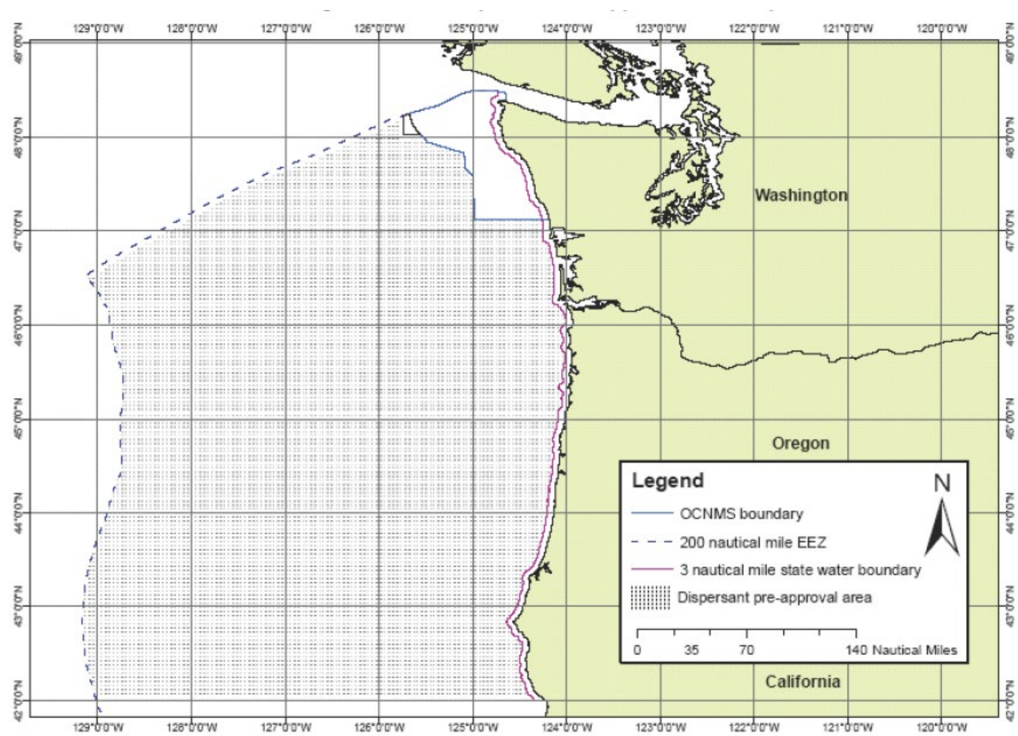
Marbled murrelets typically fly close to the surface when flying over water. Inland flights are higher than flights over water; in studies using radar to track marbled murrelet inland flights, mean altitudes ranged from 93 m (300 ft.) (Sanzenbacher et al. 2014, pg. 169) to 308 m (1,010 ft.) (Hamer Environmental 2009, pg. 37). In the marine environment, marbled murrelets fly well below the altitudes at which fixed-wing aircraft typically fly.

Helicopters (rotor or rotary-winged aircraft) present the possibility of rotor strikes and rotor wash or downdraft, especially at low or very low flight altitudes (e.g., when hovering at less than 50 ft.). Marbled murrelets will generally perceive an approaching helicopter as an aerial threat, and their primary response will be to dive. The length and distance of dives may be insufficient to completely evade rotor wash or downdraft during extended hovers. Depending on how long a helicopter(s) hover in an area, marbled murrelets may be forced to dive and re-surface several times. Rotor wash or downdraft typically extends three times the diameter of the rotor length (Federal Aviation Administration 2014, pg. 7-3-6).

We expect that when marbled murrelets are exposed to larger numbers of vessels and/or low flying or hovering helicopters, their foraging bouts and resting attempts will sometimes be interrupted for longer durations. Energy expenditures will be increased above normal when marbled murrelets are forced to flush, relocate out of the area, increase their diving effort to replace lost foraging opportunities, and/or escape from perceived predators. Because marbled murrelets have high energetic demands and must consume a large percentage of their body weight every day, we expect that these exposures and responses will in some instances represent a significant disruption of normal marbled murrelet behaviors (i.e., the ability to successfully feed, move, and/or shelter), and will create a likelihood of injury. We do not expect that marbled murrelets will collide with, or be struck by, vessels or rotor or fixed-wing aircraft in the marine environment.

Booming (placement of booms) is a very common response action or countermeasure and takes a role, often a significant role, during most spill responses. According to the action agencies, "Birds or marine mammals may be exposed to oil when perching on booms" (EPA and USCG 2018, pg. 2-20). This suggests that booms can and do act in some instances as a nuisance attractant, and booming (placement of booms) may actually cause or contribute to exposures (oiling) for some individuals.

Appendix A – Conservation Measures, Table A (below), identifies several conservation measures that will guide appropriate use of the chemical dispersion response action or countermeasure (i.e., applications of Corexit EC9500A). The Pre-Authorization Zone for use of chemical dispersion (Figure MAMU-2) includes, "U.S. marine waters 3 to 200 nautical miles from the coastline, outside Puget Sound and the Strait of Juan de Fuca or an island shoreline, except for waters designated as a part of a National Marine Sanctuary and the Makah Tribe Usual and Accustomed fishing areas" (EPA and USCG 2018, pg. 1-18).



Source: NWACP Section 4612 (EPA 2017)
Key: EEZ = Exclusive Economic Zone; OCNMS = Olympic Coast National Marine Sanctuary

Figure MAMU-2. Dispersant Pre-Authorization Zone (EPA and USCG 2018, pg. 1-17).

When consulting with the action agencies on Pre-Authorization under the California Dispersant Plan, the USFWS addressed both potential chemical toxicity as a result of direct exposure to dispersant and dispersed oil, and potential indirect effects due to changed environmental conditions (USFWS 2017b, entire):

"Our review indicates that the selected dispersant products are toxic at high concentrations, but only at levels above what would be encountered … [and] expected during an emergency response under a preauthorization scenario" (p. 2).

"The application of dispersant products in oiled environments is expected to change the baseline condition by forcing oil into the water column to facilitate biodegradation [rather than] remaining as a floating product or emulsion … Federally listed aquatic and aquatic dependent species are less likely to be exposed as the area containing [floating] oil … will be reduced" (p. 3).

"However … exposures to the plumage of seabirds [are likely to] affect thermal regulation, by altering natural oils … We believe, based on the best available information, that exposures to any free dispersant product in the water may elicit a detectable negative response in listed bird species that may be in the area of dispersant applications" (p. 3).

In support of consultation to address the Alaska Unified Plan, the action agencies prepared an aquatic exposure and toxicity evaluation that includes content specific to a closely related species, Kittlitz's murrelet (USCG and EPA 2014); according to the authors and other sources cited therein: "Dispersants, if applied inappropriately, could result in severe impacts on the Kittlitz's murrelet

(Duerr et al., 2011; Jenssen and Ekker, 1991a, b). Best Management Practices dictate monitoring for bird presence and avoiding the application of dispersants directly to birds on water or in flight" (p. 96).

"Exposure of murrelet prey species to both oil and dispersed oil may occur due to the shallow depths at which murrelet feed (i.e., nearshore and shallow offshore) (Day et al., 1999; Day and Nigro, 2000; Day et al., 2011). The application of chemical dispersant is expected to decrease toxicity to the overall planktonic community (including sensitive life stages of prey), and dispersants are expected to protect nearshore habitats and shorelines (Fingas, 2008) that support Kittlitz's murrelet and its prey (Day et al., 1999; Day and Nigro, 2000; Day et al., 2011)" (p. 96).

"It is possible that oil is less toxic to embryonic or larval herring species than dispersed oil, although the long-term impacts of shoreline and vegetation oiling (Peterson et al., 2003) may be more lasting (Humphrey et al., 1987)" (p. 96).

"While PAHs are known to increase in concentration in dispersed oil plumes relative to baseline conditions, toxicity is generally not increased. Furthermore, the uptake and trophic transfer of PAHs to fish is limited by their efficient metabolisms (Wolfe et al., 2001; Logan, 2007). Alterations to the bioavailability of PAHs caused by oil dispersion will not likely increase the body burden of PAHs in Kittlitz's murrelet over time (Albers and Loughlin, 2003). The exposure of Kittlitz's murrelet to PAHs after chemical dispersion is likely to be acute rather than chronic (due to dilution and degradation of oil components after chemical dispersion), so body burdens are likely to decrease over time as dissolved PAH concentrations in the environment, which were increased as a result of chemical dispersion, are metabolized and excreted by Kittlitz's murrelet. The uptake of PAHs in diet is also expected to decrease over time (Wolfe et al., 2001; Wolfe et al., 1998; Logan, 2007)" (p. 97).

"The removal of oil from the ocean's surface will effectively reduce the volume, concentration, and areal extent of oil to which this species will be exposed" (p. 97).

"Under most circumstances, the removal of oil from the ocean's surface will benefit Kittlitz's murrelet by eliminating the most impactful routes of exposure to oil and reducing toxicity to the planktonic base of the food web (i.e., early life stages of prey species, winter forage) (Day et al., 1999; Day and Nigro, 2000; Day et al., 2011)" (p. 97).

This information leads us to conclude that potential adverse exposures and effects to individuals cannot be fully discounted. We expect that use of the chemical dispersion response action or countermeasure may in some instances expose marbled murrelets to free dispersant product, may cause or contribute to possible thermoregulatory complications, and thereby create a likelihood of injury. However, we also conclude that the conservation measures that guide appropriate use of chemical dispersion (Appendix A – Conservation Measures, Table A below) should serve well to avoid and minimize these potential adverse exposures and effects for marbled murrelets.

Because the proposed action includes a hierarchy of scaled responses, with many (but not all) spill responses involving a limited volume of spilled/released material, and many (but not all) spill responses completed over the course of a few days, the scope and scale of each spill and spill response (spatial and temporal) will have a strong influence on what specific exposures and effects are likely to occur. With consideration for the species' habitat and habitat requirements, current, geographic distribution, presence in the action area, known locations in the action area, and with effective implementation of the CMs, we conclude that use and/or implementation of these response actions and countermeasures (i.e., use of vessels in nearshore or offshore marine habitats, use of aircraft, booming in nearshore or offshore marine habitats, and chemical dispersion) will result in relatively few instances of physical injury or mortality for marbled murrelets.

Physical or Chemical Alteration, Damage, or Destruction of Habitat. The following response actions and countermeasures will directly or indirectly affect or have impacts to suitable terrestrial/upland, riparian, shoreline, nearshore marine, and offshore marine habitats. Even with implementation of all the relevant and practicable CMs, the following response actions and countermeasures have the potential to result in instances of adverse physical or chemical alteration, damage, or destruction of suitable marbled murrelet habitat (terrestrial/upland and riparian habitat): use of vehicles or heavy machinery, staging area establishment and use, mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking), and woody debris removal, terrestrial and aquatic cutting/ removal of vegetation (before or after oiling). And, even with implementation of all the relevant and practicable CMs, the following response actions and countermeasures have the potential to result in instances of adverse physical or chemical alteration, damage, or destruction of suitable marbled murrelet habitat (shoreline, nearshore marine, and offshore marine habitats: liquid waste management, mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking), woody debris removal, terrestrial and aquatic cutting/ removal of vegetation (before or after oiling), pressure washing/steam cleaning or sand blasting, and *in situ* burning. When spill responses are conducted in or immediately adjacent to marbled murrelet habitat and include these response actions or countermeasures, they pose a risk of adverse habitat alteration, damage, or destruction that cannot be fully discounted.

Implementation of all the relevant and practicable CMs will reduce, but cannot fully avoid these outcomes. We conclude that instances of adverse marbled murrelet habitat alteration, damage, or destruction will be uncommon, because most of the unavoidable impacts will be limited in spatial and temporal extent (i.e., most spill responses are limited in geographic scope, and durations, for the purpose of this consultation, are limited to up to 4 days), and these impacts and adverse effects will (in most, if not all, instances) be small in comparison to the significant beneficial effects resulting from containment, control, removal, and recovery of spilled hazardous material (i.e., restored and/or improved water, soil, and sediment quality reduced or eliminated long term potential for exposure).

The following response actions and countermeasures have the potential to result in unavoidable impacts and adverse effects to suitable terrestrial/upland and riparian habitats: use of vehicles or heavy machinery, staging area establishment and use, mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking), and woody debris removal, terrestrial and aquatic cutting/ removal of vegetation (before or after oiling).

Physical containment, control, removal, and recovery of spilled hazardous material (oil, petroleum, other) cannot be achieved in all instances without some likelihood of impacts to terrestrial/upland and riparian habitats, with corresponding potential for measurable adverse effects to marbled murrelet habitat conditions and functions. If/when conducted in or immediately adjacent to marbled murrelet nesting habitat the above-described response actions and countermeasures will, in some instances, have unavoidable adverse effects to habitat conditions and functions (e.g., removal of trees or limbs providing suitable nest platforms, removal of mid-canopy vegetation providing vertical and horizontal cover, creation or enlargement of canopy breaks/gaps or forest edge). Furthermore, while in most instances these unavoidable impacts and effects will be limited in spatial and temporal extent (i.e., most spill responses are limited in geographic scope, and durations, for the purpose of this consultation, are limited to up to 4 days), there could and likely will be instances where these impacts and effects extend to scales sufficient to significantly disrupt normal marbled murrelet behaviors (i.e., the ability to successfully feed, move, and/or shelter).

It is appropriate here to also highlight and emphasize the limited potential spatial overlap between the above-described response actions and countermeasures and suitable marbled murrelet nesting habitat. The action area includes a 1-mile buffer(s) extending from shipping waterways/coast. Along some more remote shorelines, where mature forest extends to the bluff or beach, spill responses may and likely will require occasional small incursions into suitable nesting habitat; e.g., Figure MAMU-3 depicts discrete locations in southwest Washington, and a greater number of locations on the Oregon coast, where critical habitat has been designated and provides suitable conditions for nesting. However, throughout much of the action area, suitable marbled murrelet nesting habitat, and designated marbled murrelet critical habitat, are located at a greater distance and not likely to be affected.

The following response actions and countermeasures have the potential to cause unavoidable impacts and adverse effects to suitable shoreline, nearshore marine, and offshore marine habitats: liquid waste management, mechanical removal of oil and oiled substrate with excavation (and/or sediment reworking), woody debris removal, terrestrial and aquatic cutting/ removal of vegetation (before or after oiling), pressure washing/steam cleaning or sand blasting, and *in situ* burning.

Liquid waste management refers to the handling, storage, and transport of recovered liquid wastes, and sometimes includes on water decanting to open waters (EPA and USCG 2018, pp. 2-11, 2-19, 2-31):

"Decanting of oily water may be necessary during operations involving recovery of oil … Water may be mixed with the oil during recovery and [will] need to be returned to the response area to preserve storage space for recovery of the maximum amount of oil" (EPA and USCG 2018, pg. 2-19).

"The decanting process involves the collection of large volumes of oil and water … allowing the water and oil to separate within a separation tank, and then discharging water that may contain a small amount of oil … The decanting process separates the water from the oil so that … there is no visible sheen [upon] discharge (per EPA requirements)… On-water decanting is pre-authorized for … all crude oils, vacuum gas oils, atmospheric gas oils, recycle oils not containing distillates, bunker fuels, [etc.]" (EPA and USCG 2018, pg. 2-31). All decanting in a designated "Response Area" within a collection area, vessel collection well, recovery belt, weir area, or directly in front of a recovery system; a containment boom will be deployed around the collection area, where feasible, to prevent the loss of decanted oil or entrainment of species in recovery equipment. Decanting shall be monitored at all times, so that discharge of oil in the decanted water is promptly detected. Where feasible, decanting will be done just ahead of a skimmer recovery system so that discharges of oil in decanting water can be immediately recovered.

In situ burning is a response action or countermeasure described by the federal action agencies as follows (EPA and USCG 2018, pp. 1-18 through 1-20, 2-26, 2-42):

"*In situ* burning is a valuable tool to quickly remove oil from open water or terrestrial areas and prevent it from reaching sensitive habitats or populations … burning is considered 'feasible' when spilled oil can be ignited and remain ignited until the oil has been consumed" (EPA and USCG 2018, pg. 2-42).

"*In situ* burning is pre-authorized for any on-water area that is more than 5 km (3 miles) from human populations … [but] the EPA does not intend to utilize preauthorization in the inland zone; decisions about use of *in situ* burning in inland areas … will be decided on a case-by-case basis … Within the pre-authorization area [and] under proper conditions, FOSCs have the authority to ignite spilled oil [(either with or without burning agents)] without RRT approval" (EPA and USCG 2018, pg. 1-20).

"Prior to an *in situ* burn, an on-site survey must be conducted to determine if any threatened or endangered species are present or at risk from burn operations, fire, or smoke … A Net Environmental Benefit Analysis [must] be conducted to evaluate the possible risk … of the *in situ* burn and compare it to the risk of not using *in situ* burning" (EPA and USCG 2018, pg. 2-26).

"*In situ* burning produces viscous residues that will, to the extent possible, be collected and properly disposed … Buoyant residues can be contained in fire booms and collected … whereas dense residues may sink and be lost … The residues … contain chemicals with relatively low toxicity (compared to crude oil) … The more acutely toxic components … are combusted … *In situ* burning removes 90 to 98 percent of the oil within the burn area" (EPA and USCG 2018, pg. 2-42).

We consider spills of oil, petroleum, or other hazardous material to be part of the baseline environmental conditions; i.e., not an element of the proposed action. However, liquid waste management with open-water decanting, and use of *in situ* burning, represent conscious and deliberate decisions to release materials back into the environment that are not completely "clean" or benign. However, the resulting impacts and adverse effects are likely to be small in comparison to the significant beneficial effects that are attributable to removal and recovery of spilled hazardous material (including reduced or eliminated long term potential for exposure).

Because the proposed action includes a hierarchy of scaled responses, with many (but not all) spill responses involving a limited volume of spilled/released material, and many (but not all) spill responses completed over the course of a few days, the scope and scale of each spill and spill response (spatial and temporal) will have a strong influence on what specific exposures and effects are likely to occur. With consideration of the murrelets': (1) habitat and habitat requirements; (2) current, geographic distribution; (3) presence in the action area; (4) known locations in the action area; and (5) with effective implementation of the CMs, we conclude that use and/or implementation of the response actions and countermeasures listed above (i.e., in this sub-section) have the potential to result in limited instances of adverse physical or chemical alteration, damage, or destruction of marbled murrelet habitat that will significantly disrupt normal marbled murrelet behaviors (i.e., the ability to successfully feed, move, and/or shelter).

Other Adverse Exposures and Effects: In-Air and Underwater Sound, Visual Disturbance. The USFWS has previously assessed the elevated sound levels that result temporarily from small- and medium-sized work vessels and skiffs (*Biological Opinion – Programmatic Consultation for Shellfish Activities in Washington State Inland Marine Waters*; 01EWFW00-2016-F-0121, August 26, 2016). These are generally powered with outboard motors, and produce in-air and underwater sound levels that are likely to exceed the ambient condition to a distance of a few hundred feet. Much of the other equipment used when conducting spill responses has a similar potential to elevate sound levels (e.g., gas-powered air compressors, hydraulically powered onboard equipment, etc.).

Wyatt (2008, pp. 59-62) has reported source sound levels for the following: a 50-horsepower four-stroke outboard motor operating at 13 knots (approximately 166 dB_{rms} at 1 meter); a 90-horsepower outboard motor operating at idle and full speed (approximately 141 dB_{rms}, and 163 dB_{rms}, at 1 meter respectively); twin 210-horsepower inboard motors operating at idle and full speed (approximately 148 dB_{rms}, and 162 dB_{rms}, at 1 meter respectively); and a 450-horsepower motor operating at 12 knots (approximately 139 dB_{rms} at 30 meters).

Larger vessels may produce more intense sound levels. The loudest and most intense sound levels (e.g., those produced by rotor or fixed-wing aircraft) are likely to exceed the ambient condition to a distance of more than 0.5 mile. However, all of these sources of measurable in-air and underwater sound are non-impulsive.

For many years, the USFWS has used measures of sound intensity and duration to assess, describe, and interpret the significance of sound exposures and potential effects. In the Pacific Northwest, most of this work has focused on impulsive sound, including the sound produced by impact pile driving and underwater detonations. Given the large amount of uncertainty, not only in extrapolating from experimental data to the field, but also between sound sources and from one species to another, the USFWS has generally applied thresholds analogous to the "lowest observed adverse effect level" used frequently in the field of toxicology.

Exposure to elevated non-impulsive sound may interfere with an organism's ability to perceive and respond to their environment, communicate, or engage in other important behaviors. The USFWS's work in the Pacific Northwest involving sound exposures and effects to marbled murrelets has focused on both in-air and underwater sound. Marbled murrelets typically forage in groups of two or more and are highly vocal on the surface when foraging (Speckman *et al*. 2003; Sanborn 2005). Conspecific vocalizations play an important role, and whether they are audible may influence foraging efficiency (SAIC 2012, pg. 13). Based on field observations, it appears that the social foraging strategy employed by marbled murrelets requires adequate acoustic communication to distances up to 30 meters (98 ft.) (SAIC 2012, pg. 16). Hearing and hearing sensitivity are also important to predator detection and avoidance.

When hearing sensitivity is reduced, the measurable effect is referred to as threshold shift (TS). There are varying levels or degrees of TS, the amount and duration of which are correlated to the duration and intensity of sound exposures (SAIC 2012). When associated with actual injury (e.g., physical damage to the hair cells), either permanent TS or temporary TS can result. A TS ≥40 dB is generally indicative of injury (SAIC 2012). However, TS occurs whenever the auditory system processes acoustic stimuli, and some amount of TS is inconsequential because it is effectively truncated by the masking effect of ambient sound. If TS is below the ambient sound it is inconsequential; the ambient sound itself interferes with signal perception (SAIC 2012).

Masking occurs when a sound interferes with the perception of a signal of interest. Masking is assessed by considering the critical ratio, the difference (measured in dB) between a hearing threshold and the masking noise. Critical ratios are documented for a number of bird species (Dooling et al. 2000). In general, a signal at specific frequency must be approximately 25 dB above the ambient sound level to be detected by a bird.

The "keer" call of the marbled murrelet is relatively loud; the source level is approximately 95 dB_{rms}, with the majority of the energy centered at 3 kHz. The USFWS, working with a panel of experts (SAIC 2012), has estimated ambient in-air sound levels for industrialized and non-industrialized marine shoreline areas, and has adjusted those estimates downward to arrive at ambient in-air sound levels centered at 3 kHz. When adjusted downward, the ambient in-air sound level for non-industrialized marine shoreline areas is approximately 15 dB (SAIC 2012). Based on this work, the USFWS has concluded that non-injurious TS (<40 dB) occurring in the marine environment would not generally have a measurable effect on marbled murrelet behaviors; the effect of ambient sound levels on signal perception would be greater than that of TS (SAIC 2012). The USFWS concludes that a TS <40 dB will not generally interfere with predator detection by murrelets.

Like most other birds that utilize the nearshore marine environment, marbled murrelets are accustomed to low levels of human activity. Many, perhaps most, individuals are unlikely to leave, or discontinue foraging, in response to the sound and visual disturbance that results temporarily from activities. Some exposures will be transient and low intensity. In response to these, foraging marbled murrelets will typically resume their activity. Many activities will be either stationary or proceed at slow or moderately-slow vessel speeds. There is information to suggest that lower vessel speeds could reduce the frequency and/or severity of adverse responses.

Marbled murrelets exposed to elevated in-air and underwater sound levels resulting from the operation of vessels, motors, and other equipment (e.g., gas-powered air compressors, hydraulically powered onboard equipment, etc.) will not typically experience TS ≥40 dB, and non-injurious TS (<40 dB) occurring in the marine environment is unlikely to significantly disrupt normal marbled murrelet behaviors (i.e., the ability to successfully feed, move, and/or shelter). In-air sound levels may mask marbled murrelet vocalizations to a distance of 100 to 200 ft. However, many of these exposures will be transient and passing; at a given location, they are unlikely to significantly interfere with conspecific vocalizations and social foraging, and will not interfere with predator detection and avoidance.

It is also possible that some breeding adults may incur added energetic costs associated with avoidance diving and flights, or as a result of failed prey deliveries and bouts of repeated foraging. According to Agness et al. (2008) and the other sources cited therein:

"Behaviors. At the immediate time-scale, we found that Kittlitz's murrelets changed behavior in the presence of vessels … such that the proportion of individuals flying increased, loafing decreased, and diving behavior did not immediately change … murrelets not holding fish (i.e., nonbreeders) had greater flight response … from cruise ships and tour boats than from small, medium, or large recreational vessels … Fish-holders (i.e., breeders) had the greatest flight response … from slow vessels with 'far' (400 - 1,000 m) approach distance … Fish-holders most commonly responded to vessels by diving, regardless of vessel speed, approach distance, or vessel size … vessel activity caused changes in behavior at the daily time-scale. Individuals spent more time loafing and less time diving when there was no vessel traffic on a given day than when vessel traffic was low, moderate, or high" (pp. 350, 351).

"[However,] Environmental and biological factors had more influence than vessels on density near shore, group size, and behavior … vessels influenced density near shore and behavior, but they were not the sole or the most influential factor" (pp. 351, 352).

"Vessel activity did not cause declines to persist at the daily time-scale, where environmental and biological factors had the greatest influence, which suggests only temporary disturbance of murrelets by vessels … Although Kittlitz's murrelets moved an unknown distance away to accommodate vessel traffic, they eventually returned within the day in greater numbers … for reasons that remain unclear to us … We did not detect effects of vessel activity on the group size of Kittlitz's murrelets at short-term or daily time-scales, which indicates that group dynamics were not affected" (p. 352).

"Kittlitz's murrelets increased diving effort on days with vessel activity by a factor of three … [and] flying effort during vessel activity increased more than 30-fold … Negative effects on the birds' daily energy budgets can occur when vessel activity reduces foraging behavior and increases energetically costly behavior such as flight. Other studies have shown that such behavioral changes may constitute significant energy loss at high rates of vessel traffic (diving ducks: Korschgen *et al*. 1985; American Coot [*Fulica americana*]: Schummer and Eddleman 2003). Therefore, it is possible that Kittlitz's murrelets suffer a net energy loss as a consequence of vessel activity" (p. 352).

"Dive response may be a better indicator of disturbance for fish-holders. Dive behavior was not observed among fish-holders in the absence of vessels … Given that fast vessel speed caused the greatest disturbance (i.e., dive response) for fish-holders … vessel travel at slower speeds enforced with speed limits (i.e., ≤ 16 km h^{-1}) could prevent disturbance of fish-holders" (Agness *et al*. 2008, pg. 352).

According to Speckman, Piatt, and Springer (2004) and the other sources cited therein:

"In general, marbled murrelets in Auke Bay and Fritz Cove appeared to be habituated to boat traffic, perhaps more so than murrelets in other parts of Alaska (Kuletz 1996; SGS, pers. obs.). Both motor and sailing vessels comprising a wide range of sizes frequently pass through Auke Bay and Fritz Cove, including 130-m ferries of the Alaska Marine Highway system, commercial fishing vessels, numerous sport fishing charter boats, transient pleasure boats, and hundreds of resident vessels. Of the hundreds of murrelets we encountered with the skiff each day, only a few birds reacted to the moving skiff by flying away; the vast majority merely paddled away, and a few dove briefly before surfacing to paddle away" (pp. 32, 33).

"However … [marbled] murrelets that were holding fish for chicks appeared threatened by our skiff when we approached them during surveys. On 8 separate occasions … murrelets that were holding fish crosswise in their bills, presumably for chicks, swallowed those fish when approached closely by the skiff. Judging from their behavior, birds that swallowed fish did so because of the approaching skiff" (p. 33).

"Such disturbance could be detrimental to [marbled] murrelets in areas where prey are relatively scarce, where birds must fly great distances inland to nesting sites, or where boat traffic is concentrated in waters immediately adjacent to nesting areas … The loss of prey … can represent a substantial energetic cost to adults if they have to repeat [the] foraging … to capture another fish … it may be too late to get another prey item for delivery to the chick, and presumably the cost to chicks is even greater than for adults. It is not known whether adult murrelets can make up for these losses. If not, boat disturbance could result in a decrease in food delivery to chicks" (p. 33).

We expect that when marbled murrelets are exposed to larger numbers of vessels and/or low flying or hovering helicopters, their foraging bouts and resting attempts will sometimes be interrupted for longer durations. Energy expenditures will be increased above normal when marbled murrelets are forced to flush, relocate out of the area, increase their diving effort to replace lost foraging opportunities, and/or escape from perceived predators. Because marbled murrelets have high energetic demands and must consume a large percentage of their body weight every day, we expect that these exposures and responses will in some instances represent a significant disruption of normal marbled murrelet behaviors (i.e., the ability to successfully feed, move, and/or shelter), and will create a likelihood of injury. We do not expect that marbled murrelets will collide with, or be struck by, vessels or rotor or fixed-wing aircraft in the marine environment.

The action area includes a 1-mile buffer(s) extending from shipping waterways/coast. Along some more remote shorelines, where mature forest extends to the bluff or beach, spill responses may and likely will require occasional small incursions into suitable nesting habitat. However, throughout much of the action area, suitable marbled murrelet nesting habitat, and designated marbled murrelet critical habitat, are located at a greater distance and not likely to be directly affected.

We cannot fully discount the possibility that temporary sound and visual disturbances resulting from spill response activities may extend into suitable marbled murrelet nesting habitat and significantly disrupt nesting behaviors or that human activities in or adjacent to nesting habitat may result in attraction of predators (e.g., corvids). However, due to the limited locations where murrelets nest close to the shoreline, we expect that these instances, if any, will be very uncommon.

The USFWS has compiled available information to assess and describe outcomes representing likelihood of injury for nesting marbled murrelets and their young (e.g., delayed nest establishment, flushing of the nest, delayed or aborted feedings). Ground-based activities involving a significant temporary increase in sound (in-air) and visual disturbance are likely to result in these outcomes, and will significantly disrupt nesting activities creating a likely of injury, when they occur within 100 m (approximately 110 yards or 330 ft.) (USFWS 2015, pg. 10). If the activities include impulsive or concussive in-air sound, or if aircraft are involved, outcomes representing disturbance within or adjacent to marbled murrelet nesting habitat may occur at greater distances (USFWS 2015, pp. 4, 5, 10-14).

These general conclusions do not extend to the practice of hazing (intentional hazing) of wildlife. Hazing is described as a response action or countermeasure taken very infrequently, and only in close coordination with the UC-Wildlife Branch and USFWS (EPA and USCG 2018, pp. 2-14, 2-27, 2-43, 2-44). The effects of intentional hazing of marbled murrelets may occur in the shoreline, nearshore, or offshore marine environments. The recommendation to haze will be guided by site-specific and species-specific factors present at the time of the spill, and availability of proven hazing techniques. Operational guidelines and standard of care requirements in both marine and fresh waters include the following information referenced in the NWACP Section 9310 and 9311: USFWS Best Practices for Migratory Bird Care During Oil Spill Responses (USFWS 2003, entire), the Bird Hazing Manual: Techniques and Strategies for Dispersing Birds from Spill Sites (Gorenzel and Salmon 2008, entire). Any decision to employ intentional hazing where it is likely to directly expose and effect marbled murrelets will require emergency consultation procedures, unless the party (or parties) directly implementing/executing this response action or countermeasure holds a valid, current Incidental Take Permit. However, while short-term significant adverse impacts to marbled murrelet are likely during the rare hazing event for a spill response lasting <4 days, use of deterrence methods described in the proposed action are expected to minimize the effects of hazing and significantly reduce exposure to oil or dispersed oil in the environment.

Cumulative Effects

Appendix J presents the cumulative effects analysis prepared for the BA that applies to all species and critical habitats contained in this opinion, including *Water Management, Urban and Agricultural Development,* and *Permitted Discharges.*

Non-Federal lands in the action area are managed primarily for timber production, but almost all forest that was potential marbled murrelet nesting habitat on these lands has been previously harvested. In the absence of a federally-approved Habitat Conservation Plan (HCP) or a State-approved special wildlife management plan, suitable marbled murrelet habitat on non-federal lands is generally only protected where protocol surveys document an occupied marbled murrelet site.

The following have resulted in the past, and may continue to result, in the loss of occupied marbled murrelet habitat: 1) Timber harvest or road construction in suitable marbled murrelet habitat that occurs outside detection areas; 2) Timber harvest or road construction on smaller acreages where the land does not contain a known occupied marbled murrelet site; 3) Timber harvest along federal boundary areas that provide suitable marbled murrelet habitat; and, 4) Timber harvest where habitat has been surveyed to protocol, but the surveys failed to detect marbled murrelets (i.e., survey error). The greatest risks for adverse cumulative effects are through harvest of small remnant habitat patches, and habitat areas that do not meet minimum platform density criteria to trigger a survey.

Expansion of suburban and urban areas is likely to enhance corvid populations, potentially increasing nest predation in the nearby suitable marbled murrelet nesting habitat (Marzluff and Neatherlin 2006, pp. 306-310; Neatherlin and Marzluff 2004, pp. 712, 715). Development, and the increasing human population, are also likely to lead to increasing levels of recreation, such as hiking and camping, in forested areas. Increasing recreational activities is likely to be associated with increases in corvid presence, leading to elevated levels of nest predation (Marzluff and Neatherlin 2006, pp. 306-310; Neatherlin and Marzluff 2004, pg. 712).

Other types of development, including construction, road work, levee repair, etc., have the potential to create noise and visual disturbance. When these stressors occur within 100 m of marbled murrelet nesting habitat during the breeding season, they could alter important breeding behaviors. Where there is a federal nexus, projects that create these effects are required to undergo section 7 consultation. However, in some cases there may not be a federal nexus (e.g., county road repairs with no federal funding).

Other ongoing non-federal actions include implementation of commercial fishing and angling regulations, hatchery programs, and habitat restoration programs. Future State and local actions may include implementation of Total Maximum Daily Loads and watershed-scale water quality improvement programs.

Taken as a whole, the foreseeable future State, tribal, local, and private actions may have both beneficial effects and adverse effects to the marbled murrelet and designated marbled murrelet critical habitat.

Conclusion

After reviewing the current status of the marbled murrelet, the environmental baseline, the effects of the proposed action and conservation measures, and the cumulative effects, it is our biological opinion that the proposed action, as described in this opinion, is not likely to jeopardize the continued existence of the marbled murrelet. We made this determination for the following reasons.

In general, the proposed action is likely to result in significant beneficial effects to the environment (inclusive of any affected marbled murrelet habitat) caused by timely containment, control, and removal in areas affected by spilled material with corresponding immediate and long-term benefits to fish and wildlife, water, soil, and sediment quality.

The proposed action includes specific CMs designed to limit habitat disturbance, the potential for the proposed action to cause adverse effects to the murrelet is reduced. Additionally, spill response activities are likely to be localized, and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response. For these reasons, there is a high potential for any adverse effects to the murrelet habitat caused by spill response activities to be localized, and limited in scale and duration.

Response actions and countermeasures will directly or indirectly affect or have impacts to suitable terrestrial/upland, riparian, shoreline, nearshore marine, and offshore marine habitats. When spill responses include use of vessels in nearshore or offshore marine habitats, use of aircraft, booming in nearshore or offshore marine habitats, and/or chemical dispersion, they pose a risk of direct physical injury or mortality for marbled murrelets that cannot be fully discounted. Also, while we cannot fully discount the possibility that temporary sound and visual disturbances resulting from spill response activities may extend into marbled murrelet nesting habitat and significantly disrupt nesting behaviors, we expect that these instances, if any, will be very uncommon.

With effective implementation of the CMs, we expect relatively few instances of physical injury or mortality for marbled murrelets. Effective implementation of the CMs will also limit physical or chemical alteration and damage of marbled murrelet habitat. For the reasons described in the above analysis, instances where these impacts and effects extend to scales sufficient to significantly disrupt normal marbled murrelet behaviors (i.e., the ability to successfully feed, move, and/or shelter) are likely to be uncommon.

Marbled Murrelet Critical Habitat

Rangewide Status of the Marbled Murrelet Critical Habitat

The final rule designating critical habitat for the marbled murrelet (murrelet) (May 24, 1996, 61 FR 26256) became effective on June 24, 1996. In the 1996 final rule, the USFWS designated critical habitat for the murrelet within 32 Critical Habitat Units (CHUs) encompassing approximately 3.9 million acres across Washington, Oregon, and California.

In 2011, the USFWS issued a revised final rule which removed approximately 189,671 acres in northern California and southern Oregon from critical habitat designated under the 1996 final rule based on new information indicating that these areas did not meet the definition of critical habitat (76 FR 61599, October 5, 2011). No changes were made for critical habitat designations in Washington. The revised critical habitat designation for murrelets encompasses over 3.69 million acres in Washington, Oregon, and California.

The primary constituent elements (PCEs) of critical habitat represent specific physical and biological features that are essential to the conservation of the species and may require special management considerations or protection. The PCEs of murrelet critical habitat include (1) individual trees with potential nesting platforms and (2) forested areas within 0.8 kilometer (0.5 mile) of individual trees with potential nesting platforms that have a canopy height of at least one-half the site potential tree height. This includes all such forest, regardless of contiguity (76 FR 61604).

In 2016, the USFWS issued a final determination which confirmed that critical habitat for the murrelet as designated in 1996 and revised in 2011, meets the statutory definition of critical habitat under the ESA of 1973 (81 FR 51348, August 4, 2016). This final determination did not propose any changes to the boundaries of the specific areas identified as critical habitat in the 2011 final rule. The current designation includes approximately 3,698,100 acres of critical habitat in Washington, Oregon, and California.

The critical habitat designation in Washington also includes approximately 426,800 acres of State lands (26 percent) managed under the Washington Department of Natural Resources (WDNR) 1997 Habitat Conservation Plan (WDNR 1997). Because these lands are managed under an approved Habitat Conservation Plan issued under section 10(a) of the Act, these lands are excluded from critical habitat by description in the final rule. However, should their permit be revoked, terminated, or expire, WDNR lands would revert back to designated critical habitat. WDNR lands, therefore, continue to remain mapped and accounted for in the total designation acreage (81 FR 51365, August 4, 2016).

Conservation Role of Critical Habitat

The conservation role of murrelet critical habitat is to support successful nesting and reproduction of murrelets, and to maintain viable murrelet populations that are well distributed across the listed range of the species (76 FR 61609). Much of the area included in the critical habitat designation includes young forest and previously-logged areas within LSRs that are expected to provide buffer habitat to existing old-forest stands, and future recruitment habitat to create large, contiguous blocks of suitable murrelet nesting habitat. To recover the species, it is necessary to re-establish and maintain viable murrelet populations that are well distributed throughout the respective Conservation Zones (USFWS 1997, pg. 116). Critical habitat helps focus murrelet conservation activities by identifying areas that contain essential habitat features (PCEs) that Federal agencies and the public should appreciate and fully consider in carrying out land management activities. Critical habitat designations also identify areas that may require special management or protection (61 FR 26256, May 24, 1996).

Activities that May Affect PCEs

The final rule (61 FR 26256, May 24, 1996) states that “A variety of ongoing or proposed activities that disturb or remove primary constituent elements may adversely affect, though not necessarily ‘adversely modify’ murrelet critical habitat as that term is used in section 7 consultations. Examples of such activities include 1) forest management activities which greatly reduce stand canopy closure, appreciably alter the stand structure, or reduce the availability of nesting sites, 2) land disturbance activities such as mining, sand, and gravel extraction, construction of hydroelectric facilities and road building, and 3) harvest of certain types of commercial forest products (e.g., moss [Bryophyta] and salal [*Gaultheria shallon*])." Ultimately, actions may alter PCEs if they remove or degrade forest habitat, or prevent or delay future attainment of suitable habitat.

According to the revised final rule, proposed actions requiring section 7 consultations must be evaluated individually, in light of the baseline conditions of the CHU and Conservation Zone, unique history of the area, and effect of the impact on the CHU relative to its regional and range-wide role in the conservation of the species (76 FR 61599, October 5, 2011).

Distribution of Critical Habitat

Approximately 3,698,100 acres are designated on Federal, state, county, city, and private lands in Washington, Oregon, and California in 101 subunits (81 FR 51359). These individual units are coded by the state in which they occur and are individually numbered by unit and sub-unit (e.g., WA-01-a, OR-01-a, CA-01-a). The majority of these CHUs (78 percent) occur on Federal lands (Table MMCH-1). In the selection of CHUs, there was a reliance on lands designated as Late-Successional Reserves (LSRs) on Federal lands. Most LSRs within the range of the murrelet in Washington, Oregon, and California were designated as critical habitat. LSRs, as described in the Northwest Forest Plan, are most likely to develop into large blocks of suitable murrelet nesting habitat given sufficient time.

Table MMCH-1. Designated murrelet critical habitat by state, ownership, and land allocation.†

State	Ownership	Land Allocation	Designated Critical Habitat (hectares)(ha)	Designated Critical Habitat (acres)
Washington	Federal Lands	Congressionally Withdrawn Lands	740	1,800
		Late Successional Reserves	485,680	1,200,200
		Federal Total	**486,420**	**1,202,000**
	Non-Federal Lands	State Lands	172,720	426,800
		Private Lands	1,020	2,500
		Non-Federal Total	173,740	429,300
		Washington Total	**660,160**	**1,631,300**
Oregon	Federal Lands	Late Successional Reserves	541,530	1,338,200
		Withdrawn in 2011	*18,690*	*46,184*
		Federal Total	**522,840**	**1292,016**
	Non-Federal Lands	State Lands	70,880	175,100
		County Lands	440	1,100
		Private Lands	350	900
		Oregon Total	**594,510**	**1,469,116**
California (Northern)	Federal Lands	Late Successional Reserves	193,150	477,300
		Withdrawn in 2011	*58,068*	*143,487*
		Federal Total	**135,082**	**333,813**
	Non-Federal Lands	State Lands	71,040	175,500
		Private Lands	16,360	40,400
California (Central)	Non-Federal Lands	State Lands	14,080	34,800
		County Lands	3,230	8,000
		City Lands	400	1,000
		Private Lands	1,720	4,200
		California Total	**241,912**	**597,713**
		Overall Total	***1,496,582***	***3,698,129***

†These figures reflect the values from the 1996 final rule and 2011 revised final rule.

In 2011, the USFWS issued a revised final rule for critical habitat (76 FR 61599, October 5, 2011) removing approximately 189,671 acres (76,758 ha) of designated critical on Federal lands in Oregon and California. It was determined that these acreages were not essential to the conservation of the murrelet and did not meet the definition of critical habitat. The table above reflects the findings presented in the revised final rule.

Although most of the areas designated as murrelet critical habitat occur on Federal lands, the USFWS designated selected certain non-Federal lands that met the criteria for critical habitat. These lands occurred in areas where Federal lands were insufficient to provide suitable nesting habitat for the recovery of the species. On non-Federal lands, 21 percent of designated critical habitat acres occur on State lands, 1.2 percent on private lands, 0.2 percent on county lands, and 0.003 percent on city lands. In application, critical habitat does not include non-Federal lands covered by a legally operative incidental take permit for murrelets issued under section 10(a) of the ESA (61 FR 26256, May 24, 1996). Therefore, critical habitat designations are excluded on non-Federal lands upon completion of an approved Habitat Conservation Plan that addresses conservation of the murrelet.

Effects to Critical Habitat from prior Federal Actions

The USFWS maintains a database to summarize effects to critical habitat documented through consultations with Federal agencies under section 7 of the Act. In Washington, there has been almost no loss of suitable nesting habitat within designated critical habitat due to timber harvest or major fires. The majority of nesting habitat loss on Federal lands in Washington has been through natural disturbance (Raphael et al. 2016, pg. 80). The USFWS's Tracking and Integrated Logging System (TAILS) reports that within Conservation Zones 1 and 2 (zones within Washington which include the Olympic Peninsula and the Cascade Mountains, only 16 acres of critical habitat stands (PCE 1s) and 45 acres of PCE 2s are estimated to have been removed by Federal actions since 2003 (Table MMCH-2).

Table MMCH-2. Summary of murrelet critical habitat PCEs (acres) removed or downgraded as documented through section 7 consultations from 2003 to present (May 24, 2019).

Conservation Zones[1]	**Designated Acres**[2]	**Authorized Habitat Effects**[3]			**Reported Habitat Effects**[3]		
	Total CHU Acres	**Stands**[4]	**Remnants**[5]	**PCE2**[6]	**Stands**[4]	**Remnants**[5]	**PCE2**[6]
Puget Sound (Zone 1)	1,271,782	-16	0	-45	0	-1	0
Western Washington (Zone 2)	414,050	-1	0	-1	0	0	0
Oregon Coast Range (Zone 3)	1,024,122	-501	-4	-2,497	0	-1,186	0
Siskiyou Coast Range (Zone 4)	1,055,788	-4,900	0	-3,176	0	-97	0
Mendocino (Zone 5)	122,882	0	0	0	0	0	0
Santa Cruz Mountains (Zone 6)	47,993	0	0	0	0	0	0
Total	**3,936,617**	**-5,418**	**-4**	**-5,719**	**0**	**-1,284**	**0**

Notes:

[1] Conservation Zones: Six zones were established by the Marbled Murrelet Recovery Plan (USFWS 1997) to guide terrestrial and marine management planning and monitoring for the species.

[2] Designated Acres: Critical Habitat Unit (CHU) acres as designated in 1996, divided by Conservation Zones, as presented in the 1997 Marbled Murrelet Recovery Plan (USFWS 1997; Figure 8, p. 114).

[3] Authorized Habitat Effects: Includes all known occupied sites, as well as other suitable habitat, though not necessarily occupied. Importantly, there is no single definition of suitable habitat. The Marbled Murrelet Effectiveness Monitoring Module is in the process of rectifying this. Some useable working definitions include the Primary Constituent Elements as defined in the Critical Habitat Final Rule or the criteria used for Washington State used by Raphael et al. (2002).

[4] Stands: A patch of older forest in an area with potential platform trees.

[5] Remnants: A residual or remnant stand is an area with scattered potential platform trees within a younger forest that generally lacks structures for marbled murrelet nesting.

[6] PCE2: Trees with one half site-potential tree height within 0.5 miles of a potential nest tree.

At the range-wide scale, impacts to critical habitat from prior Federal actions have been limited, and in total, less than 1,000 acres of nesting habitat (PCE 1s) are estimated to have been removed for purposes of timber harvest or other Federal actions. The amount of habitat loss due to natural disturbance within critical habitat is not known, as range-wide monitoring efforts have only been summarized at the scale of Federal reserves and non-reserved lands under the Northwest Forest Plan (Raphael et al. 2016). Monitoring of murrelet nesting habitat within the Northwest Forest Plan area indicates nesting habitat has declined from an estimated 2.53 million acres in 1993 to an estimated 2.23 million acres in 2012, a total decline of about 12.1 percent (Raphael et al. 2016, pg. 72). These estimates are for all lands (Federal and non-federal) within the range of the murrelet. Habitat losses on Federal reserves have been substantially less, estimated at approximately 34,000 acres, representing a net loss of -2.5 percent of the potential murrelet nesting habitat within reserves (Raphael et al. 2016, pg. 78). Most of this habitat loss is attributed to wildfires and other natural disturbances. Critical habitat does not include designated Wilderness or National Parks, and so the estimates of habitat loss on Federal reserves likely represents a reasonable estimate of total habitat losses that have occurred within designated critical habitat.

Status of the Marbled Murrelet Critical Habitat in the Action Area

Appendix H contains general information about the environmental baseline that applies to all species and critical habitats addressed in this opinion and a discussion of *Oil (and Hazardous Substance) Facilities and Transport in the Action Area, Size and Types of Spills in the NW, Typical Response Time and Type, Influence of Spilled Material on Species Habitats in the Action Area,* and *Influence of Climate Change on Species Habitats in the Action Area*.

The action area includes a 1-mile buffer(s) extending from shipping waterways/coast. Throughout much of the marbled murrelet's current range in Washington and Oregon, the action area does not extend into designated marbled murrelet critical habitat. However, at a few discrete locations in southwest Washington (Conservation Zone 2 – Western Washington Coast Range; Pacific and Wahkiakum Counties) the action area does extend into designated marbled murrelet critical habitat (CHUs WA-05-a, WA-05-b, and WA-05-e) (Figure MMCH-1). In Conservation Zone 3 (Oregon Coast Range) the action area extends into designated marbled murrelet critical habitat at a greater number of locations in Clatsop, Tillamook, Lincoln, and Lane Counties: CHUs OR-01-b, OR-01-c, OR-02-b, OR-04-a, OR-04-b, OR-04-c, and OR-04-d (Figure MMCH-1).

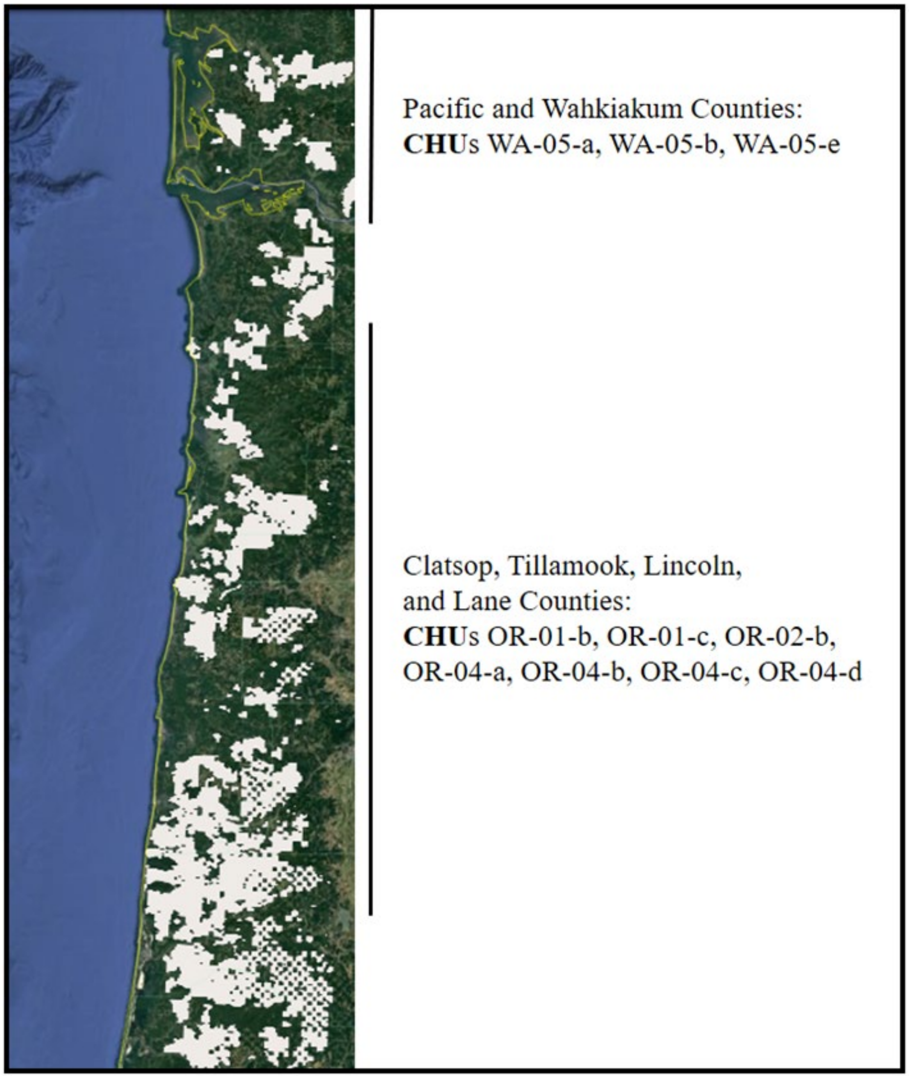


Figure MMCH-1. Marbled Murrelet CHUs.

Although most of the designated critical habitat is located on Federal lands, the USFWS identified additional non-Federal lands that meet criteria for marbled murrelet critical habitat. These lands are found in areas where federal lands are insufficient to provide suitable nesting habitat for the recovery of the species. Approximately 21 percent of designated critical habitat (by acreage) is located on State lands, 1.2 percent on private lands, 0.2 percent on County lands, and 0.003 percent on City lands (61 FR 26269; May 24, 1996).

The current condition of designated marbled murrelet critical habitat within the action area, and the factors that degrade that condition, are the same as those described at the rangewide scale. Much of the area included in the critical habitat designation includes young forest and previously-logged areas within Late Successional Reserves (LSRs). These areas provide buffer habitat to existing mature forest stands, and future recruitment habitat to create larger, contiguous blocks of suitable marbled murrelet nesting habitat. Due to a combination of past timber harvest, wildfire history, and natural topography (e.g., subalpine, wetlands, etc.), only a fraction of the designated marbled murrelet critical habitat on Federal lands is currently mapped as suitable and potential murrelet nesting habitat.

The USFWS maintains a database to summarize effects to designated critical habitat documented through consultations with Federal agencies (i.e., the USFWS's Tracking and Integrated Logging System; TAILS). At the rangewide scale, impacts to designated marbled murrelet critical habitat from prior Federal actions have been limited, and in total, less than 1,000 acres of nesting habitat (PCE 1) are estimated to have been removed for purposes of timber harvest or other Federal actions (Table MMCH-2).

The amount of habitat loss due to natural disturbance is not known, as rangewide monitoring efforts have only been summarized at the scale of Federal reserves and non-reserved lands under the NWFP (Raphael et al. 2016). Monitoring of marbled murrelet nesting habitat within the NWFP area indicates nesting habitat has declined from an estimated 2.53 million acres in 1993, to an estimated 2.23 million acres in 2012, a total decline of about 12.1 percent (Raphael et al. 2016, pg. 72). These estimates are for all lands (Federal and non-Federal) within the range of the marbled murrelet. Habitat losses on federal reserves have been substantially less, estimated at approximately 34,000 acres, representing a net loss of 2.5 percent of the potential marbled murrelet nesting habitat within reserves (Raphael et al. 2016, pg. 78). Most of this habitat loss is attributed to wildfires and other natural disturbances. Designated critical habitat does not include designated Wilderness or National Parks, and so the estimates of habitat loss on Federal reserves likely represents a reasonable estimate of total habitat losses that have occurred within designated marbled murrelet critical habitat.

The following text generically describes the current condition and function of designated marbled murrelet critical habitat in the action area in the context of the current condition and function of the PCEs of designated marbled murrelet critical habitat:

1) *Individual trees with potential nesting platforms*. [Note: Areas with or providing PCE #1, or with or providing both PCE #1 and #2, are considered, by definition, to be critical habitat.]

Within the action area, conditions range between mostly intact and undisturbed, and substantially disturbed and impaired. The current condition and function of this PCE in the action area may be described generically as moderately impaired.

2) *Forest lands of at least one half site-potential tree height regardless of contiguity, within 0.5 miles (0.8 km) of individual trees with potential nesting platforms and that are used or potentially used for nesting or breeding.* [Note: Areas with or providing PCE #1, or with or providing both PCE #1 and #2, are considered, by definition, to be critical habitat.]

Within the action area, conditions range between mostly intact and undisturbed, and substantially disturbed and impaired. The current condition and function of this PCE in the action area may be described generically as moderately impaired.

Effects of the Action on the Marbled Murrelet Critical Habitat

Appendix I presents general information regarding effects of the action for all species and critical habitats addressed in this opinion, including the *Analytical Approach Used in the BA*, and *Environmental Fate and Toxicity of Dispersant and Dispersed Oil*.

In general, the proposed action is likely to result in significant beneficial effects to the environment (inclusive of any affected marbled murrelet critical habitat) caused by timely containment, control, and removal in areas affected by spilled material with corresponding immediate and long-term benefits to fish and wildlife, water, soil, and sediment quality.

The proposed action includes specific CMs designed to: limit habitat disturbance; locate staging areas and support facilities in the least sensitive areas possible; restrict foot traffic, vehicles, and heavy machinery from sensitive areas; and decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E). With implementation of these CMs, the potential for the proposed action to cause adverse effects to marbled murrelet critical habitat is reduced. Additionally, spill response activities are likely to be localized (not occurring along the entire length of a pipeline or rail corridor), and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure to the response. For these reasons, there is a high potential for any adverse effects to the murrelet critical habitat caused by spill response activities to be localized, and limited in scale and duration.

Throughout much of the marbled murrelet's current range in Washington and Oregon, the action area does not extend to include designated critical habitat. However, at a few discrete locations in southwest Washington (Pacific and Wahkiakum counties), and at a greater number of locations in Clatsop, Tillamook, Lincoln, and Lane counties, Oregon, the action area does include designated marbled murrelet critical habitat (Figure MMCH-1).

The PCEs that define designated marbled murrelet critical habitat and their baseline condition in the action area were discussed above. This section discusses the potential effects of the proposed action with specific reference to those PCEs.

Physical containment, control, removal, and recovery of spilled hazardous material (oil, petroleum, other) cannot be achieved in all instances without some likelihood of impacts to terrestrial/upland and riparian habitats, with corresponding potential for measurable adverse effects to marbled murrelet habitat conditions and functions. If/when vehicles or heavy machinery are used to: establish and utilize staging areas; mechanically remove oil and oiled substrate by excavation (and/or disturbance of sediments); and remove terrestrial or aquatic woody debris or vegetation, in some instances, these activities have the potential to cause temporary and unavoidable adverse effects to habitat conditions and functions (e.g., removal of trees or limbs providing suitable nest platforms, removal of mid-canopy vegetation providing vertical and horizontal cover, creation or enlargement of canopy breaks/gaps or forest edge). Such impacts are likely to be limited in spatial extent with implementation of the CMs. Potential adverse effects include:

1) *Individual trees with potential nesting platforms*. [Note: Areas with or providing PCE #1, or with or providing both PCE #1 and #2, are considered, by definition, to be critical habitat.]

Within the action area, conditions range between mostly intact and undisturbed, and substantially disturbed and impaired. The current condition and function of this PCE in the action area may be described generically as moderately impaired.

Unavoidable adverse effects will be limited in spatial extent. However, the affected habitat conditions and functions will require years to fully recover. At the scale of the action area, PCE #1 will remain moderately impaired.

2) *Forest lands of at least one half site-potential tree height regardless of contiguity, within 0.5 miles (0.8 km) of individual trees with potential nesting platforms and that are used or potentially used for nesting or breeding*. [Note: Areas with or providing PCE #1, or with or providing both PCE #1 and #2, are considered, by definition, to be critical habitat.]

Within the action area, conditions range between mostly intact and undisturbed, and substantially disturbed and impaired. The current condition and function of this PCE in the action area may be described generically as moderately impaired.

Unavoidable adverse effects will be limited in spatial extent. However, the affected habitat conditions and functions will require years to fully recover. At the scale of the action area, PCE #2 will remain moderately impaired.

Cumulative Effects

Appendix J presents the cumulative effects analysis discussed in the BA that applies to all species and critical habitats contained in this opinion, including *Water Management, Urban and Agricultural Development,* and *Permitted Discharges.* See *Cumulative Effects* section for marbled murrelet above.

Conclusion

The action agencies determined that the proposed action is not likely to adversely affect marbled murrelet critical habitat because spill response actions will not result in the removal or alteration of forest habitat used by the marbled murrelet, and spill responses in coastal areas are very unlikely to occur (e.g., be staged) in forested areas used by murrelets. However, as described above, at a few discrete locations the action area does extend into designated marbled murrelet critical habitat, and in some instances, implementation of spill response activities has the potential to adversely affect critical habitat conditions and functions. However, these potential effects are likely to be limited in scope and temporary in duration with implementation of the CMs.

After reviewing the current status of the marbled murrelet critical habitat, the environmental baseline, the effects of the proposed action and the CMs, and cumulative effects, it is our biological opinion that the proposed action, as described in this opinion, is not likely to destroy or adversely modify designated critical habitat for the marbled murrelet. We have made this determination for the following reasons.

Throughout much of the marbled murrelet's current range in Washington and Oregon, the action area does not extend into marbled murrelet critical habitat. Along some more remote shorelines, where mature forest extends to the bluff or beach, spill responses may and likely will require occasional small incursions into suitable nesting habitat. However, throughout much of the action area, suitable marbled murrelet nesting habitat and marbled murrelet critical habitat are located adjacent to the action area.

The proposed action will have temporary adverse effects to the PCEs of designated marbled murrelet critical habitat (PCE #s 1 and 2). These adverse effects will be limited in both spatial and temporal extent. At the scale of the action area, designated marbled murrelet critical habitat is likely to retain most or all of its current function due to those limitations.

In general, the proposed action is likely to result in significant beneficial effects to the environment (inclusive of any affected marbled murrelet critical habitat) caused by timely containment, control, and removal of spilled material with corresponding immediate and long-term benefits to fish and wildlife, water, soil, and sediment quality.

The proposed action includes specific CMs designed to: limit habitat disturbance; locate staging areas and support facilities in the least sensitive areas possible; restrict foot traffic, vehicles, and heavy machinery from sensitive areas; and to decontaminate equipment and vehicles during the spill response and prior to exiting the site (see Table 2-2, and Appendix A and E). These measures are likely to reduce the potential for the proposed action to cause adverse effects to murrelet critical habitat. Additionally, spill response activities are likely to be localized, and limited to smaller spills requiring responses lasting four days or less (up to 96 hours), further reducing the exposure of critical habitat to spill response actions. For these reasons, there is a high potential for any adverse effects to murrelet critical habitat caused by spill response activities to be localized, and limited in scale and duration.

Streaked Horned Lark

Rangewide Status of the Streaked Horned Lark

The streaked horned lark (*Eremophila alpestris strigata*) was listed as a threatened species on October 3, 2013 (78 FR 61452), under the ESA. For a detailed account of streaked horned lark biology, life history, threats, demography, and conservation needs, refer to Appendix G below. Threats identified in the listing have not substantially changed. Based on our review of the current rangewide status information, the streaked horned lark retains the potential for recovery because its current range-wide condition conforms to the survival condition as defined by the USFWS (1998, pg. xviii) and summarized in the Analytical Framework section herein.

Status of the Streaked Horned Lark in the Action Area

Appendix H presents general information about the environmental baseline that applies to all species and critical habitats addressed in this opinion, including the regulatory definition of environmental baseline, a discussion of *Oil (and Hazardous Substance) Facilities and Transport in the Action Area, Size and Types of Spills in the NW, Typical Response Time and Type, Influence of Spilled Material on Species Habitats in the Action Area,* and *Influence of Climate Change on*

Species Habitats in the Action Area.

The action area intersects the range of the streaked horned lark sites in the following areas:

- The Washington coast (and possibly on the northern Oregon coast on Ft. Stevens State Park, where three larks were recently detected);
- Islands and mainland sites in the lower Columbia River;
- Habitats within the one-mile buffer around the oil transportation corridor in the Puget lowlands at Olympia Airport and Joint Base Lewis-McChord; and
- Habitats within the one-mile buffer around the oil transportation corridor in the Willamette Valley, including a small piece of the Ankeny Unit of the Willamette Valley National Wildlife Refuge Complex.

There may be other sites with larks in the action area, if open agricultural lands or industrial sites fall within the boundaries of the corridor in the Willamette Valley or the Puget lowlands. See table SHL-1 for recent population estimates at known sites.

Table SHL-1. Range-wide survey data for streaked horned larks (2015-2018). Rows highlighted in gray are not within the action area for the NW Area Contingency Plan consultation. (From Treadwell 2019, pp. 4-5).

	Site	**2015**	**2016**	**2017**	**2018**	+/-	**Notes** (*NS = no survey, YOY= young-of-the-year*)
Washington	**South Puget Sound**	(max males)					
	13th Division	10	11	15	**15**	=	
	Gray Army	22	30	33	**28**	-	
	McChord	15	25	22	**21**	-	
	91st Range 76	6	15	16	**18**	+	
	Range 50	3	9	5	**1**	-	Western portion surveyed, no access to East, where most birds were concentrated in 2017
	Range 53	NS	2	2	**1**	-	
	Olympia	48	34	43	**21**	-	Protocol surveys not performed in 2016 or 2017; #s from Banded Bird Survey
	Shelton	13	5	5	**6**	-	Protocol surveys not performed in 2016, or 2017; #s from Banded Bird Survey
	Tacoma Narrows	2	NS	NS	**3**	+	
	SPS Total	119	131	141	**114**		
	Washington Coast	(max males)					
	Damon Point	0	NS	NS	**0**		
	Graveyard Spit	0	NS	NS	**NS**		Three nests discovered & some YOY observed
	Johns River Island	0	NS	NS	**NS**		
	Leadbetter Point	11	7	11	**5**	-	Five nests w/in 12 territories were discovered. Additional unsurveyed areas were occupied.
	Midway Beach	0	NS	NS	**6**	+	
	Oyhut Spit	0	NS	NS	**0**		
	WC Total	*11*	*7*	*11*	***11***		
WA & OR	**Columbia River**	(max males)					Abundance protocol followed all four years unless otherwise noted.
	Brown Island	17	17	11	**15**	+	
	Rice Island	14	20	14	**17**	+	
	Crims Island	6	5	3	**4**	+	
	Miller Sands Island	12	11	7	**10**	+	
	Pillar Rock Island	2	6	3	**2**	-	
	Sandy Island	3	3	4	**5**	+	

Table SHL-1. Range-wide survey data for streaked horned larks (2015-2018). Rows highlighted in gray are <u>not</u> within the action area for the NW Area Contingency Plan consultation. (From Treadwell 2019, pp. 4-5).

	Martin Bar	0	0	1	**2**	+	Occupancy protocol conducted in 2015/16, abundance in 2017/18
	Tenasillahee	2	2	1	**1**	=	Only two abundance surveys conducted at this site in 2018
	Howard Island	0	4	8	**7**	-	Surveys conducted w/occ. protocol in 2015, abundance in 2016-18
	Lower Deer	0	1	1	**3**	+	Surveys conducted w/occ. protocol in 2016, abundance in 2015, 2017, 2018
	Gateway	0	1	0	**0**	=	Abundance protocol in 2015-2017, occupancy in 2018
	Sand Island	2	1	2	**1**	-	
	Welch Island	0	0	1	**1**	**=**	Occupancy protocol followed in 2015-17, abundance in 2018
	CR Total						
	Other Sites: Larks also detected at Austin Point and Hump Island in 2018 following occupancy protocol.						
Oregon	**Port of Portland, etc.**	(pairs)					
	SW Quad PDX	3	1-2	1	**1**	**=**	
	PDX Airfield	0	1-2	3-4	**3**	=	
	Rivergate	5	2	3	**2**	-	Up to two pairs in 2018
	St. Johns (Metro)	0	0	0	**0**	=	2018: 1; one singing male detected May 25, 26 and 27; not seen after.
	Sauvie Island (4 sites)	0	0	0	**0**	=	
	PoP Total	*8*	*4-6*	*7-8*	***6***		
	WV Airports	(pairs)					
	Eugene	12	NS	NS	NS	*n/a*	
	McMinnville	12-15	NS	NS	TBT	*n/a*	
	Salem	0	NS	NS	**TBT**	*n/a*	
	Corvallis	29	61	34	**60+**	-	Est. number. Additional habitat in surrounding ag fields not surveyed
	WVA Total	*53-56*	*61*	34			
	WV Refuges & other	(pairs)					
	Ankeny	8	12	4	**6**	+	April=4 June=6 July=2 August=6; Indep. Fledglings=13
	Baskett	23	17	26	**37**	+	April=23 June=37 July=36 August=28; Indep. Fledglings=77
	Finley	8	7	6	**11**	+	April=7 June=9 July=11 August=3 +6 unk; Indep. Fledglings=14
	Private Lands – WRPs	15	27	*	*	-	*Numbers are opportunistic sightings. No official surveys conducted. 19 pairs detected in 5 WRPs in 2017, 8 males detected in 3 WRPs in 2018.
	Herbert Farm	2	3	0	**0**	=	
	Coyote Creek South	-	-	5	**4-5**	=	
	WVR/other Total	*56*	*66*				In the Willamette Valley, there are many sites that have not been surveyed due to lack of access.

Maximum counts of male streaked horned larks from annual surveys following standardized protocols as described in Pearson et al. 2016, entire. Please note that these numbers are uncorrected for detectability and transect length; (NS = no survey). Population estimates (and error values) are generated using N-mixture models (Keren and Pearson 2016, pg.1).

<u>Factors Affecting the Species' Environment in the Action Area</u>

The baseline for consultation includes State, tribal, local and private actions already affecting the species or that will occur contemporaneously with the consultation in progress. Unrelated Federal actions affecting the species or critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are Federal and other actions within the action area that may benefit listed species or critical habitat. Other Federal actions affecting the streaked horned lark or its designated critical habitat that required previous formal section 7 consultation include: the USACE's maintenance dredging program in the lower Columbia River, the Endangered Species Management Plan for larks at the Army's Joint Base Lewis-McChord, the USFWS's Partners for Fish and Wildlife program in the Willamette Valley, the USFWS's farming program at the Willamette Valley National Wildlife Refuge Complex, the USFWS's issuance of section 10(a)(1)(A) recovery permits for the lark, and various construction and maintenance projects at airports and river port sites in Oregon and Washington. None of the completed section 7 consultations reached a jeopardy finding for the streaked horned lark or a finding of adverse modification of its designated critical habitat.

Conservation Role of the Action Area

The action area includes a substantial portion of the streaked horned lark's current range. Maintaining the existing population and increasing the size and number of populations on the Washington Coast, Oregon Coast, lower Columbia River, Puget lowlands and in the Willamette Valley are essential to recovery of the species.

Summary

Based on our review of the current information regarding the species status in the action area, the streaked horned lark populations in the action area retain sufficient resiliency and redundancy to offset patchy, temporary adverse impacts caused by natural or anthropogenic sources.

Effects of the Action on the Streaked Horned Lark

Appendix I presents general information regarding effects of the action for all species and critical habitat addressed in this opinion, including the *Analytical Approach Used in the BA*.

The streaked horned lark is found in terrestrial habitats in open grasslands in the south Puget lowlands in Washington, on the Washington coast (and possibly the northern Oregon coast) and lower Columbia River islands and shoreline, and in open habitats in the Willamette Valley in Oregon. Oil spills are likely to happen in habitats that do not support streaked horned larks (e.g., aquatic habitats, highly disturbed oil transportation corridors); larks are most likely to be affected by spill response actions, such as staging areas and access route establishment in terrestrial environments, including shoreline sites on the Washington coast or the lower Columbia River. There may also be some suitable habitat for larks within the one-mile buffer around oil transportation corridors that could be affected by spill response activities in the Puget lowlands (at Olympia Airport or Joint Base Lewis-McChord) or in the Willamette Valley.

Based on previous spill responses along the coast of Oregon and Washington (USFWS 2002, pp. 3-5), and as described in the NWACP BA (USEPA and USCG 2018, pp. 2-1 – 2-47), spill response can be a complicated effort consisting of many different kinds of activities (see Table 2-1 in the BA and Appendix D below) that have the potential to adversely affect streaked horned larks and their habitats. Response activities may be short (hours) or long (up to 4 days) in duration due to the magnitude and extent of the spill and may affect wintering and breeding larks depending on the timing of the incident. In addition, we assume the chaotic nature of coordinating many people in an emergency response scenario means that conservation guidance is not always clearly conveyed, and thus will not always be followed. The NWACP BA (USEPA and USCG 2018, pp. 2-17 – 2-28) outlines broad conservation measures that will help to avoid and minimize adverse effects to larks, but defers to the local area GRPs for more detailed information on sensitive locations, and avoidance and minimization measures. However, our review of several relevant GRPs shows they lack site-specific detail and are out of date regarding lark habitat sites. Drawing on previous spill response actions (USFWS 2002, entire), the most effective CM was the involvement of a USFWS or cooperator resource expert within the ICS chain of communication. This allowed the resource expert to identify site-specific avoidance areas and provide conservation measures to reduce adverse effects listed species in areas where activities were unavoidable. Where appropriate, USFWS involvement in the ICS chain of communication will be a crucial element of the proposed action.

The following response activities have the potential to affect the streaked horned lark: use of vehicles, heavy machinery, and aircraft; foot traffic; manual or mechanical removal of oil substrates; the establishment of staging areas and access points; construction of berms, trenches, or pits; and removal of vegetation; see Table SHL-2 and SHL-3 (below). Detailed descriptions of each response action are found in the NWACP BA (USEPA and USCG 2018, pp. 2-11 – 2-15). Given that the actual locations of future oil spills is not known, we can only provide a general assessment of the effects of spill response activities on larks and their habitats. A more detailed and accurate effects assessment will only be possible when the size, timing, duration and location of response activities are known.

<u>Effects to the Species</u>

Direct Injury. Spill response activities in any habitats occupied by streaked horned larks could result in death or injury to some individuals. The effects of vehicle strikes on adult larks could include mortality and severe injury; however, these impacts are expected to be unlikely, as adult larks will generally avoid areas of high disturbance by vehicles and people. Vehicles are more likely to crush nests and chicks. Larks nest on the ground and their nests are cryptic, which makes them vulnerable to vehicles or foot traffic. Injuries caused by vehicle strikes should be reduced through implementation of breeding season vehicle-related conservation measures. The likelihood of injury or death will be minimized by adherence to conservation measures requiring speed limits and designation of sensitive habitat areas. These effects are most likely to occur at sites established as spill response staging areas and access points, because areas of sparse vegetation and cleared ground are ideal for staging. Staging areas will to the extent possible be established in previously developed areas (e.g., paved ground), which will minimize such injuries. Monitors in the spill response area will be present to advise response personnel to minimize the potential impacts on streaked horned larks associated with foot traffic and the use of vehicles and heavy machinery; this will likely lessen, but not wholly remove, the potential for death or injury of adults, eggs or nestlings. Despite following recommended CMs for vehicle operating speeds, previous spill response actions have shown that there will be incidents of vehicles driven at speeds well above those recommended or driven in sensitive habitats (USFWS 2002, pg. 20). These incidents increase the risk of direct horned lark mortality and nest loss.

The manual or mechanical excavation of oiled soils are unlikely to directly kill or injure adult larks because affected birds are likely to move out of harms way, but could kill or injure eggs and nestlings.

In addition to the direct injuries caused by the presence of response personnel and equipment, avian and mammalian predators will likely be attracted to human use and staging sites. Avian predators (e.g., corvids, hawks) could use response equipment as perches. This could increase the likelihood that an avian predator detects a lark or its nest, eggs, or chicks resulting in injury or death. Similarly, mammalian predators (e.g., raccoons, coyotes) may be attracted by trash or cover at the staging site. This potential increase in mammalian predators could also increase predation on lark nests and chicks. However, as part of establishing and maintaining staging areas, the USCG and EPA have proposed that there will be daily removal of all trash or anything that would attract wildlife to the site (BA, Table 2-2; Appendix E below). This effort is expected to minimize but not eliminate likely impacts associated with the presence of personnel and equipment.

Disturbance. Most of the effects to streaked horned larks from spill response activities would likely take the form of disturbance. Response activities may occur at any time throughout the year and may be intense and long in duration. Personnel and equipment in or adjacent to occupied lark habitats will have the potential to cause disturbance, the effect of which will vary depending on the life history stage (i.e., breeding or wintering) affected.

Larks are more sensitive to human and vehicle disturbances during the breeding season than during winter months. Larks have been shown to flush when humans or vehicles approached within 50 meters during the breeding season (Pearson and Hopey 2004, pp. 19-20). During the breeding season, response activities in occupied habitat can be a source of disturbance that interferes with courtship, incubation, brood rearing, roosting, and foraging. Activity by personnel, vehicles, aircraft and other heavy equipment that disturb breeding larks could potentially cause flushing from nest sites, exposing eggs to chilling or predators, nest abandonment, and loss of nesting areas during the breeding season. Such disturbance leaves nests and chicks more vulnerable to predation and temperature extremes. Repeated or sustained disturbance may lead to nest abandonment. The effects of disturbance to wintering larks may be less dramatic but may include flushing and exposing larks to predators; repeated flushing could result in higher energy expenditure, causing stress and reduced fitness.

Aerial operations in occupied lark habitats have a high potential to cause disturbance of larks. Larks occur in some areas that routinely have a high level of disturbance (e.g., airports); the effect of novel disturbances caused by spill response activities will depend on the location and timing of the disturbance. During winter months, noise and the visual image of low flying helicopters and other aircraft can disturb roosting and foraging larks. During the breeding season, low flying aircraft can interrupt courtship, incubation, brood rearing, roosting, and foraging. The frequency and duration of flights over lark habitat will influence the magnitude of the effect. Landing helicopters in or very near lark nesting habitat can destroy nests and kill chicks through direct crushing, burial by blown debris, or abandonment. These types of effects may be almost entirely avoided through implementation of typical aircraft-related CMs outlined in the area-specific GRPs and directed by on-site resource managers.

Hazing is described as a response action or countermeasure taken very infrequently, and only in close coordination with the UC-Wildlife Branch and USFWS (EPA and USCG 2018, pp. 2-14, 2-27, 2-43, 2-44). The effects of intentional hazing of streaked horned larks may occur in or near occupied habitat. The recommendation to haze will be guided by site-specific and species-specific factors present at the time of the spill, and availability of proven hazing techniques. Operational guidelines and standard of care requirements in both marine and fresh waters include the following information referenced in the NWACP Section 9310 and 9311: USFWS Best Practices for Migratory Bird Care During Oil Spill Responses (USFWS 2003, entire), the Bird Hazing Manual: Techniques and Strategies for Dispersing Birds from Spill Sites (Gorenzel and Salmon 2008, entire). Any decision to employ intentional hazing where it is likely to directly expose and effect streaked horned larks will require emergency consultation procedures, unless the party (or parties) directly implementing/executing this response action or countermeasure holds a valid, current Incidental Take Permit. However, while short-term significant adverse impacts to streaked horned lark are likely during the rare hazing event for a spill response lasting <4 days, use of deterrence methods described in the NWACP are expected to minimize the effects of hazing and significantly reduce horned lark exposure to oil or dispersed oil in the environment.

Habitat Degradation. Habitat degradation could occur as a result of the removal or destruction of vegetation when constructing berms, trenches, or pits; establishing a staging area; or using heavy machinery. These activities could have a long-term effect on habitat quality, as the short-stature grasses and forbs used by larks would be removed, and would require months to regrow. This reduction in habitat quality would result in a loss of available breeding and foraging habitat for larks, possibly reducing the size or productivity of the local population.

Proposed CMs are likely to reduce the potential impacts of a spill response on streaked horned larks. The involvement of the USFWS, where appropriate, and the presence of monitors on-site during spill response activities are essential to ensuring that the activities avoid important lark habitat areas and that the long-term effects of the spill response are minimized.

<u>Summary of Effects to the Species</u>

In summary, while oil spill response and cleanup may benefit larks by removing toxic materials from their habitats in the long-term, response activities as described in the NWACP BA (USEPA and USCG 2018, entire) are anticipated to result in adverse effects to larks and their habitats in Oregon and Washington. The magnitude and duration of actual response actions and the proximity to known lark wintering and breeding sites will determine the extent of the adverse effects. Emergency spill response can be complicated and sometimes chaotic, involving a large number of personnel and activities; the USFWS will be involved in spill response coordination within the ICS communication chain, where appropriate, which will minimize, but cannot completely eliminate adverse effects to larks.

We cannot predict the number of streaked horned larks that may be adversely affected by the proposed action, given that the location of spill response could be almost anywhere within the species' range and most of the anticipated effects of disturbance are sub-lethal. There is also the potential for some mortality of adults, juveniles and eggs due to disturbance, direct crushing by response personnel and equipment, loss of habitat and exposure to toxic substances, but the actual number of individuals killed cannot be estimated without knowledge of the specific sites involved. Larks occur at many sites scattered across the Puget lowlands, Washington coast, lower Columbia River and the Willamette Valley; the local impacts of any spill response operation could be significant to the larks using a single site, but response actions are unlikely to affect multiple lark sites simultaneously.

Table SHL-2. Summary of Effects to Streaked Horned Larks.

Time and location of potential exposure	Applicable actions	Potential stressors associated with applicable actions	Effects on individuals
Seasonality: Year-round Habitat: Terrestrial Bare ground in agricultural fields and wetland mudflats; habitats subject to frequent human disturbance include mowed fields at airports, managed road margins, and agricultural lands Nesting habitat found in dune habitats along the coast of Washington, in western Washington and western Oregon prairies and agricultural lands, and on the sandy islands and spits along the Columbia and Willamette Rivers	Use of vehicles or heavy machinery Staging area establishment and use Foot traffic at spill site Use of aircraft Berms or other barriers; pits and trenches Manual or mechanical removal of oiled substrates Terrestrial vegetation cutting/removal	Destruction of nests by vehicles, machinery, or foot traffic Disturbance from noise, light, presence of people Exclusion from essential resources (e.g., food, nesting habitat) or disrupted passage between habitat areas by presence of humans Trampling and loss of vegetation Removal of oiled vegetation Exposure to fire or smoke	Direct injury: The use of vehicles, heavy machinery, and aircraft during response actions could result in vehicle or aircraft strikes or the crushing of nests on the ground, potentially resulting in deaths of adults, juveniles or eggs. Foot traffic and construction-related actions may also result in the crushing of nests, potentially killing juveniles or eggs. Disturbance: The presence of machinery and people in lark habitats is likely to cause larks to flush, resulting in increased energetic costs. Increased air traffic may cause additional stress to larks during the spill response, including increased noise disturbance and altered behaviors (e.g., flushing from foraging habitat or nests). Larks that nest at airfields are likely habituated to such noise. Spill response actions could temporarily cause streaked horned lark to leave nesting habitats, which would separate eggs and nestlings from parents, which could result in reduced nutrition or death of juveniles and eggs by exposure or predation. Habitat degradation: Habitat degradation could occur as a result of the removal or destruction of vegetation when constructing berms, trenches, or pits; establishing a staging area; using heavy machinery, resulting in loss of available nesting and foraging habitat for adults and juveniles. Short grasses and forbs may reestablish within months after soil and vegetation disturbance.

Cumulative Effects

Appendix J presents a cumulative effects analysis prepared for the BA that applies to all species and critical habitats contained in this opinion, including *Water Management, Urban and Agricultural Development,* and *Permitted Discharges.*

The BA identifies agricultural and urban development as primary long-term threats to the streaked horned lark due to the conversion (i.e., loss) and degradation of lark habitats. In the Willamette Valley, the human population is projected to double by 2050, which will require increased development of urban infrastructure and, in turn, the potential loss of streaked horned lark habitat. Airports are a common habitat for streaked horned larks, and airport expansions have resulted in lost foraging habitat. While there are stressors associated with agricultural activities, agricultural lands also provide some important habitat features for the streaked horned lark. Permanent loss of farmland supporting the species may result from increased human population growth and associated suburban development. The effects of these activities may result in some reduction in the habitat area available to streaked horned larks, and to the numbers of larks throughout their range.

Conclusion

After reviewing the current status of the streaked horned lark, the environmental baseline, the effects of the proposed action, including CMs, and cumulative effects, it is our biological opinion that the proposed action, as described in this opinion, is not likely to jeopardize the continued existence of the streaked horned lark for the following reasons:

1. Larks do not generally use habitats that will be affected by oil spills (aquatic systems, developed oil transportation corridors). Most of the effects of oil spill response actions to larks will result from the placement of staging areas and establishment of access routes adjacent to areas affected by spills.
2. Most of the effects of spill response activities will be through temporary disturbance and habitat degradation. There may be a small number of individuals (adults, juveniles or eggs) that will be killed, especially if response activities occur in or adjacent to occupied habitat during the breeding season.
3. CMs included in the project description, including USFWS participation in the ICS, where appropriate, and the requirement for resource monitors on-site during spill response activities, will ensure that larks are considered, and are likely to minimize the likelihood of disturbance, habitat destruction and death or injury of larks.
4. Oil spill response activities are likely to affect small, discrete areas within the lark's range in any year. The effects of spill response generally be temporary and limited in scope, and are therefore not likely to permanently decrease reproduction, numbers, or distribution of the species.

Streaked Horned Lark Critical Habitat

Rangewide Status of Streaked Horned Lark Critical Habitat

In October of 2013, the USFWS designated critical habitat for the threatened streaked horned lark (78 FR 61506). Approximately 4,629 acres (1,873 ha) in Grays Harbor, Pacific, and Wahkiakum counties in Washington, and in Clatsop, Columbia, Marion, Polk, and Benton counties in Oregon, fall within the boundaries of the critical habitat designation for the streaked horned lark.

Critical habitat is defined in section 3 of the ESA as: (1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features: (a) essential to the conservation of the species, and (b) which may require special management considerations or protection; and (2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. Conservation, as defined under section 3 of the ESA, means to use and the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided pursuant to the ESA are no longer necessary.

Primary Constituent Elements

Under the ESA and its implementing regulations, the physical or biological features essential to the conservation of the streaked horned lark must be identified in areas occupied at the time of listing, focusing on the features' primary constituent elements. Primary constituent elements are the features that provide for the species' life-history processes and are essential to the conservation of the species. The primary constituent elements specific to the streaked horned lark are areas having a minimum of 16 percent bare ground that have sparse, low-stature vegetation composed primarily of grasses and forbs less than 13 inches (33 cm) in height found in: (1) Large (300-acre [120-ha]), flat (0–5 percent slope) areas within a landscape context that provides visual access to open areas such as open water or fields, or (2) areas smaller than described in (1), but that provide visual access to open areas such as open water or fields. All of the units designated as critical habitat are currently occupied by the streaked horned lark and contain the primary constituent elements to support the life-history needs of the subspecies.

Critical Habitat Units and Subunits

The USFWS designated two units of critical habitat for the streaked horned lark based on the presence of sufficient elements of physical or biological features to support life history processes during the breeding or winter seasons. (The two units are identified as Unit 3 and Unit 4; there are no Units 1 or 2. The reason for this is that critical habitat for the streaked horned lark was designated at the same time as critical habitat for Taylor's checkerspot butterfly *Euphydryas editha taylori*]; Units 1 and 2 contain critical habitat only for the butterfly). The two units designated for the streaked horned lark are further divided into 16 subunits. The two units designated as critical habitat are: Unit 3 (Washington Coast and Columbia River, with 13 subunits), and Unit 4 (Willamette Valley, with 3 subunits) (Table SHL-2).

Table SHL-2. Critical Habitat Units for the Streaked Horned Lark. All units were occupied by larks at the time of designation.

Unit 3: Washington Coast and Columbia River Islands	Federal	State	Private	Tribal	Other*

	Subunit name	Ac (Ha)	Ac (Ha)	Ac (Ha)	Ac (Ha)	Ac (Ha)
3–A	Damon Point	0	456 (185)	24 (10)	0	0
3–B	Midway Beach	0	611 (247)	0	0	0
3–C	Shoalwater Spit	0	377 (152)	102 (41)	0	0
3–D	Leadbetter Point	564 (228)	101 (41)	0	0	0
3–E	Rice Island	0	224 (91)	0	0	0
3–F	Miller Sands	0	123 (50)	0	0	0
3–G	Pillar Rock/Jim Crow	0	44 (18)	0	0	0
3–H	Welch Island	0	43 (18)	0	0	0
3–I	Tenasillahe Island	0	23 (9)	0	0	0
3–J	Whites/Brown	0	98 (39)	0	0	0
3–K	Wallace Island	0	13 (5)	0	0	0
3–L	Crims Island	0	60 (24)	0	0	0
3–M	Sandy Island	0	37 (15)	0	0	0
	Unit 3 Totals	564 (228)	2,209 (894)	126 (51)	0	0
Unit 4: Willamette Valley						
4–A	Baskett Slough NWR	1,006 (407)	0	0	0	0
4–B	Ankeny NWR	264 (107)	0	0	0	0
4–C.............	William L Finley NWR.........	459 (186)	0	0	0	0
	Unit 4 Totals	1,729 (700)	0	0	0	0
		2,293 (928)	2,209 (894)	126 (51)	0	0
	GRAND TOTAL OF ALL UNITS, ALL OWNERSHIP	4,629 (1,873)				

* Other = Ports, local municipalities, and nonprofit conservation organizations.

Unit 3: Washington Coast and Columbia River

The Washington Coast and Columbia River Unit totals 2,900 acres (1,173 ha) and includes 564 acres (228 ha) of Federal ownership, 2,209 acres (894 ha) of State-owned lands, and 126 acres (51 ha) of private lands. On the Washington coastal sites, the streaked horned lark occurs on sandy beaches and breeds in the sparsely vegetated, low dune habitats of the upper beach. There are four subunits (Subunits 3–A, 3–B, 3–C and 3–D) and a total of 2,235 acres (904 ha) of critical habitat on the Washington coast. The coastal sites are owned and managed by Federal, State, and private entities. The physical or biological features essential to the conservation of the streaked horned lark may require special management considerations or protection to reduce human disturbance during the nesting season, and the continued encroachment of invasive, nonnative plants requires special management to restore or retain the open habitat preferred by the streaked horned lark. Subunits 3–A, 3–B, 3–C and 3–D overlap areas that are designated as critical habitat for the western snowy plover. The snowy plover nesting areas are posted and monitored during the spring and summer to keep recreational beach users away from the nesting areas (Pearson *et al*. 2009, pg. 22); these management actions also benefit the streaked horned lark. In the lower Columbia River, there are nine island subunits (Subunits 3–E through 3–M) for a total of 665 acres (269 ha). The island subunits are owned by the States of Oregon and Washington. On the Columbia River island sites, only a small portion of each island is designated as critical habitat for the streaked horned lark; most of the areas mapped are used by the U.S. Army Corps of Engineers for dredge material deposition in its channel maintenance program. Within any deposition site, only a portion is likely to be used by the streaked horned lark in any year, as the area of habitat shifts within the deposition site over time as new materials are deposited and as older deposition sites become too heavily vegetated for use by streaked horned larks. All of the island subunits are small, but are adjacent to open water, which provides the open landscape context needed by streaked horned larks. The main threats to the essential features in the critical habitat subunits designated on the Columbia River islands are invasive vegetation and direct impacts associated with deposition of dredge material onto streaked horned lark nests during the nesting season. In all subunits, the physical or biological features essential to the conservation of the streaked horned lark may require special management considerations or protection to manage, protect, and maintain the PCEs supported by the subunits.

Unit 4: Willamette Valley

The Willamette Valley Unit totals 1,729 acres (700 ha) and is entirely composed of Federal lands. There are three subunits (4–A, 4–B and 4–C) for the streaked horned lark in the Willamette Valley, all on the Willamette Valley National Wildlife Refuge Complex. These subunits at the Basket Slough, Ankeny and William L. Finley refuge units are managed for restored native prairie habitat and as agricultural land to provide forage for wintering dusky Canada geese (*Branta canadensis occidentalis*). This management is compatible with maintaining the essential habitat features for the streaked horned lark. The refuge complex has incorporated management for streaked horned lark into its recently completed comprehensive conservation plan (USFWS 2011a, entire), and streaked horned lark habitat conservation is being implemented in the refuge units. In all subunits, the physical or biological features essential to the conservation of the streaked horned lark may require special management considerations or protection to manage, protect, and maintain the PCEs supported by the subunits.

Status of Streaked Horned Lark Critical Habitat in the Action Area

Appendix H presents general information about the environmental baseline that applies to all species and critical habitats addressed in this opinion, including the regulatory definition of environmental baseline, a discussion of *Oil (and Hazardous Substance) Facilities and Transport in the Action Area, Size and Types of Spills in the NW, Typical Response Time and Type, Influence of Spilled Material on Species Habitats in the Action Area,* and *Influence of Climate Change on Species Habitats in the Action Area*.

Designated critical habitat for the streaked horned lark is found within the action area at sites on the Washington Coast (Damon Point, Midway Beach, Shoalwater Spit, and Leadbetter Point), the lower Columbia River (Rice Island, Miller Sands Island, Pillar Rock Island, Welch Island, Tenasillahe Island, Whites/Brown Island, Wallace Island, Crims Island, and Sandy Island), and at Ankeny NWR (78 FR 61506). There is also a small portion of critical habitat in the Willamette Valley at the Ankeny unit of the Willamette Valley National Wildlife Refuge Complex that overlaps with the 1-mile buffer around the Willamette River in Marion County, Oregon. The PBFs of critical habitat for the streaked horned lark are areas having a minimum of 16 percent bare ground that have sparse, low-stature vegetation composed primarily of grasses and forbs less than 13 inches in height, and which are large (300 acres) and flat in an open landscape context.

The baseline for consultation includes State, tribal, local and private actions already affecting the species or that will occur contemporaneously with the consultation in progress. Unrelated Federal actions affecting critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are Federal and other actions within the action area that may benefit critical habitat. Other Federal actions affecting streaked horned lark designated critical habitat that required previous formal section 7 consultation include: the USACE's maintenance dredging program in the lower Columbia River, the Endangered Species Management Plan for larks at the Army's Joint Base Lewis-McChord, the USFWS's Partners for Fish and Wildlife program in the Willamette Valley, the USFWS's farming program at the Willamette Valley National Wildlife Refuge Complex, the USFWS's issuance of section 10(a)(1)(A) recovery permits for the lark, and various construction and maintenance projects at airports and river port sites in Oregon and Washington. None of the completed section 7 consultations reached a finding of adverse modification of its designated critical habitat.

Effects of the Action on Streaked Horned Lark Critical Habitat

Appendix I presents general information regarding effects of the action for all species and critical habitat addressed in this opinion, including the *Analytical Approach Used in the BA*.

In the BA for this project, the action agencies conducted an analysis of effects to lark critical habitat and concluded that the spill response activities would have temporary and insignificant effects to the physical and biological features (PBFs) of critical habitat(USEPA and USCG 2018, pp. 4-142 – 4-143). We disagree with this finding because even if the expected adverse effects of spill response activities are not permanent, they are still greater than the insignificant threshold for a determination of "not likely to adversely affect." Our analysis and conclusion regarding effects to designated critical habitat for the streaked horned lark are presented below.

The PBFs of critical habitat for the streaked horned lark are areas having a minimum of 16 percent bare ground that have sparse, low-stature vegetation composed primarily of grasses and forbs less than 13 inches in height, and which are large (300 acres) and flat in an open landscape context. The aspects of spill response that require site clearing or vegetation removal (e.g., manual or mechanical excavation of contaminated soils; constructing berms, trenches, or pits; establishing a new staging area; or using heavy machinery) could degrade critical habitat by removing or destroying the vegetation component of the PBFs, which provides foraging or breeding habitat for larks. The vegetation height component of critical habitat for the streaked horned lark requires frequent disturbance, so it is likely that the effects of vegetation clearing will be temporary, and the vegetation will recover within months after the spill response activities are completed.

It is possible that some response activities, including construction of berms or barriers, will reduce the open landscape context (flat topography and open sight lines), which is a PBF of lark critical habitat. These effects may be temporary or permanent, depending on whether the barriers are removed and the site recontoured following the response effort.

The proposed CMs will reduce the potential impacts of a spill response to streaked horned lark critical habitat. As described in the section above regarding effects to the streaked horned lark, the involvement of the USFWS, where appropriate, and the presence of resource monitors on site during spill response activities are essential to ensuring that the activities avoid designated critical habitat areas and that the long-term effects of the spill response are minimized.

Table SHL-3. Summary of Effects to Streaked Horned Lark Critical Habitat

Time and location of potential exposure	Applicable actions	Potential stressors associated with applicable actions	Effects to physical and biological features of critical habitat
<u>Seasonality</u>: Year-round <u>Critical Habitat Physical and Biological Features:</u> Areas having a minimum of 16% bare ground that have sparse, low-stature vegetation composed primarily of grasses and forbs less than 13 inches (33 centimeters) in height found in: Large (300-acre (120-hectare), flat (0–5 percent slope) areas within a landscape context that provides visual access to open areas such as open water or fields; or areas smaller than described in above, but that provide visual access to open areas such as open water or fields.	Use of vehicles or heavy machinery Staging area establishment and use Berms or other barriers; pits and trenches Manual or mechanical removal of oiled substrates Terrestrial vegetation cutting/removal	Clearing and trampling of vegetation Erection of barriers that limit site openness	Removal of low-stature vegetation, resulting in too much bare ground. This effect would likely be temporary, lasting weeks or months. Loss of open sight lines, resulting in the loss of the visual openness. This effect could be temporary or permanent, depending on whether the site is recontoured following response activities.

Cumulative Effects

Appendix J presents the cumulative effects analysis prepared for the BA that applies to all species and critical habitats contained in this opinion, including *Water Management, Urban and Agricultural Development,* and *Permitted Discharges.*

See the Cumulative Effects section for the streaked horned lark above.

Conclusion

The action agencies determined that the proposed action is not likely to adversely affect streaked horned lark critical habitat because overlap with action area is small and limited to temporary impacts to low-lying vegetation and sightlines in terrestrial areas, and spill response actions will not significantly alter the PBFs of streaked horned lark critical habitat. However, even if the expected adverse effects of spill response activities are not permanent, the temporary loss of these habitat values would not support a determination of insignificant effects. After reviewing the current status of the streaked horned lark critical habitat, the environmental baseline, the effects of the proposed action and conservation measures, and cumulative effects, it is our biological opinion that the proposed action, as described in this opinion, is not likely to destroy or adversely modify designated critical habitat for the streaked horned lark for the following reasons:

1. Oil spills are unlikely to occur in designated critical habitat. Most of the effects of spill response activities will result from staging areas and establishment of access routes adjacent to areas affected by spills.
2. The adverse effects of spill response to lark critical habitat will be temporary, generally caused by clearing or trampling vegetation. The "vegetation height" PBF will likely recover within months of the completion of the spill response action. Visual barriers created by berm construction or other land moving activities will temporarily degrade the "open landscape" PBF; these will recover as long as sites are recontoured following the completion of the response action.
3. CMs included in the project description, including USFWS participation in the ICS, where appropriate, and the requirement for resource monitors on site during spill response activities, will ensure that critical habitat is considered, and will minimize the likelihood of degradation of the PBFs of lark critical habitat.

Western Snowy Plover

Rangewide Status of the Western Snowy Plover

The western snowy plover (*Charadrius nivosus nivosus*) was listed as a threatened species on March 5, 1993 (58 FR 12864) under the ESA. For a detailed account of western snowy plover biology, life history, threats, demography, and conservation needs, refer to Appendix G. Threats identified in the listing have not substantially changed. However, the number of conservation actions and known populations and individuals have substantially increased rangewide. Based on our review of the current information, the western snowy plover retains the potential for recovery because its current range-wide condition conforms to the survival condition as defined by the USFWS (1998, pg. xviii) and summarized in the Analytical Framework section herein.

Status of the Western Snowy Plover in the Action Area

Appendix H presents general information about the environmental baseline that applies to all species and critical habitats addressed in this opinion, including the regulatory definition of environmental baseline, a discussion of *Oil (and Hazardous Substance) Facilities and Transport in the Action Area, Size and Types of Spills in the NW, Typical Response Time and Type, Influence of Spilled Material on Species Habitats in the Action Area,* and *Influence of Climate Change on Species Habitats in the Action Area*.

As described in detail in Appendix G or the species final listing rule (58 FR 12864), plovers inhabit coastal beaches from southwestern Washington to southern Baja California, Mexico. Within the action area, western snowy plovers depend on open sandy or saline habitats adjacent to coastal waters. Western snowy plovers forage on invertebrates in the intertidal zone, wrack line, and dry sandy areas above the high tide line, sparsely vegetated dunes, salt pans, and the edges of salt marshes. Snowy plovers nest in depressions in open, relatively flat areas, near tidal waters but far enough away to avoid being inundated by daily tides. Snowy plovers are often associated with the mouths of rivers where sand is kept free from vegetation due to winter movement of sand and areas where winter storms create openings through the foredune. Steep rocky shores, jetties and nearshore rocks are not considered habitat. The majority of suitable snowy plover habitat occurs in the southern half of both states; however, as the population has grown, plovers are dispersing into new wintering and breeding areas in both states, particularly along the north coast of Oregon, which was mostly vacant until the last few years.

Since intensive recovery efforts and monitoring began in 1990, the Oregon and Washington Coast population, which makes up Recovery Unit 1 (RU1), has generally been increasing with peak numbers in 2016. Specific population numbers are compiled for the last eight years in Table WSP-1. Currently, western snowy plover monitoring in Oregon is conducted through the Oregon Biodiversity Information Center (ORBIC) and by Washington Department of Fish and Wildlife and Willapa Bay National Wildlife Refuge staff in Washington. Distribution and abundance monitoring efforts include breeding and winter window surveys, and productivity monitoring. The breeding and winter window surveys provide an index of population size and minimum number of birds across RU1, but are not complete counts. Survey methods are described in Appendix J of the Western snowy plover Recovery Plan (USFWS 2007b, entire Appendix J).

Table WSP-1. Estimated breeding adult population observed in Washington and Oregon (2011 to 2018); (Lauten et al. 2018, pp. 4-5; Novack et al 2018, pg. 9; and 2018 unpublished data).

Year	Washington	Oregon	WA/OR combined
2011	31	233	278
2012	33	274	326
2013	43	299	347

Year	Washington	Oregon	WA/OR combined
2014	41	327	368
2015	77	449	526
2016	93	518	611
2017	78	468	546
2018	81	489	570

Breeding window surveys have been conducted regularly in southern Oregon since 1990 with increasing regularity at suitable beaches on the north coast of Oregon. More intense productivity surveys in Oregon are conducted by ORBIC personnel and are primarily focused in historically important sites along the southcentral coast that support the majority of nesting plovers. The western snowy plover population has been monitored in Washington since 2007 and results are reported annually by WDFW (Novack et al. 2018, entire).

Wintering plovers are being encountered regularly along the north coast of Oregon with a few new breeding plovers at some of the same sites. This is a very predictable pattern in reestablishment of western snowy plover nesting, that is comprised of: (1) initial winter use, (2) increased winter use, (3) flocks of winter and migrating western snowy plovers observed, and (4) attempted nesting (often unsuccessful), and (5) successful recolonization of the site with increasing numbers of breeding birds.

During the 2019 winter window surveys, the three northernmost counties in Oregon experienced increased numbers of wintering western snowy plover.

Factors Affecting the Species' Environment in the Action Area

The baseline for consultation includes State, tribal, local and private actions already affecting the species or that will occur contemporaneously with the consultation in progress. Unrelated Federal actions affecting the species or critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are Federal and other actions within the action area that may benefit listed species or critical habitat. Other Federal actions affecting the western snowy plover or its designated critical habitat that required previous formal section 7 consultation include: USACE's rehabilitation of the south jetty of the Columbia River; USDA Forest Service's special use permit for C&M stables; OPRD's management plans for western snowy plovers at their managed beaches, the USFWS's issuance of 10(a)(1)(A) recovery permits and Section 6 funding of recovery actions. None of the section 7 consultations reached a jeopardy finding for western snowy plover or a finding of adverse modification of its designated critical habitat.

In Oregon, beaches are managed by OPRD as the Ocean Shore State Recreation Area. In Washington, coastal beaches are managed primarily by Washington State Parks and Recreation Commission. In general, both state agencies have conservation programs in place for plovers, however, ongoing recreation management, general beach management, and management of natural resources may still have some negative affects to western snowy plovers and their habitat.

Conservation Role of the Action Area

Recovery Unit 1 plays an important role in western snowy plover recovery with this area being the northern most historically occupied habitat and provides sites for the species to expand into and reoccupy as the population grows and recovers (USFWS 2007b, pg. 140). Under the recovery objectives set forth in the recovery plan (http://www.westernsnowyplover.org/recovery_plan.html) (USFWS 2007b, pg. 142), the role of RU1 to western snowy plover conservation is to provide for long-term protection and maintenance of breeding and wintering plovers and their habitat and to increase the number and productivity of breeding adult birds. Increasing western snowy plover numbers and productivity (i.e., fledglings per male) within the action area, increases the ability to withstand catastrophic events, and can increase its distribution and overall population within the recovery unit and rangewide.

Summary

Based on our review of current information regarding the species status in the action area, the western snowy plover populations in the action area retain sufficient resiliency and redundancy to offset patchy, temporary adverse impacts caused by natural or anthropogenic sources.

Effects of the Action on the Western Snowy Plover

Appendix I contains general information regarding effects of the action for all species and critical habitat addressed in this opinion, including the *Analytical Approach Used in the BA*, and *Environmental Fate and Toxicity of Dispersant and Dispersed Oil*.

The potential effects of the proposed action on the western snowy plover of the planned actions are listed in Table 2-2 of the NWACP BA (see Appendix E below) and are summarized by the likelihood of an effect in Table WSP-2.

Table WSP-2. Response activities from Table 2-2 in the NWACP BA (USEPA and USCG 2018, pp. 66-74; see Appendix E below) by potential for direct and indirect effect to western snowy plover and whether disturbance is likely. L=likely, U=unlikely.

Response Activity	Direct Effect	Disturbance	Indirect Effect
Supporting Actions Common to Most Responses			
Use of Vessel	U	U	U
Use of vehicle or heavy machinery	L	L	L
Staging area establishment and use	L	U	U
Foot traffic at spill site	L	L	L
Use of aircraft (wildlife and spill monitoring)	L	L	U
Solid waste management	L	L	L
Liquid waste management	L	L	L
Decontamination	U	U	U
Mechanical Countermeasures			
Deflection/Containment			
Booming; (containment, diversion, deflection, exclusion, recovery)	L	L	U
Berms, dams, barriers; pits and trenches	L	L	L
Culvert blocking	U	U	U
Recovery of Spilled Material			
Skimming/vacuuming	U	L	U
Passive collection of oil with sorbents (pads, sausage boom, pom-poms, peat)	L	L	U
Removal/Cleanup			
Manual removal of oil and oiled substrate using hand tools (rakes, shovels, scrapers)	L	L	U
Manual removal of oil and oiled substrate (with or without machinery; >1 inch)	L	L	U
Woody debris removal; terrestrial and aquatic cutting/removal, before or after oiling.	L	L	L
Ambient temperature, low pressure flooding/flushing	L	L	U
Pressure washing/steam cleaning or sand blasting	U	U	U
Physical herding	U	L	U
Non-mechanical Countermeasures			
Chemical dispersion	U	U	U
In situ burning	L	L	U
Other Response Actions			
Natural attenuation (w/ monitoring)	U	U	U
Places of refuge for disabled vessels	U	U	U
Non-floating oil recovery	U	U	U
Hazing and deterrence	L	L	U

Based on previous spill responses involving plovers, and activities described in the NWACP BA (USEPA and USCG 2018, pp. 77-94), response can be a complicated effort consisting of many different kinds of activities that have the potential to adversely affect plovers and their habitat. Spill responses may be short or long in duration based on the magnitude and extent of the spill and may affect wintering and/or breeding plovers depending on the timing of the incident. In addition, the nature of coordinating many people in an emergency response scenario means that conservation guidance is not always conveyed or received in a consistent manner, and thus will not always be followed in a consistent manner (USFWS 2002, pp. 19-21). Resource maps are provided and CMs are outlined in a little more detail in the GRP's, but the primary mechanism of conveying site-specific plover CMs is through communication with the USFWS's resource personnel involved in the ICS, where appropriate. To facilitate a summary of the effects of various response activities throughout the year, we have divided response activities into six categories summarized in Table 2-2 in the BA and Appendix E below. Detailed descriptions of each response action are presented in the NWACP BA (USEPA and USCG 2018, pp. 77-94). Where appropriate, separate discussions are provided for winter and breeding season effects.

Direct Effects to Plovers and their Habitat

Direct physical effects to western snowy plover from spill response activities would likely be in the form of crushing of nests and chicks, pushing (separating) adults from nests or chicks due to response personnel walking, driving vehicles or operating equipment directly on the intertidal or high beach in breeding areas; and response personnel and equipment altering habitat.

Plover nests and young are very cryptic to avoid predation, therefore they are susceptible to being stepped on by personnel. Vehicles can also directly crush nests and chicks, and when driven at night or at high speed, can crush adults. Since the chicks remain flightless for about 30 days after hatching, use the entire beach including the wet sand, and often collapse on the sand and remain motionless when confronted with a threat, they are particularly vulnerable to direct vehicle impacts. These types of adverse effects would be reduced through implementation of breeding season vehicle-related conservation measures provided through resource personnel via the ICS.

Habitat may also be impacted by response activities, particularly with heavy equipment. However, while beach impacts may be adverse within a given season, beaches are dynamic season to season and year to year, depending on how high and how frequently tides and storm surge reach the upper beach; therefore, response actions are not anticipated to have long-term negative impacts. Clearing vegetation and grubbing of staging areas generally would not be within the intertidal or immediate dry beach where plovers occur. However, cleared staging areas could eventually attract plovers to the site once response activities have ended. Long–term, if these new open areas are maintained to provide open sand habitat, they may be used by wintering or breeding plovers. Most of the construction activities associated with staging will occur above the Mean High Water level.

Disturbance

Personnel and equipment beach operations. The primary direct effect to western snowy plovers from spill response actions would likely take the form of disturbance. Response activities may occur at any time throughout the year and may be intense and long in duration. Personnel and equipment on or adjacent to the intertidal beach will have the potential to cause disturbance which will vary depending on the life history stage (i.e., breeding, non-breeding or wintering). Activity of personnel, vehicles and other heavy equipment that disturb breeding plovers could potentially cause flushing from nest sites exposing eggs to chilling or predators, nest abandonment, and preclusion from nesting areas. Impacts from disturbance to wintering plovers is not as dramatic but may include; flushing and exposing plovers to predators, and repeated flushing resulting in high energy expenditure and potential reduced fitness. Response activities that are set back beyond the intertidal and immediate dry beach zone that generate noise and visual activity from personnel and equipment would likely be screened by the foredune. Noise produced by response activities would also likely be muffled by the foredune and natural ambient noise of wind and waves near suitable habitat. In addition, plovers would likely avoid these areas while activity is high.

In addition to the disturbance and direct effects caused by the presence of response personnel and equipment, predators (e.g., corvids, gulls, raccoons, skunks foxes) will likely be attracted to human use and staging sites and other activities. Avian predators such as ravens, crows, gulls, and raptors could use materials and equipment as perches. This could increase the likelihood that an avian predator detects a plover and/or its nest, eggs, or chicks resulting in harm or death. Similarly, mammalian predators such as raccoon, coyote, weasel, mink, and others could utilize the stores materials for temporary shelter. This potential increase in mammalian predators could increase predation on western snowy plover nests and chicks. However, as part of establishing and maintaining staging areas, the USCG and EPA have proposed that there will be daily removal of all trash or anything that would attract wildlife to the site (BA, Table 2-2; Appendix E below). This effort is expected to minimize impacts associated with the presence of personnel and equipment.

In the winter, personnel walking and vehicles driving on the beach can flush roosting and foraging plovers. While the effects of disturbance on wintering plovers are not well understood, repeated disturbance or additional disturbance to oiled plovers would likely increase the risk or severity of stress and reduced fitness. Flushing plovers could also contribute to the birds re-locating to a more heavily oiled area, thereby increasing the risk of the plovers coming into direct contact with oil. Since timely and effective response activities require that vehicles be driven through foraging areas, it is possible that some disturbance to foraging plovers may occur despite general compliance with the conservation measures. Any such impacts would be unavoidable and would be minimized by maintaining low speeds and driving as close to the water as possible and safe. Some unavoidable disturbance may occur to adults or chicks that move out of areas closed to vehicles.

During the breeding season, personnel walking and vehicles on the beach can also be a source of disturbance that interferes with courtship, incubation, brood rearing, roosting, and foraging. Such disturbance leaves nests and chicks more vulnerable to predation, temperature extremes, and burial by blowing sand. Repeated or sustained disturbance often leads to nest abandonment.

Hazing and deterrence. Hazing is described as a response action or countermeasure taken very infrequently, and only in close coordination with the UC-Wildlife Branch and USFWS (EPA and USCG 2018, pp. 2-14, 2-27, 2-43, 2-44). The effects of intentional hazing of snowy plovers may occur in the shoreline, nearshore, or offshore marine environments. The recommendation to haze will be guided by site-specific and species-specific factors present at the time of the spill, and availability of proven hazing techniques. Operational guidelines and standard of care requirements in both marine and fresh waters include the following information referenced in the NWACP Section 9310 and 9311: USFWS Best Practices for Migratory Bird Care During Oil Spill Responses (USFWS 2003, entire), the Bird Hazing Manual: Techniques and Strategies for Dispersing Birds from Spill Sites (Gorenzel and Salmon 2008, entire). Any decision to employ intentional hazing where it is likely to directly expose and effect snowy plovers will require emergency consultation procedures, unless the party (or parties) directly implementing/executing this response action or countermeasure holds a valid, current Incidental Take Permit. However, while short-term significant adverse impacts to snowy plover are likely during the rare hazing event for a spill response lasting <4 days, use of deterrence methods described in the NWACP are expected to minimize the effects of hazing and significantly reduce exposure to oil or dispersed oil in the environment.

Aerial operations. During winter months, noise and the visual image of very low flying helicopters and other aircraft can disturb roosting and foraging plovers. During the breeding season, low flying aircraft can interrupt courtship, incubation, brood rearing, roosting, and foraging. Frequency and duration of flights over plover habitat will influence the magnitude of the effect. Landing helicopters in or very near plover nesting habitat can destroy nests and kill chicks through direct crushing, burial by blown sand, or abandonment. These types of effects should be almost entirely avoided through implementation of typical aircraft-related conservation measures recommended by resource managers. However, even with conservation measures in place, incidents of low flying aircraft over plover wintering and breeding beaches may, and have, occasionally occurred due to the complex nature of emergency spill response.

Water-based activities. If water based activities such as vessel use, boom deployment, chemical dispersants and *in situ* burning occur completely offshore then the primary concern for disturbance affects will be from access and mobilization that may occur on the adjacent beach. Explosions and smoke may potentially disturb plovers if immediately adjacent to the beach, however, if it's that close its likely disturbance by personnel will have pushed plovers away due to high levels of activity.

Equipment staging, vehicle access, and other upland-based activities. In order to execute timely and effective response efforts, some beach access routes would likely be improved and existing or newly created areas may be used for staging and equipment cleaning. These activities involve smoothing, compacting, and widening sand roads and enlarging pre-existing pull-outs. No paving, rocking, or other permanent improvements would occur. These activities are not anticipated to have any direct effects on plovers, but have the potential to create/enhance pedestrian and vehicle access to sensitive plover sites. Expanded public access increases the frequency and geographic extent of the kinds of impacts discussed in the Personnel and Equipment Beach Operations section of the BA. The magnitude of these types of indirect effects are proportional to the size of the response action. In the majority of spill events, relatively minor access improvements and smaller staging areas will be used over a shorter duration. These actions would be well within the scope of routine maintenance normally implemented by the agencies managing the beach access and are not anticipated to provide additional enhancement of public access. Larger spill responses would be the situations where staging and subsequent increases in beach access may be an indirect effect.

***In Situ* burning.** Offshore *in situ* burning would likely have minimal effect on snowy plovers since they are on the beach. Smoke could potentially be an impact but would likely be much less concentrated by the time it reaches the beach. In addition to the potential disturbance associated with *in situ* burns, little is known about the effects of smoke on plovers. As stated in the NWACP BA (USEPA and USCG 2018, pp. 2-42) smoke from burning oil is likely to contain toxic fumes. However, the personnel activity associated with burns on or adjacent to the beach is likely to push plovers away from the burn area. As a result, any direct effects from related onshore activity to roosting, foraging or breeding plovers is anticipated to be limited and unavoidable.

Summary of Effects to the Species

In summary, while oil spill response and clean up are typically beneficial to plovers and their habitat in the long-term, response activities as described in the NWACP BA (USEPA and USCG 2018, pp. 77-94) are anticipated to result in adverse effects to western snowy plovers and their habitat along the Washington and Oregon coasts. The magnitude and duration of spill specific response actions and the proximity to known plover wintering and breeding beaches will determine the extent of incidental take. The NWACP BA (USEPA and USCG 2018, pg. 411) outlines broad conservation measures that help avoid and minimize adverse effects to plovers but defers to the local area GRPs for more detailed information on sensitive locations, and avoidance and minimization measures. However, our review of several relevant coastal GRPs shows they do not have much more detail and may be out of date in terms of mapping current snowy plover wintering and breeding areas. From our experience (USFWS 2002, pg. 26) participating on spill response actions, the most important conservation action was the involvement of a USFWS or cooperator resource expert within the ICS (or response) chain of communication as resource advisors. This allowed the resource advisors to identify site specific avoidance areas and provide conservation measure to reduce adverse effects on plovers in areas where activities were unavoidable. Despite the ICS communication chain, some adverse effects are still likely to occur due to the complicated and sometimes chaotic nature of emergency spill response and the number of personnel and activities that can be involved.

We cannot predict the number of western snowy plovers that may be adversely affected by the proposed action, given that the majority of anticipated effects of disturbance are sub-lethal and that the locations of specific spill responses are not known. The majority of adverse effects of the proposed action will be in the form of disturbance to western snowy plovers, particularly during the breeding season. There is also the potential for some mortality of chicks and nests due to disturbance of adults and direct crushing by response personnel, vehicles and equipment. The increased noise and disturbance from staging areas, access points, and beach response activities may preclude western snowy plovers from attempting to nest until response activities decrease or conclude. This increase of noise and disturbance may also occur during the winter, potentially precluding western snowy plovers from using areas for wintering. As the Oregon and Washington (RU 1) population of western snowy plovers continues to increase and expand to new wintering and breeding areas, the likelihood of encountering plovers during spill response actions will increase.

The majority of adverse effects will be in the form of disturbance with some risk of adult and juvenile mortality and nest loss due to disturbance or crushing. It is very difficult to detect harm to individual plovers or to attribute any observed impacts to a specific cause: shorebird carcasses are rarely detected; evidence of the cause of nest loss and abandonment disappears very quickly; and disturbance effects from any one source act cumulatively with other sources of disturbance, predation, weather conditions, and other forces. Because snowy plovers nest at discreet locations along the coast of Oregon and southern Washington, local impacts could be significant while the overall population would likely be spared response activities in all but the most severe and widespread spills.

Cumulative Effects

Appendix J containpresents a cumulative effects analysis prepared for the BA that applies to all species and critical habitats contained in this opinion, including *Water Management, Urban and Agricultural Development,* and *Permitted Discharges.* There are likely to be non-Federal actions along the coasts of OR and WA, but we are currently unaware of specific actions.

Conclusion

After reviewing the current status of the western snowy plover, the environmental baseline, the effects of the proposed action including CMss, and cumulative effects, it is our biological opinion that the proposed action, as described in this opinion, is not likely to jeopardize the continued existence of the western snowy plover.

The proposed action is a necessary response action to reduce the negative impacts of oil and hazardous material spills on the environment and fish and wildlife resources. While the proposed response activities are likely to have adverse effects to western snowy plovers, the impacts from exposure to oil on plovers and their habitat have the potential to be much more significant depending on the volume and specifics of the spill. Specific avoidance and minimization measures are primarily conveyed via the USFWS's biological resource expert participating in the ICS, where appropriate.

This finding of no jeopardy for the western snowy plover is supported by the following:

1. Though there may be a small number of individuals (adults, juveniles or eggs) killed due to the response activities, the majority of adverse effects to western snowy plover from the proposed action will be in the form of temporary disturbance and habitat degradation. These disturbance effects will occur mainly through visual and auditory disturbance associated with human, vehicle and equipment response activities directly on the beach.
2. CMs included in the project description, including USFWS participation in the ICS, where appropriate, and the requirement for resource monitors on-site during spill response activities, will ensure that effects to western snowy plovers from disturbance, habitat destruction and injury/death are minimized. From our experience on past, large spills, biological resource personnel in the ICS provide specific CMs that are broadly effective in avoiding and minimizing adverse effects to plovers during response actions.
3. Oil spill response activities are likely to affect relatively small, discreet areas supporting western snowy plovers, thus not likely to threaten multiple breeding sites throughout the recovery unit. The effects of spill response will likely be temporary and limited in scope, and therefore not likely to permanently reduce reproduction, numbers or distribution of the species.

Western Snowy Plover Critical Habitat

Rangewide Status of Western Snowy Plover Critical Habitat

Previous Federal actions regarding the western snowy plover can be found in the December 7, 1999 final rule to designate critical habitat for the western snowy plover (64 FR 68508). Following designation in 1999, legal challenge, and revisions (September 29, 2005, 70 FR 56970), we published the final rule designating revised critical habitat for the western snowy plover on June 19, 2012 (77 FR 36727; USFWS 2012). In the 2012 final rule, a total of 24,527 acres (9,926 ha) of revised critical habitat were designated within the western snowy plover's historical range, across 60 units in Washington, Oregon, and California. The acreage breakdown by State is as follows: Washington, 6,077 acres (2,460 ha); Oregon, 2,112 acres (856 ha); and California, 16,337 acres (6,612 ha).

The revised final designation constituted an increase of approximately 12,377 acres (5,009 ha) from the 2005 designation of critical habitat for the western snowy plover (USFWS 2012, pg. 36728). We designated specific areas outside the geographical area occupied by the species at the time of listing because such areas are essential for the conservation of the species, are within the western snowy plover's historical range. One objective of the revised final rule was to identify and protect those habitats that we determined would provide resiliency for western snowy plover in the face of the effects of climate change on habitat. We selected some areas within occupied units that, once restored would be able to support the western snowy plover. These areas generally are upland habitats adjacent to beach and other areas used by the species containing introduced vegetation, such as European beachgrass, that currently limits use of the area by the species. These areas would provide habitat to off-set the anticipated loss and degradation of habitat due to sea-level rise expected from the effects of climate change or due to development. These areas previously contained and would still contain the physical and biological features essential to the conservation of the species once removal of the beachgrass and restoration of the area has occurred.

The physical and biological features (PBFs) essential for the conservation of the western snowy plover are derived from studies of this species' habitat, ecology, and life history. Based on the best available information (USFWS 2012, pp. 16051-16052), the PBFs essential to the conservation of the western snowy plover are the following: Sandy beaches, dune systems immediately inland of an active beach face, salt flats, mud flats, seasonally exposed gravel bars, artificial salt ponds and adjoining levees, and dredge spoil sites, with:

1. Areas that are below heavily vegetated areas or developed areas and above the daily high tides;
2. Shoreline habitat areas for feeding, with no or very sparse vegetation, that are between the annual low tide or low-water flow and annual high tide or high-water flow, subject to inundation but not constantly under water, that support small invertebrates, such as crabs, worms, flies, beetles, spiders, sand hoppers, clams, and ostracods, that are essential food sources;
3. Surf- or water-deposited organic debris, such as seaweed (including kelp and eelgrass) or driftwood located on open substrates that supports and attracts small invertebrates described

in PBF 2 for food, and provides cover or shelter from predators and weather, and assists in avoidance of detection (crypsis) for nests, chicks, and incubating adults; and,

4. Minimal disturbance from the presence of humans, pets, vehicles, or human-attracted predators, which provide relatively undisturbed areas for individual and population growth and for normal behavior.

Status of Western Snowy Plover Critical Habitat in the Action Area

Appendix H presents general information on the environmental baseline that applies to all species and critical habitats addressed in this opinion, including the regulatory definition of environmental baseline, a discussion of *Oil (and Hazardous Substance) Facilities and Transport in the Action Area, Size and Types of Spills in the NW, Typical Response Time and Type, Influence of Spilled Material on Species Habitats in the Action Area,* and *Influence of Climate Change on Species Habitats in the Action Area*.

Approximately 7,913 acres (3,205 hectares) of critical habitat are designated in Washington (5,801 acres (2,350 hectares)) and Oregon (2,112 acres (855 hectares)) and distributed among thirteen units located in Grays Harbor and Pacific counties, Washington, and Clatsop, Tillamook, Lane, Douglas, Coos and Curry counties, Oregon (Table WSP-1). The action area spans all of the CHUs within the RU1. Thirteen CHUs are designated within Recovery Unit 1 (four in Washington and nine in Oregon) (Table WSP-3), located between the Copalis Spit, Grays Harbor County, Washington and Euchre Creek, Curry County, Oregon. These units total approximately 7,913 acres. All CHUs provide crucial nesting habitat for western snowy plovers except CHUs OR-2, OR-4, OR-6, OR-8A and OR-13. CHU OR-2 has the potential to provide habitat for breeding western snowy plovers and connectivity between occupied areas in Washington and Oregon's south coast. CHUs, OR4, OR-6, and OR-13 historically supported nesting western snowy plovers and may again support western snowy plovers with intensive management to restore habitat and manage predators and recreation. CHU OR-8A was designated to protect wintering western snowy plovers that use the area. The action area encompasses the entirety of these CHUs. However, snowy plover numbers have continued to increase and disperse throughout the RU and are now wintering and attempting to breed again at some historical sites including CHUs OR-2 and OR-6.

Table WSP-3. Western snowy plover designated CHUs, Oregon and Washington (USFWS 2012, entire).

CHU	Subunit	Unit Name	Acres (ha)
WA-1		Copalis Spit	407 (165)
WA-2		Damon Point	673 (272)
WA-3	A	Midway Beach	692 (282)
	B	Shoalwater (Graveyard Spit)	425 (172)
WA-4	A	Leadbetter Point	2700 (1093)
	B	Gunpowder Sand	904 (366)
Subtotal Washington			**5,801 (2,350)**
OR-2		Necanicum River Spit	11 (4)
OR-4		Bayocean Spit	201 (82)
OR-6		Sand Lake South	5 (2)
OR-7		Baker/Sutton Beaches	276 (112)
OR-8	A	Siltcoos Breach	15 (6)
	B	Siltcoos River Spit	116 (47)
	C	Dunes Overlook/Tahkenitch Creek Spit	383 (155)
	D	North Umpqua River Spit	59 (24)
OR-9		Tenmile Creek Spit	223 (90)
OR-10		Coos Bay North Spit	273 (111)
OR-11		Bandon to New River	541 (219)
OR-13		Euchre Creek	9 (4)
Subtotal Oregon			**2,112 (855)**
Total Recovery Unit 1			**7,913 (3,205)**

Effects of the Action on Western Snowy Plover Critical Habitat

Appendix I presents general information regarding effects of the action for all species and critical habitat addressed in this opinion, including the *Analytical Approach Used in the BA*, and *Environmental Fate and Toxicity of Dispersant and Dispersed Oil*.

Adverse effects to the PBFs of designated critical habitat for the western snowy plover are likely to occur; however, impacts are anticipated to be short lived. Cleared vegetation such as European beach grass will recolonize staging areas in a couple years if not maintained specifically for more open sand plover habitat. Adverse effects are anticipated from response personnel and equipment activity on beaches and from removing oiled woody material and natural beach detritus from the beach and otherwise altering the landscape with equipment. Because plover habitat is very dynamic from year to year, it is anticipated that the adverse effects from spill response actions on plover critical habitat will not persist long-term as winter storms redeposit woody material for cover and other organic detritus/features of habitat supporting invertebrates for foraging.

Habitat that is protected from disturbance is among the PBFs essential to plover conservation that were considered in designating CH. As discussed above, much of the disturbance inherent in response efforts is unavoidable and should be minimized to the extent possible by following specific resource staff CMs addressed in this opinion made through the ICS chain of communication.

Cumulative Effects

Appendix J presents the cumulative effects analysis prepared for the BA that applies to all species and critical habitats contained in this opinion, including *Water Management, Urban and Agricultural*

Development, and *Permitted Discharges*. There are likely to be non-Federal spill response actions along the coasts of OR and WA, but we are currently unaware of specific actions.

Conclusion

After reviewing the current status of western snowy plover critical habitat, the environmental baseline, the effects of the proposed action and conservation measures, and cumulative effects, it is our biological opinion that the proposed action, as described in this opinion, is not likely to destroy or adversely modify critical habitat for the western snowy plover.

This finding of no destruction or adverse modification of critical habitat is supported by the following:

1. The adverse effects of spill response to designated critical habitat will be temporary, generally caused by personnel and equipment activity to contain and collect spilled material and removing oiled woody material and beach debris used by plovers for nesting and foraging. The foraging and nesting areas of the beach will typically be "reestablished" during seasonal high tides and winter storm surge. The seasonally dynamic nature of beach habitat is what keeps it free from dense vegetation and provides cover from predators and invertebrates for foraging.
2. CMs included in the project description, including USFWS participation in the ICS, where appropriate, and the requirement for resource monitors on-site during spill response activities, will ensure that critical habitat is considered, and are likely to minimize the potential for spill response actions to degrade the PBFs of plover critical habitat.
3. Oil spill response activities are not likely to appreciably diminish the conservation value of the designated CHUs within the action area, nor will it reduce the conservation value of the designated critical habitat elsewhere in RU1 because the effects of spill response actions are likely to be temporary and the affected habitat will typically be "reestablished" during seasonal high tides and winter storm surge.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined under section 3(19) of the ESA to mean "…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 the Service as an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered to be a prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS). An exception to this procedure is associated with take caused by Federal agency responses to emergency circumstances under emergency consultation procedures at 402.05 as discussed below.

Amount or Extent of Take

Based on the Effects of the Action analysis above, incidental take of the subject species is reasonably certain to occur in the form of harm in conjunction with implementation of emergency response actions by the Federal action agencies. However, the amount or extent of that take at the scale of this programmatic action cannot be quantified because the site-specific details of where, when and how often listed species are likely to be exposed to the stressors of spill response activities will not be known until a spill(s) occurs within the action area.

During an emergency response, the Service will provide technical assistance to the action agencies, when it is requested, while respecting the need to give top priority to protecting and providing for human health and safety.

Once the emergency is under control, as soon as practicable, the action agencies are required under 402.05 to initiate formal consultation, if the action likely resulted in adverse affects, and to submit information on the nature of the emergency action(s), the justification for the expedited consultation, and the specific impacts to listed species and their habitats caused by spill response actions.

The proposed programmatic action was developed to inform implementation of spill response actions in a manner that avoids and minimizes adverse effects to listed species to ensure compliance with the requirements of section 7(a)(2) of the ESA. As discussed above in the Conclusion sections above, that objective is likely to be achieved.

In accordance with national policy set forth in the Consultation Handbook (USFWS and NMFS 1998), an ITS does not accompany a biological opinion addressing a post-emergency formal consultation because the Services do not have the authority under the ESA to provide take exemptions after-the-fact. The biological opinion resulting from an emergency response action will account for any take caused by the action, and any measures taken to minimize those impacts. Such impacts will added to the baseline for the status of the species to inform future consultations.

For all of the above reasons, no take exemptions are provided in this ITS.

Effect of the Take

In the accompanying biological opinion, the USFWS determined that anticipated take of the Spalding's catchfly, Bliss Rapids snail, Oregon spotted frog, bull trout, Kootenai River white sturgeon, marbled murrelet, streaked horned lark, and the western snowy plover is not likely to jeopardize the continued existence of the above species.

Reasonable and Prudent Measures

Since the amount or extent of incidental take is not specified, no reasonable and prudent measures are appropriate.

Terms and Conditions

Since no Reasonable and Prudent Measures are required, there are no Terms and Conditions.

The Service is to be notified within three working days upon locating a dead, injured or sick endangered or threatened species specimen. Initial notification must be made to the nearest U.S. Fish and Wildlife Service Law Enforcement Office. Notification must include the date, time, precise location of the injured animal or carcass, and any other pertinent information. Care should be taken in handling sick or injured specimens to preserve biological materials in the best possible state for later analysis of cause of death, if that occurs. In conjunction with the care of sick or injured endangered or threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed. Contact the U.S. Fish and Wildlife Service Law Enforcement Office at (503) 682-6131, or the Service's Columbia-Pacific Northwest Regional Office at (503) 231-6131.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery programs, or to develop new information on listed species.

The USFWS recommends the following conservation measure be implemented, in addition to those listed in the BA:

As stated in the BA and proposed action section above, at this time, there are limited wildlife operations protocols for inland or fresh water response (e.g., there is no plan in the NWACP for hazing or moving fish that may be affected by a spill in a river). We recommend the action agencies to work with the wildlife agencies to review and seek improvements (e.g., obtain authorizations under section 10(a)(1)(A) of the ESA), as needed, to wildlife branch operational protocols, including but not limited to the following:

- Use all necessary methods to work with the USFWS to obtain pre-authorization for hazing of MBTA and ESA-listed birds, in an effort to ensure intentional hazing or herding of listed species addressed in the accompanying biological opinion is done only by individuals who are authorized and carrying Federal hazing permits.
- Use all necessary method to ensure intentional handling, herding, or removal of individuals or nests of species covered in the accompanying opinion is done by individuals who are authorized and possess proper permits.
- Also note that the links relating to wildlife hazing and care of oiled wildlife provided in the NWACP are no longer functional; it is not uncommon for an "url" to change or for documents to be removed. Therefore, we recommend local document links in all cases.

Utilize existing processes and protocols and including appropriate job aids for to ensure timely input from wildlife/ species experts during any future response action which may expose listed species to significant effects from response activities addressed in the above biological opinion, including as follows:

- Department of the Interior, Regional Ecosystem Officer, Portland, Oregon, for any and all official notifications of emergency consultation subject to the current notification procedures.
- Kootenai River in Idaho: Director, Fish and Wildlife Hatchery Program, Kootenai Tribe of Idaho; Assistant State Supervisor, Idaho Fish and Wildlife Office – Spokane.
- Assistant State Supervisor, Idaho Fish and Wildlife Office - Boise for input to the EU during any response that may involve the Snake River or tributaries in Idaho.
- Director, Washington Department of Fish and Wildlife, Department of Ecology, Spills Program – for any spills requiring pre-approved use of dispersants.
- Deputy State Supervisor, Oregon Fish and Wildlife Office, Portland for any spills requiring the pre-approved use of dispersants.

Use existing processes and protocols to ensure monitors are present to ensure Best Management Practices and CMs are implemented and reported as necessary to impacts are not exceeded for any species or critical habitat addressed in this consultation.

For any future response actions, we recommend the USCG or EPA utilize existing processes and protocols to provide an annual list of the location and timing and activities utilized, and any Best Management Practices and CMs are utilized to avoid or minimize impacts to listed species and critical habitat.

As stated in the BA, in accordance with the national MOA, the USFWS is encouraged to participate in planning and developing response methods for incorporation into the NWACP, guidance documents, and in periodic response training. We recommend the action agencies continue to work with the wildlife agencies to review and seek improvements, as needed, to wildlife branch operational protocols involving listed species and critical habitat.

As stated in the BA, revisions to GRPs are made at any time, and the states have begun working with the USFWS to improve integration of details about listed species and habitats. The action agencies should continue to encourage timely updates to GRPs (described in Section 1.2.2 of the BA and above) to these plans to include specific considerations for ESA-listed species and habitats.

REINITIATION NOTICE

This concludes the consultation on the proposed action. As provided in 50 CFR § 402.16(a), reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (1) if the amount or extent of taking specified in the incidental take statement is exceeded; (2) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or (4) if a new species is listed or critical habitat designated that may be affected by the identified action.

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Appendix A: Conservation Measures and May Effect - Not Likely to Adversely Affect Concurrence Determinations

Conservation Measures

The proposed action consists of federalized responses to spills of oil or petroleum to water, or of other hazardous materials that pose a risk of immediate impacts to human health and/or the environment. The proposed action includes a hierarchy of scaled responses, but the most common and predictable scenarios are generally on constrained temporal and spatial scales (e.g., spill response durations for the purpose of this consultation are limited to up to 4 days.

Where the action agencies command, control, and/or coordinate the selection, prioritization, and implementation of specific countermeasures (also "response actions", "tools", "BMPs", "strategies"), they must do so in compliance with specific administrative and decision-support requirements. These include notification to, and consultation technical assistance from, the natural resource Trustees (the USFWS included), Regional Response Team 10 approval or authorization for non-standard and/or non-pre-authorized countermeasures (e.g., use of inland *in situ* burning, use of chemical dispersion outside the pre-authorized off-shore zone), and Emergency Section 7 Consultation procedures (EPA and USCG 2018, pp. 1-2 through 1-7, 1-12 through 1-21).

Responses to spills of hazardous material (oil, petroleum, other) are typically first implemented by and at the direction of local, first responders. The EPA and USCG have described the role of GRPs, and how GRPs relate to the NWACP (2018, pp. 1-7 through 1-11).

The proposed action includes conservation measures (CMs) that have been identified by the EPA and USCG to avoid and minimize impacts to species and habitats during spill response (2018, Table 2-2, pp. 2-17 through 2-28; see Appendix E below). For sensitive aquatic species and habitats (freshwater, estuarine, and marine), Appendix A – Conservation Measures, Table A (below) lists and describes the full set of proposed CMs.

Terrestrial/Upland

Conservation measures for terrestrial/upland species and habitats are summarized as follows:

<u>Use of vehicles or heavy machinery</u>

"The use of heavy machinery is rare; when necessary, its use will take into consideration sensitive habitats … based on presence and distribution of fish and wildlife in the area, and avoid these areas when possible … Consult GRPs, if established for the response area, to set staging area[s] in location[s] already identified for the purpose, and having minimal additional impact on threatened and endangered species [or] designated critical habitat" (p. 2-17).

Staging area establishment and use

"Construct new access points only when no other options are available to reach the location (emergency consultation may be necessary) … If new access points are needed, conduct preliminary survey to determine best route … Locate staging area and support facilities in the least sensitive area possible (use areas identified in GRPs, if available) … Special restrictions should be established for sensitive areas where foot traffic and equipment operation may be damaging, such as soft substrates … Do not cut, burn, or otherwise remove vegetation unless specifically approved by the EU" (p. 2-18).

Foot traffic at spill site

"Walk on durable surfaces to the extent practicable; restrict foot traffic from sensitive areas … to reduce the potential for damage; use plywood or other material to reduce compaction" (p. 2-18).

Solid waste management

"Establish temporary upland collection sites for oiled waste materials for large spill events; collection sites should be lined and surrounded by berms to prevent secondary contamination from run-off … Coordinate the locations of any temporary waste staging or storage sites with the EU" (p. 2-19).

Liquid waste management

"Coordinate the locations of any temporary waste staging or storage sites with the EU" (p. 2-19).

Berms, dams, or other barriers; pits and trenches

"Coordinate with the Services [USFWS and NMFS]… Contact the EU to determine if any permits are required ... Restrict use and closely monitor operations in sensitive habitats … Minimize erosion and sediment runoff using engineered controls (e.g., silt fences and settling ponds) … Remove structures and fill trenches once response action is completed" (p. 2-21).

Terrestrial and aquatic cutting/removal of vegetation (before or after oiling)

"Resource experts are … consulted … prior to vegetation cutting … Strict monitoring of the operations must be conducted to minimize the degree of root destruction and mixing of oil deeper into the sediments … Concentrate removal on vegetation and wood debris that is moderately to heavily oiled; leave lightly oiled and clean vegetation and wood debris in place" (p. 2-24).

In situ burning

"Requires [RRT 10] approval prior to use … Prior to an *in situ* burn, a survey must be conducted to determine if any threatened or endangered species are present or at risk from burn operations, fire, or smoke … A Net Environmental Benefit Analysis would be conducted to evaluate the possible risk to species in the area of the *in situ* burn and compare it to the risk of not using *in situ* burning …

Provisions must be made for mechanical collection of burn residue following any burn(s) (e.g., collection with nets, hand tools, or strainers)" (p. 2-26).

Aquatic

Table A. Conservation measures, by response action or countermeasure category (based on EPA and USCG 2018, pp. 2-17 through 2-28).

Response Action or Countermeasure Category	Conservation Measures
Use of vessels	The use of vessels would take into consideration sensitive habitats (e.g., nesting areas or spawning areas) based on presence and distribution of wildlife such as birds and mammals (to the extent that information is available in GRPs), and avoid these areas when possible. Observe instructions in GRPs that outline boat and watercraft use restrictions within 183 m (200 yards) of National Wildlife Refuge sites or other sensitive areas. Obtain maps of sanctuary zones and vessel BMPs and [Standards of Practice] for marine mammals. Do not stage boats such that shoreline vegetation is crushed. Boats should not rest on or press against vegetation at any time. Avoid anchor or prop-scarring of submerged vegetation. Maintain a buffer of at least 91 m (100 yards) from marine mammals (e.g., whales) and 183 m (200 yards) from Southern Resident Killer Whales. Do not move into the path of whales. If approached by a marine mammal, put the engine in neutral and allow it to pass.
Use of vehicles or heavy machinery	Minimize traffic through oiled areas on non-solid substrates (e.g., sand, gravel, dirt) to reduce the likelihood that oil will be worked into the sediment. The use of heavy machinery is rare; when necessary, its use will take into consideration sensitive habitats (e.g., nesting areas or spawning areas) based on presence and distribution of fish and wildlife in the area and avoid these areas when possible.

Response Action or Countermeasure Category	Conservation Measures
	Consult GRPs, if established for the response area, to set staging area in location already identified for the purpose and having minimal additional impact on threatened and endangered species and designated critical habitat. Generally, vehicles are used on sand beaches and restricted to transiting outside of the oiled areas along the upper part of the beach. Use vehicles near listed plants or wildlife only if the benefits outweigh potential impacts.
Staging area establishment and use	Use same access point for repeat entries. Construct new access points only when no other options are available to reach the location (emergency consultation may be necessary). If new access points are needed, conduct preliminary survey to determine best route. Locate staging area and support facilities in the least sensitive area possible (use areas identified in GRPs, if available). Special restrictions should be established for sensitive areas where foot traffic and equipment operation may be damaging, such as soft substrates. Establish work zones and access in a manner that reduces contamination of clean areas. Observe species-specific buffer zones (e.g., 91 to 183 m (100 to 200 yards) for marine mammals, see Section 4) when planning and implementing response action. Remove all trash or anything that would attract wildlife to the site daily. Do not cut, burn, or otherwise remove vegetation unless specifically approved by the EU. Do not attempt to capture oiled wildlife. Report oiled wildlife sightings to the Wildlife Hotline.
Foot traffic at spill site	Restrict access to specific areas for periods of time to minimize impacts on sensitive biological populations (e.g., nesting, breeding, or fish spawning).

Response Action or Countermeasure Category	Conservation Measures
	Walk on durable surfaces to the extent practicable; restrict foot traffic from sensitive areas (e.g., marshes, shellfish beds, salmon redds, algal mats, bird nesting areas, dunes, etc.) to reduce the potential for damage; use plywood or other material to reduce compaction. Minimize foot traffic through oiled areas on non-solid substrates (sand, gravel, dirt, etc.) to reduce the likelihood that oil will be worked into the sediment.
Use of aircraft	Observe flight restriction zones specified in the GRPs, including minimum ceiling height (altitude of 305 m [1,000 ft.] above ground is advised) and distance from known or suspected wildlife areas (e.g., nesting areas) in order to reduce wildlife exposure to noise or presence of airplanes or helicopters.
Solid waste management	Oregon and Washington require that responders develop a waste management plan in accordance with the local [Area Contingency Plan] (or RCP in the absence of an ACP) that describes how waste will be stored and handled and how the possibility for disposed wastes to cause future environmental damage will be minimized. Solid waste management must be addressed in the disposal plan. Follow standard protocols for waste management actions. Waste accumulation and storage locations should meet the following criteria: spill prevention, control, and countermeasures are in place; storm water pollution prevention plans have severe weather contingency plans; ample storage for segregation of wastes; and, an emergency response plan for waste accumulation/storage locations. Access to waste is restricted (temporary and semi-permanent). Waste disposal plans describe the waste tracking system. Reporting system should be established (temporary and semi-permanent). Maintain adequate response equipment during waste

Response Action or Countermeasure Category	Conservation Measures
	management actions to respond quickly and appropriately to re-release of pollution. Establish temporary upland collection sites for oiled waste materials for large spill events; collection sites should be lined and surrounded by berms to prevent secondary contamination from run-off. Coordinate the locations of any temporary waste staging or storage sites with the EU. Separate and segregate any contaminated wastes generated to optimize waste disposal stream and minimize what has to be sent to hazardous waste sites.
Liquid waste management	Liquid waste management must be addressed in the disposal plan. Follow standard protocols for waste management actions. Maintain adequate response equipment during waste management actions to respond quickly and appropriately to re-release of pollution. Minimize the amount of water collected during skimming.
Liquid waste management	The response contractor or responsible party will seek approval from the FOSC and/or SOSC prior to decanting. All decanting in a designated “Response Area” within a collection area, vessel collection well, recovery belt, weir area, or directly in front of a recovery system; a containment boom will be deployed around the collection area, where feasible, to prevent the loss of decanted oil or entrainment of species in recovery equipment. Decanting shall be monitored at all times, so that discharge of oil in the decanted water is promptly detected. Where feasible, decanting will be done just ahead of a skimmer recovery system so that discharges of oil in decanting water can be immediately recovered. Coordinate the locations of any temporary waste staging or storage sites with the EU.

Response Action or Countermeasure Category	Conservation Measures
Decontamination	Decontamination areas for personnel and equipment must be addressed in the disposal plan. A decontamination/exclusion zone will be set up at each staging area. The area will be plastic lined to prevent pollution from oiled [Personal Protective Equipment] and equipment. Oiled PPE and equipment will be collected in plastic barrels. Maintain adequate response equipment during decontamination to respond quickly and appropriately to re-release of pollution. The placement and containment of materials from decontamination is an important consideration during spill response, so safety controls and proper disposal areas are used to significantly reduce the risk that oil would re-enter the environment.
Booming	Boom strategies in the GRPs are designed to consider species occurrence and habitat use, to the extent possible. Monitor for the presence of marine mammals and seabirds. Ensure that EU provides information on possible presence and impacts to ESA-listed (protected) species or critical habitats.
Booming	To the extent practicable, and when practicable, observe species-specific buffer zones (e.g., 91 to 183 m [100 to 200 yards] for marine mammal) when planning and implementing response action. Evaluate need to restrict access to sensitive habitats (e.g., nesting areas or spawning areas) based on presence and distribution of wildlife such as birds and mammals. Arrange booms to minimize impacts to wildlife and wildlife movements. Locate boom anchors using strategies identified in GRPs, if available.

Response Action or Countermeasure Category	Conservation Measures
Berms, dams, or other barriers; pits and trenches	Coordinate with the USFWS. Contact the EU to determine if any permits are required. Restrict use and closely monitor operations in sensitive habitats. Line the bottom of trenches that do not reach the water table (dry) with plastic to prevent the collected oil from penetrating deeper into the substrate. Minimize erosion and sediment runoff using engineered controls (e.g., silt fences and settling ponds). Minimize suspension of sediment to limit effects on water quality. Remove structures and fill trenches once response action is completed. Coordinate with the USFWS prior to constructing underflow dams.
Culvert blocking	Monitor water quality and sufficient flow downstream of barriers. Evaluate need to restrict access to sensitive habitats (e.g., nesting areas or spawning areas) based on presence and distribution of wildlife such as birds and mammals. To the extent practicable, and when practicable, observe species specific buffer zones (e.g., 91 to 183 m [100 to 200 yards] for marine mammals) when planning and implementing response actions. Minimize erosion and runoff using engineered controls (e.g., silt fences and settling ponds). Remove structures once completed.
Skimming/vacuuming	Use methods that minimize the amount of water relative to oil taken in (e.g., flat-head nozzle [duckbill] and skim/vacuum at water surface only). Operations in sensitive areas (e.g., marshes, submerged aquatic vegetation, worm beds) must be very closely monitored, and a

Response Action or Countermeasure Category	Conservation Measures
	site-specific list of procedures and restrictions must be developed to minimize damage to vegetation. Adequate storage for recovered oil/water mixtures, as well as suitable transfer capability, must be available. Position intake to minimize plankton and larvae entrainment. To the extent practicable, and when practicable, observe species-specific buffer zones (e.g., 91 to 183 m [100 to 200 yards] for marine mammals, see Section 4) when planning and implementing response actions.
Passive collection of oil with sorbents	Retrieval of sorbent material, and at least daily monitoring to check that sorbents are not adversely affecting wildlife or breaking apart, are mandatory. Coordinate with the EU for corrective actions if entrapment of small crustaceans is observed. Continually monitor and collect passive sorbent material to prevent it from entering the environment as non-degradable, oily debris. Follow appropriate cleaning and waste disposal protocols and regulations.
Manual removal of oil and oiled substrate using hand tools	Restrict sediment removal to supra and upper intertidal zones (or above waterline on stream banks) to minimize disturbance of biological communities. Minimize the amount of sediment removed with the oil. Sediments should be removed only to the depth of oil penetration. Protect nearby sensitive areas from increased oil runoff/sheening or siltation by the proper deployment of booms, siltation curtains, sorbents, etc.; monitor for effectiveness of protection measures.

Response Action or Countermeasure Category	Conservation Measures
	Do not remove clean wrack; instead, move large accumulations of clean wrack to above the high-water line to prevent it from becoming contaminated.
Mechanical removal of oil and oiled substrate with excavation, sediment reworking	Implement after the majority of oil has come ashore, unless significant burial (sand beaches) or remobilization is expected; implement between tidal cycles to minimize burial and/or remobilization of oil. Protect nearby sensitive areas from increased oil runoff/sheening or siltation by the proper deployment of booms, siltation curtains, sorbents, etc.; monitor for effectiveness of protection measures. Minimize the amount of oiled sediment removed by closely monitoring mechanical equipment operations. In areas prone to erosion, replace removed sediment or soil with clean sediment. Minimize erosion and runoff using engineered controls. Monitor for the presence of special status animals and plants. To the extent practicable, and when practicable, observe species-specific buffer zones (e.g., 91 to 183 m [100 to 200 yards] for marine mammals, see Section 4) when planning and implementing response actions.
Woody debris removal; Terrestrial and aquatic cutting/ removal of vegetation (before or after oiling)	Resource experts are routinely consulted regarding these concerns prior to vegetation cutting activities. Strict monitoring of the operations must be conducted to minimize the degree of root destruction and mixing of oil deeper into the sediments. For plants attached to rock boulder or cobble beaches, sources of population recruitment must be considered. Access to bird nesting areas should be restricted during nesting seasons.

Response Action or Countermeasure Category	**Conservation Measures**
	Concentrate removal on vegetation and wood debris that is moderately to heavily oiled; leave lightly oiled and clean vegetation and wood debris in place. Do not remove clean, natural shoreline debris; instead, move large accumulations of clean debris to above the high-water line to prevent it from becoming contaminated.
Ambient temperature, low pressure flooding/flushing	Implement after the majority of oil has come ashore, unless significant remobilization is expected; implement between tidal cycles to minimize remobilization of oil.
Ambient temperature, low pressure flooding/flushing	Protect nearby sensitive areas, identified in the GRPs or under advisement of the USFWS, from increased oil runoff/sheening or siltation by the proper deployment of booms, siltation curtains, sorbents, etc.; monitor for effectiveness of protection measures. Use the lowest pressure that is effective and prevent suspension of bottom sediments (do not create a muddy plume). Conduct all flushing adjacent to marshes from boats. In marshes conduct at high tide either from boats or from the high-tide line to prevent foot traffic in vegetation. Closely monitor flooding of shorelines with fine sediments (mixed sand and gravel, sheltered rubble, sheltered vegetative banks, marshes) to minimize excessive siltation or mobilization of contaminated sediments into the subtidal zone. Prevent pushing or mixing oil deeper into the sediment by directing water above or behind the surface oil to create a sheet of water to remobilize oil to containment area for recovery. Restrict flushing in marshes during high tide above the high tide line to minimize mixing oil into the sediments or mechanically damaging plants.
Pressure washing/steam	Implement after the majority of oil has come ashore.

Response Action or Countermeasure Category	Conservation Measures
cleaning or sand blasting	Restrict use to certain tidal elevations so that the oil/water effluent does not drain across sensitive low-tide habitats. Closely monitor operations in sensitive habitats. If small volumes of warm water are used to remobilize weathered oil from rocky surface, include larger volume of ambient water at low pressure to help carry re-mobilized oil into containment area for recovery. Monitor booms and oil collection methods to prevent transport of oil and oiled sediments away from site to near shores and down coast. Monitor for wildlife such as birds and mammals (evaluate need for hazing); establish buffer zone (i.e., nesting areas, haul out areas, spawning areas). Avoid sensitive habitats (e.g., soft substrates, aquatic vegetation, spawning areas, etc.).
Physical herding	Monitor for the presence of wildlife and plants. Minimize erosion and runoff using engineered controls (to the extent practicable).
Chemical dispersion	Requires Regional Response Team approval prior to use unless in a Pre-Authorization Zone. Will never be used in the inland zone (i.e., in freshwater). The EU would prepare a Net Environmental Benefit Analysis to evaluate the potential risk to animals and habitats in the area compared to not using dispersants. Monitor wildlife; establish species-specific buffer zone(s); use in water with adequate volume for dilution; apply only under conditions known to be successful; use only chemicals that are approved for use; implement wildlife deterrent techniques as needed.

Response Action or Countermeasure Category	Conservation Measures
	SMART will be used to measure efficacy. SMART is a standardized monitoring program designed to monitor chemical dispersion and *in situ* burning activities. Follow dispersant policy checklist of environmental conditions which dictates favorable conditions for use. Aircraft should spray while flying into the wind and avoid spraying into strong crosswinds.
In situ burning	Pre-approved areas only. Prior to an *in situ* burn, an on-site survey must be conducted to determine if any threatened or endangered species are present or at risk from burn operations, fire, or smoke. A Net Environmental Benefit Analysis would be conducted to evaluate the possible risk to species in the area of the in-situ burn and compare it to the risk of not using in-situ burning. Protection measures may include moving the location of oil (in water) to an area where listed species are not present; temporary employment of hazing techniques, if effective; and physical removal of individuals of listed species only under the authority of the trustee agency. Provisions must be made for mechanical collection of burn residue following any burn(s) (e.g., collection with nets, hand tools, or strainers). SMART will be used to measure efficacy. SMART is a standardized monitoring program designed to monitor chemical dispersion and *in situ* burning activities.
Natural attenuation (with monitoring)	May consider relocation or hazing activities if appropriate. Minimize presence of people and equipment.
Places of refuge for	Follow the places of refuge decision matrix (NWACP Section

Response Action or Countermeasure Category	Conservation Measures
disabled vessels	9410) when human life is not at risk. EPA must be consulted on any off shore scuttling of a vessel. States, tribes, local governments, and other stakeholders will be conferred with on a case-by-case basis.
Non-floating oil recovery	Priority given to preventing, minimizing, and containing non-floating oils. Respond rapidly and aggressively to recover oils when on the surface (if safe to do so) before the oils start to sink.
Hazing and deterrence	Hazing or deterrence measures will be conducted only as necessary under in coordination with the USFWS. Hazing and deterrence will prevent direct injuries and chemical toxicity (associated with the spilled material) to wildlife at the expense of behavioral effects and temporary exclusion from resources. NMFS has granted pre-authorization to the FOSC to implement specific deterrence activities to prevent killer whales from entering oil (Section 9310).

The proposed action will, in all cases of response to spill, result in significant beneficial effects to the environment; containment, control, removal, and recovery of spilled hazardous material (oil, petroleum, other), with corresponding immediate and long term benefits to water, soil, and sediment quality. Site- and event-specific risks of spill have not been quantified in the BA, and may not be quantifiable with available information. Nevertheless, for species with a constrained geographic distribution, where few if any populations (or suitable habitat) are known to occur in the action area and close to the identified high-risk transportation corridors (oil/petroleum and hazardous material pipelines, rail corridors, commercial shipping waterways) (EPA and USCG 2018, pp. 2-1 through 2-5), probabilities of exposure and effects from spill response must be extremely low, and therefore the USFWS concludes that measurable effects are not reasonably foreseeable, or reasonably certain to occur. Our reasoning for these determinations is presented below.

May affect - Not Likely to Adversely Affect Concurrence Determinations

Introduction

The action agencies requested our concurrence with their determination that the implementation of the proposed action may affect, but is not likely to adversely affect (NLAA), several additional listed species and their proposed or designated critical habitat. During the consultation period, we evaluated each species and were able to determine that additional species and their critical habitat were NLAA. Our concurrence that the proposed action may affect, but is not likely to adversely affect these species and their proposed or designated critical habitat, including justifications for those determinations, are presented below; based on the proposed action as described in the biological opinion for the proposed action and related appendices, together with conservation measures also described above, that serve to avoid adverse effects to these species and their critical habitat.

Any and all emergency response activities that are described in the stand-alone GRPs (=local ACPs) are covered herein providing they are included in the BA or developed at a later date in a manner consistent with the BA proposed action description, as amended by the EPA/USCG, and providing their implementation does not result in new effects not previously considered in our NLAA concurrence.

Reinitiation Notice

This concludes the consultation and conference on the proposed action. You may ask the USFWS to confirm the conference concurrence for proposed slickspot peppergrass critical habitat as a biological concurrence if the critical habitat designated. The request must be in writing. If the USFWS reviews the proposed action and finds there have been no significant changes in the action as planned or in the information used during conference, the USFWS will confirm the conference concurrence as the biological concurrence on the project and no further section 7 consultation will be necessary on the programmatic action. Our 2019 ESA regulatory revisions (at 50 CFR Part 402) specify the written concurrence process in the criterion for reinitiation of consultation. This criterion references the information and analysis the USFWS considered, including conservation measures and other information submitted by the Federal agency and applicant, in the development of our written concurrence and not just the information contained within the below written concurrences. Failure to implement a measure proposed to avoid, minimize, or offset adverse effects could implicate those reinitiation triggers. As provided in 50 CFR § 402.16(a), reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (1) if the amount or extent of taking specified in the incidental take statement is exceeded; (2) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; 3) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or (4) if a new species is listed or critical habitat designated that may be affected by the identified action.

Applegate's milk-vetch

<u>Status, Life History and Habitat Requirements</u>

Applegate's milk-vetch *(Astragalus applegatei)* is a slender perennial in the pea family (Fabaceae). It was listed as endangered on July 28, 1993 (58 FR 40547). Critical habitat has not been designated for Applegate's milk-vetch. The species is a narrow endemic only found in Klamath County, Oregon (USFWS 1998), believed to occur only in the Lower Klamath Basin near the City of Klamath Falls in southern Oregon. According to the Oregon Department of Transportation (ODOT) (2015), this plant is present in only six known locations, three of which are small; two of the six occurrences are on state-protected land, and four are on private land, including one large patch on Nature Conservancy property (EPA and USCG 2018, Figure C-1 in Appendix C of the BA, see Appendix F below). Collectively, these sites support approximately 33,000 individuals (USFWS 2009). Additionally, two historical occurrences were noted where plants were thought to have been extirpated by agricultural practices (USFWS 1993).

The milk-vetch is a habitat specialist, so it is adapted to a narrow range of environmental conditions. It grows in flat, seasonally moist, alkaline soil with underlying clay hardpan. Historically, the species' habitat was characterized by sparse, native bunch grasses and patches of bare soil, allowing for some seed dispersal by wind. Today, dense coverage by introduced grasses and weeds has caused seed dispersal to become highly localized, with most seedling establishment found adjacent to mature plants (USFWS 1998).

<u>Presence in the Action Area: Known Locations in the Action Area</u>

Within the action area, this species is only present in Oregon. Observations of these plants have been made in three clusters near Klamath Falls and Midland, Oregon (Figure 4-2, Appendix D of the BA): one near and within the Klamath Regional Airport grounds, the second near Midland, Oregon, and the third within the Klamath Falls city limits. The majority of these observations are in relative proximity to or between two rail lines.

Effects of the Action

The location of the known occurrences of the species in the vicinity of rail lines in the action area does create potential for the plants to be subject to spills (rail transport will be the primary vector for spills in this area) and, therefore, subject to the spill response activities that are the subject of this opinion. It is possible that individual Applegate's milk-vetch plants could be removed, crushed, or destroyed when spill response actions include the use of off-road vehicles; soil disturbance from construction of barriers, pits, or trenches; creating or use of new access points; or access of personnel by foot traffic. However, these effects are very unlikely for the following reasons:

- The likelihood of a spill directly affecting one of the sites of occurrence of the species is minimal based on known and anticipated size, frequency and distribution of spills in the action area and the distance of some of the sites from the rail lines that would be the source of the spills. Spill response activities directly targeting sites of species occurrence are therefore unlikely.
- In the unlikely event that a spill were to directly affect a site of species occurrence, the impacts of the spill itself would harm many individual plants, seeds and habitat/soil conditions to the extent that they are no longer viable, thereby substantially minimizing the likelihood that subsequent spill response actions would be a meaningful source of additional harm.
- In the somewhat more likely event of a spill not directly affecting a site of species occurrence but occurring near or adjacent to the site, the potential for the associated spill response to directly or indirectly affect plants, seed and habitat conditions is minimal because—
    - The spill response would likely not require access to or through the occupied sites. Existing impervious surfaces within the town (e.g., roads and parking lots) are likely to provide the necessary infrastructure for a staging area for spill response near the first two clusters of observations, and the third cluster of observations is approximately 1.1 km (0.7 miles) west of a rail line, which is expected to be well away from any spill response associated with a potential incident involving the rail line.
    - The proposed action includes CMs that will substantially avoid and minimize impacts to plants, seeds and habitat conditions that are present.

The action agencies determined that the proposed action is likely to adversely affect the Applegate's milk-vetch, because response could result in crushing, destruction, or removal of individual plants or seeds (EPA and USCG 2018, Table 6-1). However, based on the above facts, the probabilities of exposure and effects to Applegate's milk-vetch from spill response activities are very low; measurable effects are not reasonably predictable or certain to occur. Accordingly, the USFWS concludes that the proposed action "may affect, but is not likely to adversely affect" Applegate's milk-vetch.

Literature Cited

EPA and USCG. 2018. Biological Assessment for the Northwest Area Contingency Plan for the Response to Spills of Oil and Hazardous Substances. Prepared for: United States Environmental Protection Agency Region 10 and United States Coast Guard Thirteenth Coast Guard District, July 2018. Prepared by: Windward Environmental LLC, and Ecology and Environment, Inc. 520 pp.

ODOT 2015. Oregon Department of Transportation statewide habitat conservation plan for routine maintenance activities. Oregon Department of Transportation, Salem, OR.

USFWS 1993. Determination of Endangered Status for the Plant Applegate's milk-vetch (*Astragalus applegatei*). US Fish and Wildlife Service, Boise, ID. (Federal Register Notice 58 FR 40547, July 28, 1993.)

USFWS 1998. Applegate's milk-vetch (*Astragalus applegatei*) recovery plan. US Fish and Wildlife Service.

USFWS 2009. Applegate's milk-vetch (*Astragalus applegatei*) 5 year review summary and evaluation. US Fish and Wildlife Service, Klamath Falls, OR.

Bradshaw's Desert-Parsley

Status, Life History, Habitat Requirements

The Bradshaw's desert-parsley (=Bradshaw's lomatium) *(Lomatium bradshawii)* was listed as endangered, without a designation of critical habitat, on September 30, 1988 (53 FR 38448). On November 26, 2019, Bradshaw's lomatium was proposed for delisting (84 FR 65067), because threats identified at listing have been substantively removed and the recovery criteria of a minimum of 20 populations with a total of 100,000 individual plants distributed across its historical range has been met.

Bradshaw's lomatium is perennial herb in the parsley family (Apiaceae) that blooms during April and early May, with fruits appearing in late May and June. This plant reproduces entirely from seed. Insects observed to pollinate this plant include a number of beetles, ants, and some small native bees.

The majority of Bradshaw's lomatium populations occur on seasonally saturated or flooded prairies, adjacent to creeks and small rivers in the southern Willamette Valley, on alluvial (deposited by flowing water) soils. Endemic to and once widespread in the wet, open areas of the Willamette Valley of western Oregon, Bradshaw's lomatium is limited now to occurrences in Lane, Marion, and Benton Counties. Most of its historic habitat has been destroyed by land development for agriculture, industry, and housing. In addition, water diversions and flood control structures have changed historic flooding patterns, which may be critical to seedling establishment. Reductions in natural flooding and fire cycles also permit invasion of trees and shrubs, and eventual conversion of wet prairies to woodlands.

There are currently greater than 11,000,000 Bradshaw's lomatium individuals across 24 known populations, made up of 71 known sites in Oregon and Washington. Of the 71 known sites, 51 are in either public ownership, public right-of-way, or are owned by a conservation-oriented non-governmental organization. Of the 20 remaining sites, 9 are under conservation easement or are enrolled in the Service's Partners for Fish and Wildlife Program, which provides technical and financial assistance to private landowners to restore, enhance, and manage private land to improve native habitat and conserve listed species. The vast majority of known Bradshaw's lomatium individuals (>10,000,000 plants) occur at a single site in southwest Washington (Clark County). Outside of this site, there are approximately 500,000 Bradshaw's lomatium plants distributed across 70 sites in Washington and Oregon.

The USFWS works actively with numerous governmental and nongovernmental partners to develop and maintain a supply of Bradshaw's lomatium seed for use both in augmenting existing population and to establish new populations in appropriate protected habitats. Numerous sites receive habitat management to reduce pressures from invasive plants and encroaching woody vegetation.

Presence in the Action Area

In Oregon, three population centers occur in Benton, Lane, Linn, and Marion Counties. Most of these populations are small, ranging from about 10 to 1,000 individuals. Between 1916 and 2015, only one (historical observation in 1916) was located within the Action Area (EPA and USCG 2018, Figure C-1 in Appendix C). In Washington, the species is documented in at only one known location, which occurs outside of the Action Area.

Effects of the Action

The NLAA determination in the BA relies primarily on the presence/absence of known occurrences of plants, with uncertain consideration of the presence or absence of potential suitable habitat that might represent currently occupied but unknown sites (EPA and USCG 2018, pg. 4-13). Therefore, it is possible that occurrences of the species may be present within the action area, so USFWS would not consider the potential for adverse effects to be discountable. However, the CMs implemented under the proposed action are likely to substantively reduce the potential for localized, low-magnitude, temporary impacts to actually occur, such that the risk of adverse impacts are insignificant. Accordingly, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the Bradshaw's desert-parsley.

Literature Cited

EPA and USCG. 2018. Biological Assessment for the Northwest Area Contingency Plan for the Response to Spills of Oil and Hazardous Substances. Prepared for: United States Environmental Protection Agency Region 10 and United States Coast Guard Thirteenth

Coast Guard District, July 2018. Prepared by: Windward Environmental LLC, and Ecology and Environment, Inc. 520 pp.

Howell's Spectacular Thelypody

Status, Life History, Habitat Requirements

The Howell's spectacular thelypody (*Thelypodium howellii* ssp. *spectabilis*), a biennial plant in the mustard family (Brassicaceae), was listed as threatened on June 26, 1999 (64 FR 28393). A Notice of Availability of a Final Recovery Plan for the Howell's Spectacular Thelypody (*Thelypodium howellii* ssp. *spectabilis*) was published on August 5, 2002 (67 FR 50626). Critical habitat has not been designated for this species. This species occurs at 18 sites in the Baker-Powder River Valley located in Union and Baker Counties, Oregon. Howell's spectacular thelypody occurs in moist, moderately well-drained, somewhat alkaline meadow habitats, typically growing with salt tolerant species such as greasewood (*Sarcobatus vermiculatus*), giant wild rye (*Elymus cinereus*), and goosefoot (*Chenopodium* spp.). Howell's spectacular thelypody appears to be dependent on periodic flooding because it rapidly colonizes areas adjacent to streams that have flooded. The plant has been extirpated from about one-third of known historic sites, including the type locality in Malheur county. Threats to the taxon include 1) habitat loss due to urban and agricultural development; 2) habitat degradation due to livestock grazing and hydrological modification; 3) consumption by livestock; 4) use of herbicides or mowing during the growing season; and 5) competition with exotic species such as teasel (*Dipsacus sylvestris*), bull thistle (*Cirsium vulgare*), Canada thistle (*C. canadensis*), and yellow sweet clover (*Melilotus officinalis*).

Presence in the Action Area

Only five viable populations of Howell's spectacular thelypody occur within the action area. These populations are located along the Old Oregon Trail right-of-way in Baker County, approximately 0.8 km (0.5 miles) from where the pipeline crosses La Grande–Baker Highway.

Effects of the Action

The NLAA determination in the BA relies primarily on the presence/absence of known occurrences of plants, with uncertain consideration of the presence or absence of potential suitable habitat that might represent currently occupied but unknown sites (EPA and USCG 2018, pg. 4-13). The action agencies conclude that, because the species has limited overlap with the action area and any staging areas would be established in existing developed areas, the probability of exposure to spill response actions is low and so any effects of spill response actions on Howell's spectacular thelypody are extremely unlikely and therefore discountable. However, since known occurrences of the species are present within the action area, USFWS would not consider the potential for adverse effects to be discountable. If a spill were to occur, staging areas would likely be established close to the pipeline in association with nearby roads (La Grande-Baker Highway and Bidwell Road) and not on the Old Oregon Trail. However, the CMs implemented under the proposed action are expected to substantively reduce the the potential for localized, low-magnitude, temporary impacts to actually occur, such that the risk of adverse impacts are insignificant. On that basis, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the Howells's spectacular thelypody.

Literature Cited

EPA and USCG. 2018. Biological Assessment for the Northwest Area Contingency Plan for the Response to Spills of Oil and Hazardous Substances. Prepared for: United States Environmental Protection Agency Region 10 and United States Coast Guard Thirteenth Coast Guard District, July 2018. Prepared by: Windward Environmental LLC, and Ecology and Environment, Inc. 520 pp.

Kincaid's Lupine

Status, Life History, Habitat Requirements

Kincaid's Lupine *(Lupinus sulphureus var. kincaidii*), a perennial species in the pea or legume family (Fabaceae), was listed as threatened on January 25, 2000 (65 FR 3875). On June 29, 2010, the USFWS noticed a final Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington (75 FR 37460; USFWS 2010, entire). Critical habitat was designated for the Kinkaid's lupine on October 31, 2006 (71 FR 63862). Kinkaid's lupine is regionally endemic from Douglas County, Oregon, north to Lewis County, Washington. Kincaid's Lupine is currently known at about 164 sites, comprising about 246 hectares (608 acres) (USFWS 2010, Appendix B, Table B-2). This species is found mainly in the Willamette Valley, Oregon (USFWS 2006, Figure II-4, Appendix B, Tables B-1 and B-2) where it occupies native grassland habitats on upland prairie with the dominant species being red fescue (*Festuca rubra*) and/or Idaho fescue (*Festuca idahoensis*). At the southern limit of its range, this species occurs on well-developed soils adjacent to serpentine outcrops (high in magnesium, iron and certain toxic metals) where it is often found under scattered oaks. The plant's distribution implies a close association with native upland prairie sites that are characterized by heavier soils and mesic to slightly xeric soil moisture levels.

Native prairie has been virtually eliminated from the Willamette Valley as a result of conversion to loss of natural fire patterns, agriculture, urbanization, and other development. Loss of native prairie results in the separation of lupine populations which were once inter-connected. As the number of sites declines and the distance between them increases, the opportunities for dispersal of seeds between populations is reduced. Populations isolated in this manner face a higher chance of extirpation, since they are no longer part of a larger, more stable population.

Natural processes which functioned to maintain open grasslands have been altered to the point that intervention is needed to prevent further loss. Historically, large-scale fire played a role in maintaining grasslands in an open state. Today, grassland remnants are no longer maintained by fire due to suppression efforts. Where possible, controlled burning or careful mowing and hand clearing are used to manage grassland ecosystems. However, Kincaid's lupine is host to the endangered Fender's blue butterfly; thus, management actions have to be carefully planned in order to avoid harming the butterfly.

Presence in the Action Area

According to the BA, the three current observations within the action area are in Washington; two along the Cowlitz River upstream of a pipeline and one on the western edge of the 1-mile pipeline buffer (in Drews Prairie) in the same vicinity (EPA and USCG 2018, Figure C-3 in Appendix C). Critical habitat for Kincaid's lupine does not overlap with the Action Area.

Effects of the Action

The NLAA determination in the BA relies primarily on the presence/absence of known occurrences of plants, with uncertain consideration of the presence or absence of potential suitable habitat that might represent currently occupied but unknown sites (EPA and USCG 2018, pg. 4-13). The action agencies conclude that, because the species has limited overlap with the action area and any staging areas would be established in existing developed areas, the probability of exposure to spill response actions is low and so any effects of spill response actions on Kinkaid's lupine are extremely unlikely and therefore discountable. However, since known occurrences of the species are present within the action area, USFWS would not consider the potential for adverse effects to be discountable. If a spill were to occur, staging areas would likely be established close to the pipeline in association with infrastructure. However, the CMs implemented under the proposed action are expected to substantively reduce the potential for localized, low-magnitude, temporary impacts to actually occur, such that the risk of adverse impacts are insignificant. On that basis, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the Kinkaid's lupine.

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Nelson's Checkermallow

Status, Life History, Habitat Requirements

The Nelson's checkermallow (*Sidalcea nelsoniana*), a perennial herb in the mallow family (Malvaceae), was listed as threatened on February 12, 1993 (58 FR 8235). On September 30, 1998, the USFWS completed a Recovery Plan for the Threatened Nelson's Checker-mallow (*Sidalcea nelsoniana*) (USFWS 1998, entire). This Recovery Plan was updated on June 29, 2010, when the USFWS noticed a final Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington (75 FR 37460; USFWS 2010, entire). Critical habitat has not been designated for this species.

Historically, *Sidalcea nelsoniana* has been collected in Benton, Clackamas, Linn, Marion, Polk, Tillamook, Yamhill, and Washington Counties, Oregon, and Cowlitz and Lewis Counties, Washington. *Sidalcea nelsoniana* is currently known from about 90 sites, comprising about 517 hectares (1,277 acres) of total cover, distributed from southern Benton County, Oregon, northward through the central and western Willamette Valley, to Cowlitz and Lewis Counties, Washington (USFWS 1998, Figure II-5; Appendix B, Tables B-1 and B-2). This species also occurs in several higher elevation west slope Coast Range meadows that flank the western Willamette Valley in Yamhill, Washington and Tillamook Counties, Oregon. Known populations range in elevation from 45 to 600 meters (150 to 1,970 feet). In the Willamette Valley, populations of *Sidalcea nelsoniana* occur at low elevations (below 200 meters [650 feet]) within a mosaic of urban and agricultural areas, with concentrations around the cities of Corvallis and Salem. In the coast range, *Sidalcea nelsoniana* populations range in elevation from 490 to 600 meters (1,610 to 1,970 feet), and are found in open, grassy meadows within a larger matrix of coniferous forest.

In the Willamette Valley, *Sidalcea nelsoniana* is known from wet prairies and stream sides. Although occasionally occurring in the understory of *Fraxinus latifolia* (Oregon ash) woodlands or among woody shrubs, Willamette Valley *Sidalcea nelsoniana* populations usually occupy open habitats supporting early seral plant species. These native prairie remnants are frequently found at the margins of sloughs, ditches, and streams; roadsides; fence rows; drainage swales; and fallow fields.

As with the other rare prairie plants addressed in this consultation, *Sidalcea nelsoniana* is threatened by urban and agricultural development, ecological succession that results in shrub and tree encroachment of open prairie habitats, and competition with invasive weeds (58 FR 8235). The USFWS works actively with numerous governmental and nongovernmental partners to develop and maintain a supply of Nelson's checkermallow seed for use both in augmenting existing population and to establish new populations in appropriate protected habitats.

<u>Presence in the Action Area</u>

According to the BA, plants are being reintroduced into Oregon (USFWS 2012, entire) locations in Multnomah and Washington counties may overlap with the action area but exact locations are not identified. Species occurrence is limited to only two known location within the Action Area. ORBIC data show this location is in Salem, Oregon at the Salem Municipal Airport (McNary Field) (EPA and USCG 2018, Inset on Figure C-4 in Appendix C). These two observations are on the western edge of the Action Area approximately 1 km (0.6 miles) from the pipeline; Interstate 5 is between the one of the locations and the pipeline.

<u>Effects of the Action</u>

The NLAA determination in the BA relies primarily on the presence/absence of known occurrences of plants, with uncertain consideration of the presence or absence of potential suitable habitat that might represent currently occupied but unknown sites (EPA and USCG 2018, pg. 4-13). In the BA, the action agencies conclude that because: (1) there is very limited spatial overlap of this species with the action area; (2) listed plants are located far from the potential spill site and on the far side of a significant barrier (Interstate 5); and (3) there is existing infrastructure for the establishment of staging areas, the probability of exposure to spill response actions is low and any effects of spill response actions on Nelson's checkermallow are extremely unlikely and therefore discountable. However, since known occurrences of the species are present within the action area, USFWS would not consider the potential for adverse effects to be discountable. If a spill were to occur, staging areas would likely be established close to the pipeline in association with infrastructure. The CMs implemented under the proposed action are expected to substantively reduce the potential for localized, low-magnitude, temporary impacts to actually occur, such that the risk of adverse impacts are insignificant. On that basis, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the Nelson's checkermallow.

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Western Lily

Status, Life History, Habitat Requirements

The western lily (*Lilium occidentale*), a perennial member of the lily family (Liliaceae), was listed as endangered on August 19, 1994 (59 FR 42171). The Recovery Plan for the Endangered Western lily (*Lilium occidentale*) was completed in 1998 (USFWS, entire). On August 6, 2019, the USFWS published a Notice of Availability for 28 Draft Recovery Plan Revisions for 53 Species in the Southeast, Mountain-Prairie, and Pacific Southwest Regions of the United States (84 FR 38284) that includes the western lily. Critical habitat has not been designated for this

Western lily occurs in a narrow band of habitat along the Pacific Coast between the ocean and four miles inland at elevations ranging from just above sea level to about 120 m (400 ft.). It ranges from Coos County, Oregon to about 220 miles south into Humboldt County, California. Of the 25 populations known to exist in 1987, 14 contained less than 50 plants, another 10 contained up to 600 plants, and 1 numbered nearly 1,000 plants. Since then, several populations were lost to habitat modifications and several new populations were discovered. Less than half the current populations are located on private land, with the remainder scattered on county, state, and federal lands in Oregon and California.

Western lily occurs in freshwater fens, bogs, and coastal prairie and scrub. The species also occurs in poorly drained forests, but plants in this habitat often do not produce flowers due to lack of sunlight. Western lily occurs in two distinct, poorly drained soil types, deep organic peat soils and mineral-based soils which tend to be acidic and exhibit a perched water table due to either iron or clay pans that hold water seasonally. These soils afford western lily the moisture it needs during the early part of the growing season. Western lily habitat is often but not always associated with jurisdictional wetlands and is never associated with flowing water.

Presence in the Action Area

Isolated populations occur within 6.4 km (4 miles) of the Oregon coast in Coos and Curry Counties of southern Oregon. There are eight occurrences of lily that overlap with the action area (1-mile marine buffer) along the Oregon coast (USFWS 2009, entire), largely limited to wooded areas east of Highway 101 outside the influence of beach/shoreline or adjacent residential areas or agricultural fields.

Effects of the Action

If a spill occurred in this area, it would most likely be in the marine and shoreline area, and the spill response would be staged along the shoreline rather than in wooded or peat bog areas. The action agencies concluded that because: (1) the listed species has limited overlap with the action area; (2) any staging areas would be established in existing developed areas (e.g., along Highway 101); (3) listed plants are restricted to wooded areas that are not likely to be affected by spill response actions; and (4) Highway 101 provides a break between the marine zone and wooded areas that will block the flow of oil into lily habitat, any effects of spill response actions on western lily are extremely unlikely, and therefore, discountable. However, since known occurrences of the species are present within the action area, USFWS would not consider the potential for adverse effects to be discountable. If a spill were to occur, staging areas would likely be established close to the pipeline in association with infrastructure. The CMs implemented under the proposed action are expected to substantively reduce the potential for adverse impacts to the lily to actually occur, such that the risk of adverse impacts are insignificant. On that basis, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the western lily.

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Willamette Daisy

Status, Life History, Habitat Requirements

The Willamette daisy (*Erigeron decumbens* var. *decumbens*) a perennial member of the composite family (Asteraceae), was listed as endangered on January 25, 2000 (65 FR 3875). On June 29, 2010, the USFWS noticed a final Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington (75 FR 37460; USFWS 2010, entire).

The Willamette Daisy is endemic to Oregon's Willamette Valley. Historically, this plant was likely widespread throughout the Valley. Currently, 46 sites are known, distributed over an area of 700,000 hectares (1.7 million acres), between Grand Ronde and Goshen, Oregon. The species is known to have been extirpated (destroyed or no longer surviving) from an additional 19 historic locations. Willamette daisy populations are known mainly from bottomland but one population is found in an upland prairie remnant.

The wet prairie grassland community where Willamette daisy is found is typically dominated by *Deschampsia cespitosa*, *Danthonia californica* and a number of Willamette Valley endemic forbs (USFWS 2010, pg. II-12). Like many native species endemic to Willamette Valley prairies, *Erigeron decumbens* var. *decumbens* is threatened by habitat loss due to urban and agricultural development, successional encroachment into its habitat by trees and shrubs, competition with non-native weeds, and small population sizes (USFWS 2010, pg. II-12). It is likely that conservation of *Erigeron decumbens* var. *decumbens* may require augmenting small populations with propagated individuals; as such, seeds of this species have been banked at the Berry Botanic Garden in Portland, Oregon (USFWS 2010, pg. II-13).

Presence in the Action Area

Three occurrences of this species overlap with the action area (EPA and USCG 2018, Figure C-6 in Appendix C). All three are considered historical (i.e., extirpated) with the last recorded observations occurring as late as 1984. These areas are currently developed for urban or agricultural land uses. Designated critical habitat for this species does not overlap with the action area.

Effects of the Action

The action agencies concluded that because the species is not currently documented (historical observations) in the action area, the probability of exposure to spill response actions is low, and any effects of spill response actions on the Willamette daisy are extremely unlikely and therefore discountable. However, since unknown occurrences of the species may be present in unsurveyed areas within the action area, USFWS would not consider the potential for adverse effects to be discountable. If a spill were to occur, staging areas would likely be established close to the pipeline in association with infrastructure. The CMs implemented under the proposed action are expected to substantively reduce the potential for adverse impacts to the daisy to actually occur, such that the risk of adverse impacts are insignificant. On that basis, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the Willamette daisy.

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Golden Paintbrush

Status, Life History, Habitat Requirements

The golden paintbrush *(Castilleja levisecta)* was listed as threatened, without a designation of critical habitat, on June 11, 1997 (62 FR 31740). The following descriptions are taken from the *Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington* (USFWS 2010, entire), and other sources cited therein:

Golden paintbrush is a perennial herb in the figwort or snapdragon family (Scrophulariaceae). Plants are up to 30 centimeters (12 inches) tall and are covered with soft, somewhat sticky hairs. The showy bracts are about the same width as the upper leaves, softly hairy and sticky, and golden yellow. The bracts effectively hide the flowers (USFWS 2000; USFWS 2010, Appendix F, pp. F-4, F-5)

Historically, golden paintbrush was reported from more than 30 sites in the Puget Trough of Washington and British Columbia, and as far south as the Willamette Valley of Oregon (Hitchcock et al. 1959, Sheehan and Sprague 1984, Gamon 1995, Gamon et al. 2001). Many populations have been extirpated as their habitats were converted for agricultural, residential, and commercial development. As of 2010, approximately 11 populations were known to exist in Washington and British Columbia; more than half of them on Whidbey Island and the San Juan Islands of Washington, two on Canadian islands, and one near Olympia, Washington. In Oregon, golden paintbrush historically occurred in the grasslands and prairies of the Willamette Valley in Linn, Marion, and Multnomah Counties; as of 2010, the species had been extirpated from all of these sites as the habitat had been modified by urbanization or agriculture. (USFWS 2010, pp. II-32, II-34)

Golden paintbrush occurs in upland prairies, on generally flat grasslands, including some that are characterized by mounded topography. Low deciduous shrubs are commonly present as small to large thickets. In the absence of fire, some of the sites have been colonized by trees, primarily *Pseudotsuga menziesii* (Douglas-fir), and shrubs, including *Rosa nutkana* (wild rose) and *Cytisus scoparius* (Scotch broom), an aggressive non-native shrub. The mainland population in Washington occurs in a gravelly, glacial outwash prairie. Most of the extant populations are on loamy sand or sandy loam soils derived from glacial origins; at the southern end of its historic range, populations occurred on clayey alluvial soils, in association with *Quercus garryana* (Oregon white oak) woodlands (Caplow 2004). (USFWS 2010, pg. II-35)

The following descriptions are taken from the *Biological Opinion – Programmatic Restoration Opinion for Joint Ecosystem Conservation by the Service* (USFWS 2015; 01EOFW00-2014-F-0222, 15 May 2015), and other sources cited therein:

As of 2014, there were 12 extant wild populations in Washington, totaling approximately 13,300 plants (T. Thomas, USFWS, pers. comm. 2015). In addition to the wild populations, 34 reintroductions were completed in Oregon and Washington. (USFWS 2015, pg. 463)

The combined rangewide population of both wild and introduced golden paintbrush is greater than 185,000 flowering plants, indicating that site management coupled with broadcast seeding can establish robust populations in relatively short time periods (about two years) (T. Thomas, USFWS, pers. comm. 2015). Restoration actions are essential for the continued survival of golden paintbrush. Steps to increase population sizes and establish new populations within the historical range are necessary to ensure long term survival of golden paintbrush. (USFWS 2015, pp. 463, 464)

In the absence of active management, robust populations of golden paintbrush have rapidly declined to close to extirpation in less than a decade. These declines did not result from overt habitat destruction, but from the threats associated with low population numbers, in-breeding depression, fire-suppression, and competition with non-native and invasive plant species (USFWS 2010). Competition from non-native, invasive/noxious species such as *Hieracium pilosella* (mouse-ear hawkweed), *Cytisus scoparius* (Scotch broom), and *Leucanthemum vulgare* (ox-eye daisy), and other non-native plants severely degrades golden paintbrush habitat (Wentworth 1998; Gamon 1995). Use of prescribed fires for prairie management may help to reverse the decline throughout its range (T. Thomas, USFWS, pers. comm. 2015). (USFWS 2015, pg. 465)

All extant sites with golden paintbrush are monitored annually. Recently reintroduced populations are also monitored annually, if funding is available; otherwise, some of the reintroduced populations may be surveyed only every two to three years (T. Thomas, USFWS, pers. comm. 2015). (USFWS 2015, pg. 466)

It is believed today there are 46 extant populations of golden paintbrush (R. McReynolds, in litt. 2018): 3 in British Columbia, Canada, one of which is a recent outplanting; 22 outplantings in the Willamette Valley, Oregon; 21 populations in Washington, 16 of which are outplantings (six sites on south Puget Sound prairies, six sites on the San Juan Islands, seven sites on Whidbey Island, one site on the mainland near Dungeness Bay, one site near the Columbia River).

Presence in the Action Area; Known Locations in the Action Area

The species is present in the action area (EPA and USCG 2018, pg. 4-84). There are three observations documented in the WDNR Natural Heritage Program (NHP) database for Washington (WDNR 2017, entire). One of the observations is directly on a rail line running through Rocky Prairie in Thurston County. According to Caplow (2004), a robust population was located in a 12 ha (30 acre) site within Rocky Prairie, Thurston County, Washington (EPA and USCG 2018, pg. 4-30). The other two locations are on Whidbey Island (Island County) within the 1-mile coastal buffer (EPA and USCG 2018, pg. 4-84). Current information (J. Hanson pers. comm. 2018) would indicate there may be additional, possible locations within the 1-mile coastal buffer.

Effects of the Action

In Washington, more than 30 geographically-specific, coastal and inland GRPs have been approved, and identify specific natural resources that would be at risk in the event of spills (RRT and NWAC 2018x; WDOE 2018x). For the action area in Washington, where this species is known to occur, one of two GRPs specifically identify golden paintbrush as a resource at risk (Northwest Area Committee, WADE GRP 2017, Chapter 6, pp. 101-106); the Strait of Juan de Fuca GRP (Northwest Area Committee, Strait of Juan de Fuca GRP, Chapter 6, pp. 6-1 through 6-23) was last updated in 2011 and does not include information that identifies or addresses the golden paintbrush specifically, but does identify some of the known localities as ‘sensitive’.

When implementing countermeasures as part of spill response, the EPA and USCG will also implement all of the relevant, practicable, and effective CMs (Table A).

The habitats where golden paintbrush may be found today (or likely found in the future) do not include freshwaters, marine waters, emergent freshwater wetlands, or coastal/estuarine wetlands. Generally speaking, the habitats where golden paintbrush may be found today are physically removed from the locations where spills and federalized spill responses are more likely to occur. The action agencies determined that the proposed action is likely to adversely affect the golden paintbrush due to proximity to rail lines and potential for crushing, destruction, or removal of individual plants or seeds (EPA and USCG 2018, Table 6-1). However, with consideration for the species’ (1) habitat and habitat requirements; (2) current, constrained geographic distribution; (3) limited potential presence in the action area; (4) limited number of known locations in the action area; and (5) with effective implementation of the CMs, we conclude that potential effects to the golden paintbrush are insignificant. On that basis, the USFWS has determined that the proposed action may affect, but is NLAA the golden paintbrush.

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Slickspot Peppergrass

Status, Life History, Habitat Requirements

Slickspot peppergrass *(Lepidium papilliferum)* is an annual or biennial member of the mustard family (Brassicaceae). It was first listed as a threatened species in 2009. The decision to list the species was vacated by the Idaho District Court on August 8, 2012, and the final rule was remanded to the USFWS. Slickspot peppergrass was reinstated as threatened (81 FR 55058) effective September 16, 2016.

Slickspot peppergrass plants are typically found in visually distinct microsites known as slick spots, which are interspersed within sagebrush-steppe habitat of southwest Idaho, including Ada, Canyon, Gem, Elmore, Payette, and Owyhee counties (Moseley 1994, pg. 7). Slickspot microsites are shallow depressions that are usually a few centimeters lower than the surrounding soil surface, where rain and snowmelt collect. Slickspot peppergrass require functional slickspot microsites that have relatively low levels of disturbance, sunlight for photosynthesis, and timely precipitation and favorable temperatures for seed germination and plant growth. Biological soil crust is one component of quality habitat for the species. Biological soil crusts are sensitive to disturbances such as compression from livestock trampling or off highway vehicle use and are subject to damage by wildfire; recovery of biological soil crusts from disturbance is possible, but occurs very slowly (Johnston 1997, pp. 10–11; USFWS 2017, pg. 18). Element occurrences of slickspot peppergrass are illustrated in Figure SPG-1.

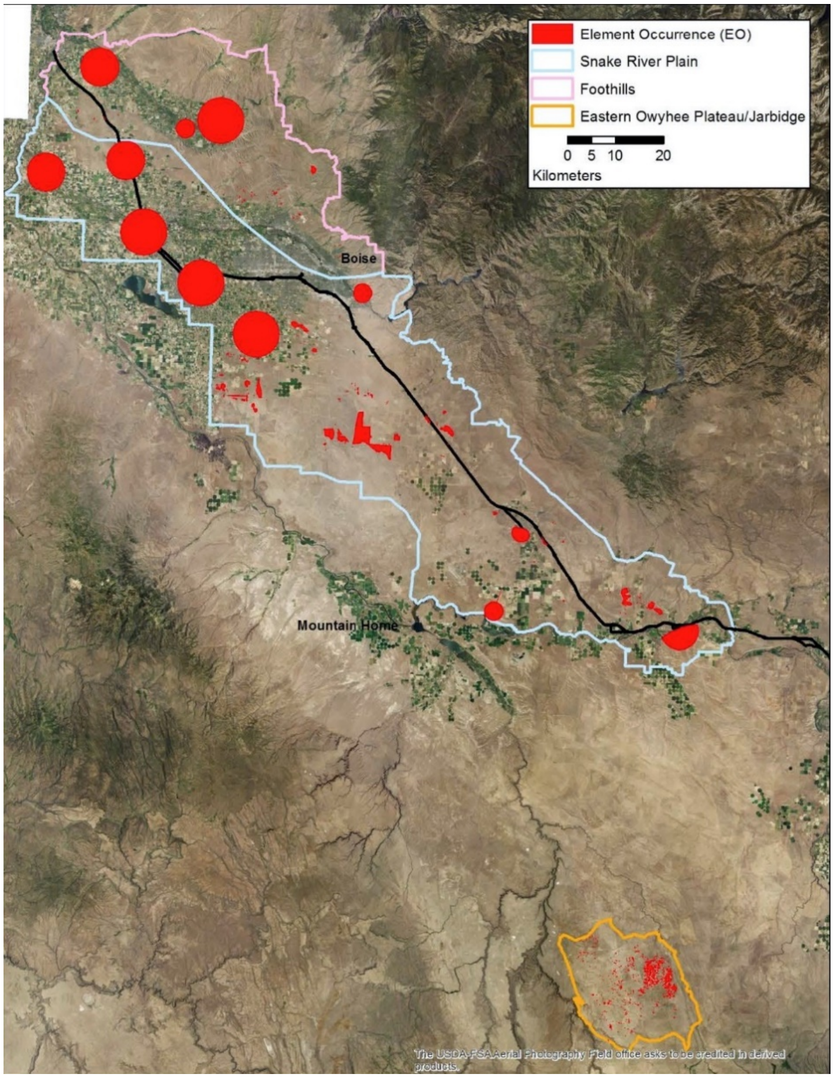

Figure SPG-1. Satellite imagery depicting historic and probable current range of slickspot peppergrass. The large circular Element Occurrences are indicative of vague population location data associated with historic records.

Effects of the Action

Appendix E, Table 2-2, contains a complete list of expected response and CM-related actions. Given the extent of disturbance during original construction of the existing buried oil pipeline, as well as the lack of slickspot peppergrass microsites observed within other existing pipeline rights-of-way, it is extremely unlikely that any slickspot peppergrass microsites that may have been present pre-construction within the pipeline footprint have reformed. However, slickspot peppergrass microsites, individual plants, and a seed bank may be present in undisturbed nearby areas within the 1-mile buffer around the oil pipeline footprint.

Oil spill remediation activities have the potential to impact the slickspot peppergrass. If response activities occur within the 1-mile buffer around the pipeline, the most likely impact would be crushing of individual plants and disturbance of slickspot microsites. However, it is unlikely that the action agencies will implement response activities in the arid areas where slickspot peppergrass is found. If response activities occur in suitable habitat, CMs discussed above in the Description of the Proposed Action and this appendix would be implemented. As discussed herein, the CMs are likely to reduce the the likelihood of adverse consequences caused by spill response actions to this species to a level of insignificance. On that basis, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the slickspot peppergrass.

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Slickspot Peppergrass Proposed Critical Habitat

Critical habitat was proposed for slickspot peppergrass on May 10, 2011 (76 FR 27184). On February 12, 2014, the USFWS amended the original critical habitat proposal to include recently discovered slickspot peppergrass locations that met critical habitat designation criteria (79 FR 8402) which in turn was amended on April 21, 2014 (79 FR 22077). Final designation of critical habitat for slickspot peppergrass has not yet been determined, but a court ordered deadline has been established as of this writing to complete the final rule for the designation by June 30, 2021.

In the 2011 proposed rule (76 FR 27184), we determined that PCEs for *Lepidium papilliferum*. (PCE1) Ecologically-functional microsites or ''slickspots'' that are characterized by: (a) A high sodium and clay content, and a three-layer soil horizonation sequence, which allows for successful seed germination, seedling growth, and maintenance of the seed bank; and (b) sparse vegetation with low to moderate introduced, invasive, nonnative plant species cover. (PCE2) Relatively-intact, native

Artemisia tridentata ssp. *wyomingensis* (Wyoming big sagebrush) vegetation assemblages, represented by native bunchgrasses, shrubs, and forbs, within 250 m (820 ft.) of *Lepidium papilliferum* element occurrences to protect slickspots and *Lepidium papilliferum* from disturbance from wildfire, slow the invasion of slickspots by nonnative species and native harvester ants, and provide the habitats needed by L. *papilliferum*'s pollinators. (PCE3) A diversity of native plants whose blooming times overlap to provide pollinator species with sufficient flowers for foraging throughout the seasons and to provide nesting and egglaying sites; appropriate nesting materials; and sheltered, undisturbed places for hibernation and overwintering of pollinator species. Alternative pollen and nectar sources (other plant species within the surrounding sagebrush vegetation) are needed to support pollinators during times when *Lepidium papilliferum* is not flowering, when distances between slickspots are large, and in years when L. *papilliferum* is not a prolific flowerer. (PCE4) Sufficient pollinators for successful fruit and seed production, particularly pollinator species of the sphecid and vespid wasp families, species of the bombyliid and tachnid fly families, honeybees, and halictid bee species, most of which are solitary insects that nest outside of slickspots in the surrounding sagebrush-steppe vegetation, both in the ground and within the vegetation.

According to the BA (EPA and USCG 2018, Table 4-1, pp. 4-15 – 4-16) there are four units of terrestrial critical habitat in Payette, Ada, Elmore, and Owyhee Counties, Idaho (76 FR 27184). Two CHUs overlap with the action area in Ada and Elmore Counties, within 1.6 km (1 mile) of a pipeline (BA Figure C-5 in Appendix C). An oil pipeline passes through several areas of critical habitat for slickspot peppergrass, where the species is present.

<u>Effects of the Action</u>

As discussed in the BA, the action agencies have determined that spill response actions are unlikely to significantly impact PBFs of slickspot peppergrass proposed critical habitat because these areas are sparsely vegetated and extensive clearing, and removal of vegetation would not be necessary during a pipeline spill response. Sufficient access points are already present near proposed critical habitat to preclude the need to clear areas to establish staging areas. However, since the PCEs of proposed critical habitat are likely present within the action area, the USFWS would not consider the potential for adverse effects to be discountable as suggested in the BA. Given the extent of disturbance during original construction of the existing buried oil pipeline, as well as the lack of PBFs (in this case, microsites) of proposed slickspot peppergrass critical habitat observed within other existing pipeline rights-of-way, it is extremely unlikely that any PBFs of slickspot critical habitat that may have been present pre-construction within the pipeline footprint have reformed. Proposed critical habitat that intersects the existing oil pipeline footprint is not considered to contain any of the four PBFs of proposed critical habitat needed by the species. However, functional slickspot microsites, relatively intact native sagebrush steppe vegetation, habitat features needed by insect pollinators, and insect pollinators are likely present in undisturbed proposed critical habitat areas within the 1-mile buffer around the oil pipeline footprint. If a spill were to occur, staging areas would likely be established close to the pipeline in association with infrastructure. In addition, as discussed herein, the CMs implemented under the proposed action are expected to substantively reduce the potential for localized, low-magnitude, temporary impacts to actually occur to any of the proposed critical habitat PBFs for slickspot peppergrass, such that the risk of adverse consequences are likely to be insignificant (see the discussion of CMs in the above Description of the Proposed Action and in this appendix).

Oil spill remediation activities have the potential to adversely affect proposed critical habitat. If response activities occur within the 1-mile buffer around the pipeline, the most likely impact would be ground disturbance within areas of proposed critical habitat PBFs (microsites). If a spill were to occur, staging areas would likely be established close to the pipeline in association with existing infrastructure. The CMs implemented under the proposed action are expected to substantively reduce the potential for adverse consequences to proposed slickspot peppergrass critical habitat PBFs to actually occur, such that the risk of these adverse consequences is insignificant (see the discussion of CMs in the Description of the Proposed Action and in this appendix). On that basis, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA proposed critical habitat for the slickspot peppergrass.

Water Howellia

Status, Life History, Habitat Requirements

Water howellia *(Howellia aquatilis)* was listed as threatened, without a designation of critical habitat, on July 14, 1994 (59 FR 35860). The following descriptions are taken from the *Public and Agency Review Draft Recovery Plan – Water Howellia (Howellia aquatilis)* (USFWS 1996):

Water howellia is an annual aquatic species in the Campanulaceae (bellflower family). It is known from a total of six geographic areas: one in Idaho (Latah County); three in Washington (one each in Spokane, Clark, and Pierce Counties); one in Montana (Lake and Missoula Counties); and, one in California (Mendocino County). Five of these six geographic areas include significant federal ownership (USFWS 1996, pg. iii).

Water howellia is restricted to small, vernal, freshwater wetlands that have an annual cycle of filling up with water over the fall, winter, and early spring, followed by drying during the summer months. These wetlands are generally small (< 1 ha (2.5 ac)) and shallow (< 1 m (3 ft.) deep). Water howellia generally occupies only a fraction of the basin of each wetland. The wetlands typically occur in a matrix of forest vegetation, and are usually bordered in part by broadleaf deciduous trees. The bottom surfaces of the wetlands usually consist of firm, consolidated clay and organic sediments (USFWS 1996, pg. iii).

The following descriptions are taken from the *Biological Opinion – Programmatic Restoration Opinion for Joint Ecosystem Conservation by the Service* (USFWS 2015; 01EOFW00-2014-F-0222, 15 May 2015), and other sources cited therein:

Their freshwater wetland and pond habitats consist of glacial potholes or depressions (Shapley and Lesica 1997, pg. 8; USDOD 2006, pg. 3-3) or river oxbows (Lesica 1997) in Montana and western Washington, riverine meander scars (Idaho NHP 2012, pg. 1) in Idaho, or glacial-flood remnant wetlands (Robison 2007, pg. 8) in eastern Washington, but all are ephemeral to some degree (USFWS 2013). Depending on annual patterns of temperature and precipitation, the drying of the ponds may be complete or partial by autumn. Some ponds supporting water howellia are dependent on complex ground and surface water interactions. (USFWS 2015, pg. 514)

Water howellia habitat is typically surrounded or nearly surrounded by forested vegetation (USFWS 2013). Broadleaf deciduous trees or shrubs are usually a component, with species composition varying with geographic location (Mincemoyer 2005, pg. 7). This aspect of water howellia habitat may be important because of numerous observations reporting water howellia occupying shaded portions of ponds and wetlands (Isle 1997, pg. 32; McCarten et al. 1998, pg. 4). It has been hypothesized that water howellia can photosynthesize at lower light levels than other wetland species (e.g., reed canarygrass [*Phalaris arundinacea*] [McCarten et al. 1998, pg. 4]), thus intact canopy cover surrounding water howellia habitat that provides shade to the water surface may provide a competitive advantage to water howellia. Forested vegetation surrounding water howellia habitat also contributes large woody debris to the water body; a feature thought to be important in water howellia persistence (Robison 2007, pg. 17, 28). (USFWS 2015, pg. 515)

Water howellia has been documented to be more widely distributed on the landscape than at the time of listing, including in areas where it was formerly considered extirpated (USFWS 2013). Given the reduction or elimination of threats present at the time of listing, increased redundancy rangewide, and increased habitat protections, water howellia is not in danger of extinction throughout all or a significant portion of its range (i.e., endangered) (USFWS 2013). Further, the USFWS concluded that water howellia does not meet the definition of an endangered or threatened species per the ESA and recommended removal of water howellia from the federal list of threatened and endangered species (USFWS 2013). (USFWS 2015, pp. 513, 514)

Water howellia is endemic to the Pacific Northwest with historical occurrences identified in California, Oregon, Washington, Idaho, and Montana (Shelly and Moseley 1988, pp. 6, 9). Since listing, new occurrences have been documented in all five states, generally in areas known historically to support the species (USFWS 2013). Thus, locations of extant occurrences are generally representative of the areas where the species was thought to historically occur. (USFWS 2015, pg. 513)

At the time of federal listing (1994), 107 water howellia occurrences (defined as known populations) were known to occupy an estimated 200 acres across its range (USFWS 1994, pg. 35861). In 2012, a minimum of 302 occurrences were documented; current, occupied acreage was unavailable (USFWS 2013). The majority of extant occurrences (91 percent) are within three meta-populations occupying three distinct, geographic areas: Montana's Swan Valley (Lake and Missoula Counties); Department of Defense property at JBLM, Pierce County in western Washington; and Turnbull National Wildlife Refuge, Spokane County in northeastern Washington. A meta-population is defined as a collection of interdependent populations affected by recurrent extinctions and linked by recolonizations (Murphy et al.1990, pg. 47). As reported in 2013, the Status Review for this species, 244 of the 302 (80 percent) reported water howellia occurrences are on lands administered by the federal government (USFWS 2013). (USFWS 2015, pg. 513)

Presence in the Action Area; Known Locations in the Action Area

The species is present in the action area (EPA and USCG 2018, pg. 4-31) In Washington, the species occurs in Clark, Pierce, Spokane, and Thurston Counties. Based on spatial data from the WDNR NHP database (WDNR 2017), 8 occurrences are adjacent to either a railway or pipeline in the action area, at distances of 0.6 km (0.4 miles) or farther from railways or pipelines. In Idaho and Oregon, known occurrences of water howellia do not overlap with the action area (EPA and USCG 2018, pg. 4-31). One known occurrence, at the Ridgefield National Wildlife Refuge, is located within one mile of the commercial shipping waterway along the lower Columbia River.

"Extant occurrences of water howellia include [on] JBLM, the Turnbull National Wildlife Refuge, one location in Latah County, Idaho, and one location in Clackamas County, Oregon (USFWS 2013c). A few plants were documented in wetlands in one isolated location approximately 0.8 km (0.5 miles) from the rail line southeast of Millersylvania State Park (south of Olympia, Washington), and water howellia are also present at Lancaster Lake and the Ridgefield National Wildlife Refuge (north of Vancouver, Washington)" (EPA and USCG 2018, pg. 4-88). "According to the WDNR [NHP] Database (WDNR 2017), water howellia is present in the action area at 24 of the 67 documented occurrences in Washington (Figures 4-5a and 4-5b) (WDNR 2017)" (EPA and USCG 2018, pg. 4-88). The BA provided by the EPA and USCG includes additional details to describe these localities (EPA and USCG 2018, pg. 4-89 through 4-92).

Effects of the Action

In Washington, more than 30 geographically-specific, coastal and inland GRPs have been approved, and identify specific natural resources that would be at risk in the event of spills (RRT and NWAC 2018; WDOE 2018). For the action area in Washington, where the species is known to occur, three of four GRPs specifically identify water howellia as a resource at risk (Northwest Area Committee, LCR GRP 2015, Chapter 6, pp. 771-782; Northwest Area Committee, WADE GRP 2017, Chapter 6, pp. 101-106; Northwest Area Committee, NR GRP 2015, Chapter 6, pp. 171-175); the Spokane River GRP (Northwest Area Committee, SPR GRP, Chapter 6, pp. 6-1 through 6-4) was last updated in 2011 and does not include information to identify or address water howellia specifically, but does identify some of the known localities (i.e., at Turnbull National Wildlife Refuge) as 'sensitive'.

When implementing countermeasures as part of spill response, the EPA and USCG will also implement all of the relevant, practicable, and effective CMs (Table A, above).

The action agencies determined that the proposed action is likely to adversely affect water howellia due to proximity and because spill response could result in crushing, destruction, or removal of individual plants or seeds. However, with consideration of the species' (1) habitat and habitat requirements; (2) current, constrained geographic distribution; (3) limited potential presence in the action area; (4) limited number of known locations in the action area; and (5) with effective implementation of the CMs, we conclude that the risk of adverse consequences to water howellia caused by the spill response activities is insignificant. On that basis, the USFWS concludes that the proposed action may affect, but is NLAA the water howellia.

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Island Marble Butterfly

Status, Life History, Habitat Requirements

On May 5, 2020, the USFWS published a final rule to list island marble butterfly (*Euchloe ausonides insulanus)* as an endangered species, and designate critical habitat for the species (85 FR 26786). The final rule took effect on June 4, 2020.

The island marble butterfly is a subspecies of the large marble butterfly (*E. ausonides*) in the Pieridae family, subfamily Pierinae, which primarily consists of yellow and white butterflies. The island marble butterfly was formally described in 2001, by Guppy and Shepard based on 14 specimens collected between 1859 and 1908 on or near Vancouver Island, British Columbia, Canada, and is geographically isolated from all other *E. ausonides* subspecies. The taxonomic status of the island marble butterfly is not in dispute (85 FR 26786, May 5, 2020).

The island marble butterfly was historically known from just two areas along the southeast coast of Vancouver Island, British Columbia, Canada, based on 14 museum records. The last known specimen from Canada was collected in 1908 on Gabriola Island, and the species is now considered extirpated from the province. Reasons for its disappearance from Canada are unknown (85 FR 26786, May 5, 2020).

After 90 years without a documented occurrence, the island marble butterfly was rediscovered in 1998 on San Juan Island, San Juan County, Washington, at least 9 mi (15 km) east of Victoria across the Haro Strait. Subsequent surveys in suitable habitat across Southeast Vancouver Island and the Gulf Islands in Canada (COSEWIC 2010, pg. 5), as well as the San Juan Islands and six adjacent counties in the United States (Whatcom, Skagit, Snohomish, Jefferson, Clallam, and Island Counties), revealed only two other occupied areas. One of these occupied areas was centered on San Juan Island and the other on Lopez Island, which is separated from San Juan Island by just over 0.5 mi (1 km) at its closest point (85 FR 26786, May 5, 2020).

Four of the five populations that once spanned San Juan and Lopez Islands have not been detected in recent years, and the species is now observed only in a single area centered on American Camp, a part of San Juan Island National Historical Park. The island marble butterfly likely also uses the lands adjoining or near American Camp, as there have been at least two observations of island marble butterflies flying along the boundaries of these adjoining lands in 2015 (85 FR 26786, May 5, 2020).

No current records exist for any life history stage of the island marble butterfly except at or near American Camp at San Juan Island National Historical Park. Therefore, we consider only

American Camp and the immediately adjacent areas to be occupied at the time of the listing. However, because of the island marble butterfly's cryptic nature and its dispersal ability, its distribution is somewhat uncertain, and the USFWS is seeking any new information regarding the island marble butterfly's distribution (83 FR 15903, April 12, 2018).

The reasons for the precipitous decline in the number of occupied sites since 2005 are not known with certainty, but the near-complete loss of habitat outside of American Camp in some years is likely a principal cause. Habitat loss has been caused by road maintenance, mowing, cultivation of land, intentional removal of host plants, improperly timed restoration activities, development, landscaping, deer browse, and livestock grazing (85 FR 26786, May 5, 2020).

The island marble butterfly has three known host plants, all in the mustard family (Brassicaceae). One is native, *Lepidium virginicum* var. *menziesii* (Menzies' pepperweed), and two are nonnative: *Brassica rapa* (no agreed upon common name, but sometimes called field mustard; hereafter referred to as field mustard), and *Sisymbrium altissimum* (tumble mustard). All three larval host plants occur in open grass- and forb-dominated vegetation systems, but each species is most robust in one of three specific habitat types: Menzies' pepperweed at the edge of low-lying coastal lagoon habitat; field mustard in upland prairie habitat, disturbed fields, and disturbed soils, including soil piles from construction; and tumble mustard in sand dune habitat. Adults primarily nectar (forage) on their larval host plants, but use a variety of other nectar plants (85 FR 26786, May 5, 2020). Island marble butterflies exhibit strong site fidelity and low dispersal capacity and, when considered on the whole, exist as a group of spatially separated populations that interact when individual members move from one occupied location to another (85 FR 26786, May 5, 2020).

All of the known larval host plants for the island marble butterfly are annual mustard species that are dependent on open, early-successional conditions for germination. Disturbance or active management maintains these conditions; otherwise, plant succession and invasion by weedy native and nonnative plants greatly inhibit germination and growth of larval host plants. These processes of vegetation change thus degrade and reduce the availability of habitat required by the island marble butterfly to complete its life cycle (85 FR 26786, May 5, 2020).

The nearshore lagoon habitat for island marble butterfly is close to sea level. Three intermittently occupied sites are in lagoons along the northeastern edge of American Camp, where they are partially protected from tidal surges that arrive from the west. One of these lagoons had the highest relative encounter rate of all monitored transects at American Camp in 2015, and raw counts at this site represented roughly 50 percent of the adult island marble butterflies recorded during annual monitoring for that year. Storm surges, attributable to the combined forces of high tides and high-wind storm events, inundate these low-lying lagoon areas intermittently, as evidenced by the deposition of driftwood logs along the shoreline (85 FR 26786, May 5, 2020).

Presence in the Action Area; Known Locations in the Action Area

The species is present in the action area, but "…only on [the] southeast side of San Juan Island, Washington" (EPA and USCG 2018, pg. 4-34). "American Camp is … within the 1-mile buffer … action area" (EPA and USCG 2018, pg. 4-102).

Effects of the Action

In Washington, more than 30 geographically-specific, coastal and inland GRPs have been approved, and identify specific natural resources that would be at risk in the event of spills (RRT and NWAC 2018; WDOE 2018). For the action area in Washington, where the species is known to occur, the only completed GRP does not specifically identify island marble butterfly as a resource at risk; the Strait of Juan de Fuca GRP (Northwest Area Committee, Strait of Juan de Fuca GRP, Chapter 6, pp. 6-1 through 6-23) was last updated in 2011 and does not include information to identify or address island marble butterfly specifically, but does identify the known localities as 'sensitive'.

When implementing countermeasures as part of spill response, the EPA and USCG will also implement all of the relevant, practicable, and effective CMs (Table A, above). [Note: Because a local population of the island marble butterfly is known to occupy nearshore lagoons along the northeastern edge of American Camp, the CMs that serve to avoid and minimize impacts to sensitive aquatic species and habitats during spill response may also serve to further avoid and minimize potential effects to the island marble butterfly.]

The habitats where the island marble butterfly may be found today (or likely found in the future) do not include fresh or marine waters, but do include a small grouping of coastal wetlands. Generally speaking, the habitats where the island marble butterfly may be found today are physically removed from the locations where spills and federalized spill responses are more likely to occur. With consideration for the species' (1) habitat and habitat requirements; (2) current, constrained geographic distribution; (3) limited potential presence in the action area; (4) limited number of known locations in the action area; and (5) with effective implementation of the CMs, we conclude that potential direct and indirect exposures and effects to the island marble butterfly caused by spill response activities are extremely unlikely, and therefore discountable. On that basis, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the island marble butterfly.

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Island Marble Butterfly Critical Habitat

On May 5, 2020, the USFWS published a final rule to designate critical habitat for the island marble butterfly (*Euchloe ausonides insulanus)* and to list as an endangered species (85 FR 26786). The BA acknowledged that "critical habitat is proposed (now designated) for parts of American Camp within the San Juan Island National Historical Park … A portion of [this] habitat is [located in] a coastal lagoon" (EPA and USCG 2018, pg. 4-34). "American Camp is … within the 1-mile buffer … action area" (EPA and USCG 2018, pg. 4-102).

The critical habitat designation includes approximately 812 ac (329 hectares) on the south end of San Juan Island, San Juan County, Washington. San Juan Island National Historical Park is the largest landholder (718 ac; 291 hectares). Boundaries for the CHU follow the open, generally treeless habitat that the island marble butterfly relies upon for mate-finding, reproduction, feeding, and dispersal. The entirety of the CHU is within the geographical area occupied at the time of listing (85 FR 26786, May 5, 2020).

The physical or biological features (PBFs) essential to the conservation of the island marble butterfly consist of (85 FR 26786, May 5, 2020):

- Open, primarily treeless areas with short-statured forb- and grass-dominated vegetation that include diverse topographic features such as ridgelines, hills, and bluffs for patrolling, dispersal corridors between habitat patches, and some south-facing terrain. Areas must be large enough to allow for the development of patchy-population dynamics, allowing for multiple small populations to establish within the area.
- Low- to medium-density larval host plants for egg-laying and larval development, with both flower buds and blooms on them between the months of May through July. Larval host plants may be any of the following *Brassica rapa*, *Sisymbrium altissimum*, or *Lepidium virginicum*.
- Adult nectar resources in flower and short-statured, white-flowering plants in bloom used for mate-finding, which may include, but are not limited to *Abronia latifolia* (yellow sand verbena), *Achillea millefolium* (yarrow),

Amsinckia menziesii (small-flowered fiddleneck), *Cakile edentula* (American sea rocket), *Cerastium arvense* (field chickweed), *Erodium cicutarium* (common stork's bill), *Geranium molle* (dovefoot geranium), *Hypochaeris radicata* (hairy cat's ear), *Lomatium utriculatum* (common lomatium), *Lupinus littoralis* (seashore lupine), *Myosotis discolor* (common forget-me-not), *Ranunculus californicus* (California buttercup), *Rubus ursinus* (trailing blackberry), *Taraxacum officinale* (dandelion), *Toxicoscordion venenosum* (death camas, formerly known as *Zigadenus venenosus*), and *Triteleia grandiflora* (Howell's Brodiaea, formerly *Brodiaea howellii*).

- Areas of undisturbed vegetation surrounding larval host plants sufficient to provide secure sites for diapause and pupation. The vegetation surrounding larval host plants must be left standing for a sufficient period of time for the island marble butterfly to complete its life cycle.

Effects of the Action

In Washington, more than 30 geographically-specific, coastal and inland GRPs have been approved, and identify specific natural resources that would be at risk in the event of spills (RRT and NWAC 2018; WDOE 2018). For the action area in Washington, where the species is known to occur, the only completed GRP does not specifically identify island marble butterfly as a resource at risk; the Strait of Juan de Fuca GRP (Northwest Area Committee, Strait of Juan de Fuca GRP, Chapter 6, pp. 6-1 through 6-23) was last updated in 2011 and does not include information to identify or address island marble butterfly specifically, but does identify the known localities as 'sensitive'.

When implementing countermeasures as part of spill response, the EPA and USCG will also implement all of the relevant, practicable, and effective CMs (above). [Note: Because a local population of the island marble butterfly is known to occupy nearshore lagoons along the northeastern edge of American Camp, the CMs that serve to avoid and minimize impacts to sensitive aquatic species and habitats during spill response may also serve to further avoid and minimize potential effects to the island marble butterfly and critical habitat.]

The habitats where island marble butterfly may be found today (or likely found in the future) do not include fresh or marine waters, but do include a small grouping of coastal wetlands. Generally speaking, the habitats where island marble butterfly may be found today are physically removed from the locations where spills and federalized spill responses are more likely to occur. With consideration of the species' (1) habitat and habitat requirements; (2) current, constrained geographic distribution; (3) limited potential presence in the action area; (4) limited number of known locations in the action area; and (5) with effective implementation of the CMs, we conclude that potential direct and indirect effects to the PBFs of island marble butterfly critical habitat caused by spill response activities are extremely unlikely, and therefore discountable. On that basis, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the island marble butterfly critical habitat.

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Banbury Spring limpet

<u>Status, Life History, Habitat Requirements</u>

The federally endangered Banbury Springs limpit, or lanx (*Lanx* sp.), was listed in on December 14,1992 (57 FR 59244), when the species was not taxonomically described. However, in 2017 (D.C. Campbell et al. 2017, entire), based on a phylogenetic analysis, the species is described as a new monotypic genus and species, *Idaholanx fresti*, confirming its distinctiveness and narrow endemicity (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5523177/). However the USFWS has yet to legally acknowledge this naming convention.

The Banbury Springs limpet is currently known from four isolated colonies along the middle Snake River in Idaho: Thousand Springs, Box Canyon Springs, Banbury Springs, and Briggs Springs (USFWS 2018, pg 4). The population size, abundance, and trends of the Banbury Springs limpet are largely uncertain as little density and trend information exists. Very few density estimates have been made and methods have not been consistent between studies (USFWS 2006, pg. 4). Because this species is currently restricted to four isolated colonies, future stochastic, as well as anthropogenic disturbances could negatively affect this species (USFWS 2006, pg. 20).

Presence in the Action Area; Known Locations in the Action Area

The four springs inhabited by the Banbury Springs limpet flow to the Snake River, but are off the Snake River channel. Three of the four springs are downstream of the action area; only Briggs Springs is located within the action area's mile buffer. At its closest point, the confluence of Briggs Springs output with the Snake River, through Briggs Creek, is approximately 0.3 mile from the pipeline which defines the buffer and is on the opposite (north) side of the Snake River. The pipeline and associated buffer crosses Deep Creek, which enters the Snake River approximately 1.1 miles upstream of the Briggs Springs output. The pipeline crossing of Deep Creek is approximately 0.4 mile from its confluence with the Snake River. Banbury Springs is to the north of Briggs Springs and just outside the mile buffer. Box Canyon Springs and Thousand Springs are farther north still, downstream of the action area. (EPA and USCG 2018, pg. 4-93).

Effects of the Action

The proposed action consists of federalized responses to spills of oil or petroleum to water, or of other hazardous materials that pose a risk of immediate impacts to human health and/or the environment. The proposed action includes a hierarchy of scaled responses, but the most common and predictable scenarios are generally on constrained temporal and spatial scales (e.g., spill response durations for the purpose of this consultation are limited to up to 4 days (EPA and USCG 2019, pg. 1). Appendix A contains a complete list of expected response and conservation actions.

The Banbury Springs limpet at Briggs Springs has a constrained geographic distribution, in an area easily protected should a spill occur from the pipeline in the action area. If a spill were to occur in this location and was not contained prior to reaching the river, response activities would likely occur downstream of Briggs Springs. Conservation measures include booming, which would protected the Briggs Springs outlet or direct the product away from where the Briggs Springs habitat is located. Response activities which could gather product for skimming could hinder or stop the downstream flow of the river, but would not likely cause the oil to flow across the river toward Briggs Springs. There is a road across Briggs Springs that could be utilized for staging; therefore, impacts associated with staging could affect the species. However, affects to the Banbury Springs limpet are unlikely to occur because in accordance with conservation measures the spring will be identified as a sensitive area and access will be restricted (EPA and USCG 2018, Table 2-2, pp. 2-18; see Appendix E below). Additionally, conservation measures require coordination with the USFWS to avoid effects of the response to Banbury Springs limpet at Briggs Springs.

Any product that moved downstream in the Snake River could threaten other Banbury Springs limpet habitat (EPA and USCG 2018, pg. 4-93 and Figure 4-6, pg. 4-94). However, for the product to move from the Snake River to the springs themselves, the Snake River would have to be experiencing flood conditions sufficient to raise the water level in the river to an elevation allowing oil to access the spring outflow. Because of the combination of circumstance that would have to occur for any spilled product to reach Banbury Springs limpet habitat (a spill of sufficient concentration occurring during the necessary flood flow levels and moving at such a speed that implementing activities to protect these sensitive springs would not be possible), the USFWS believes it is highly unlikely that a spill response would affect Banbury Springs limpet.

Because of the limited distribution of the Banbury Springs limpet in springs flowing to the Snake River, the CMs described in the proposed action and this appendix are designed to avoid the need for response activities in the spring habitat itself, and the specific combination of circumstances that would have to occur for response actions to be necessary due to direct releases of oil at the springs themselves, we determine that effects are extremely unlikely to occur, and are therefore considered discountable. On that basis, the USFWS concurs with the findings of the action agencies that the proposed action may effect, but is NLAA the Banbury Springs limpet.

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Snake River Physa

Status, Life History, Habitat Requirements

The Snake River physa *(Physa natricina)* was listed as endangered by the USFWS on December 14, 1992 (57 FR 59244) under the ESA. The Snake River physa is a freshwater mollusk found in the middle Snake River of southern Idaho, from Minidoka Dam downstream to Ontario, Oregon (USFWS 2014, pg. 9). This species is restricted to sand to boulder-sized substrates, most frequently in water 1.5 to 2.5 meters (5 to 8 feet) deep (USFWS 2014, pg. 4; EPA and USCG 2018, pg. 3-118). Snake River physa have been found in water temperatures above 22 °C (71.6 °F) and have not been found in the cool-water springs that flow into the Snake River (USFWS 2014, pg. 4). There are no studies allowing an estimate with any degree of confidence of current abundance or long-term demographic trends for the Snake River physa. (USFWS 2014, pp. 4-5)

Presence in the Action Area; Known Locations in the Action Area

The species' range is estimated to be over 300 river miles, but the snail has been recorded in less 5 percent of 787 samples collected within this area, and it has never been found in high densities (USFWS 2018, pg. 2). The species' highest abundance and densities currently occur in the 18.5 kilometer (km; 11.5 mile (mi)) river segment downstream of Minidoka Dam (i.e., Minidoka reach)(USFWS 2018, pg. 2). The Snake River physa has not been found outside of the Minidoka reach since 2002.

A refined petroleum pipeline crosses two tributaries to the Snake River, the Raft River and its ephemeral tributary, Calder Creek; these drainages are just over 20 river miles upstream of the Minidoka Dam. The pipeline comes within 0.1 mile of the Snake River just east of the city of Burley, Idaho, approximately 17.3 miles downstream of the Minidoka Dam, and within 0.3 mile of the Snake River in the vicinity of the confluence with Deep Creek. The pipeline crosses the Snake River at Glenn's Ferry, then diverges from the path of the Snake River, to continue generally along Interstate 84.

Effects of the Action

The proposed action consists of federalized responses to spills of oil or petroleum to water, or of other hazardous materials that pose a risk of immediate impacts to human health and/or the environment. The proposed action includes a hierarchy of scaled responses, but the most common and predictable scenarios are generally on constrained temporal and spatial scales (e.g., spill response durations for the purpose of this consultation are limited to up to 4 days (EPA and USCG 2019, pg. 1). Appendix A contains a complete list of expected response and conservation actions.

If a spill were to occur and was not contained prior to reaching the river, it is possible that parts of Snake River physa range could be affected by response activities (EPA and USCG 2018, page 4-97). Although response activities could cause disturbance of soils, leading to erosion and introduction of sediments into the river, conservation measures such as locating staging areas and support facilities in the least sensitive area possible and restricting foot traffic, vehicles, and heavy machinery from sensitive areas substantially reduce the potential for soil disturbance. Should the Snake River physa be located within the portion of the river affected during response activities, crushing of individuals during operations in the river could occur. However, it is highly unlikely that the Snake River physa would be present in any reach affected by response activities.

Due to the location and limited extent of currently occupied Snake River physa range (Minidoka reach), it is unlikely that Snake River physa would be impacted should a spill occur. Most of the points where the pipeline is near the Snake River are more than 5 miles downstream of the Minidoka reach, thus any spilled substance that may enter the river would be flowing away from the physa-occupied reach and response activities would occur downstream of the reach. Should a spill occur where the pipeline crosses the Raft River (upstream of the Minidoka reach) a very specific combination of conditions would have to exist for Snake River physa to be affected by response activities. The volume and velocity of flow in this small tributary to the Snake River would have to be sufficient to convey the spilled materials into the Snake River before response activities could stop the flow of that material. Additionally, the flow in the Snake River would have to be conducive to rapid dispersal to convey the spilled material more than 20 miles downstream to the Minidoka Dam before response activities occur. Because of the combination of circumstance that would have to occur for any spilled material to reach occupied Snake River physa habitat (i.e., a spill of sufficient concentration occurring during the necessary flood flow levels and moving at such a speed that implementing activities to protect the Minidoka reach would not be possible), the USFWS believes it is highly unlikely that a spill response would affect the Snake River physa.

Because of the limited distribution of the Snake River physa in the Snake River, the CMs described in the proposed action and this appendix designed to limit soil disturbance, and the specific combination of circumstances that would have to occur for response actions to be necessary in occupied Snake River physa range, the USFWS concludes that adverse consequences are extremely unlikely to occur, and are therefore considered discountable. On that basis, the USFWS concurs with the findings of the action agencies that the proposed action may effect, but is NLAA the Snake River physa.

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Oregon Silverspot Butterfly

<u>Status, Life History and Habitat Requirements</u>

The Oregon silverspot butterfly *(Speryeria zerene hippolyta)* was listed as threatened on July 2, 1980

(45 FR 44935). Historically, the species was distributed along the Washington and Oregon coasts from Westport in Grays Harbor County, Washington, south to Heceta Head in Lane County, Oregon, with a disjunct population located north of Crescent City in Del Norte County, California. There are currently five known populations of Oregon silverspot butterfly in existence—Rock Creek-Big Creek, Bray Point, Cascade Head, and Mt. Hebo, Oregon and Del Norte County, California (76 FR 22139, April 20, 2011). As off 2018, two new nonessential experimental populations were established--one at Nestucca Bay NWR, in Tillamook County and one on top of Saddle Mountain on OPRD land in Clatsop County, Oregon (81 FR 94296, December 23, 2018). Because of the unique regulatory status of these populations, they are not included in this consultation. The Saddle Mountain population is not in the action area. A sixth population, in the Clatsop Plains of Oregon, is possibly extirpated, with no butterflies observed there since 1998.

The Oregon silverspot butterfly occupies four types of grassland habitats: marine terrace, coastal headland "salt spray" meadows, stabilized dunes, and montane grasslands. To support the species, each habitat area must provide the caterpillar host plant, early blue violets, and adult butterfly nectar sources, as well as grasses and forbs in which the butterfly larvae find shelter, and closely-located spruce woods in which the adults find shelter.

Presence in the Action Area: Known Locations in the Action Area

Of the six known/potential populations of the species, four occur within the action area: Cascade Head, Rock Creek-Big Creek, Bray Point, and the Clatsop Plain, all of which are points along the Oregon coast. Critical habitat is designated only in association with the Rock Creek-Big Creek population.

Effects of the Action

The location of the known occurrences of the species (and its critical habitat) in the vicinity of coastal shorelines and roadways does create some potential for the plants to be subject to spills and, therefore, subject to the spill response activities that are the subject of this opinion. It is possible that individual Oregon silverspot butterflies, caterpillars or pupa could be killed or plants on which they rely could be removed, crushed, or destroyed when spill response actions include off-road vehicle use; soil disturbance from construction of barriers pits and trenches; creating or use of new access points; or foot traffic in the action area. Compaction of soils by heavy machinery or vehicles could reduce the ability of plants to germinate and grow. Butterflies may also be disturbed by responders, resulting in reduced feeding efficiency and added energy expenditure. However, these effects are very unlikely for the following reasons:

- Two (Cascade Head and Bray Point) of the four populations in the action area consist primarily of steep and/or higher elevation habitat that are not reasonably subject to spills. The likelihood of a spill directly affecting one of the other populations with lower elevation or less steep habitat (Rock Creek-Big Creek and the Clatsop Plain) is minimal based on known and anticipated size, frequency and distribution of spills in the action area. Spill response activities directly targeting any of the sites of known populations of the species occurrence are therefore unlikely.

- In the unlikely event that a spill were to directly affect the two populations with lower elevation or less steep habitat, the impacts of the spill itself would harm many individual butterflies/caterpillars/pupa, plants, seeds and habitat/soil conditions to the extent that they are no longer viable, thereby substantially minimizing the likelihood that subsequent spill response actions would be a meaningful source of additional harm.
- In the somewhat more likely event of a spill not directly affecting a site of species occurrence but occurring near or adjacent to the site, the potential for the associated spill response to directly or indirectly affect the species is minimal because of the geographic conditions that dominate three of the populations (Cascade Head, Bray Point and Rock Creek-Big Creek); they are unlikely to be suitable or desirable as staging areas or to provide access to the spills. Easier alternative staging and access areas exist in the form of unoccupied/unsuitable habitats and/or existing impervious surfaces (e.g., roads and parking lots).
- The proposed action includes CMs that will substantially avoid and minimize impacts to the species and its habitat if cleanup, staging or access activities did become necessary at or near one of the populations.
- The species is likely extirpated from the one population area (Clatsop Plains) with topographic and other features that least limit the potential for spill response activities. No butterflies have been observed there since 1998.

The action agencies determined that the proposed action is likely to adversely affect Oregon silverspot butterfly, specifically that individuals from the populations at Rock Creek-Big Creek, Bray Point, or Clatsop Plain could be affected. However, based on the above facts, the probabilities of exposure and effects to Oregon silverspot butterfly from spill response activities are very low; measurable effects are not reasonably predictable or certain to occur. On that basis, the USFWS concludes that the proposed action may affect, but is NLAA the Oregon silverspot butterfly.

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Oregon Silverspot Butterfly Critical Habitat

Critical habitat for the Oregon silverspot butterfly was designated on July 2, 1980 (45 FR 44935) for coastal salt spray meadows in Lane County, Oregon that were, at that time, believed to support the last viable population. This is a very small area designation between Nancy Creek and Big Creek (Rock Creek-Big Creek).

The PCEs for Oregon silverspot butterfly critical habitat include the caterpillar host plant, *Viola adunca* (PCE 1), the grasses and forbs which provide shelter for the caterpillars (PCE 2), native nectar plants on which the adult butterflies feed (PCE 3) and the Sitka spruce forests which provide shelter for the adult butterflies (PCE 4) (45 FR 44935).

Effects of the Action

Response activities in Oregon silverspot critical habitat may crush and trample native vegetation, including larval host plants and nectar sources (PCEs 1, 2, and 3). The location of critical habitat in the vicinity of coastal shorelines and roadways does create some potential for the plants to be subject to spills and, therefore, subject to the spill response activities that are the subject of this opinion. However, these effects are very unlikely for the following reasons:

- The likelihood of a spill directly affecting designated critical habitat at Rock Creek-Big Creek is minimal based on known and anticipated size, frequency and distribution of spills in the action area. Spill response activities directly targeting critical habitat are therefore unlikely.
- In the unlikely event that a spill were to directly affect the critical habitat with lower elevation or less steep habitat, the impacts of the spill itself would harm critical habitat PCEs to the extent that they are no longer functioning, thereby substantially minimizing the likelihood that subsequent spill response actions would be a meaningful source of additional adverse impacts.
- In the somewhat more likely event of a spill not directly affecting critical habitat but occurring near or adjacent to are as containing PCEs, the potential for the associated spill response to directly or indirectly affect the critical habitat is minimal because of the geographic conditions that dominate Rock Creek-Big Creek; they are unlikely to be suitable or desirable as staging areas or to provide access to the spills. Easier alternative staging and access areas exist in non-habitat and/or existing impervious surfaces (e.g., roads and parking lots).
- The proposed action includes CMs that will substantially avoid and minimize impacts to critical habitat if cleanup, staging or access activities did become necessary.

The action agencies determined that the proposed action is likely to adversely affect Oregon silverspot butterfly critical habitat at Rock Creek-Big Creek. Based on consideration of the above information, the probabilities of exposure and effects to Oregon silverspot butterfly critical habitat casues by spill response activities are extremely low and measurable effects to critical habitat are not reasonably predictable or certain to occur. On that basis, the USFWS concludes that the proposed action may affect, but is NLAA the Oregon silverspot butterfly critical habitat.

Taylor's Checkerspot Butterfly

Status, Life History, Habitat Requirements

Taylor's checkerspot butterfly *(Euphydyas editha taylori)* was listed as an endangered species on October 3, 2013, throughout the subspecies range in Washington, Oregon, and British Columbia (78 FR 61452).

Taylor's checkerspot butterfly requires open grassland habitat dominated by short-statured grasses, with abundant forbs to serve as larval host plants and nectar sources. These habitats are found on prairies, shallow-soil balds (Chappell 2006, pg. 1), grassland bluffs, and grassy openings within a forested matrix on south Vancouver Island, British Columbia; the north Olympic Peninsula; south Puget Sound prairies, Washington; and the Willamette Valley, Oregon. Occupied habitats range in elevation from near sea-level to over 3,200 ft. in elevation, and occupied grassland patches range in size from less than 1 acre up to 100-plus acres (0.4 to 40 ha). Areas of habitat with open bare soil are an important habitat component, as these areas warm more quickly than the surrounding vegetation, and butterflies thermoregulate by basking (Scott 1986, pg. 296; Kuussaari et al. 2004, pg. 140; Stinson 2005, pg. 81).

In Washington, Taylor's checkerspot butterflies inhabit glacial outwash prairies in the south Puget Sound region. Northwest prairies were formerly more common, larger, and interconnected, and supported a greater distribution and abundance of Taylor's checkerspot butterflies than prairie habitat does today. On the north Olympic Peninsula they use shallow-soil balds dominated by prairie forbs and bunchgrasses within a forested landscape, as well as roadsides, former clear-cut areas within a forested matrix, and a coastal stabilized dune site near the Strait of Juan de Fuca (Stinson 2005, pp. 93-96). The two Oregon sites are on grassland hills in the Willamette Valley within a forested matrix (Ross 2008, pg. 1; Benton County 2010, Appendix N, pg. 5). The total area and quality of habitat for the Taylor's checkerspot butterfly has rapidly declined over the past century due to development, conversion, successional changes to grassland habitat, and the spread of nonnative invasive plants.

Landscape and habitat diversity, or heterogeneity, are essential elements for the conservation of Edith's checkerspot butterflies (Ehrlich and Murphy 1987, pg. 122; Hellman et al. 2004, pg. 41). Patches of habitat where Taylor's checkerspot butterfly populations are robust also tend to have high topographic diversity including areas with mima mounds (low, domelike, mounds of earth found in certain prairies) and areas composed of swales (depressions) that produce ecotone habitat (Johnson and O'Neil 2001, pg. 715) between dry upland habitat typical of south Puget Sound prairies, and wet prairie habitat more typical of the Willamette Valley (Easterly et al. 2005, pg. 1). Habitat diversity is important for species persistence at a site, because during drought, butterflies survive best in cool, moist habitats, during extremely wet periods, butterflies survive best on warm, dry exposures (Murphy et al. 2004, pg. 32).

Presence in the Action Area; Known Locations in the Action Area

The subspecies is present in the action area (EPA and USCG 2018, pp. 4-106, 4-107). The subspecies is present "…on [Joint Base Lewis-McChord (JBLM)], near a petroleum pipeline, [and elsewhere] in the south Puget Sound, near a rail line" (p. 4-107).

Nearly all localities for the Taylor's checkerspot butterfly in British Columbia have been lost; the only location currently known from British Columbia was discovered in 2005 (COSEWIC 2011, pg. iv). In Oregon, the number of locations occupied by Taylor's checkerspot butterflies has declined from 13 to 2 (Ross 2011, in litt., pg. 1). In Washington State, 43 historical locales were documented for the Taylor's checkerspot butterfly. In 2017, there were 12 documented locations for the Taylor's checkerspot butterfly in Washington, with three localities consistently harboring more than 1,000 individuals, while the majority of known sites have daily counts of fewer than 100 individual butterflies. Available information would indicate it is unlikely that there are additional, possible locations in the action area.

As of April 2017, there were 15 locations considered occupied by Taylor's checkerspot butterfly rangewide, because of the 2014 reintroduction into Training Area 7 South on JBLM (Linders et al. 2014, pg. 19): Denman Island (BC) (1 occupied site), North Olympic Peninsula (WA) (6 occupied sites), South Puget Prairies (WA) (5 occupied sites), and the Willamette Valley (OR) (2 occupied sites). The subspecies is a declining taxon found only on a few habitat patches throughout the range. A number of sites in Oregon and Washington where Taylor's checkerspot butterfly have been recently extirpated are considered high priority sites for habitat restoration and reintroduction. These sites, which were unoccupied at the time of listing, are identified in the October 11, 2012 proposed rule to designate critical habitat for the Taylor's checkerspot butterfly (77 FR 61938).

Effects of the Action

In Washington, more than 30 geographically-specific, coastal and inland GRPs have been approved, and identify specific natural resources that would be at risk in the event of spills (RRT and NWAC 2018; WDOE 2018). For the action area in Washington, where the species is known to occur, one of two GRPs specifically identify Taylor's checkerspot butterfly as a resource at risk (Northwest Area Committee, NR GRP 2015, Chapter 6, pp. 171-175); the Strait of Juan de Fuca GRP (Northwest Area Committee, Strait of Juan de Fuca GRP, Chapter 6, pp. 6-1 through 6-23) was last updated in 2011 and does not include information to identify or address Taylor's checkerspot butterfly specifically, but does identify some of the known localities as 'sensitive'.

When implementing countermeasures as part of spill response, the EPA and USCG will also implement all of the relevant, practicable, and effective CMs (described above in the proposed action and this appendix).

The habitats where Taylor's checkerspot butterfly may be found today (or likely found in the future) do not include freshwaters, marine waters, emergent freshwater wetlands, or coastal/estuarine wetlands. The aquatic features (wetlands, springs, seeps, etc.) that Taylor's checkerspot butterflies sometime seasonally occupy (i.e., during periods of drought) are typically seasonal or ephemeral, and surrounded by or found within a more mesic (or even xeric) landscape. Generally speaking, the habitats where Taylor's checkerspot butterfly may be found today are physically removed from the locations where spills and federalized spill responses are more likely to occur.

In the BA, the action agencies determined that the proposed action is likely to adversely affect Taylor's checkerspot butterfly populations at the south Puget Sound and JBLM sites. However, considering the subspecies' (1) habitat and habitat requirements; (2) current, constrained geographic distribution; (3) limited potential presence in the action area; (4) limited number of known locations in the action area; and (5) with effective implementation of the CMs, we conclude that potential direct and indirect exposures and adverse effects to the Taylor's checkerspot butterfly are extremely unlikely to occur, and therefore are discountable. On that basis, the USFWS concludes that the proposed action may affect, but is NLAA the Taylor's checkerspot butterfly.

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Taylor's Checkerspot Critical Habitat

On October 3, 2013, the USFWS designated critical habitat for Taylor's checkerspot butterfly (78 FR 61506).

The critical habitat designation includes three Critical Habitat Units (CHUs) which encompass approximately 1,941 acres in Island, Clallam, and Thurston Counties, Washington; and, Benton County, Oregon (78 FR 61506). The three CHUs are: Unit 1, South Sound – 1,143 ac (462 ha) in Washington State; Unit 2, Strait of Juan de Fuca – 779 ac (315 ha) in Washington State (160 ac (65 ha); and, Unit 3, Willamette Valley – 20 ac (8 ha) of privately owned lands in Oregon.

The PCEs of designated Taylor's checkerspot butterfly critical habitat consist of four components (78 FR 61576):

1. Patches of early seral, short-statured, perennial bunchgrass plant communities composed of native grass and forb species in a diverse topographic landscape ranging in size from less than 1 acre up to 100 acres (0.4 to 40 ha) with little or no overstory forest vegetation that have areas of bare soil for basking.
2. Primary larval host plants (narrow-leaf plantain, *Plantago lanceolata*, and harsh paintbrush, *Castilleja hispida*) and at least one of the secondary annual larval host plants (blue-eyed Mary (*Collinsia parviflora*), sea blush (*Plectritis congesta*), or dwarf owl-clover (*Triphysaria pusilla*) or one of several species of speedwell [marsh speedwell (*Veronica scutella*), American speedwell (*V. beccabunga* var. *americana*), or thymeleaf speedwell (*V. serpyllifolia*)].
3. Adult nectar sources for feeding that include several species found as part of the native (and one non-native) species mix on northwest grasslands, including: narrow-leaved plantain; harsh paintbrush; Puget balsam root (*Balsamorhiza deltoidea*); woolly or Oregon sunshine (*Eriophyllum lanatum*); nine-leaved desert parsley (*Lomatium triternatum*); fine-leaved desert parsley or spring gold *(L. utriclatum*); common camas (*Camassia quamash*); showy fleabane (*Erigeron speciosus*); Canada thistle (*Cirsium arvense*); common yarrow (*Achillea millefolium*); prairie lupine (*Lupinus lepidus*); sickle-keeled lupine (*L. albicaulis*); and wild strawberry (*Fragaria virginiana*).
4. Aquatic features such as wetlands, springs, seeps, streams, ponds, lakes, and puddles that provide moisture during periods of drought, particularly late in the spring and early summer. These features can be permanent, seasonal, or ephemeral.

According to the BA, the only critical habitat that overlap[s] with the action area [is] near Sequim Bay and Deception Pass on Whidbey Island, Washington (EPA and USCG 2018, p. 4-35). Sites considered high priority for habitat restoration and reintroduction were unoccupied at the time of listing, are identified in the October 11, 2012 proposed rule to designate critical habitat for the Taylor's checkerspot butterfly (77 FR 61938).

<u>Effects of the Action</u>

In Washington, more than 30 geographically-specific, coastal and inland GRPs have been approved, and identify specific natural resources that would be at risk in the event of spills (RRT and NWAC 2018; WDOE 2018). For the action area in Washington, where the species is known to occur, one of two GRPs specifically identify Taylor's checkerspot butterfly as a resource at risk (Northwest Area Committee, NR GRP 2015, Chapter 6, pp. 171-175); the Strait of Juan de Fuca GRP (Northwest Area Committee, Strait of Juan de Fuca GRP, Chapter 6, pp. 6-1 through 6-23) was last updated in 2011 and does not include information to identify or address Taylor's checkerspot butterfly specifically, but does identify some of the known localities as 'sensitive'.

When implementing countermeasures as part of spill response, the EPA and USCG will also implement all of the relevant, practicable, and effective CMs (see CMs in the above project description and this appendix). The action agencies determined that the proposed action is likely to adversely affect Taylor's checkerspot butterfly critical habitat. However, Taylor's checkerspot butterfly critical habitat is physically removed from the locations where spills and federalized spill responses are more likely to occur. Considering the species' (1) critical habitat PCEs; (2) current, constrained geographic distribution of designated critical habitat; and (3) with effective implementation of the CMs, we conclude that potential direct and indirect adverse consequences to the PCEs of designated Taylor's checkerspot butterfly critical habitat are extremely unlikely to occur, and therefore are discountable. On that basis, the USFWS concludes that the proposed action may affect, but is NLAA designated Taylor's checkerspot butterfly critical habitat.

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Lost River Sucker, Shortnose Sucker and their Designated Critical Habitats

Status, Life History, Habitat Requirements

The USFWS listed Lost River sucker (*Deltistes luxatus*) and shortnose sucker (*Chasmistes brevirostris*) as endangered throughout their entire range on July 18, 1988 (USFWS 1988) under the ESA. A recovery plan for both species was finalized on March 17, 1993 (USFWS 1993), and revised on January 22, 2013 (USFWS 2013) (also see USFWS 2019). These fish species are present throughout the year in a limited geographic ranged within the action area, specifically the Upper Klamath Lake and Iron Gate and J.C. Boyle Reservoirs. Suckers spawn in streams and rivers from

February to May, primarily over gravel substrates in Upper Klamath Lake, Williamson River, and in sections of the Sprague River. Larval suckers emerge by mid-July.

The following information was taken from the *Revised Recovery Plan for the Lost River Sucker and Shortnose Sucker* (USFWS 2013):

The recovery units for both species are the Upper Klamath Lake Unit and the Lost River Basin Unit. Each recovery unit also includes several management units. Within the Klamath Lake unit are Upper Klamath Lake and tributaries – river spawning individuals, Upper Klamath Lake – shoreline spring spawning individuals, Keno Reservoir, and populations below Keno Reservoir. These management units allow for tailored management objectives and actions for individual populations or sub-populations. Within the Lost River Basin Unit are Clear Lake Reservoir and tributaries, Tule Lake, Gerber Reservoir and tributaries, and Lost River Proper (USFWS 2013).

Current factors limiting species recovery also include high mortality of larvae and juveniles due to reduced rearing habitat, entrainment in water management structures, poor water quality and negative interactions with introduced species. Adult populations are limited by the negligible recruitment to the population, as well as high levels of stress and mortality associated with severely impaired water quality. As a whole the species are potentially limited by the lack of habitat connectivity (USFWS 2013).

Lost River sucker and shortnose sucker, like other suckers, are relatively tolerant of degraded water quality conditions. They tolerate higher pH, temperature, un-ionized ammonia concentrations, and lower dissolved oxygen concentrations than many other fishes. Nevertheless, water quality in Upper Klamath Lake and the Lost River often becomes poor enough to adversely affect both species, especially in summer. Not all modification or curtailment of sucker habitat is solely from anthropogenic causes; climatic trends, resulting from both anthropogenic causes and natural variation, also play an important role. Upper Klamath Lake levels are affected by drought, because it is shallow (average depth in summer = 2.2 meters [7.1 feet]), and because during droughts larger irrigation diversions are needed to offset low soil moisture in agricultural fields. Clear Lake Reservoir is even more sensitive to droughts given the limited local precipitation and bathymetry of the lake itself. Severe or prolonged droughts likely negatively impact all Lost River sucker and shortnose sucker life stages throughout their range.

Overharvest contributed to declining population levels, particularly for Lost River sucker, prior to listing. However, since 1987, harvest of any kind has been restricted. Shortnose sucker were not targeted by recreational fishing prior to listing as were Lost River sucker, though they were occasionally caught because of the indiscriminant methods of capture.

Non-native fishes were identified as a potential threat at the time of listing through predation or as sources of exotic diseases/parasites, although no direct evidence was cited. Since then, controlled experiments have demonstrated that adult fathead minnows prey on sucker larvae.

Movement of fish into irrigation systems through unscreened diversions was identified as a threat to the suckers at the time of listing, that has been resolved in some areas and not in others. The impact of entrainment into the irrigation system of the Klamath Project was reduced by construction of screening facilities over the A-Canal; fish screened from entering the A-Canal are returned via pipeline to Upper Klamath Lake at a point that is near the river gates of the Link River Dam. Substantial entrainment occurs at the river gates of the Link River Dam. However, the East Side and West Side hydroelectric diversion facilities are currently shutdown between July 15 and November 15 to reduce entrainment when vulnerable life stages of listed suckers are present. Some percentage of suckers do persist following passage through the Link River Dam gates or the hydroelectric facilities. A new fish ladder was also constructed at Link River Dam in 2004 through which adult suckers have been documented (using PIT tag readers) moving upstream through Link River. There are also significant unscreened diversion structures that divert water from Lake Ewauna, including the Lost River Diver Channel and Ady Canal. Major sucker recovery oriented projects completed include: screening of irrigation diversions, eliminating barriers to fish passage, and restoration of rearing and spawning habitat. In addition, private landowners, the Oregon Department of Fish and Wildlife, Bureau of Reclamation, Natural Resources Conservation Service, the USFWS, and others have built or funded construction of many new fish screens in the upper basin. As a result, the threat of entrainment is now lower than at the time of listing.

Critical Habitat

The following information was taken from the final rule designating of critical habitat for Lost River sucker and the shortnose sucker (final rule; 77 FR 73740, December 11, 2012):

On January 10, 2013, the USFWS designated critical habitat for Lost River suckers on approximately 146 miles (mi) (234 kilometers (km)) of streams and 117,848 acres (ac) (47,691 hectares (ha)) of lakes and reservoirs, and for short-nosed suckers on approximately 136 mi (219 km) of streams and 123,590 ac (50,015 ha) of lakes and reservoirs (USFWS 2013b). Critical habitat is distributed in Klamath and Lake Counties, Oregon, as well as Modoc County, California, including Upper Klamath Lake; the Williamson, Sprague, and Wood Rivers and Crooked Creek upstream of Upper Klamath Lake; and the Link and Klamath Rivers and Lake Ewauna downstream of Upper Klamath Lake. Critical habitat designated for shortnose suckers includes Upper Klamath Lake, the Wood, Sprague, Williamson, Link, and Klamath Rivers, Crooked Creek, and Lake Ewauna, as well as a second unit entirely outside of the action area (around the Gerber Reservoir). For both species, the action area overlaps with these freshwater critical habitats along the east side of Upper Klamath Lake, intersecting with portions of the aforementioned rivers.

The PCEs specific to Lost River sucker and shortnose sucker critical habitat are:

1. Water. Areas with sufficient water quantity and depth within lakes, reservoirs, streams, marshes, springs, groundwater sources, and refugia habitats with minimal physical, biological, or chemical impediments to connectivity. Water must have varied depths to accommodate each life stage: Shallow water (up to 3.28 ft. (1.0 m)) for larval life stage, and deeper water (up to 14.8 ft. (4.5 m)) for older life stages. The water quality characteristics should include water temperatures of less than 28.0 [deg]Celsius (82.4[emsp14][deg]F); pH less than 9.75; dissolved oxygen levels greater than 4.0 mg per L; low levels of microcystin; and un-ionized ammonia (less than 0.5 mg per L). Elements also include natural flow

regimes that provide flows during the appropriate time of year or, if flows are controlled, minimal flow departure from a natural hydrograph.
2. Spawning and rearing habitat. Streams and shoreline springs with gravel and cobble substrate at depths typically less than 4.3 ft. (1.3 m) with adequate stream velocity to allow spawning to occur. Areas containing emergent vegetation adjacent to open water, provides habitat for rearing and facilitates growth and survival of suckers, as well as protection from predation and protection from currents and turbulence.
3. Food. Areas that contain an abundant forage base, including a broad array of chironomidae, crustacea, and other aquatic macroinvertebrates.

Effects of the Action

Because of the close proximity of an oil railway to Upper Klamath Lake, it is possible that a spill and associated spill response could occur in designated critical habitat for the two sucker species. Spill response activities with some potential to impact these habitats or to cause direct injuries to individual fish include: use of vessels and heavy equipment (due to anchoring, grounding, or prop wash); establishment and use of staging areas (including points of access); booming (due to anchoring); construction of berms or other barriers; manual or mechanical removal of oiled substrate; and cutting or removal of vegetation.

In the BA, the actions agencies concluded that any adverse consequences that result from such activities are likely to be insignificant (i.e., localized to small areas, low in magnitude and temporary, and that CMs incorporated into the project will further substantially minimize the likelihood such consequences to individual suckers and their habitats inclusive of critical habitat. On that basis, the action agencies concluded that the impacts of spill responses actions are NLAA the two sucker species and their designated critical habitats.

After reviewing information presented in the BA regarding the potential for spill response activities to adversely affect the species, their habitats or the PBFs of their designated critical habitats via direct injury, altered behavior, exclusion from resources, toxicity and water chemistry/quality changes, and habitat destruction or degradation, the USFWS concurs with the action agencies' determination that adverse consequences of spill response activities on the suckers and thier critical habitat will be insignificant. On that basis, the USFWS concurs that the proposed action may affect, but is NLAA the Lost River sucker, the shortnose sucker and their critical habitat.

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Northern Spotted Owl

On June 26, 1990, the USFWS listed the northern spotted owl *(Strix occidentalis caurina*) as a threatened species under the ESA (55 FR 26114). On December 4, 2012, the USFWS revised the original critical habitat designation for the northern spotted owl (77 FR 71875). Northern spotted owls are present in the action area throughout the year, inhabiting forests consisting predominantly of Douglas-fir, western hemlock, grand fir, white fir, ponderosa pine, Shasta red fir, mixed evergreen, mixed conifer hardwood, and redwood. Potential areas of use or occupancy by owls are most likely to overlap with the action area along lowland rail lines or pipelines within 1 mi of forests (e.g., limited to along the Lower Columbia River (LCR), northwest of Hood Canal, or along the Deschutes River).

Spill response activities with some potential to impact individual spotted owls or owl-use areas include: removal or degradation of habitat for development of new access points and staging areas; smoke and particulates from *in situ* burning; and disturbances from the noise and movements of humans and mechanical equipment.

The actions agencies have concluded that there is minimal potential for impacts from spill response activities to spotted owls, and that any impacts that do occur will be insignificant. The action agencies reached these conclusions because: (1) there is very limited overlap of the action area with northern spotted owl use areas; (2) to respond to a spill, humans and equipment will stay near the rail lines that define the action area near spotted owl habitat rather than go into densely wooded areas that actually represent owl habitat, thereby making it unlikely that owls will be exposed to significant noise, lights, or movement; (3) the magnitude of any disturbance effects that do occur would be low and limited to the duration of the spill response; (4) potential effects from smoke and particulates would also be of limited duration, and not likely to extent far enough into owl habitat that owls couldn't readily move and avoid these conditions; (5) the existence of boat launches and other developed areas with the action area that overlaps owl use areas substantially minimize the need to create new access and staging points, thereby making it unlikely that old-growth trees, nesting, foraging, or roosting habitats will be removed or degraded; and (6) project-specific CMs related to the above issues are also supplemented by information and recommendations specific to spotted owls in the Geographic Response Plan for one of the regions (LCR) in which the action area overlaps with potential spotted owl use. Collectively, these facts led the action agencies to determine that spill response actions may affect but NLAA the spotted owl individuals or populations.

After reviewing information presented in the BA regarding the very low potential for spill response activities to adversely affect the spotted owl and its habitats via direct injury, altered behavior, exclusion from resources, toxicity, and habitat destruction or degradation, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the northern spotted owl.

Northern Spotted Owl Critical Habitat

On December 4, 2012, the USFWS revised the original critical habitat designation for northern spotted owl (77 FR 71875). Designated critical habitat for the northern spotted owl overlaps with the action area along the same limited areas described above for the species.

The PCEs of the northern spotted owl crtical habitat are as follows:

PCE#1: Forest types that may be in early-, mid-, or late-seral stages and that support the northern spotted owl across its geographical range.

PCE#2: Habitat that provides for nesting and roosting.

PCE#3: Habitat that provides for foraging.

PCE#4: Habitat to support the transience and colonization phases of dispersal.

Spill response activities with some potential to impact spotted owl critical habitat include: removal or degradation of habitat for development of new access points and staging areas; smoke and particulates from *in situ* burning; and disturbances from the noise and movements of humans and mechanical equipment.

The actions agencies presented a reasoned analysis in the BA to support a finding that there is a minimal potential for spill response activities to adversely affect spotted owl designated critical habitat, and that any impacts that do occur are likely to be insignificant. The action agencies reached these conclusions because: (1) there is very limited overlap between the action area and spotted owl critical habitat; (2) in the event of a spill, humans and equipment are likely to stay near the rail lines that define the action area near spotted owl critical habitat rather than go into densely wooded areas that actually represent spotted owl critical habitat, thereby making it unlikely that critical habitat will be disturbed; (3) the magnitude of any disturbance effects that do occur would be low and limited to the duration of the spill response; (4) the existence of boat launches and other developed areas with the action area that overlaps spotted owl critical habitat substantially minimize the need to create new access and staging points, thereby making it unlikely that critical habitat PCEs will be impacted; and (5) project-specific CMs supplemented by information and recommendations specific to spotted owls in the GRP for the LCR are likely to further minimize the magnitude, scope, and duration of any adverse consequences caused by response actions that overlap spotted owl critical habitat. Collectively, these findings prompted the action agencies to determine that spill response actions may affect but are NLAA spotted owl critical habitat. The USFWS concrs with this finding for the reasons described above.

Short-tailed Albatross

On July 31, 2000, the short-tailed albatross *(Phoebastria albatrus*) was listed as endangered under the ESA (65 FR 46643). The Short-tailed Albatross Recovery Plan was finalized in 2008 (USFWS 2008, entire). The current breeding distribution of the short-tailed albatross is restricted to islands of Japan and Taiwan, with recent successful breeding observed on Midway Atoll, but post-fledging juvenile birds forage throughout the North Pacific and have been observed feeding in the open marine waters of the action area. Critical habitat for the species has not been designated.

As of 2015, the population was estimated at almost 5,000 birds. Of these, the total number of breeding age birds is thought to be approximately 2,470. At-sea sightings since the 1940s indicate that the short-tailed albatross, while still very few in number today, are distributed widely throughout their historical foraging range of the temperate and subarctic North Pacific Ocean and is often found close to the western U.S. coast.

The worldwide population of short-tailed albatrosses continues to be in danger of extinction throughout its range due to natural environmental threats from the active volcano on Torishima, small population size, and the small number of breeding colonies. Longline fishing, plastics pollution, oil contamination, and airplane strikes are considered threats to the species' conservation and recovery.

Spill response activities with some potential to impact short-tailed albatross include: use of vessels, use of aircraft, skimming/vacuuming, chemical dispersion, and *in situ* burning.

The actions agencies concluded that there is a minimal potential for impacts from spill response activities to adversely affect the short-tailed albatross, and that any adverse consequences that do occur will be insignificant (EPA and USCG 2018, pg. 4-140). The action agencies reached these conclusions because: (1) the type of response activities to which short-tailed albatross could be exposed would be restricted primarily to responses to very large spills in open marine water, which are anticipated to be rare; (2) albatross travel widely to forage for food, so the potential for intersection between specific food resources or feeding areas and spill response actions is low; (3) the possibility of a bird's presence in an area treated by chemical dispersants is very low due to the infrequent occurrence of short-tailed albatross in the action area and the infrequent use of chemical dispersants; and (4) resource monitors will be present to watch for the presence of albatross during large spill response activities, and to coordinate those activities and avoidance measures to further reduce likelihood of exposure. Most importantly, dispersants will not be used in areas where albatross are present (EPA and USCG 2018, Table 4-2). On the basis of this information, the action agencies determined that spill response actions may affect but are NLAA the short-tailed albatross.

As mentioned in the proposed action description, the use of dispersants represents a tradeoff in exposure because organisms in the water column, such as diving birds, may be more exposed as oil disperses throughout the water column (at least until greater dilution or biodegradation is achieved, which occurs over the course of hours to days [for dilution] or months [for biodegradation]). The potential toxicity of dispersants or dispersed oil is a factor of, among other things, the duration of exposure and the frequency of exposure (e.g., is the animal exposed once or repeatedly). As described elsewhere in this opinion, the timeframe for which the use of dispersants is viable and likely to be successful is very short, and dispersants would not be used repeatedly in the same area.

After reviewing information presented in the BA regarding the potential for spill response activities to adveresely affect the short-tailed albatross and its habitats via direct injury, altered behavior, exclusion from resources, toxicity, and habitat destruction or degradation, the USFWS has determined that impacts are likely to be insignificant. On that basis, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the short-tailed albatross.

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Yellow-billed cuckoo

Status, Life History, Habitat Requirements

The western distinct population segment (DPS) of the yellow-billed cuckoo (*Coccyzus americanus*) was listed as threatened on October 3, 2014 (79 FR 59991). Critical habitat for this species has been proposed; however, areas identified in the proposal do not occur within the action area (79 FR 71373, December 2, 2014).

The yellow-billed cuckoo is a neotropical migrant bird that winters in South America and breeds in North America. It is typically secretive and difficult to detect. The species is capable of, and likely adapted to, locating and utilizing resources that are highly variable in time and space (Halterman et al. 2015, pp. 2, 7, 8). However, the yellow-billed cuckoo has high site fidelity and it is possible for individuals to return to the sites where they were reared (E. Ohr, USFWS, pers. comm., September 26, 2018).

Habitat for the yellow-billed cuckoo is characterized as multi-layered, with riparian canopy trees and at least one layer of understory shrubby vegetation. Breeding occurs in habitat patches that are at least 12 acres (5 ha) or greater in extent (USFWS 2018a).

Presence in the Action Area; Known Locations in the Action Area

The yellow-billed cuckoo may occur in the action area in Idaho. There have been approximately 26 observations within Idaho from 1975 to present, including along the Portneuf River and American Falls Reservoir and the Fort Hall bottoms on the Snake River. Single birds have been documented (66 FR 38611; EPA and USCG 2018, pp. 3-173) and recent preliminary data indicates probable breeding pairs occur in Idaho (E. Ohr, USFWS, pers. comm., September 26, 2018). Recent data demonstrates additional occurrence along the Interstate 84 corridor. However, the majority of yellow-billed cuckoo observations occur along the Snake River upstream of the action area, (E. Ohr, USFWS, pers. comm., September 26, 2018).

Historical records for the state of Oregon show that breeding yellow-billed cuckoos were most often sighted in willow bottoms along the Willamette and Columbia Rivers, and potential habitat may still exist along these areas (USFWS 2018b). There are few records of cuckoo sightings in eastern Oregon. Washington has confirmed 20 sightings of yellow-billed cuckoos since the 1950s, mostly in eastern Washington. No sightings involved confirmed or probably breeding. In the last decade, only 3 records have occurred in Washington, and the species may be functionally extirpated from Washington and Oregon (Wiles and Kelasz 2017, pg. 12). Confirmation of yellow-billed cuckoo breeding pairs is very difficult due to their secretive nature, thus a null response is not necessarily an indication that they are not present or not breeding (E. Ohr, USFWS, pers. comm., September 26, 2018). Due to a lack of specific surveys and limited areas of habitat in Oregon and Washington, breeding pairs may be possible, but are unconfirmed in these states.

Effects of the Action

The proposed action consists of federalized responses to spills of oil or petroleum to water, or of other hazardous materials that pose a risk of immediate impacts to human health and/or the environment. The proposed action includes a hierarchy of scaled responses, but the most common and predictable scenarios are generally on constrained temporal and spatial scales (e.g., spill response durations for the purpose of this consultation are limited to up to 4 days (EPA and USCG 2019, pg. 1). Appendix A contains a complete list of expected response and conservation actions.

Yellow-billed cuckoos, if present, could be disturbed by human presence and response activities. However, taking into account (1) the low density of this species in the action area, (2) available information indicating yellow-billed cuckoo do not breed in the action area, (3) CMs which will assist in avoiding response activities in cuckoo-occupied habitat, and (4) the short duration of covered response activities (maximum 4 days, EPA and USCG 2018, 1-4; EPA and USCG 2019, pg. 1), adverse consequences are expected to be highly unlikely to occur and discountable.

Although it is unlikely yellow-billed cuckoo would be present in the action area during implementation of the proposed action, there is a potential that yellow-billed cuckoo habitat could be impacted, resulting in possible effects through the loss of habitat. Response activities in riparian areas could include the need to provide access to waterways or equipment, anchoring of booms in riparian areas, or less commonly, the need to construct staging areas. These activities would require some clearing of riparian vegetation. Where clearing occurs in riparian vegetation characteristic of yellow-billed cuckoo habitat, that habitat could be rendered unsuitable for yellow-billed cuckoos until the vegetation recovers. On the rare occasion when construction of access points or staging areas is necessary, CMs require surveys to be conducted to determine the best route and avoidance of sensitive habitat where possible, minimizing potential impacts to cuckoo habitat. Because implementation of the CMs would limit impacts to suitable yellow-billed cuckoo habitat to small areas, habitat impacts would be temporary as habitat is expected to recover with time, and adjacent suitable habitat is available in the action area, the effects of the proposed action are anticipated to be insignificant. Accordingly, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the yellow-billed cuckoo.

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Columbian White-tailed Deer

Status, Life History, Habitat Requirements

The Columbian white-tailed deer (*Odocoileus virginianus leucurus*; CWTD) is the western-most of the 38 subspecies of white-tailed deer, a species with a continuous geographic distribution that extends from Canada to South America, including most of the continental U.S. (Whitehead 1972). The CWTD was first listed as endangered under the Endangered Species Preservation Act of 1966 (32 FR 4001; March 11, 1967), but was subsequently added to the List of Endangered and Threatened Wildlife when the ESA was enacted in 1973. The CWTD Recovery Plan was prepared in 1976, and revised in 1977 and again in 1983 (USFWS 1983). On October 17, 2016, the Columbia River Distinct Population Segment (DPS) of the CWTD was reclassified as threatened (81 FR 71386).

CWTD inhabit riparian forests, scrub-shrub wetlands, and pastures on islands and within the floodplain of the lower Columbia River. Only a few populations remain. These populations are confined to the Julia Butler-Hansen National Wildlife Refuge, Puget Island, the Ridgefield National Wildlife Refuge, several smaller islands, and adjacent main lands. From 2013 through 2015, the USFWS and its partners translocated a total of 80 CWTD to the Roth and Carty units of the Ridgefield National Wildlife Refuge (*Columbian White-Tailed Deer Cooperative Recovery Initiative Report*; Julia Butler Hansen National Wildlife Refuge, Willapa National Wildlife Refuge Complex; August 2016).

The Columbia River DPS of the CWTD is known today to occur in five counties in Washington and Oregon; Clark, Cowlitz, and Wahkiakum Counties in Washington, and Clatsop and Columbia Counties in Oregon.

Presence in the Action Area; Known Locations in the Action Area

The species is present throughout floodplain forests, pastures, and wetlands along the lower Columbia River (inclusive of islands), from the vicinity of the Ridgefield National Wildlife Refuge and extending north and west toward the mouth. “There is both a rail line and a petroleum pipeline extending along the Columbia River from Longview, Washington … [to] Portland, Oregon … [but they] do not appear to pass directly through areas occupied by CWTD” (EPA and USCG 2018, pp. 4-127). However, much of the CWTD’s most important and productive habitat is located within one mile of the commercial shipping waterway along the lower Columbia River.

Effects of the Action

In Washington, more than 30 geographically-specific, coastal and inland GRPs have been approved, and identify specific natural resources that would be at risk in the event of spills (RRT and NWAC 2018x; WDOE 2018x). For the action area in Washington and Oregon, where the species is known to occur, the only completed GRP does specifically identify CWTD as a resource at risk (Northwest Area Committee, LCR GRP 2015, Chapter 6, pp. 771-782).

When implementing countermeasures as part of spill response, the EPA and USCG will also implement all of the relevant, practicable, and effective CMs (Table A, above). Because much of the CWTD's most important and productive habitat is located within one mile of the commercial shipping waterway along the lower Columbia River, the CMs that serve to avoid and minimize impacts to sensitive aquatic species and habitats during spill response may also serve to further avoid and minimize potential effects to CWTD and their habitats.

CWTD are resilient to disturbance and often habituate to local noise and activities. Minor amounts of increased vigilance, small-scale movement, and increased use of cover do not represent a significant disruption of normal behaviors (i.e., the ability to successfully feed, move, and/or shelter).

Taking into account the species' (1) habitat and habitat requirements, (2) current, constrained geographic distribution, (3) limited potential presence in the action area, (4) limited number of known locations in the action area, and (5) with effective implementation of the CMs, we conclude that potential direct and indirect exposures and adverse consequences to the CWTD from spill response activities are extremely unlikely to occur, and therefore are discountable. On that basis, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the Columbian white-tailed deer.

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Grizzly Bear

Status, Life History, Habitat Requirements

The grizzly bear *(Ursus arctos horribilis)* of the conterminous United States was listed as threatened under the ESA on July 28, 1975 (40 FR 31734). Since the original listing of the grizzly bear, the USFWS has undertaken a number of actions to review the status of individual grizzly bear populations. The North Cascades Ecosystem (NCASC), Selkirk Ecosystem (SE), and Cabinet-Yaak (CYE) populations were determined warranted for reclassification from threatened to endangered status, but precluded by higher priority actions (64 FR 57534, October 25, 1999; 66 FR 54808, October 30, 2001; 67 FR 40657, June 13, 2002; 69 FR 24876, May 4, 2004; 70 FR 24870, May 11, 2005; 71 FR 53756, September 12, 2006; 72 FR 69034, December 6, 2007; 73 FR 75176, December 10, 2008; 74 FR 57804, November 9, 2009). No critical habitat has been designated for the grizzly bear.

The Grizzly Bear Recovery Plan was approved on January 29, 1982, and a revised plan was completed on September 10, 1993 (USFWS 1993, pg. ii). The revised Recovery Plan identifies six recovery zones: 1) the Yellowstone (GYA); 2) the Northern Continental Divide (NCDE); 3) the CYE; 4) the SE; 5) the NCASC; and 6) the Bitterroot (BE) (Figure GB-1). Although there are six grizzly bear recovery zones, only five are occupied; the BE does not having a grizzly bear population at this time.

Grizzly bears have large home ranges, varying from 50 miles or more for females to a few hundred miles for males. Grizzly bear movements are largely influenced by their search for food. Grizzly bears are largely dependent on riparian habitats also used extensively by people; thus, grizzly bear populations are susceptible to human influences. Grizzly bears may avoid key habitats due to human generated disturbances, or become habituated and food conditioned, which may ultimately lead to the animal being destroyed. Historically, as human settlements, developments, and roads increased in grizzly bear habitat, grizzly bear populations became fragmented. Roads, and the increased human presence associated with roads, represent a significant mortality-displacement risk to grizzly bears.

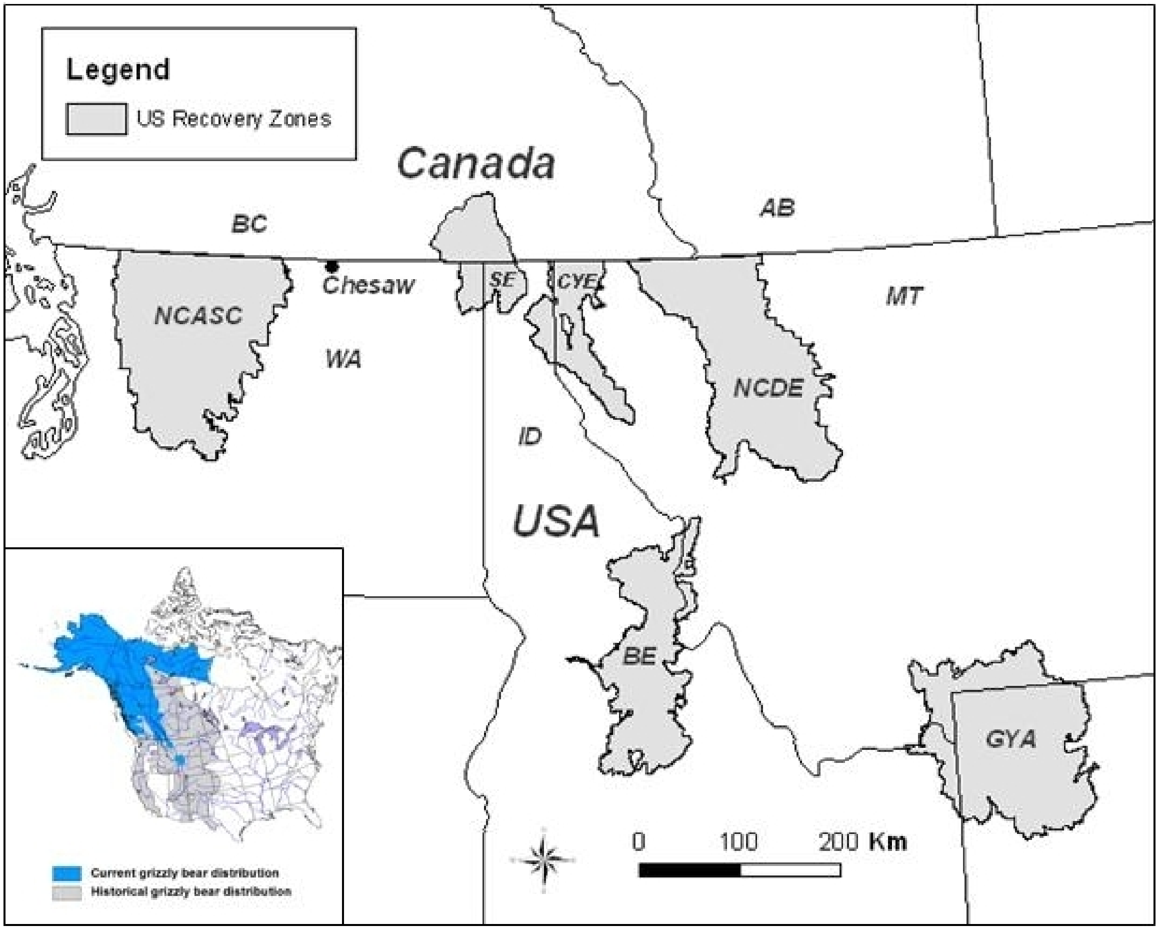

Figure GB-1: Current and historic grizzly bear range and location of recovery ecosystems (In USFWS 2011, pg. A-11) Inset: Historic (grey) and current (blue) grizzly bear distribution (Proctor et al, in review).

<u>Presence in the Action Area; Known Locations in the Action Area</u>

No portion of the transportation routes intersect grizzly bear recovery zones; however, the networks lie adjacent to portions of the Cabinet-Yaak and Bitterroot Recovery Zones in Idaho. The Bitterroot Recovery Zone (RZ) is currently unoccupied by grizzly bears, but transient bears may wander into the area. The Cabinet-Yaak RZ is occupied by grizzly bears. A recent mark-recapture study estimates the number of grizzly bears in the CYE at 48-50 individuals (includes full- and part-time residents) with an estimated 43 full-time residents (Kendall et al. 2016, pp. 314, 323). While RZs are the focus of recovery, bears may be found in any suitable habitat (Servheen, et. al 2001, pg. 161) and have been documented outside of recovery zones on numerous occasions. Given the proximity of the project area to the Cabinet-Yaak RZ, it is possible that a grizzly bear may initially be present in close proximity to a response site that occurs adjacent to this Recovery Zone.

Effects of the Action

The proposed action consists of federalized responses to spills of oil or petroleum to water, or of other hazardous materials that pose a risk of immediate impacts to human health and/or the environment. The proposed action includes a hierarchy of scaled responses, but the most common and predictable scenarios are generally on constrained temporal and spatial scales (e.g., spill response durations for the purpose of this consultation are limited to up to 4 days (EPA and USCG 2019, pg. 1. The above proposed action and this appendix contains a complete descrption of expected response and CMs.

Grizzly bears may be present in or near the action area during response activities. Increased human activity and noise levels that result from implementation of response activities may disturb or displace bears that happen to be in the area. However, these activities will occur at intermittent levels and over a short duration (up to 4 days) (EPA and USCG 2019, pg. 1; see Appendix E below). There are existing large paved areas within the vicinity of the corridor for staging; therefore, construction of new areas will likely not be necessary (EPA and USCG 2018, pg. 2-29). Although not specifically stated in the BA, we expect response teams to lodge in nearby facilities and not camp in the response area, thus minimizing human activity and noise in areas near grizzly occurrence. Where there is a large spill, aerial surveillance may occur. Recovery zones and adjacent areas would be considered sensitive areas. As such, flights will be minimized and restricted to within 1,500 feet of the spill, and above 1,000 feet. These specifications meet the guidance on helicopter overflights that are not likely to adversely affect grizzly bear. (Montana/Northern Idaho Level I Terrestrial Biologists Team 2009, pg. 6). We expect that any grizzly bear that may be using habitat within the response corridor area at the time of a response will have ample opportunity to avoid the activity by moving to similar or higher quality habitat within recovery zones adjacent to the response activities.

It is unlikely that spill response activities would overlap recovery zones; however, in the rare instance that the spill response did infringe on a recovery zone, we expect bears to respond by moving to nearby habitat of similar or higher quality. Due to the short duration of the response time, we expect this response would be short-term and temporary and would not impair breeding, feeding, or sheltering behavior of the grizzly bear, resulting in insignificant effects. Accordingly, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the grizzly bear.

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Mazama Pocket Gopher and Designated Critical Habitat

<u>Status, Life History, Habitat Requirements</u>

On April 9, 2014, the USFWS published a final rule listing four subspecies of the Mazama pocket gopher (*Thomomys mazama* ssp.; MPG) as threatened throughout their ranges in Washington (79 FR 19760); the Roy Prairie (*T. m. glacialis*), Olympia (*T. m. pugetensis*), Tenino (*T. m. tumuli*), and Yelm (*T. m. yelmensis*) pocket gophers. MPGs are small fossorial rodents from the family Geomyidae ("true gophers"). MPGs are regional endemics found only in western Washington, western Oregon, and northern California. A larger, related species, the northern pocket gopher (*T. talpoides*) is found in eastern Washington.

In Washington, specifically Thurston and Pierce Counties, MPGs live in open meadows, prairies, and grassland habitats of the glacial outwash plain, where there are porous, well-drained soils. They do not require high quality prairie, but instead can live on a wide range of sites, provided that the vegetative cover is mostly open (no trees, with little or no woody shrub cover), and especially where soils support the perennial forbs that MPGs prefer.

Much of the suitable habitat that historically occurred across the ranges of the four listed MPG subspecies has been degraded by curtailment of natural disturbance regimes (i.e., lack of wildfire leading to tree and woody shrub encroachment), lost to development, or converted to incompatible land uses. However, populations do persist today on partially-developed sites, including road right-of-ways, on municipal properties, tree farms, and in agricultural settings. Poor habitat connectivity across the landscape isolates many of these populations.

The final rule designating critical habitat for the Olympia, Tenino, and Yelm pocket gophers (79 FR 19712; April 9, 2014) identifies two primary constituent elements (PCEs) essential for the conservation of each subspecies.

(PCE #1) *Soils that support the burrowing habits of the MPG, and where the four Thurston/Pierce subspecies of the MPG may be found*. These are usually friable, loamy, and deep soils, some with relatively greater content of sand, gravel, or silt, all generally on slopes less than 15 percent. Most are moderately to well-drained, but some are poorly drained. The range of each subspecies of the MPG overlaps with a subset of potentially suitable soil series or soil series complexes. Here we describe the suitable soil series or soil series complexes that may occur within the range of each subspecies. All of the soil series or soil series complexes listed could potentially be suitable for any of the four Thurston/Pierce subspecies of the MPG.

- Olympia pocket gopher soils include the following soil series or soil series complex: Alderwood; Cagey; Everett; Godfrey; Indianola; Kapowsin; McKenna; Nisqually; Norma; Spana; Spanaway; Spanaway-Nisqually complex; and, Yelm.
- Tenino pocket gopher soils include the following soil series or soil series complex: Alderwood; Cagey; Everett; Indianola; Kapowsin; Nisqually; Norma; Spanaway; Spanaway-Nisqually complex; and, Yelm.
- Yelm pocket gopher soils include the following soil series or soil series complex: Alderwood; Cagey; Everett; Godfrey; Indianola; Kapowsin; McKenna; Nisqually; Norma; Spanaway; Spanaway-Nisqually complex; and, Yelm.

(PCE #2) *Areas equal to or larger than 50 acres (20 hectares) in size that provide for breeding, foraging, and dispersal activities, that have*:

- Less than 10 percent woody vegetation cover;
- Vegetative cover suitable for foraging by MPG. The diet includes a wide variety of plant material, including leafy vegetation, succulent roots, shoots, tubers, and grasses. Forbs and grasses that MPG are known to eat include, but are not limited to: common yarrow (*Achillea millefolium*), agoseris (*Agoseris* spp.), thistle (*Cirsium* spp.), brome (*Bromus* spp.), camas (*Camassia* spp.), tiny trumpet (*Collomia linearis*), willowherb (*Epilobium* spp.), woolly sunflower (*Eriophyllum lanatum*), groundsmoke (*Gayophytum diffusum*), hairy cat's ear (*Hypochaeris radicata*), peavine (*Lathyrus* spp.), lupine (*Lupinus* spp.), slender phlox (*Microsteris gracilis*), penstemon (*Penstemon* spp.), Gairdner's yampah (*Perideridia gairdneri*), varileaf phacelia (*Phacelia heterophylla*), knotweed (*Polygonum douglasii*), cinquefoil (*Potentilla* spp.), bracken fern (*Pteridium aquilinum*), common dandelion (*Taraxacum officinale*), clover (*Trifolium* spp.), and violet (*Viola* spp.); and,
- Few, if any, barriers to dispersal within the unit or subunit. Barriers to dispersal may include, but are not limited to, forest edges, roads (paved and unpaved), abrupt elevation changes, Scot's broom (*Cytisus scoparius*) thickets,

highly cultivated lawns, inhospitable soil types or substrates, development and buildings, slopes greater than 35 percent, and open water.

Presence in the Action Area; Known Locations in the Action Area

All four of the listed MPG subspecies are present in the action area (EPA and USCG 2018, pp. 4-128 through 4-132), "…near the airport in Olympia, Washington (Olympia pocket gopher); [on] JBLM (Roy Prairie pocket gopher); near the Rocky Prairie Natural Area Preserve (Tenino pocket gopher); and near the Washington towns of Ground Mound, Littlerock, Rainier, Rochester, and Vail (Yelm pocket gopher)" (p. 4-129). "A total of 650 ha (1,606 acres) of critical habitat is designated in Thurston County, Washington for three of the subspecies: Olympia, Tenino, and Yelm [pocket gophers] (79 FR 19711); all [more accurately, much] of … [this] critical habitat … overlap[s] with the Action Area, within 1.6 km (1 mile) of a pipeline or railroad" (p. 4-131). The subspecies may be found in Thurston County (Olympia, Tenino, and Yelm pocket gophers), and in Pierce County (Roy Prairie pocket gopher), wherever there are suitable soils and cover types.

Effects of the Action

In Washington, more than 30 geographically-specific, coastal and inland GRPs have been approved, and identify specific natural resources that would be at risk in the event of spills (RRT and NWAC 2018; WDOE 2018). For the action area in Thurston and Pierce Counties, Washington, where the four listed MPG subspecies are known to occur, both GRPs specifically identify MPG as a resource at risk (Northwest Area Committee, WADE GRP 2017, Chapter 6, pp. 101-106; Northwest Area Committee, NR GRP 2015, Chapter 6, pp. 171-175).

When implementing countermeasures as part of spill response, the EPA and USCG will also implement all of the relevant, practicable, and effective CMs (Table A, above).

The habitats where the four listed MPG subspecies may be found today (or likely found in the future) do not include freshwaters, marine waters, emergent freshwater wetlands, or coastal/estuarine wetlands. Generally speaking, the habitats where the four listed MPG subspecies may be found today are physically removed from the locations where spills and federalized spill responses are more likely to occur. Taking into account the subspecies' (1) habitat and habitat requirements, (2) current, constrained geographic distributions, (3) limited potential presence in the action area, (4) limited number of known locations in the action area, and (5) with effective implementation of the CMs, we conclude that potential direct and indirect exposures and adverse consequences caused by spill response activities to the four listed MPG subspecies are extremely unlikely, and therefore discountable. For the same reasons, we conclude that potential direct and indirect effects to the PCEs of MPG critical habitat are also extremely unlikely to occur, and therefore are discountable. On that basis, the USFWS concurs with the findings of the action agencies that the proposed action may affect, but is NLAA the Olympia, Roy Prairie, Tenino, and Yelm pocket gophers and their designated critical habitat.

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Appendix B: From BA - Table 3-1 Protected Species and Critical Habitat Evaluated in the Northwest Area Contingency Plan Biological Assessment

From BA: Table 3-1 Protected Species and Critical Habitat Evaluated in the Northwest Area Contingency Plan Biological Assessment (Grey cells represent "no effect" species or critical habitat as determined by the EPA and USCG).

Protected Species	Scientific Name	Status	Species Occurrence by State[a]			Critical Habitat	
			OR	WA	ID	Status	Overlap with Action Area
Plants							
Kincaid's lupine	*Lupinus sulphureus* var. *kincaidii*	T	X	X		D	
Nelson's checkermallow	*Sidalcea nelsoniana*	T	X	X			
Slickspot peppergrass	*Lepidium papilliferum*	T			X	P	X
Spalding's catchfly	*Silene spaldingii*	T		X	X		
Ute Ladies′-tresses	*Spiranthes diluvialis*	T		X			
Water howellia	*Howellia aquatilis*	T	X	X	X		
Western lily	*Lilium occidentale*	E	X				

From BA: Table 3-1 Protected Species and Critical Habitat Evaluated in the Northwest Area Contingency Plan Biological Assessment (Grey cells represent "no effect" species or critical habitat as determined by the EPA and USCG).

Protected Species	Scientific Name	Status	Species Occurrence by State[a]			Critical Habitat	
			OR	WA	ID	Status	Overlap with Action Area
White Bluffs bladderpod	*Physaria douglasii* ssp. *tuplashensis*	T		X		D	
Willamette daisy	*Erigeron decumbens* var. *decumbens*	E	X			D	
Snails							
Banbury springs limpet	*Lanx* spp.	E			X		
Bliss Rapids snail	*Taylorconcha serpenticola*	T			X		
Bruneau hot springsnail	*Pyrgulopsis bruneauensis*	E			X		
Snake River physa	*Physa natricina*	E			X		
Butterflies							
Fender's blue butterfly	*Icaricia icarioides fenderi*	E	X			D	
Island marble butterfly	*Euchloe ausonides insulanus*	C[c]		X		P[c]	X
Oregon silverspot butterfly	*Speyeria zerene hippolyta*	T	X	X		D	X

From BA: Table 3-1 Protected Species and Critical Habitat Evaluated in the Northwest Area Contingency Plan Biological Assessment (Grey cells represent "no effect" species or critical habitat as determined by the EPA and USCG).

Protected Species	Scientific Name	Status	Species Occurrence by State[a]			Critical Habitat	
			OR	WA	ID	Status	Overlap with Action Area
Taylor's checkerspot	*Euphydryas editha taylori*	E	X	X		D	X
Fish							
Bull trout	*Salvelinus confluentus*	T	X	X	X	D	X
Kootenai River white sturgeon	*Acipenser transmontanus*	E			X	D	X
Lost River sucker	*Deltistes luxatus*	E	X			D	X
Shortnose sucker	*Chasmistes brevirostris*	E	X			D	X
Herptiles							
Oregon spotted frog	*Rana pretiosa*	T	X	X		D	X
Mammals							
Canada lynx	*Felis lynx canadensis*	T	X		X	D	
Columbian white-tailed deer (Columbia River DPS)	*Odocoileus virginianus leucurus*	T[d]	X	X			

From BA: Table 3-1 Protected Species and Critical Habitat Evaluated in the Northwest Area Contingency Plan Biological Assessment (Grey cells represent "no effect" species or critical habitat as determined by the EPA and USCG).

Protected Species	Scientific Name	Status	Species Occurrence by State[a]			Critical Habitat	
			OR	WA	ID	Status	Overlap with Action Area
Grizzly bear	*Ursus arctos horribilis*	T			X		
Gray wolf (North Rocky Mountain)	*Canis lupus*	E	X	X			
North American wolverine	*Gulo gulo luscus*	T(P)	X	X	X		
Olympia pocket gopher	*Thomomys mazama pugetensis*	T		X		D	X
Roy Prairie pocket gopher	*T. m. glacialis*	T		X			
Tenino pocket gopher	*T. m. tumuli*	T		X		D	X
Yelm pocket gopher	*T. m. yelmensis*	T		X		D	X
Birds							
Marbled murrelet	*Brachyrampus marmoratus*	T	X	X		D	X
Northern spotted owl	*Strix occidentalis caurina*	T	X	X		D	X
Short-tailed albatross	*Phoebastria albatrus*	E	X	X			
Streaked horned lark	*Eremophila alpestris strigata*	T	X	X		D	X

From BA: Table 3-1 Protected Species and Critical Habitat Evaluated in the Northwest Area Contingency Plan Biological Assessment (Grey cells represent "no effect" species or critical habitat as determined by the EPA and USCG).

Protected Species	Scientific Name	Status	Species Occurrence by State[a]			Critical Habitat	
			OR	WA	ID	Status	Overlap with Action Area
Western snowy plover	*Charadrius alexandrinus nivosus*	T	X	X		D	X
Yellow-billed cuckoo	*Coccyzus americanus*	T	X	X	X	P	

Notes to Table 3-1:

[a] Species occurrence within a state does not imply overlap with the action area.

[b] Species occurrence by state for anadromous fish is shown for inland areas.

[c] On April 12, 2018, the USFWS proposed to list the island marble butterfly and designated critical habitat; the final listing rule is scheduled to publish on or before April 12, 2019 (83 FR 15900).

[d] Status of Columbian white-tailed deer was changed from endangered to threatened in October 2016 (81 FR 71836).

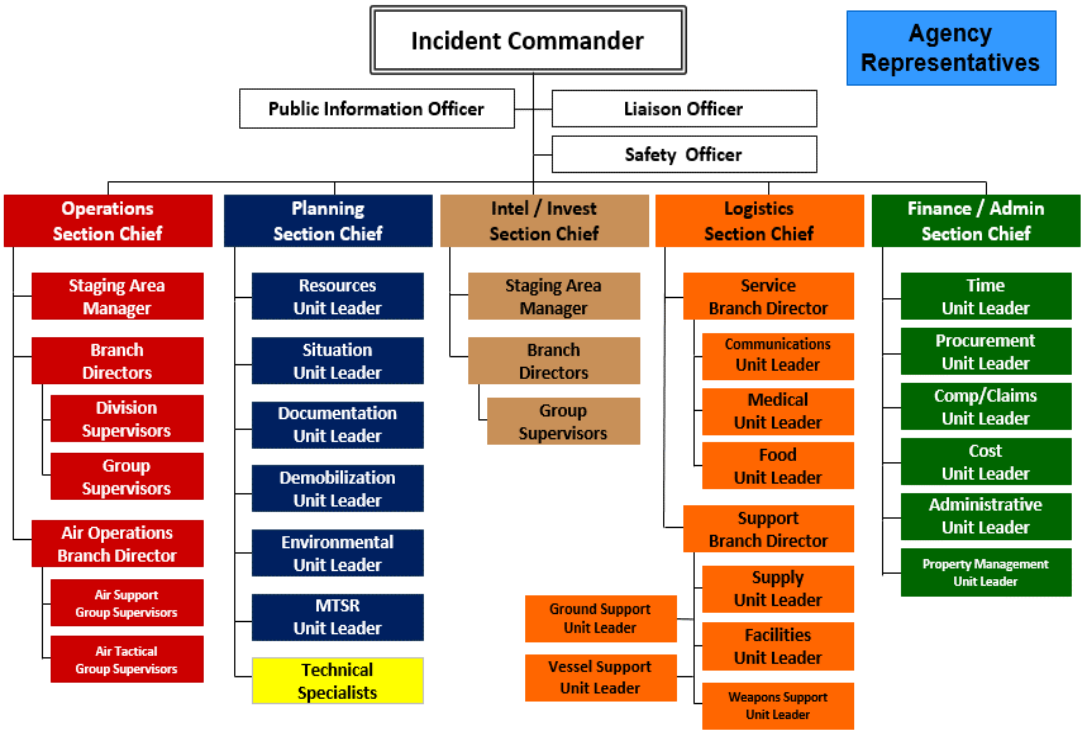
From BA: Table 3-1 Protected Species and Critical Habitat Evaluated in the Northwest Area Contingency Plan Biological Assessment (Grey cells represent “no effect” species or critical habitat as determined by the EPA and USCG).

Protected Species	Scientific Name	Status	Species Occurrence by State[a]			Critical Habitat	
			OR	WA	ID	Status	Overlap with Action Area

Key:

D	designated
DPS	distinct population segment
E	endangered
ESU	evolutionary significant unit
F	foreign
ID	Idaho
NMFS	National Marine Fisheries Service
OR	Oregon
P	proposed
T	threatened
USFWS	US Fish and Wildlife Service
WA	Washington

Appendix C: Incident Command Structure



Source: USCG Incident Command Handbook

From Figure 1-1 of the BA: Oil and Hazardous Substance Response Incident Command System Structure

Appendix D: BA Table 2-1 – Response Actions, Elements in Scope of Consultation, and Habitat Types Potentially Affected

Table 2-1 Response Actions, Elements in Scope of Consultation, and Habitat Types Potentially Affected

Response Action	Elements in Scope of Consultation	Habitat Types Potentially Affected							Groups of Listed Species Potentially Affected (by Service Agency)
		Terrest	Riparia	Riverine/	Wetlan	Shoreline	Marine Nearsh	Open Marine	
Supporting Actions Common to Most Response Actions									
Use of vessels	Mobilization of vessels to and from site; presence of vessel in atypical locations, shoreline access			X		X	X	X	NMFS: fish, sea turtles, marine mammals USFWS: herptiles, fish
Use of vehicles or heavy machinery	Mobilization of vehicles to and from site; presence of vehicles or machinery in atypical locations					X			NMFS: fish, marine mammals USFWS: plants, snails, butterflies, fish, herptiles, mammals, birds

Table 2-1 Response Actions, Elements in Scope of Consultation, and Habitat Types Potentially Affected

Response Action	Elements in Scope of Consultation	Habitat Types Potentially Affected							Groups of Listed Species Potentially Affected (by Service Agency)
		Terrest	Riparia	Riverine/ L	Wetlan	Shoreline (Fresh	Marine Nearshore	Open Marine	
Staging area establishment and use	Mobilization of personnel to and from the site; manual construction/deconstruction using heavy equipment placement of components (e.g., waste oil tanks and equipment) and establishment of access points								USFWS: plants, butterflies, mammals, birds
Foot traffic at spill site	Mobilization of personnel to and from the site, presence of responders					X			USFWS: plants, butterflies, herptiles, mammals, birds
Use of aircraft (e.g., to monitor for wildlife and track spill trajectory)	Flights over the impacted spill area			X		X	X	X	NMFS: sea turtles, marine mammals USFWS: mammals, birds

Table 2-1 Response Actions, Elements in Scope of Consultation, and Habitat Types Potentially Affected

Response Action	Elements in Scope of Consultation	Habitat Types Potentially Affected							Groups of Listed Species Potentially Affected (by Service Agency)
		Terrest	Riparia	Riverine/ Lacustr	Wetlan	Shoreline (Fresh	Marine Nearshore	Open Marine	
Solid waste management	Handling, storage, and transport of wastes			X		X	X	X	NMFS: fish USFWS: plants, snails, butterflies, fish, herptiles, mammals, birds
Liquid waste management	Handling, storage, and transport of wastes; decanting to open waters (within 24 hours of spill discovery)			X		X	X	X	NMFS: fish, sea turtles, marine mammals USFWS: plants, snails, butterflies, fish, herptiles, mammals, birds
Decontamination	Decontamination operations of equipment, personnel, and vessels			X		X	X	X	NMFS: fish, sea turtles, marine mammals USFWS: plants, snails, butterflies, fish, herptiles, mammals, birds
Mechanical Countermeasures									
Deflection/Containment									
Booming	Transport, deployment, anchoring (including on land), presence, access, tending, removal, and disposal of equipment			X		X	X	X	NMFS: fish, sea turtles, marine mammals USFWS: plants, butterflies, fish, herptiles, mammals, birds

Table 2-1 Response Actions, Elements in Scope of Consultation, and Habitat Types Potentially Affected

Response Action	Elements in Scope of Consultation	Habitat Types Potentially Affected							Groups of Listed Species Potentially Affected (by Service Agency)
		Terrest	Riparia	Riverine/	Wetlan	Shoreline	Marine Nearsh	Open Marine	
Berms, dams, or other barriers; pits and trenches	Construction, maintenance, and deconstruction			X		X			NMFS: fish, marine mammals USFWS: plants, snails, butterflies, fish, herptiles, mammals, birds
Culvert blocking	Construction, transport, and placement of barrier; re-plumbing of outlet; and establishment of access points and staging areas			X		X			NMFS: fish, marine mammals USFWS: plants, snails, fish, herptiles, mammals, birds
Recovery of Spilled Material									
Skimming	Transport, deployment, and operation of skimmer and placement of hoses			X		X	X	X	NMFS: fish, sea turtles, marine mammals USFWS: snails, fish, herptiles
Vacuuming	Transport, deployment, and operation of vacuum equipment and placement of hoses			X		X	X	X	NMFS: fish, sea turtles, marine mammals USFWS: snails, fish, herptiles

Table 2-1 Response Actions, Elements in Scope of Consultation, and Habitat Types Potentially Affected

Response Action	Elements in Scope of Consultation	Habitat Types Potentially Affected							Groups of Listed Species Potentially Affected (by Service Agency)
		Terrest	Riparia	Riverine/ Lacustr	Wetlan	Shoreline (Fresh	Marine Nearshore	Open Marine	
Passive collection of oil with sorbents (e.g., sorbent pads, sausage boom, pom poms, peat)	Deployment, transport, maintenance, and removal of sorbent materials			X		X	X		NMFS: fish, sea turtles, marine mammals USFWS plants, snails, butterflies, fish, herptiles, mammals, birds
Removal/Cleanup									
Manual removal of oil and oiled substrate using hand tools (e.g., rakes and shovels)	Site access, removal of oil/oiled material, collection and transport of oily waste, and transport and use of equipment					X			NMFS: fish, marine mammals USFWS: plants, snails, butterflies, fish, herptiles, mammals, birds

Table 2-1 Response Actions, Elements in Scope of Consultation, and Habitat Types Potentially Affected

Response Action	Elements in Scope of Consultation	Habitat Types Potentially Affected							Groups of Listed Species Potentially Affected (by Service Agency)
		Terrest	Riparia	Riverin e/	Wetlan	Shoreli ne	Marine Nearsh	Open Marine	
Mechanical removal of oil and oiled substrate (with or without excavation >2.5 cm [1 inch]) Sediment reworking	Site access, removal of oil/oiled material, collection and transport of oily waste, and transport and use of equipment					X			NMFS: fish, marine mammals USFWS: plants, snails, butterflies, fish, herptiles, mammals, birds
Woody debris removal (before or after oiling) Terrestrial and aquatic cutting/ removal of vegetation (before or after oiling)	Site access, removal of oiled or unoiled material, collection and transport of oily waste, and transport of equipment					X			NMFS: fish, sea turtles, marine mammals USFWS: plants, snails, butterflies, fish, herptiles, mammals, birds

Table 2-1 Response Actions, Elements in Scope of Consultation, and Habitat Types Potentially Affected

Response Action	Elements in Scope of Consultation	Habitat Types Potentially Affected							Groups of Listed Species Potentially Affected (by Service Agency)
		Terrest	Riparia	Riverin e/	Wetlan	Shoreli ne	Marine Nearsh	Open Marine	
Ambient temperature, low pressure flooding/flushin g	Transport, deployment, and use of equipment and oil re-mobilization			X[a]		X			NMFS: fish, marine mammals USFWS: plants, snails, fish, herptiles, mammals, birds
Pressure washing/ steam cleaning/sand blasting	Transport, deployment, and use of equipment; oil re-mobilization; and introduction of sand from blasting					X			NMFS: fish, marine mammals USFWS: plants, snails, butterflies, fish, herptiles, mammals, birds
Physical herding	Use, deployment, and transport of equipment and oil re-mobilization			X		X	X		NMFS: fish, sea turtles, marine mammals USFWS: aquatic plants, snails, fish, herptiles, mammals, birds
Non-mechanical Countermeasures									
Chemical dispersion[b,c]	Surface application from vessel or aircraft (including deployment, transport, and use of dispersant chemical)							X	NMFS: fish, sea turtles, marine mammals USFWS: marine or shore birds

Table 2-1 Response Actions, Elements in Scope of Consultation, and Habitat Types Potentially Affected

Response Action	Elements in Scope of Consultation	Habitat Types Potentially Affected							Groups of Listed Species Potentially Affected (by Service Agency)
		Terrest	Riparia	Riverin e/	Wetlan	Shoreli ne	Marine Nearsh	Open Marine	
In situ burning[b]	Transport, deployment, maintenance, and removal of fire booms; burning; residual collection			X[a]		X	X	X	NMFS: fish, sea turtles, marine mammals USFWS: birds
Other Response Actions									
Natural attenuation (with monitoring)	Accessing/monitoring site			X		X	X	X	NMFS: fish, sea turtles, marine mammals USFWS: plants, snails, butterflies, fish, herptiles, mammals, birds
Places of refuge for disabled vessels	Relocation of disabled vessels			X		X	X	X	NMFS: fish, sea turtles, marine mammals USFWS: fish, birds
Non-floating oil	Recovery of non-floating oil			X			X	X	NMFS: fish USFWS: snails, fish
Hazing and deterrence	Deterring and hazing wildlife to prevent oiling					X	X	X	NMFS: sea turtles, marine mammals USFWS: mammals, birds

Notes to Table 2-1:

[a] Ambient temperature, low pressure flooding/flushing and i*n situ* burning can be used in lacustrine open water habitat but is typically not used in fast flowing riverine habitat.

[b] *In situ* burning and use of chemical dispersants as part of the response action require prior approval. Use of *in situ* burning and chemical dispersants is authorized in preauthorized areas and on a case-by-case basis as described in Section 9407 and 9406, respectively, and in Section 1 of the BA.

[c] No dispersants are currently formulated for use in freshwater. Dispersants are not recommended for use in areas near protected resources.

Key:

BA	biological assessment
cm	centimeters
ft.	feet
NMFS	National Marine Fisheries Service
USFWS	US Fish and Wildlife Service

Appendix E: Table 2-2 - Response Actions, Exposure/Stressor Pathways, and Conservation Measures

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Supporting Actions Common to Most Responses Actions[c]						
Use of vessels	Decontamination of vessels	Rivers/Lakes Shoreline Marine nearshore Open marine water	Type of vessel used determined based on its capabilities relative to spill-specific needs. Adverse weather (e.g., thunderstorms, low visibility) may limit use. Draft of vessel may limit use in shallow areas.	Vessel types range from small tenders to large ships, with smaller vessels providing access to shallow or narrow habitats. Larger vessels are associated with deep water and responses to large volumes of oil. Most spills are minor so smaller vessels are used and would primarily be used to place/replace boom. There is limited loitering or need to anchor or ground. Fueling and launch locations further from the spill require travel over greater distances and at greater speeds. Vessels are generally deployed at the time of or immediately after a spill and repeatedly, as necessary, for the duration of the spill; may be used at night. The use of vessels for on-water recovery is short term (hours to days). Given the nature of oil dissipation and degradation (particularly in the NW environment), on-water recovery periods are short. Use of vessels for on-water recovery of more than four days is not typical, although vessels may be used for shoreline clean-up for weeks in areas that are difficult to access from land.	Vessel strikes may occur. Wildlife may be disturbed due to noise, light, and presence. Benthic habitat and organisms may be destroyed by anchoring, grounding, or prop wash.	The use of vessels would take into consideration sensitive habitats (e.g., nesting areas or spawning areas) based on presence and distribution of wildlife such as birds and mammals (to the extent that information is available in GRPs), and avoid these areas when possible. Observe instructions in GRPs that outline boat and watercraft use restrictions within 183 m (200 yards) of National Wildlife Refuge sites or other sensitive areas. Obtain maps of sanctuary zones and vessel BMPs and SOPs for marine mammals. Do not stage boats such that shoreline vegetation is crushed. Boats should not rest on or press against vegetation at any time. Avoid anchor or prop-scarring of submerged vegetation. Maintain a buffer of at least 91 m (100 yards) from marine mammals (e.g., whales) and 183 m (200 yards) from Southern Resident Killer Whales. Do not move into the path of whales. If approached by a marine mammal, put the engine in neutral and allow it to pass.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Use of vehicles or heavy machinery	Decontamination Staging area establishment and use to support heavy machinery	Terrestrial Riparian Shorelines	Type of vehicle used determined based on its capabilities relative to spill-specific needs. Adverse weather (e.g., thunderstorms, low visibility) may limit use. Response very rarely involves establishing staging areas in undeveloped environments. Most staging areas are in developed areas such as parking lots.	Vehicle types range from small ATVs to large earth movers. Vehicles or equipment may be operated in sensitive areas (e.g., soft substrates, vegetated areas, or intertidal beaches). Operation of vehicles may adversely affect shoreline habitats that are susceptible to erosion. The presence of durable surfaces in the path of ingress/egress to staging area limits physical impacts. Staging locations further from the spill location require travel over greater distances and at greater speeds. Vehicles are generally deployed at the time of or immediately after spill and repeatedly, as necessary, for duration of spill; may be used at night. Establishing staging areas in undeveloped areas is very rarely done.	Plants may be crushed or otherwise destroyed. Habitat may be disturbed or destroyed (e.g., soil compaction, erosion from truck or foot traffic, destruction of vegetation). Vehicle strikes may occur. Wildlife may be disturbed due to noise, light, and presence of responders.	Minimize traffic through oiled areas on non-solid substrates (e.g., sand, gravel, dirt) to reduce the likelihood that oil will be worked into the sediment. The use of heavy machinery is rare; when necessary, its use will take into consideration sensitive habitats (e.g., nesting areas or spawning areas) based on presence and distribution of fish and wildlife in the area and avoid these areas when possible. Consult GRPs, if established for the response area, to set staging area in location already identified for the purpose and having minimal additional impact on threatened and endangered species and designated critical habitat. Generally, vehicles are used on sand beaches and restricted to transiting outside of the oiled areas along the upper part of the beach. Use vehicles near listed plants or wildlife only if the benefits outweigh potential impacts.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Staging area establishment and use	Use of vehicles or heavy equipment Foot traffic Solid waste management Liquid waste management	Terrestrial Riparian	Establishing a new staging area (beyond using an existing parking lot or otherwise already developed area) is rare. Typically, response vessels launch from existing marinas. Equipment staging for routine spills is minimal and typically contained in small cargo trailers. Spills nearshore and in open water are typically accessed from existing vessel locations. Spills located in remote locations may require construction of new vessel, vehicle, and personnel access locations with associated land clearing and staging of necessities such as fuel tanks.	Due to the rarity of this response action, the likelihood of exposure is low. Greater numbers of on-site personnel require more infrastructure over a larger space for eating, sleeping, and restroom facilities. Distance travelled on-site and transportation mode (e.g., foot, vehicle, vessel) determine type and magnitude of stressors (e.g., trampling). Used from time of or immediately after spill and accessed as necessary for duration of spill. May be used during night.	Habitat may be disturbed or destroyed (e.g., soil compaction, erosion from truck or foot traffic,). Wildlife may be disturbed (e.g., noise, light, presence of people).	Use same access point for repeat entries. Construct new access points only when no other options are available to reach the location (emergency consultation may be necessary). If new access points are needed, conduct preliminary survey to determine best route. Locate staging area and support facilities in the least sensitive area possible (use areas identified in GRPs, if available). Special restrictions should be established for sensitive areas where foot traffic and equipment operation may be damaging, such as soft substrates. Establish work zones and access in a manner that reduces contamination of clean areas. Observe species-specific buffer zones (e.g., 91 to 183 m (100 to 200 yards) for marine mammals, see Section 4) when planning and implementing response action. Remove all trash or anything that would attract wildlife to the site daily. Do not cut, burn, or otherwise remove vegetation unless specifically approved by the EU. Do not attempt to capture oiled wildlife. Report oiled wildlife sightings to the Wildlife Hotline.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Foot traffic at spill site	Staging area establishment and use	Terrestrial Riparian Wetlands Shorelines	Oiled shorelines may be accessed from existing roads, paths, etc. or from the water.	Occurs from time of or immediately after spill and as necessary for duration of spill response and demobilization. Most staging areas are already existing and developed areas like parking lots, so likely to be very little disturbance from foot traffic.	Habitat may be disturbed or destroyed (e.g., soil compaction, erosion from truck or foot traffic, working of oil into sediments). Wildlife may be disturbed (e.g., noise, light, presence of people).	Restrict access to specific areas for periods of time to minimize impacts on sensitive biological populations (e.g., nesting, breeding, or fish spawning). Walk on durable surfaces to the extent practicable; restrict foot traffic from sensitive areas (e.g., marshes, shellfish beds, salmon redds, algal mats, bird nesting areas, dunes, etc.) to reduce the potential for damage; use plywood or other material to reduce compaction. Minimize foot traffic through oiled areas on non-solid substrates (sand, gravel, dirt, etc.) to reduce the likelihood that oil will be worked into the sediment.
Use of aircraft (e.g., to monitor for wildlife and track spill trajectory)	None	All (over but not within habitats)	Flying is typically restricted within a 457-m (1,500-ft) radius, below 305 m (1,000 ft.) from areas identified as sensitive, with some areas (e.g., Olympic Coast National Marine Sanctuary) having more restrictive zones. Adverse weather (e.g., thunderstorms, low visibility, low cloud ceiling) may limit use. Aerial surveillance usually only happens during a large spill, so it's not a typical occurrence.	Frequency of monitoring Altitude of monitoring Type of aircraft (e.g., helicopter, fixed wing, or drone) can influence exposure. Drones are able to fly at very low altitudes and can get closer to the habitat, so they may increase exposures Aircraft may be used from time of or immediately after spill and as necessary for duration of spill; may be used during night. Use is not routine and is generally limited to large spills.	Use may exclude animals from essential resources (e.g., food, refuge, nesting area) and/or critical habitat areas. Birds are subject to aircraft strikes. Wildlife may be disturbed by noise and presence.	Observe flight restriction zones specified in the GRPs, including minimum ceiling height (altitude of 305 m [1,000 ft.] above ground is advised) and distance from known or suspected wildlife areas (e.g., nesting areas) in order to reduce wildlife exposure to noise or presence of airplanes or helicopters.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Solid waste management	Staging area establishment and use	All	Solid waste management is common to all response actions except natural attenuation.	The specific methods used to collect, transfer, contain, transport, and dispose of waste affect exposure. Any incineration of waste in the NW is subject to federal and state air regulations. Extreme weather may increase the likelihood of an accidental release during handling or transport. Waste management is used from time of or immediately after spill and repeated as necessary for duration of spill.	Accidental re-release of pollution, which has low likelihood of occurring, see Section 4.1 for discussion.	Oregon and Washington require that responders develop a waste management plan in accordance with the local ACP (or RCP in the absence of an ACP) that describes how waste will be stored and handled and how the possibility for disposed wastes to cause future environmental damage will be minimized. Solid waste management must be addressed in the disposal plan. Follow standard protocols for waste management actions. Waste accumulation and storage locations should meet the following criteria: spill prevention, control, and countermeasures are in place; storm water pollution prevention plans have severe weather contingency plans; ample storage for segregation of wastes; and an emergency response plan for waste accumulation/storage locations. Access to waste is restricted (temporary and semi-permanent). Waste disposal plans describe the waste tracking system. Reporting system should be established (temporary and semi-permanent). Maintain adequate response equipment during waste management actions to respond quickly and appropriately to re-release of pollution. Establish temporary upland collection sites for oiled waste materials for large spill events; collection sites should be lined and surrounded by berms to prevent secondary contamination from run-off. Coordinate the locations of any temporary waste staging or storage sites with the EU. Separate and segregate any contaminated wastes generated to optimize waste disposal stream and minimize what has to be sent to hazardous waste sites.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Liquid waste management	Staging area establishment and use Decanting Booming Skimming/vacuuming Use of vessels	Terrestrial Rivers/Lakes Shoreline Marine nearshore Open marine water	Liquid waste management is common to many response actions. Decanting of oily water may be necessary during operations involving recovery of oil. Water may be mixed with the oil during recovery and need to be returned to the response area to preserves storage space for recovery of the maximum amount of oil possible.	The specific methods used to collect, transfer, contain, transport, and dispose of waste affect exposure. Any incineration of waste in the NW is subject to federal and state air regulations. Extreme weather may increase the likelihood of an accidental release during handling or transport. Waste management is used from time of or immediately after a spill and repeated as necessary for duration of spill. Decanting is conducted in conjunction with the use of appropriate equipment in place (e.g., boom) to prevent re-release of oil to the marine environment. Use oil/water separator or allow sufficient retention time for the oil and water to separate. Decant ahead of an operating skimmer where feasible.	Accidental re-release of pollution, which has low likelihood of occurring. Authorized incidental release of the minimal amount of oil possible mixed into a large volume of water (decanting) as a way to manage limited liquid storage capacity.	Liquid waste management must be addressed in the disposal plan. The response contractor or responsible party will seek approval from the FOSC and/or SOSC prior to decanting. Follow standard protocols for waste management actions. Maintain adequate response equipment during waste management actions to respond quickly and appropriately to re-release of pollution. Minimize the amount of water collected during skimming. All decanting in a designated “Response Area” within a collection area, vessel collection well, recovery belt, weir area, or directly in front of a recovery system; a containment boom will be deployed around the collection area, where feasible, to prevent the loss of decanted oil or entrainment of species in recovery equipment. Decanting shall be monitored at all times, so that discharge of oil in the decanted water is promptly detected. Where feasible, decanting will be done just ahead of a skimmer recovery system so that discharges of oil in decanting water can be immediately recovered. Coordinate the locations of any temporary waste staging or storage sites with the EU.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Decontamination	Staging area establishment and use Solid waste management Liquid waste management Booming Sorbents	All, except wetlands	Decontamination is required anytime durable (not disposable) equipment is used on a spill response.	Extent of contaminated materials/vessels or personnel can affect exposure. Specific materials to be decontaminated can affect exposure. Decontamination is used when personnel or vehicles exit the spill site and repeated as necessary for duration of spill.	Accidental re-release of pollution, which has low likelihood of occurring, see Section 4.3 for discussion.	Decontamination areas for personnel and equipment must be addressed in the disposal plan. A decontamination/exclusion zone will be set up at each staging area. The area will be plastic lined to prevent pollution from oiled PPE and equipment. Oiled PPE and equipment will be collected in plastic barrels. Maintain adequate response equipment during decontamination to respond quickly and appropriately to re-release of pollution. The placement and containment of materials from decontamination is an important consideration during spill response, so safety controls and proper disposal areas are used to significantly reduce the risk that oil would re-enter the environment.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Mechanical Countermeasures						
Deflection/Containment						
Booming (containment, diversion, deflection, exclusion, recovery)	Use of vessels Staging area establishment and use Hazing and deterrence Solid waste management Liquid waste management Foot traffic	All, except terrestrial	Booming is a typical response tool to control the spread of a spill. Effectiveness is maximized when depth is ≥5 times the draft of the boom; not used in water <46 cm (18 inches) in depth. Booms are less effective in rough water, high winds, and fast currents. In current >1 knot booms are not set across the river, but rather at an angle to direct oil into an area where it can be collected. Booms are used to prevent oil from contacting shorelines, to prevent oil from spreading, and collect oil to enable oil recovery. Booms are also used to contain remobilized oil during decontamination (e.g., vessels, industrial equipment) and shoreline cleanup.	Boom draft varies from 15 to >229 cm (6 to >90 inches), depending on use and habitat where deployed (and may include skirting). Booms may be anchored to the shore, the sea bottom (in waters <30 m [100 ft.] deep), or to vessels (in deep water, when anchoring is infeasible, or to avoid sensitive habitats). Boom may be towed by vessels to actively collect oil. Booms are generally deployed at the time of or immediately after spill and repeated as necessary. The duration of deployment is typically <1 week for booms moored in place, anchored to the shoreline, or tidal seal booms; towed boom deployment duration is shorter (hours). Short booms (<61 cm [<24 inches] in depth) are used in rivers. Larger booms are used only in open water marine areas.	Placement of boom may exclude animals from essential resources (e.g., food, refuge, nesting area). Birds or marine mammals may be exposed to oil when perching on booms. Benthic habitat and organisms may be destroyed by anchors, anchor chains, or boom contact in shallow waters or along shorelines (reduction in habitat quality and resources).	Boom strategies in the GRPs are designed to consider species occurrence and habitat use, to the extent possible. Monitor for the presence of marine mammals and seabirds. Ensure that EU provides information on possible presence and impacts to ESA-listed (protected) species or critical habitats. To the extent practicable, and when practicable, observe species-specific buffer zones (e.g., 91 to 183 m [100 to 200 yards] for marine mammal) when planning and implementing response action. Evaluate need to restrict access to sensitive habitats (e.g., nesting areas or spawning areas) based on presence and distribution of wildlife such as birds and mammals. Arrange booms to minimize impacts to wildlife and wildlife movements. Locate boom anchors using strategies identified in GRPs, if available.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Berms, dams, or other barriers; pits and trenches	Use of vehicles and heavy equipment Staging area establishment and use Foot traffic Solid waste management Liquid waste management	All, except open marine water and marine nearshore	These are tactics with the objective of containing spilled oil and limiting spreading of oil slicks. These tactics are used when oil threatens sensitive habitats (e.g., upper intertidal and back-shore areas) and other barrier options (e.g., boom, skimmers, less invasive barriers) are not effective. The water body must be small enough to dam (not more than about 3 m (10 ft.) across) and have low enough flow to not blow out an underflow dam. Equipment type – Motor graders are used if beach can sustain motor traffic well; front-end loaders or bulldozers are used if beach cannot sustain motor traffic well.	These tactics disturb the upper 0.5 m (2 ft.) of beach or riparian sediments. Size of underflow dam – larger dams result in a larger pool behind the dam. Water flow/rainfall mobilizes oil from upstream spill sites to downstream berm/dam collection site. Use of a berm/dam in locations subject to dramatic changes in water flow can result in blowout. Duration/frequency typically installed shortly after spill and left in place about 1 week up to 5 weeks, until upstream cleanup activity is completed. Decontamination occurs after spill has been contained and contamination removed.	Construction may result in removal of substrate; loss, trampling, or crushing of vegetation; and increased erosion or sedimentation in streams. Placement may exclude animals from essential resources (e.g., food, refuge, nesting area) or disrupt passage between critical habitat areas. Underflow dams will result in increased oiling behind the dam than would have occurred without the dam; dams are intended to stop oil from entering sensitive downstream habitats.	Coordinate with the USFWS. Contact the EU to determine if any permits are required. Restrict use and closely monitor operations in sensitive habitats. Line the bottom of trenches that do not reach the water table (dry) with plastic to prevent the collected oil from penetrating deeper into the substrate. Minimize erosion and sediment runoff using engineered controls (e.g., silt fences and settling ponds). Minimize suspension of sediment to limit effects on water quality. Remove structures and fill trenches once response action is completed. Coordinate with the USFWS prior to constructing underflow dams.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Culvert blocking	Staging area establishment and use Foot traffic	Rivers/ Lakes Wetlands Shoreline	Open culverts present a potential route for spilled oil to enter otherwise unaffected areas. This tactic is often used to protect sensitive habitats that are located downstream of the barrier. This tactic is used to block tidal inflow to an upgradient waterbody. Generally only 61-cm- (<24-inch-) diameter culvert pipes are blocked. If complete blocking results in flooding, an underflow dam or booming would be used instead.	Material used (e.g., plywood, plug, plastic sheeting, sandbags) and other construction elements may affect sedimentation or other shoreline processes. Frequency/duration – typically placed shortly after spill and remains less than three days.	Construction may result in removal of substrate; loss, trampling, or crushing of vegetation; and increased erosion or sedimentation in streams. Placement may exclude animals from essential resources (e.g., food, refuge, nesting area) or critical habitat areas. It may result in increased predation, and increased exposure to spilled material.	Monitor water quality and sufficient flow downstream of barriers. Evaluate need to restrict access to sensitive habitats (e.g., nesting areas or spawning areas) based on presence and distribution of wildlife such as birds and mammals. To the extent practicable, and when practicable, observe species-specific buffer zones (e.g., 91 to 183 m [100 to 200 yards] for marine mammals) when planning and implementing response action. Minimize erosion and runoff using engineered controls (e.g., silt fences and settling ponds). Remove structures once completed.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Recovery of Spilled Material						
Skimming/ vacuuming	Staging area establishment and use Use of vessels Use of vehicles Booming Liquid waste management Berms, dams, or other barriers; pits and trenches	Rivers/ Lakes Wetlands Shoreline Marine nearshore Open marine water	Skimming/vacuuming is typically deployed in areas where floating oil naturally accumulates. Oil can be collected against a shoreline or contained by a boom. Skimming only works as long as there is sufficiently thick oil, approximately 6.3 mm (0.25 inches). Shallow water prevents use of some skimmers. Emulsified oil (affected by weathering/wave action/heat/type of oil) cannot be skimmed. Skimming is less effective in rough water and strong currents. Waves, debris, seaweed, and kelp reduce efficiency.	Skimming/vacuuming often proceeds through night (with continuous presence of responders) if there is enough oil. Safe and effective night operations require floodlights. Vessel size depends on the response; since most spills are small, vessels may be small, 6 m (20 ft.) or more. In the rare event of a large spill, vessels up to 61 m (200 ft.) w/pump (in ocean water) could be used. Skimming vessels are slow moving. Skimming/vacuuming often generates wastewater that requires additional space for storage and treatment. Duration/frequency for shoreside skimming is typically <4 days; open water is typically <1 week; repeated as necessary. Vacuuming is done at the very top of the water to minimize the amount of water intake and maximize the amount of product removed.	Noise (in air and underwater) due to vessels and pumps can cause stress. Lighting can attract birds to oiled environment Vacuuming may entrain eggs, plankton, fish larvae.	Use methods that minimize the amount of water relative to oil taken in (e.g., flat-head nozzle [duckbill] and skim/vacuum at water surface only). Operations in sensitive areas (e.g., marshes, submerged aquatic vegetation, worm beds) must be very closely monitored, and a site-specific list of procedures and restrictions must be developed to minimize damage to vegetation. Adequate storage for recovered oil/water mixtures, as well as suitable transfer capability, must be available. Position intake to minimize plankton and larvae entrainment. To the extent practicable, and when practicable, observe species-specific buffer zones (e.g., 91 to 183 m [100 to 200 yards] for marine mammals, see Section 4) when planning and implementing response action.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Passive collection of oil with sorbents (e.g., sorbent pads, sausage boom, pom poms, peat)	Staging area establishment and use Foot traffic Use of vehicles Use of vessels Solid waste management	All, except open marine water	Use of sorbents is labor intensive, typically hand placed from light motor vehicle or shallow water craft; usually used for small quantities of oil and as indicator of oil presence (will be marked by oil). Sorbents are often used on sheen, though ineffective. There must be sufficient product to be absorbed (sheen usually not sufficient quantity). Sorbents are more likely to be used in difficult-to-access areas where skimming is infeasible in conjunction with most other response actions (not skimmers). Sorbents may be reused. Wave and tidal energy, as well as the oil type, affect efficacy.	Passive collection elements are tended more frequently immediately after spill and less frequently with time after spill. Water flows past sorbent booms. Distribution of sorbent pads on oil contained in booms can help to suppress waves and prevent splash-over. Standard practice is that, when passive collection/containment is the best practice, sorbent booms are tended to ensure they stay in place, and sorbents are routinely replaced. The effectiveness of passive collection is highest when the sorbent boom is not saturated. Pads/booms can sink if left in place for extended duration, especially if dirt is present. Lightweight pads can get caught by wind and dispersed outside of response areas. Pads are often one of the first response actions to be used because they are readily available Duration: pads generally ~1 day, sausage boom <2 weeks. Frequency: pads <3 days after spill, boom used until saturated, then replaced.	Intertidal environmental effects can occur if sorbent material is not recovered when saturated. Placement or use of sorbent booms may create concentrations of oil that could lead to additional exposure. Sunken sorbents may expose pelagic/ demersal/riverine habitats to oil, although the pads are regularly monitored to avoid this.	Retrieval of sorbent material, and at least daily monitoring to check that sorbents are not adversely affecting wildlife or breaking apart, are mandatory. Coordinate with the EU for corrective actions if entrapment of small crustaceans is observed. Continually monitor and collect passive sorbent material to prevent it from entering the environment as non-degradable, oily debris Follow appropriate cleaning and waste disposal protocols and regulations.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Removal/Cleanup						
Manual removal of oil and oiled substrate using hand tools (e.g., rakes, shovels, scrapers)	Staging area establishment and use Foot traffic Solid waste management Liquid waste management Decontamination	Terrestrial Riparian Wetlands Shorelines	This method is generally used on shorelines where the oil cannot be easily removed by mechanical means. Manual removal can be used on mud, sand, gravel, and cobble when oil is light, sporadic, and/or at or near the beach surface, or when there is no beach access for heavy equipment. Manual removal can be used to remove gross oil contamination (e.g., thick black oil, tar balls, congealed oils,) from shorelines or submerged oil that has formed semi-solid or solid masses. Manual removal is used in places that are difficult to access with heavy equipment. Adverse weather conditions (e.g., thunderstorms, snow and ice, extreme temperatures) may limit access and use.	Manual removal is a large, complex operation with a large footprint due to the logistical support necessary for workers (e.g., facilities, utilities). Manual removal may use ATV support. Duration: throughout cleanup activities (potentially long duration up to several weeks). Anything beyond a week would require consultation with USFWS. Frequency: repeated as necessary to remove oiled substrates. Does not occur at night. Use of hand tools and rakes typically require coordination with both the USFWS and other and stakeholders if there would be removal of natural debris or sand from shorelines.	Intertidal environmental effects are minimal if surface disturbance by cleanup activities and work force movement is limited. No effects on subtidal is expected. Noise from vehicles and continuous presence of crew. Trampling and loss of vegetation. Potentially increased erosion. Increased sedimentation of streams. May disturb or remove sediment and shallow burrowing organisms or cause root damage. Habitat and/or wildlife disturbance or loss from noise, crushing, lighting, and/or presence of people. Can distribute the contamination deeper into substrates.	Restrict sediment removal to supra and upper intertidal zones (or above waterline on stream banks) to minimize disturbance of biological communities. Minimize the amount of sediment removed with the oil. Sediments should be removed only to the depth of oil penetration. Protect nearby sensitive areas from increased oil runoff/sheening or siltation by the proper deployment of booms, siltation curtains, sorbents, etc.; monitor for effectiveness of protection measures. Do not remove clean wrack; instead, move large accumulations of clean wrack to above the high-water line to prevent it from becoming contaminated. If in an archaeological and/or culturally sensitive area, activities may need to be monitored or may not be appropriate.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Mechanical removal of oil and oiled substrate (with or without excavation >2.5 cm [>1 inch]) Sediment reworking	Staging area establishment and use Foot traffic Heavy equipment use Solid waste management Liquid waste management Decontamination	Terrestrial Riparian Shorelines	Mechanical removal with heavy equipment (e.g., bulldozers, backhoes) is usually implemented when the spill area/debris size exceeds the capacity of manual removal. It is typically used in sand, gravel, or cobble, where surface sediments are amenable to, and accessible by heavy equipment. The contaminated substrate is excavated to the depth of contamination. Dredging of sediments is only considered for sinking oils (rare). Sediment reworking may be used on sand or gravel beaches with high erosion rates or low sediment replenishment rates or where remoteness or other logistical limitations make sediment removal unfeasible.	Duration: throughout cleanup activities (potentially over a long duration up to several weeks) Frequency: repeated as necessary to remove oiled substrates. Very rarely occurs at night. This would be a long-term action, and the action agencies would request input from the USFWS if under consideration for area with critical habitat.	Intertidal environmental impacts if excessive sediment is removed without replacement. Noise, crushing, and lighting from vehicles and continuous presence of crew. Trampling and loss of vegetation. Potentially increased erosion. Increased sedimentation of streams/ nearshore environment. May disturb or remove sediment and shallow burrowing organisms or cause root damage. Can distribute the contamination deeper into substrates.	Implement after the majority of oil has come ashore, unless significant burial (sand beaches) or remobilization is expected; implement between tidal cycles to minimize burial and/or remobilization of oil. Protect nearby sensitive areas from increased oil runoff/sheening or siltation by the proper deployment of booms, siltation curtains, sorbents, etc.; monitor for effectiveness of protection measures. Minimize the amount of oiled sediment removed by closely monitoring mechanical equipment operations. In areas prone to erosion, replace removed sediment or soil with clean sediment. Minimize erosion and runoff using engineered controls. Monitor for the presence of special status animals and plants. To the extent practicable, and when practicable, observe species-specific buffer zones (e.g., 91 to 183 m [100 to 200 yards] for marine mammals, see Section 4) when planning and implementing response action.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Woody debris removal (before or after oiling) Terrestrial and aquatic cutting/removal of vegetation (before or after oiling)	Staging area establishment and use Foot traffic Solid waste management Liquid waste management Use of vessels	Terrestrial Riparian Wetlands Shorelines	Conducted before or after spill has been contained and cleanup activities begin. More likely to be used for plants that will grow back. Lightly oiled vegetation typically left in place. Vegetation is removed if it poses a contact hazard to wildlife. Beach wrack is relocated before oil comes ashore when possible. Removal of large wood is generally avoided, unless it poses a persistent source of oil.	Duration: typically occurs after progress has been made on mobile oil removal. Done within first few days of incident. UC would request input from the USFWS if operations are to occur in critical habitat. Frequency: typically once.	Removal of cover and forage can cause stress to juvenile fish and salmonid prey. Noise from vehicles, heavy machinery, hand tools, and cleanup crew. Along the exposed section of shoreline, the vegetation may not regrow, resulting in erosion and permanent loss of the habitat. Reduction in habitat quality because of loss of structure. Long-term subtidal impacts from increased sediment load can occur as a result of increased erosion in the intertidal area.	Resource experts are routinely consulted regarding these concerns prior to vegetation cutting activities. Strict monitoring of the operations must be conducted to minimize the degree of root destruction and mixing of oil deeper into the sediments. For plants attached to rock boulder or cobble beaches, sources of population recruitment must be considered. Access to bird nesting areas should be restricted during nesting seasons. Concentrate removal on vegetation and wood debris that is moderately to heavily oiled; leave lightly oiled and clean vegetation and wood debris in place. Do not remove clean, natural shoreline debris; instead, move large accumulations of clean debris to above the high-water line to prevent it from becoming contaminated.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Ambient temperature, low pressure flooding/flushing	Staging area establishment and use Use of vessels Foot traffic Booming Skimming Sorbents	Terrestrial Riparian Lakes Wetlands Shorelines	Flooding is applicable on all shoreline types where equipment can be effectively deployed; however, not recommended for steep intertidal or shorelines with fine grains or muddy substrates. Not generally useful on exposed rocky shorelines or submerged tidal flats because these areas are naturally well flooded. Location must accommodate a collection boom (sufficiently large area and receiving water flow needs to be slow). Works only on fresh oil (others require pressure washing).	Oil is flushed into the water where it is collected with sorbent. Method or procedures (i.e., flow rates, temperature, volume, chemicals, delivery system (by fire hose [with low pressure flow] or header pipe) can affect exposure. In marine environment, ambient marine water is typically used, though fresh water may be used if marine water is oiled. Flooding should be restricted to tidal stages when subtidal zones are under water to prevent secondary oiling. Equipment may include: deluge system (perforated pipe sprinkler system) or trash pump with hose. Duration: in freshwater environment typically about 2 days; in marine environment typically <1 week. Timing: done within first week, at the soonest 2 to 3 days after spill. This technique is only effective if conducted quickly after a spill occurs.	Physical habitat disturbance/smothering from gravel components washed down slope and sedimentation of streams/nearshore environment.	Implement after the majority of oil has come ashore, unless significant remobilization is expected; implement between tidal cycles to minimize remobilization of oil. Protect nearby sensitive areas, identified in the GRPs or under advisement of the USFWS, from increased oil runoff/sheening or siltation by the proper deployment of booms, siltation curtains, sorbents, etc.; monitor for effectiveness of protection measures. Use the lowest pressure that is effective and prevent suspension of bottom sediments (do not create a muddy plume). Conduct all flushing adjacent to marshes from boats. In marshes conduct at high tide either from boats or from the high-tide line to prevent foot traffic in vegetation. Closely monitor flooding of shorelines with fine sediments (mixed sand and gravel, sheltered rubble, sheltered vegetative banks, marshes) to minimize excessive siltation or mobilization of contaminated sediments into the subtidal zone. Prevent pushing or mixing oil deeper into the sediment by directing water above or behind the surface oil to create a sheet of water to remobilize oil to containment area for recovery. Restrict flushing in marshes during high tide above the high tide line to minimize mixing oil into the sediments or mechanically damaging plants.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Pressure washing/ steam cleaning or sand blasting	Staging area establishment and use Use of vessels Foot traffic Booming Skimming Sorbents	Terrestrial Riparian Shorelines	Pressure washing/steam cleaning or sand blasting are infrequently used when heavy oil residue must be removed for aesthetic reasons (ship-hulls, break-walls, man-made structures). Steam and sand blasting are very infrequently, if ever, used in the NW. Contaminated vessels are boomed with sorbents in industrial area, cleaned, and then released when clean.	The selected method for washing is always done from least intrusive to most intrusive, as acceptable based on the surface being cleaned and the presence of organisms. Ambient water is preferred to heated or pressurized water. Heated water can be used to pressure wash structures such as the hull of a ship, pier structures, or asphalt. A spray and wipe chemical may be considered prior to going with higher heats. Higher temperatures and higher pressures can be used to mobilize oil but can lead to more potential impacts. Similarly, sand is used to physically scour oil from surfaces. Endpoints for degree of removal desired (e.g., no visible sheening, no ability to wipe oil off, not able to scratch oil off). Duration/frequency: typically 1 day to weeks (for vessel cleaning, depending on size of vessels, number of vessels, and type of oiling).	Direct harm to organisms in spray zone. Heat, scouring, runoff, disturbance, flooding, and increased erosion and sedimentation. Heated water may affect freshwater or intertidal habitats. Introduction of sand into aquatic environment could smother invertebrates or contribute to suspended sediments.	Implement after the majority of oil has come ashore. Restrict use to certain tidal elevations so that the oil/water effluent does not drain across sensitive low-tide habitats. Closely monitor operations in sensitive habitats. If small volumes of warm water are used to remobilize weathered oil from rocky surface, include larger volume of ambient water at low pressure to help carry re-mobilized oil into containment area for recovery. Monitor booms and oil collection methods to prevent transport of oil and oiled sediments away from site to near shores and down coast. Monitor for wildlife such as birds and mammals (evaluate need for hazing); establish buffer zone (i.e., nesting areas, haulout areas, spawning areas). Avoid sensitive habitats (e.g., soft substrates, aquatic vegetation, spawning areas, etc.).
Physical herding	Staging area establishment and use Use of vessels Booming Skimming Sorbents	Rivers/ Lakes Shorelines Wetlands Marine Nearshore	Physical herding is used to move oil into containment. It is rarely used to move oil more than a few hundred feet. Sufficiently thick product is required. When oil contained in hard-to-access places (e.g., against seawalls or under docks), prop-wash from a vessel can help to push the product to a collection area (e.g., boom).	Not used at night. Frequency: typically shortly after spill on fresh oil. Duration <1 week. The exposure is based upon the method(s) used to herd the oil.	Erosion May disrupt movement patterns of fish. Generation of in-air sound from vessels.	Monitor for the presence of wildlife and plants. Minimize erosion and runoff using engineered controls (to the extent practicable).

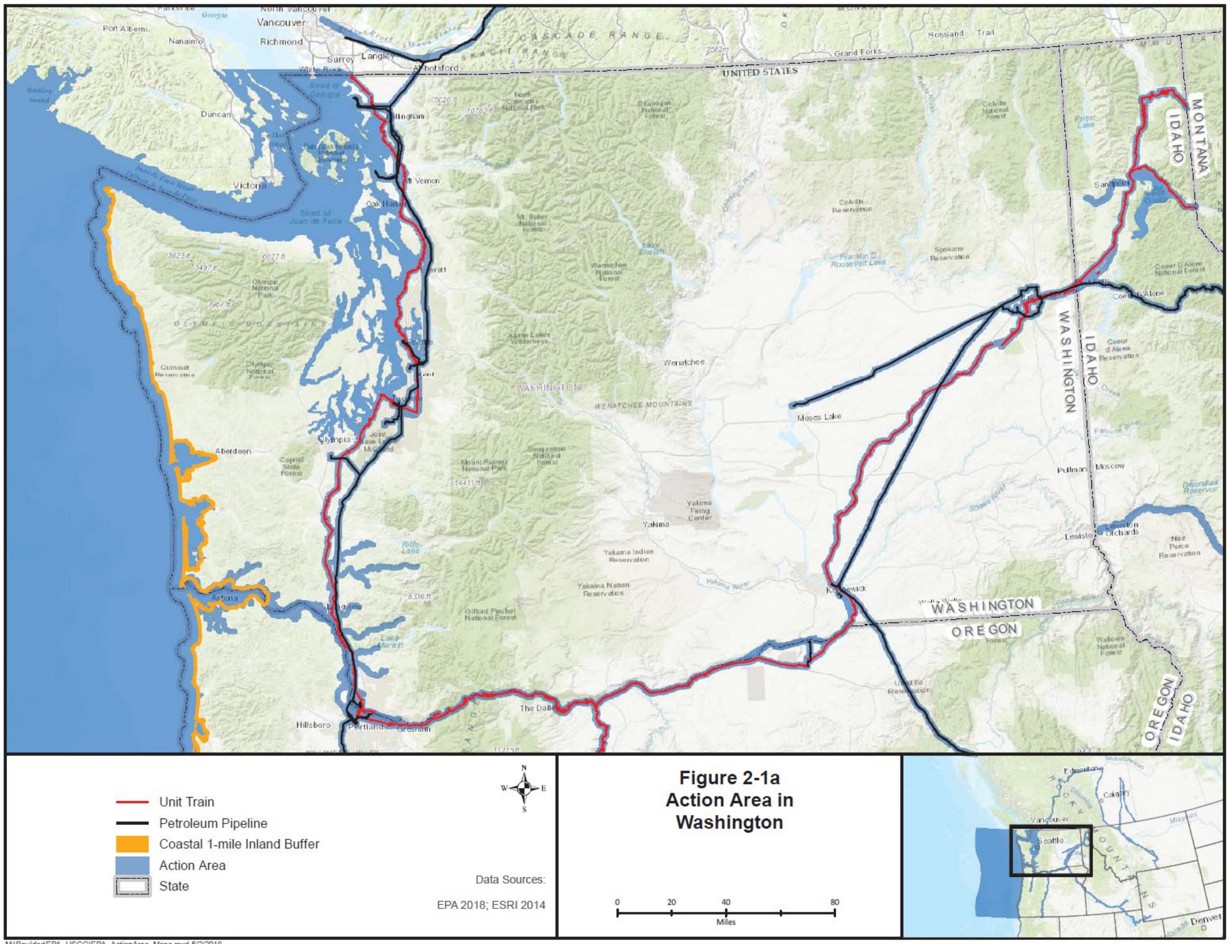
Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Non-Mechanical Countermeasures						
Chemical dispersion	Use of vessels Use of aircraft	Open marine water (outside of No Dispersant Use Zone; use in Case-by-Case Zone (see Section 1.2.4.1) will require emergency consultation)	Only used in marine water bodies with sufficient depth (>18 m [60 ft.] deep). Applied as soon as possible after a spill (when oil is not weathered and more concentrated. Works best when there is wave energy to mix the dispersant into the oil. Can be used in strong currents and higher sea states. Only applied to spilled oil and completion of the dispersant use checklist, as described in the NWACP. In areas where dispersant use is not pre-authorized, RRT activation and approval is necessary before use.	Dispersants have not been used in the NW for decades. Used to protect organisms at the water surface or shorelines from oiling. Can impact organisms in the upper water column (<10 m [33 ft.]). Amount of oil requiring dispersion. Amount of mixing/current affects rate of dissipation Weather conditions (e.g., wind, waves, and currents) determine efficacy and dispersal area and environmental fate. Nozzles are used to give a flat, uniform spray of droplets, rather than a fog or mist. The mechanical wave energy of a wake from a boat enhances dispersion. Duration: <1 day with a few passes over spill. Too much dispersant will be ineffective and dispersion must happen soon after a spill to be effective. Frequency: once Application rate to be determined by dispersant manufacturer and the UC.	Direct exposure routes include inhalation, ingestion, absorption, and physical contact. Possible disturbance from vessels in the area, including noise; strikes; aircraft. Change in oil fate and transport can result in increased exposures to oil for shallow-dwelling aquatic species. Such exposures are not consistent with the baseline condition. However, if oil is not dispersed or recovered using mechanical means (e.g., booming and sorbents) the oil will break down due to wave, wind, and water activity. Naturally dispersed oil will remain at the surface longer than dispersed oil (affecting surface-active species like birds, whales, and turtles).	Requires Regional Response Team approval prior to use unless in a Pre-Authorization Zone. Will never be used in the inland zone (i.e., freshwater). The EU would prepare a Net Environmental Benefit Analysis to evaluate the potential risk to animals and habitats in the area compared to not using dispersants. Monitor wildlife; establish species-specific buffer zone(s); use in water with adequate volume for dilution; apply only under conditions known to be successful; use only chemicals that are approved for use; implement wildlife deterrent techniques as needed. SMART will be used to measure efficacy. SMART is a standardized monitoring program designed to monitor chemical dispersion activities. Follow dispersant policy checklist of environmental conditions which dictates favorable conditions for use. Aircraft should spray while flying into the wind and avoid spraying into strong crosswinds.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
In situ burning	Staging area establishment and use Booming Use of vessel Use of aircraft	Pre-authorization zone is any area that is more than 3 miles from human population (>100 or more people per square mile). All other areas need incident-specific authorization.	Conducted after containing oil slick in fire boom, soon after spill has occurred; while oil still has enough volatility to burn easily. May be ignited with gelled fuel or flares. Oil needs to be sufficiently thick. Only used where the spread of the fire can be controlled. Wind, ability to put in fire-break, meteorological conditions (e.g., no inversion); no heavy wind, offshore winds are favorable. Should not burn substances regulated by EPA (e.g., PCBs)	Duration: each burn lasts about half an hour, then fresh oil is gathered, and the burn is repeated. Frequency: typically over two days, within the first few days of a spill.	Exposure to fire, smoke, or particulates Exposure to burn residues; exposures to burn residues are not consistent with the baseline condition. Burn residues are less acutely toxic than oil because the relatively toxic components of oil are removed during the burning process.	Requires Regional Response Team approval prior to use outside pre-authorization zone. Prior to an *in situ* burn, a survey must be conducted to determine if any threatened or endangered species are present or at risk from burn operations, fire, or smoke. A Net Environmental Benefit Analysis would be conducted to evaluate the possible risk to species in the area of the in-situ burn and compare it to the risk of not using in-situ burning. Protection measures may include moving the location of oil (in water) to an area where listed species are not present; temporary employment of hazing techniques, if effective; and physical removal of individuals of listed species only under the authority of the trustee agency. Provisions must be made for mechanical collection of burn residue following any burn(s) (e.g., collection with nets, hand tools, or strainers). SMART will be used to measure efficacy. SMART is a standardized monitoring program designed to monitor chemical dispersion and *in situ* burning activities.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Other Response Actions						
Natural attenuation (with monitoring)	Foot traffic	All	When the adverse impacts resulting from response activities outweigh the benefits. Examples include: 1) when oiling has occurred on high-energy beaches where wave action will remove most of the oil in a short time; 2) remote or inaccessible shorelines; 3) wetlands, where treatment or cleaning may cause more damage than leaving it to recover naturally; 4) other response techniques are not practical. This method may be inappropriate for areas with high numbers of people, mobile animals, or ESA-listed species.	Areas affected by small amounts of non-persistent oil can recover naturally, given appropriate circumstances. May be inappropriate for areas where high numbers of mobile animals (e.g., birds, marine mammals, crabs) use the intertidal zone (shoreline) or adjacent nearshore waters.	Wildlife disturbance from presence of people and equipment necessary for monitoring.	May consider relocation or hazing activities if appropriate. Minimize presence of people and equipment.

Response Action	Related Response Actions[a]	Areas Implemented	Factors Affecting Where/ When Used	Elements Influencing Exposure	Stressors[b, c]	Conservation Measures[d]
Places of refuge for disabled vessels	Use of vessels	Rivers Shorelines Marine nearshore Open marine water	Which resources at risk are in the area, including ESA-listed species, seasonal breeding locations, or designated critical habitat; Essential Fish Habitat; aquaculture facilities; other resources, lands and/or waters with special designations; offshore fisheries; near shore fisheries. The USCG Captain of the Port has the authority to designate a place of refuge for a specific disabled vessel.	Because many of the spills in the NW are due to vessels sinking, finding places of refuge for compromised vessels is a routine part of response. Many conditions could dictate refuge location: weather, distance to location, seaworthiness of ship, types of hazards, captain's navigation ability.	Wildlife disturbance from presence of people and vessel(s).	Follow the places of refuge decision matrix (NWACP Section 9410) when human life is not at risk. EPA must be consulted on any off shore scuttling of a vessel. States, tribes, local governments, and other stakeholders will be conferred with on a case-by-case basis.
Non-floating oil recovery	Staging area establishment and use Use of vessels Use of vehicles Foot traffic	Rivers/Lakes Marine nearshore Open marine water	Identified presence of oils (e.g., diluted bitumen, Group V residual fuel oils, low API oil, asphalt and asphalt products) that may submerge or sink when spilled.	Non-floating oils are difficult to detect and recover. Spills of non-floating oil rarely happen in the NW. Duration: responders must be capable of responding within 24 hours of discovery of a discharge of non-floating oil; duration will depend on extent of spill. Frequency: once during spill response	Disturbance of bottom substrate (habitat) by use of suction dredge, diver-directed pumping and vacuuming	Priority given to preventing, minimizing, and containing non-floating oils. Respond rapidly and aggressively to recover oils when on the surface (if safe to do so) before the oils start to sink.
Hazing and deterrence	Staging area establishment and use Use of vessels Use of aircraft Use of vehicles Foot traffic	Riparian Wetlands Shorelines Marine nearshore Open marine water	Will only be used when wildlife are observed near a spill and when deemed necessary to prevent exposure to spilled material or direct injury.	Duration: could last for the length of a response (typically less than four days) or be limited to isolated instances of wildlife presence, as needed. Will depend on the selected deterrence measures. For example, reflective tape or automated noise generators (e.g., propane cannons) would provide a near-constant deterrence, whereas vocalizations, "bird bombs" (or similar noise-makers) would be limited to short durations and isolated instances.	Noise Lights Movement/presence of hazing-related objects (e.g., silver fluttering tape tied to vegetation in wetlands and riparian areas to deter birds) Presence of personnel conducting the hazing.	Hazing or deterrence measures will be conducted only as necessary under in coordination with the USFWS. Hazing and deterrence will prevent direct injuries and chemical toxicity (associated with the spilled material) to wildlife at the expense of behavioral effects and temporary exclusion from resources. NMFS has granted pre-authorization to the FOSC to implement specific deterrence activities to prevent killer whales from entering oil (Section 9310).

Appendix F: Action Area Maps



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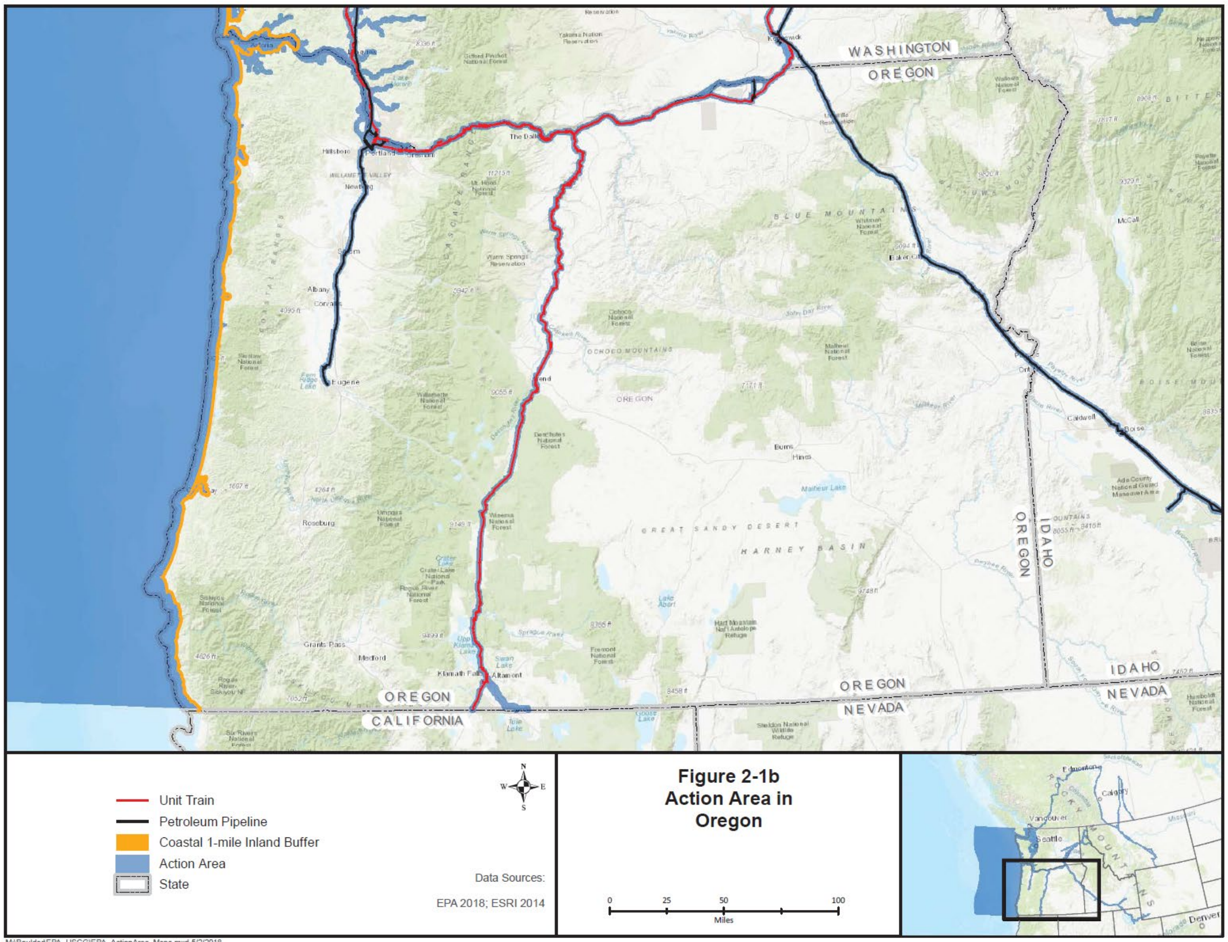

Figure 2-1b
Action Area in Oregon

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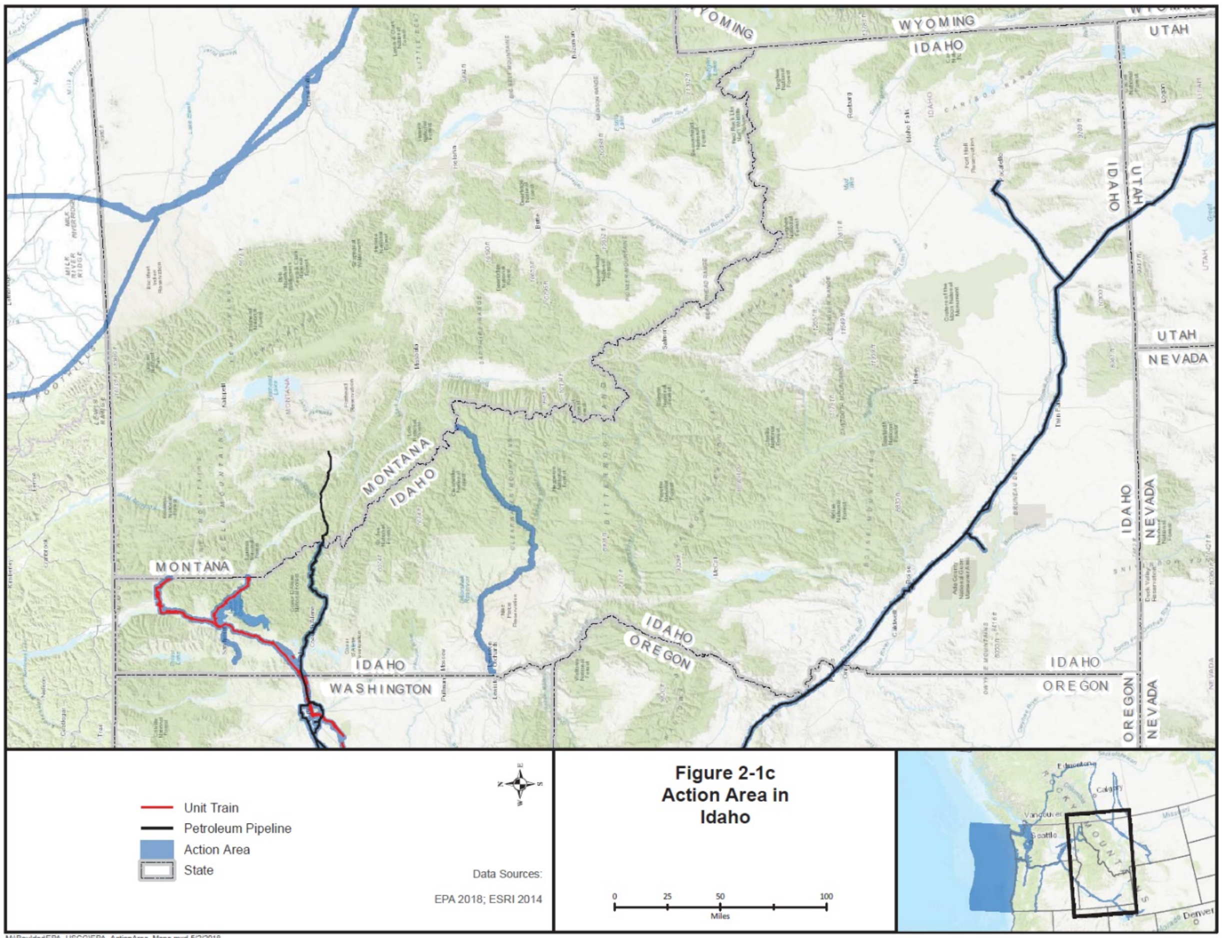

Figure 2-1c
Action Area in Idaho

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Appendix G: Status of the Species and Critical Habitat

Oregon Spotted Frog

Legal Status

The Oregon spotted frog was listed as threatened under the ESA on August 29, 2014 (79 FR 51658).

Taxonomy

The scientific name *Rana pretiosa* (order Anura; family Ranidae) was first applied to a series of five specimens collected in 1841 by Baird and Girard (1853, pg. 378) from the vicinity of Puget Sound. Subsequently, the "spotted frog" was separated into two species, *Rana pretiosa* (Oregon spotted frog) and *Rana luteiventris* (Columbia spotted frog) based on genetic analyses (Green et al. 1996, 1997).

Phylogenetic analyses conducted on samples of Oregon spotted frogs collected from 3 locations in Washington and 13 locations in Oregon indicate that there are two well-supported clades (a group of biological taxa, as species, that includes all descendants of one common ancestor) nested within the Oregon spotted frog: the Columbia clade (Trout Lake Natural Area Preserve (NAP) and Camas Prairie) and the southern Oregon clade (Wood River and Buck Lake in the Klamath River basin) (Funk et al. 2008, pg. 202).

Blouin et al. (2010) performed genetic analyses on Oregon spotted frogs from 23 locations in British Columbia, Washington, and Oregon for variation at 13 microsatellite loci and 298 base pairs of mitochondrial DNA. Their results indicate that *Rana pretiosa* is comprised of six major genetic groups: (1) British Columbia; (2) the Chehalis River drainage in Washington; (3) the Columbia River drainage in Washington; (4) Camas Prairie in northern Oregon; (5) the central Cascades of Oregon; and (6) the Klamath River basin (Blouin et al. 2010, pp. 2184–2185). Within the northern genetic groups, the British Columbia (Lower Fraser River) and Chehalis (Black River) populations form the next natural grouping (Blouin et al. 2010, pg. 2189). Recently discovered locales in the Sumas, South Fork Nooksack, and Samish Rivers occur in-between these two groups. While no genetic testing has been done on these newly found populations, it is reasonable to assume that they are likely to be closely related to either the British Columbia or Chehalis group, or both, given their proximity and use of similar lowland marsh habitats (79 FR 51659).

Physical Description

The Oregon spotted frog is named for the black spots that cover the head, back, sides, and legs. The dark spots are characterized by ragged edges and light centers that grow and darken with age (Hayes 1994, pg. 14). Body color also varies with age. Juveniles are usually brown or, occasionally, olive green on the back and white, cream, or flesh-colored with reddish pigments on the underlegs and abdomen developing with age (McAllister and Leonard 1997, pp. 1–2). Adults range from brown to reddish brown but tend to become redder with age. The Oregon spotted frog is a medium-sized frog, ranging from 44 to 100 millimeters (mm; 1.74 to 4 inches) in body length. Females are typically larger than males and can reach up to 100 mm or more (4 in) (Rombough et al. 2006, pg. 210).

Life History

Adult Oregon spotted frogs begin to breed by one to three years of age, depending on sex, elevation, and latitude. Male Oregon spotted frogs are not territorial and often gather in large groups of 25 or more individuals at specific locations (Leonard et al. 1993, pg. 132). Breeding occurs in February or March at lower elevations and between early April and early June at higher elevations (Leonard et al. 1993, pg. 132). The majority of egg masses are laid communally in groups of a few to several hundred (Licht 1971, pg. 119; Nussbaum et al. 1983, pg. 186; Cook 1984, pg. 87; Hayes et al. 1997 pg. 3; Engler and Friesz 1998, pg. 3). Females may deposit their egg masses at the same locations in successive years, in shallow, often temporary, pools of water; gradually receding shorelines; on benches of seasonal lakes and marshes; and in wet meadows. These sites are usually associated with the previous year's emergent vegetation, are generally no more than 14 inches (35 centimeters (cm)) deep (Pearl and Hayes 2004, pp. 19–20). Breeding micro-environments are often located in seasonally inundated shallows, and are usually hydrologically connected to permanently-wetted areas, such as creeks, wetlands, and springs (Licht 1971, pg. Licht, 1974, pg. 614). Shallow water is easily warmed by the sun, and warmth hastens egg development (McAllister and Leonard 1997, pg. 8). However, laying eggs in shallow water can result in high mortality rates for eggs and hatchling larvae due to desiccation or freezing (Licht 1971, pg.112, Licht1974, pg. 618).

Eggs usually hatch within three weeks after oviposition. Tadpoles metamorphose into froglets during their first summer. Tadpoles are grazers, having rough tooth rows for scraping plant surfaces and ingesting plant tissue and bacteria. They also consume algae, detritus, and probably carrion. Post-metamorphic spotted frogs feed on live animals, primarily insects.

Similar to many North American pond-breeding anurans (belonging to the Order Anura, which contains all frogs), predators can strongly affect the abundance of larval and post-metamorphic spotted frogs. The heaviest losses to predation are thought to occur shortly after tadpoles emerge from eggs, when they are relatively exposed and poor swimmers (Licht 1974, pg. 624). However, the odds of survival appear to increase as tadpoles grow in size and aquatic vegetation matures, thus affording cover (Licht 1974, pg. 624).

Licht (1974, pp. 617–625) documented the highly variable mortality rates for spotted frog life-history stages in marsh areas in the lower Fraser Valley, BC: embryos (30 percent), tadpoles (99 percent), and post-metamorphic (after the change from tadpole to adult, or "metamorphosis") frogs (95 percent). Licht (1974, pg. 625) estimated mortality of each life stage and predicted only a 1 percent chance of survival of eggs to metamorphosis, a 67 percent chance of juvenile survival for the first year, and a 64 percent adult annual survival with males having a higher mortality rate than females. An average adult between-year survival of 37 percent was estimated by a mark-recapture study at Dempsey Creek in Washington between 1997 and 1999 (Watson et al. 2000,
p. 19).

Habitat

The Oregon spotted frog is highly aquatic; it is almost always found in or near a perennial body of water that includes zones of shallow water and abundant emergent or floating aquatic plants, which the frogs use for basking and cover. Watson et al. (2003, pg. 298) summarized the conditions required for completion of the Oregon spotted frog life cycle as shallow water areas for egg and tadpole survival, perennially deep, moderately vegetated pools for adult and juvenile survival in the dry season, and perennial water for protecting all age classes during cold wet weather. Characteristic vegetation includes grasses, sedges, and rushes, although eggs are laid where the vegetation is low or sparse, such that vegetation structure does not shade the eggs (McAllister and Leonard 1997, pg. 17). While native vegetation is the preferred substrate, the frog may also use short, manipulated reed canarygrass/native vegetation mix (J. Engler, pers. comm. 1999) a high level of insolation, or solar exposure, seems to be a significant factor in breeding habitat selection (McAllister and White 2001, pg. 12; Pearl and Hayes 2004, pg. 18). The availability of the unique characteristics of traditional egg-laying sites is limited at many sites, and adults may have limited flexibility to switch sites (Hayes 1994, pg. 19). This may make the spotted frog particularly vulnerable to modification of egg-laying sites (Hayes 1994, pg. 19).

After breeding, during the dry season, spotted frogs move to deeper, permanent pools or creeks (Watson et al. 2003, pg. 295). They are often observed near the water surface basking and feeding in beds of floating and submerged vegetation (Watson et al. 2003, pp. 292–298; Pearl et al. 2005, pp. 36–37).

Known overwintering sites are associated with flowing systems, such as springs and creeks, that provide well-oxygenated water (Hallock and Pearson 2001, pg. 15; Hayes et al. 2001, pp. 20–23, Tattersall and Ultsch 2008, pp. 123, 129, 136) and sheltering locations protected from predators and freezing (Risenhoover et al. 2001; Watson et al. 2003, pg. 295). Oregon spotted frogs burrow in mud, silty substrate, clumps of emergent vegetation, woody accumulations within the creek, and holes in creek banks when inactive during periods of prolonged or severe cold (Watson et al. 2003, pg. 295; Hallock and Pearson 2001, pg. 16; McAllister and Leonard 1997, pg. 17); however, they are intolerant of anoxic (absence of dissolved oxygen) conditions and are unlikely to burrow into the mud for more than a day or two (Tattersall and Ultsch 2008, pg. 136) because survival under anoxic conditions is only a matter of 4–7 days (Tattersall and Ultsch 2008, pg. 126). This species can remain active during the winter and selects microhabitats that can support aerobic metabolism and minimize exposure to predators (Hallock and Pearson 2001, pg. 15; Hayes et al. 2001, pp. 20–23; Tattersall and Ultsch 2008, pg. 136). In central Oregon, where winters generally result in ice cover over ponds, spotted frogs follow a fairly reliable routine of considerable activity and movement beneath the ice during the first month following freeze-up. Little movement is observed under the ice in January and February, but activity steadily increases in mid-March, even when ice cover persists (Bowerman 2006, pers. comm.; Hallock 2009, pers comm.; Hayes et al. 2001, pp. 16–19). Oregon spotted frogs have been observed using “semi-terrestrial” overwintering habitats such as interstices in lava rock, beaver channels, and flooded beaver lodges along the Deschutes River in central Oregon (Pearl et al. 2018, p 545). Overwintering sites may contain multiple frogs, underscoring the importance of these habitat features for spotted frogs (Pearl et al. 2018, p 548).

Movement studies specific to Oregon spotted frogs are limited in number and scope. Results of a habitat utilization and movement study at Dempsey Creek in Washington indicate that adult frogs made infrequent movements between widely separated pools and more frequent movements between pools in closer proximity (Watson et al. 2003, pg. 294), but remained within the study area throughout the year. Home ranges averaged 5.4 acres (2.2 ha), and daily movement was 16–23 ft. (5–7 m) throughout the year (Watson et al. 2003, pg. 295). During the breeding season (February–May), frogs used about half the area used during the rest of the year. During the dry season (June–August), frogs moved to deeper, permanent pools, and occupied the smallest range of any season, then moved back toward their former breeding range during the wet season (September–January) (Watson et al. 2003, pg. 295). Individuals equipped with radio transmitters stayed within 2,600 ft. (800 m) of capture locations at the Dempsey Creek site (Watson et al. 1998, pg. 10) and within about 1,312 ft. (400 m) at the Trout Lake NAP (Hallock and Pearson 2001, pg. 16). A late season movement and habitat use study of four spotted frog populations in the upper Willamette (1 population), Klamath River basin (1 population) and upper Deschutes (2 populations) showed that 84.5% (49/58) of frogs moved less than 250 m between late summer and winter tracking locations (Pearl et al. 2018, pg. 543). The Pearl et al. (2018, pg. 543) study also showed that frogs associated with ditches in the Klamath Marsh National Wildlife Refuge, traveled significantly longer distances (i.e., ranging up to 1145 m) than frogs not utilizing ditches. Whether ditches facilitate movement of spotted frogs or frogs are moving longer distances to locate more suitable overwintering habitat is unknown (Pearl et al 2018, pg. 548).

Long travel distances, while infrequent, have been observed between years and within a single year between seasons. Recaptures of spotted frogs at breeding locations in the Buck Lake population in Oregon indicated that adults often move less than 300 ft. (100 m) between years (Hayes 1998, pg. 9). Three adult spotted frogs (one male and two females) marked in a study at Dempsey Creek and the Black River in Washington moved a distance of 1.5 miles (2.4 km) between seasons along lower Dempsey Creek to the creek's mouth from the point where they were marked (McAllister and Walker 2003, pg. 6). An adult female spotted frog traveled 1,434 ft. (437 m) between seasons from its original capture location at the Trout Lake Wetland NAP (Hallock and Pearson 2001, pg. 8). Two juvenile frogs at the Jack Creek site in Oregon were recaptured the next summer 4,084 ft. (1,245 m) and 4,511 ft. (1,375 m) downstream from where they were initially marked, and one adult female moved 1.7 miles (2.7 km) downstream (Cushman and Pearl 2007, pg. 13). Spotted frogs at a Sunriver site routinely make annual migrations of 1,640 to 4,265 ft. (500 to 1,300 m) between the major egg-laying complex and an overwintering site (Bowerman 2006, pers. comm.).

Although these movement studies are specific to Oregon spotted frogs, the number of studies and size of the study areas are limited. Few studies have been conducted over multiple seasons or years. In addition, the ability to detect frogs is challenging because of the difficult terrain and the need for the receiver and transmitter to be in close proximity. Hammerson (2005) recommends that a 3.1-mile (5-km) dispersal distance be applied to all ranid frog species, because the movement data for ranids are consistent. The preponderance of data indicates that a separation distance of several kilometers may be appropriate and practical for delineation of occupancy, despite occasional movements that are longer or that may allow some genetic interchange between distant populations (for example, the 6.2-miles (10-km) distance noted by Blouin et al. 2010, pp. 2186, 2188). Based on the best available scientific information, the USFWS considers that spotted frog habitats are connected for purposes of genetic exchange when occupied/suitable habitats fall within a maximum movement distance of 3.1 miles (5 km) (79 FR 51663, pg. 51662).

Distribution

Historically, the Oregon spotted frog ranged from British Columbia to the Pit River basin in northeastern California (Hayes 1997; pg. 40; McAllister and Leonard 1997, pg. 7). Oregon spotted frogs have been documented at 61 historical localities in 48 watersheds (3 in British Columbia, 13 in Washington, 29 in Oregon, and 3 in California) in 31 sub-basins (McAllister et al. 1993, pp. 11–12; Hayes 1997, pg. 41; McAllister and Leonard 1997, pp. 18–20; COSEWIC 2011, pp. 12–13).

Currently, the spotted frog is found within 16 sub-basins ranging from extreme southwestern British Columbia south through the Puget Trough, and the Cascades Range from south-central Washington at least to the Klamath River basin in southern Oregon (Table 1 79 FR 51662-51663) (Figure 1). Oregon spotted frogs occur in lower elevations in British Columbia and Washington and are restricted to high elevations in Oregon (Pearl et al. 2010 pg. 7). In addition, spotted frogs currently have a very limited distribution west of the Cascade crest in Oregon, are considered to be extirpated from the Willamette Valley in Oregon (Cushman and Pearl 2007, pg. 14), and may be extirpated in the Klamath and Pit River basins of California (Hayes 1997, pg. 1; USFWS (Klamath Falls Fish and Wildlife Office), unpublished data).

In British Columbia, spotted frogs no longer occupy the locations documented historically, but they currently are known to occupy six locations in a single sub-basin and 3 unconfirmed eDNA detections in, the Lower Fraser River (Canadian Oregon Spotted Frog Recovery Team 2012, p. 6, Kendra Morgan, BC Ministry of Environment, pers. comm., 2018).

In Washington, spotted frogs are known to occur only within seven sub-basins/watersheds: the Sumas River, a tributary to the Lower Chilliwack River watershed and Fraser River sub-basin; the lower South Fork Nooksack River, a tributary of the Nooksack River; Samish River; Chambers Creek, which drains to the Puget Sounds, Black River, a tributary of the Chehalis River; Outlet Creek (Conboy Lake), a tributary to the Middle Klickitat River; and Trout Lake Creek, a tributary of the White Salmon River. The Klickitat and White Salmon Rivers are tributaries to the Columbia River. The spotted frogs in each of these sub-basins/watersheds, with the exception of perhaps the South Fork Nooksack and Samish, are isolated from frogs in other sub-basins (79 FR 51663).

In Oregon, Oregon spotted frogs are known to occur only within eight sub-basins (scale equivalent to Hydrologic Unit Code 8): (1) Lower Deschutes River; (2) Upper Deschutes River; (3) Little Deschutes River; (4) McKenzie River; (5) Middle Fork Willamette; (6) Upper Klamath; (7) Upper Klamath Lake; and (8) the Williamson River. Oregon spotted frogs in most of these sub-basins are isolated from spotted frogs in other sub-basins. However, Oregon spotted frogs in the lower Little Deschutes River are aquatically connected with those in the Deschutes

River downstream of the confluence of the rivers in the Upper Deschutes River sub-basin. Oregon spotted frog distribution west of the Cascade Mountains in Oregon is restricted to a few lakes in the upper watersheds of the McKenzie River and Middle Fork Willamette River sub-basins, which represent the remaining 2 out of 12 historically occupied sub-basins west of the Cascades in Oregon (79 FR 51663).

In California, this species has not been detected since 1918 (California Academy of Science Museum Record 44291) at historical sites and may be extirpated (Hayes 1997 pp. 135). However, there has been little survey effort of potential habitat since 1996, so this species may still occur in California (79 FR 51663).

Population Dynamics

The USFWS' final rule to list the Oregon spotted frog estimated the total minimum breeding adult populations within each of the 15 occupied sub-basins using egg mass counts from known breeding locations (79 FR 51663-51667). Although there are limitations with using egg mass data to evaluate population size and status at the site level and sub-basin scale, egg mass counts do indicate that many breeding locations within sub-basins have small numbers of breeding adults. Adams et al. (2013, pg. 1 and 4 and 2014 pp. 1 - 2) recommends assessing trends in amphibian populations by documenting the change in the number of populations using occupancy modeling rather than a change in abundance at individual sites. However, long-term spotted frog population trends using occupancy modeling are not yet available.

Modeling across a variety of amphibian taxa suggests that pond-breeding frogs have high temporal variances of population abundances and high local extinction rates relative to other groups of amphibians, with smaller frog populations undergoing disproportionately large fluctuations in abundance (Green 2003, pp. 339–341). The vulnerability of spotted frog egg masses to fluctuating water levels (Hayes et al. 2000, pp. 10–12; Pearl and Bury 2000, pg. 10), the vulnerability of post-metamorphic stages to predation (Hayes 1994, pg. 25), and low overwintering survival (Hallock and Pearson 2001, pg. 8) can contribute to relatively rapid population turnovers, suggesting spotted frogs are particularly vulnerable to local extirpations from stochastic events and chronic sources of mortality (Pearl and Hayes 2004, pg. 11). The term "rapid population turnovers" refers to disproportionately large fluctuations in abundance.

Oregon spotted frogs concentrate breeding efforts in relatively few locations (Hayes et al. 2000, pp. 5–6; McAllister and White 2001, pg. 11). For example, Hayes et al. (2000, pp. 5–6) found that 2 percent of breeding sites accounted for 19 percent of the egg masses at the Conboy Lake National Wildlife Refuge (NWR). Similar breeding concentrations have been found elsewhere in Washington and in Oregon. Moreover, spotted frogs exhibit relatively high fidelity to breeding locations, using the same seasonal pools every year and often using the same egg-laying sites. In years of extremely high or low water, the frogs may use alternative sites. For example, the Trout Lake Creek and Conboy Lake frogs return to traditional breeding areas every year, but the egg-laying sites change based on water depth at the time of breeding. A stochastic event that impacts any one of these breeding locations could significantly reduce the Oregon spotted frog population associated with that sub-basin.

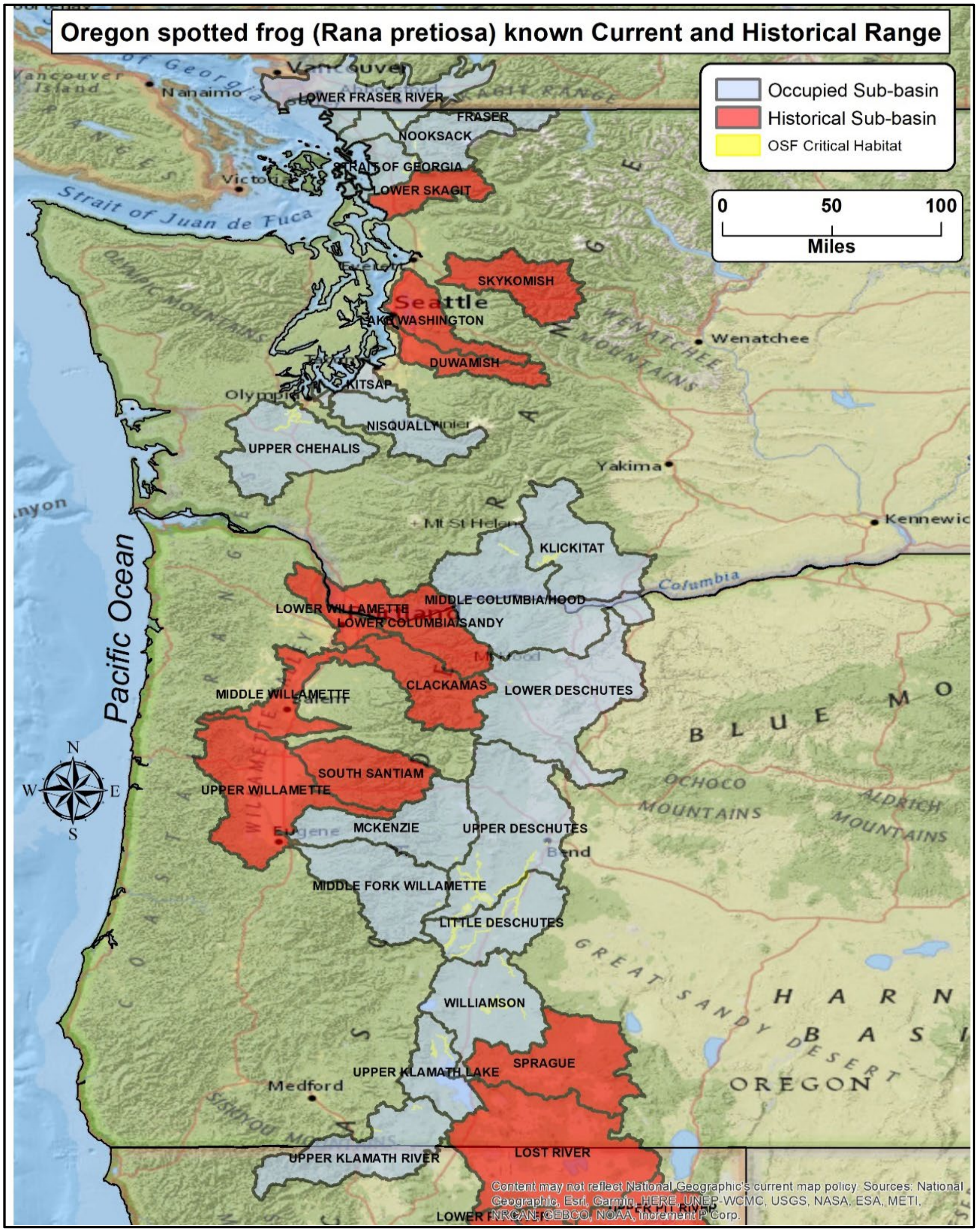

Figure 2: Historic and current occupation of sub-basins (HUC level 4) by the Oregon spotted frog (Table 1 79 FR 51662 -51663, with addition of a single extant population in Chamber Creek found in 2018)

Egg mass count data suggests a positive correlation and significant link between site size and spotted frog breeding population size (Pearl and Hayes 2004, pg. 12). Larger sites are more likely to provide the seasonal microhabitats required by spotted frogs, have a more reliable prey base, and include overwintering habitat. The observation that extant spotted frog populations tend to occur in larger wetlands led Hayes (1994, Part II pp. 5, 7) to hypothesize that a minimum size of 9 acres (4 hectares (ha)) may be necessary to reach suitably warm temperatures and support a large enough population to persist despite high predation rates. However, spotted frogs also occupy smaller sites and are known to occur at sites as small as 2.5 acres (1 ha) and as large as 4,915 acres (1,989 ha) (Pearl and Hayes 2004, pg. 11). Smaller sites generally have a small number of frogs and, as described above, are more vulnerable to extirpation. Pearl and Hayes (2004, pg. 14) believe that these smaller sites were historically subpopulations within a larger breeding complex and spotted frogs may only be persisting in these small sites because the sites exchange migrants or seasonal habitat needs are provided nearby.

Egg mass counts are believed to be a the best available metric of adult reproductive population size and are the most time-efficient way to estimate population size (Phillipsen et al. 2010, pg. 743). Adult females are believed to lay one egg mass per year (Phillipsen et al. 2010, pg. 743), and the breeding period occurs within a reliable and predictable timeframe each year (McAllister 2006, pers. comm.). If egg mass numbers are collected in a single survey timed to coincide with the end of the breeding season, when egg laying should be complete, then the egg mass count should represent a reliable estimate of total egg masses. Because one egg mass is approximately equivalent to one breeding female plus one to two adult males, a rough estimate of adult population size can be made if a thorough egg mass census is completed (Phillipsen et al. 2010, pg. 743). A minimum adult population estimate can be derived from the total egg mass count multiplied by two (one egg mass equals two adult frogs). However, using egg mass counts to estimate population size has some weaknesses. For example, researchers have uncertainties about whether adult females breed every year, only lay one egg mass per year, and find difficulty in distinguishing individual egg masses in large communal clusters. Furthermore, access to high elevation or remotely located sites during the breeding period can be difficult or unsafe due to snow and other hazards.

Egg mass counts, as currently conducted at most sites, do not allow for evaluation of trends within a site nor between sites because surveys are not standardized. Survey effort, area coverage, and timing can differ between years at individual sites. In addition, method of survey can differ between years at individual sites and differ between sites. Because of the weaknesses associated with the egg mass counts, site estimates derived from egg mass counts are considered to be a minimum estimate and generally should not be compared across years or with other sites. However, some breeding locations have been surveyed in a consistent manner (in some cases by the same researcher) and for enough years that trend data are available and considered to be reliable (e.g., Big Marsh or Sunriver).

Most species' populations fluctuate naturally in response to weather events, disease, predation, or other factors. However, these factors have less impact on a species with a wide and continuous distribution. Small, isolated populations are generally more likely to be extirpated by stochastic events and genetic drift (Lande 1988, pp. 1456–1458).

Funk et al. (2008, pg. 205) found low genetic variation in Oregon spotted frogs, which likely reflects small effective population sizes, historical or current genetic bottlenecks, and/or low gene flow among populations. Genetic work by Blouin et al. (2010) indicates low genetic diversity within and high genetic differentiation among each of the six Oregon spotted frog groups (British Columbia, Chehalis and Columbia drainages, Camas Prairie, central Oregon Cascades, and the Klamath River basin). This pattern of genetic fragmentation is likely caused by low connectivity between sites and naturally small populations sizes. Gene flow is very limited between locations, especially if separated by 6 miles (10 km) or more, and at the larger scale, genetic groups have the signature of complete isolation (Blouin et al. 2010, pg. 2187). At least two of the locations sampled by Blouin et al. (2010) (Camas Prairie and Trout Lake) show indications of recent genetic drift.

Movement studies suggest spotted frogs are limited in their overland dispersal and potential to recolonize sites. Oregon spotted frog movements are associated with aquatic connections (Watson et al. 2003, pg. 295; Pearl and Hayes 2004, pg. 15). Oregon spotted frogs rely on an aquatic connection between breeding sites to maintain population viability.

Rangewide Threats

Large historical losses of wetland habitat have occurred across the range of the Oregon spotted frog. Wetland losses are estimated from between 30 to 85 percent across the species range with the greatest percentage lost having occurred in British Columbia. These wetland losses have directly influenced the current fragmentation and isolation of remaining spotted frog populations. Loss of natural wetland and riverine disturbance processes as a result of human activities has and continues to result in degradation of spotted frog habitat. Historically, a number of disturbance processes created early successional wetlands favorable to spotted frogs throughout the Pacific Northwest: (1) Rivers freely meandered over their floodplains, removing trees and shrubs and baring patches of mineral soil; (2) beavers created a complex mosaic of aquatic habitat types for year-round use; and (3) summer fires burned areas that would be shallow water wetlands during the spotted frog breeding season the following spring. Today, all of these natural processes are greatly reduced, impaired, or have been permanently altered as a result of human activities, including stream bank, channel, and wetland modifications; operation of water control structures (e.g., dams and diversions); beaver removal; and fire suppression.

The historical loss of Oregon spotted frog habitats and lasting anthropogenic changes in natural disturbance processes are exacerbated by the introduction of reed canarygrass, nonnative predators, and potentially climate change. In addition, current regulatory mechanisms and voluntary incentive programs designed to benefit fish species have inadvertently led to the continuing decline in quality of Oregon spotted frog habitats in some locations in Washington. The current wetland and stream vegetation management paradigm is generally a no-management or restoration approach that often results in succession to a tree- and shrub-dominated community that unintentionally degrades or eliminates remaining or potential suitable habitat for Oregon spotted frog breeding. Furthermore, incremental wetland loss or degradation continues under the current regulatory mechanisms. If left unmanaged, these factors are anticipated to result in the eventual elimination of remaining suitable Oregon spotted frog habitats or populations. The persistence of habitats required by the species is now largely management dependent.

In the Final Rule to list the frog as threatened (79 FR 51658), the USFWS determined that the Oregon spotted frog is impacted by one or more of the following factors to the extent that the species meets the definition of a threatened species under the ESA:

- Habitat necessary to support all life stages is continuing to be impacted and/or destroyed by human activities that result in the loss of wetlands to land conversions; hydrologic changes resulting from operation of existing water diversions/manipulation structures, new and existing residential and road developments, drought, and removal of beavers; changes in water temperature and vegetation structure resulting from reed canarygrass invasions, plant succession, and restoration plantings; and increased sedimentation, increased water temperatures, reduced water quality, and vegetation changes resulting from the timing and intensity of livestock grazing (or in some instances, removal of livestock grazing at locations where it maintains early seral stage habitat essential for breeding);
- Predation by nonnative species, including nonnative trout and bullfrogs;
- Inadequate existing regulatory mechanisms that result in significant negative impacts such as habitat loss and modification; and
- Other natural or manmade factors including small and isolated breeding locations, low connectivity, low genetic diversity within occupied sub-basins, and genetic differentiation between sub-basins.

Also, there are cumulative effects of the several threats that the Oregon spotted frog faces. All occupied sub-basins are subjected to multiple threats, which cumulatively pose a risk to individual populations. Many of these threats are intermingled, and the magnitude of the combined threats to the species is greater than the individual threats (79 FR 51658).

Consulted-on Effects

Consulted-on effects are those effects that have been analyzed through section 7 consultation as reported in a Biological Opinion. These effects are an important component of objectively characterizing the current condition of the species.

Formal Consultations have been completed for Oregon spotted frog habitat restoration activities in the Middle Klickitat River sub-basin in Washington and within the Little and Upper Deschutes River sub-basins in Oregon (Table 1). These restoration activities, described briefly below, were designed to improve habitat for Oregon spotted frog and will have short-term adverse but long term beneficial effects to spotted frog habitat.

Conboy Lake NWR, located within the Middle Klickitat River sub-basin in Klickitat County, WA, will improve habitat conditions for Oregon spotted frogs through decommissioning and cleaning approximately 0.75 mile of ditches and other management actions. Ditch decommissioning reduces the amount of habitat used by non-native predatory and competitive species (ex: bullfrogs and brown bullhead). Ditch cleaning is essential for maintaining water flow into the wetlands that are used by Oregon spotted frogs for breeding and rearing. These conservation actions paired with continued removal of predatory and competitive species and reed canarygrass management support recovery of this large and isolated population of spotted frogs.

The Ryan Ranch Restoration Project, located downstream of Wickiup Dam within the Upper Deschutes River sub-basin on the Deschutes National Forest, has restored approximately 65 acres of emergent marsh habitat and reconnects the Deschutes River with its floodplain. The wetland restoration area had been historically (circa 1949) occupied by Oregon spotted frog prior to the construction of a berm that disconnected the wetland from the Deschutes River. Restoration work was completed in the spring of 2019.

The Marsh Project, located within the Little Deschutes River sub-basin on the Deschutes National Forest in Klamath County, OR, implemented in 2018, improves habitat conditions for Oregon spotted frog through hydrological restoration and lodgepole pine removal. The Big Marsh project area represents approximately 80 percent of the adult breeding population in the Little Deschutes River sub-basin at the time of the ESA Listing. The Big Marsh Oregon spotted frog population is essential to the conservation of the spotted frog because it is the source population for downstream habitats within Big Marsh Crescent, Crescent Creek, and the Little Deschutes River. Therefore, the Big Marsh Restoration Project supports the recovery of Oregon spotted frogs within the Little Deschutes River sub-basin.

The Deschutes Project consultation with the Bureau of Reclamation analyzed impacts to spotted frogs as a result of water management and the implementation of early conservation measures within the Deschutes Basin Habitat Conservation Plan ([HCP], OSF Proposal) within the Upper and Little Deschutes River sub-basins within an approximate 5,858 acres of spotted frog habitat.

The current condition of the Oregon spotted frog and its critical habitat within the Deschutes Project action area is highly degraded due to the impacts of past and ongoing irrigation water storage and delivery activities conducted by the Districts, in coordination with Reclamation, that have radically altered the natural hydrology of this portion of the Deschutes River Basin. Synchronizing and modifying, as needed, water management activities within the action area to ensure the proper function of habitats that support all spotted frog life stages and to ensure connectivity within suitable habitat areas and between spotted frog populations are vital to the survival and recovery of this species. Implementation of the OSF Proposal over a two-year period is a first step in that direction, and should help inform the development of the Deschutes River Basin HCP by the Districts. That HCP effort represents a highly significant opportunity to conserve the Oregon spotted frog by aligning irrigation water management in the Basin to closely conform to and support the life history requirements of the spotted frog and the proper function of its critical habitat.

The Thurston Country Beaver Creek Culvert Replacement Project installed a bridge that allowed better connectivity between two known Oregon spotted frog sites on Beaver Creek. Most of the construction activities occurred outside the wetted channel and incorporated several conservation measures such as having experience frog biologist on site to oversee seining the dewater area and minimize effects to Oregon spotted frogs if found in the area. Take in the form of harm is estimated at two adult spotted frogs along 50 feet of Beaver Creek.

The overall goal of the Bonneville Power Administration's (BPA) Chehalis-Olympia No. 1 Transmission Line Right-of-Way (ROW) Maintenance Project is to establish low-growing plant communities along the ROW and control the development of trees that could interfere with transmission lines. The ROW easement is 75 to 615 feet in width through the project area and approximately 80 miles long. The action area contains known occupied sites and contains habitat for the full life history of the Oregon spotted frog. The vegetation maintenance includes conservation measures to avoid or minimize effects of the activities to Oregon spotted frogs and suitable habitat. Although there may be short-term impacts to frogs, maintaining the ROW and avoiding activities in wetted areas at known occupied sites and in areas with suitable habitat will benefit Oregon spotted frogs in the long term. The action area may also act as a dispersal corridor that is necessary for gene flow and demographic support of populations within the Black River watershed.

The Preserve HCP includes managing 25 acres of wetland habitat to benefit Oregon spotted frog by reducing the occurrence of invasive or non-native plants. The mitigation site is degraded due to reed canarygrass and other invasive plant species. Reed canarygrass mechanical control, mowing, management of livestock access in wetted areas of Oregon spotted frog suitable habitat will improve the suitability of the habitat at the mitigation site. Conservation measures include avoiding mechanical management activities in the water or immediately next to the water's edge on the mitigation site, and no in-water vegetation management work in Oregon spotted frog suitable habitat during Oregon spotted frog breeding season. Take in the form of harm is estimated as one adult spotted frog and one egg mass annually for 10 years.

The BPA's Monroe-Custer No. 2 Transmission Right-of-Way Vegetation Management Project includes maintaining vegetation and performing routine inspections on the existing right-of-way under the transmission lines. The right-of-way easement is 150 to 575 feet in width and crosses approximately 20 miles of potentially suitable habitat for Oregon spotted frogs. Within that area, the ROW crosses 16 to 18 acres of designated critical habitat for the Oregon spotted frog. Vegetation control methods include hand cutting, mowing, and managed herbicidal treatments to remove tall-growing trees and shrubs and to maintain low-growing vegetation. The proposed vegetation maintenance may affect a small number of individual spotted frogs on a total of 210 acres suitable habitat spread over a period of 15 years. In the long term, maintaining the vegetation in the ROW and avoiding activities in wetted areas at known occupied sites and in areas with potentially suitable habitat will benefit Oregon spotted frogs.

The Gifford Pinchot National Forest Beaver Pond restoration project will restore 12 acres of Oregon spotted frog wetland habitat through removal of invasive plant species via manual and herbicide treatment over a five-year period (2018-2023). Annual Oregon spotted frog egg mass surveys will occur to complement the restoration activities. Reed canarygrass and Canada thistle will be treated through mowing beginning in June and application of aquatic-labeled imazapyr beginning August 1. Take associated with activities conducted in suitable occupied habitat will include a small proportion of the total number of individuals in all life stages of Oregon spotted frogs within 12 acres.

Each year Washington Department of Fish and Wildlife (WDFW) staff conducts surveys for Oregon spotted frogs in Washington State under the WDFW Section 6 Cooperative Agreement.

When new breeding sites are located 1 to 3 eggs are collected for genetic confirmation to ensure species identification as they can easily confused with red-legged frog (*Rana aurora*).

Table 1. Completed formal consultations or conferences involving effects of Federal actions on the Oregon spotted frog.

Project/Consultation/Conference Name	**Sub-basin Affected**	**Type of Take (Harm or Harass)**	**Amount of Take (eggs, tadpoles, frogs, or habitat surrogate)**
Colorado Avenue Dam Paddle Trail Improvements Project Biological Opinion	Upper Deschutes	Harm	2.72 acres overwintering habitat permanent loss
		Harass	3.44 acres of disturbance
Ryan Ranch Restoration Conference Opinion and Amended Biological Opinion (2018)	Upper Deschutes	Harm	2,940 tadpoles
		Harass	14 adults, 7 egg masses (avg. of 600 eggs per mass) and 7 juveniles
Old Mill CCAA 20-year Permit Conference Opinion	Upper Deschutes	Harm	12 adult/juvenile spotted frogs and 20 egg masses or up to 8,400 tadpoles
Antelope Grazing Allotments Project Biological Opinion	Williamson River	Harm	2 adults, 4 juveniles, 2 metamorphs, and 237 tadpoles
Marsh Biological Opinion	Little Deschutes	Harm	29 adults, 29 sub adults and 216 juveniles – mortality within 0.10 acre
		Harass	adults, sub-adults, and juveniles with 153 acres
		Harass	294 adult spotted frogs, 294 sub-adult and 2,157 juveniles via capture and handling
Conboy Lake NWR Habitat Management Activities Opinion	Middle Klickitat River	Harm	13 tadpoles
		Harass	109adults
Wickiup Hydro Opinion	Upper Deschutes	Harm	$\leq$5% increase in brown trout
Deschutes Project	Upper Deschutes	Harm and harass	All life stages within 4,661 acres of wetlands.
		Harm	All spotted frogs within 7 acres of wetlands.

Project/Consultation/Conference Name	Sub-basin Affected	Type of Take (Harm or Harass)	Amount of Take (eggs, tadpoles, frogs, or habitat surrogate)
		Harass	All spotted frogs within 8 acres of wetlands.
	Little Deschutes	Harm and harass	All spotted frogs within 1,182 acres of wetlands.
Thurston Country PW Beaver Creek Culvert Replacement	Black River	Harm	2 adult spotted frogs along 50 ft. of Beaver Creek
Nationwide Aerial Application of Fire Retardant on National Forest System Land	All sub-basins on USFS lands		No take
Chehalis-Olympia No. 1 Transmission Line Right-of-Way Maintenance	Black River	Harm and harass	All spotted frogs occurring on a total of 268 acres of suitable habitat
The Preserve Habitat Conservation Plan	Black River	Harm and harass	A total of 47 acres over ten years
		Harm	1 adult spotted frog and 1 egg mass annually for 10 years
Monroe-Custer No. 2 Transmission Right-of-Way Vegetation Management Project	South Fork Nooksack & Samish Rivers	Harm and harass	All spotted frogs on a total of 210 acres suitable habitat spread over a period of 15 yrs,
GPNF Beaver Pond	White Salmon River	Harm and harass	Oregon spotted frogs, all life stages, on 12 acres
Section 6	All sub-basins in Washington	Harm and harass	1 to 3 eggs at newly found sites

Rangewide Conservation Needs

The overall reproductive success of the Oregon spotted frog is directly influenced by the timing and availability of water in habitats that support all life stages and maintaining aquatic connectivity within suitable habitat areas and between populations. Synchronizing and modifying, as needed, water management activities within Oregon spotted frog habitat to ensure the proper function of habitats that support all spotted frog life stages and to ensure connectivity within suitable habitat areas and between spotted frog populations are vital to the survival and recovery of this species. Of equal importance is maintaining low emergent wetland vegetative structure with a high level of solar exposure (low canopy closure) during breeding and the early stages of rearing. Maintaining and restoring complex wetland habitats of variable water depths and native vegetation structure and diversity will provide quality habitat that is suitable for all life stage of spotted frogs. These habitats should be without non-native predators such as bull frogs.

Currently, Oregon spotted frogs are mostly found in small isolated sites occupied by a small number of individuals in a very small portion of its historic range. Therefore, re-establishing and maintaining adequate areas of high quality, connected wetland and aquatic habitat for the spotted frog is a vital conservation need. Conservation efforts focused on improving water management to create habitats that are suitable for all life stages and reducing or removing non-native plant and animal species that reduce the suitability of habitat or result in direct predation of spotted frog are necessary.

In most watersheds across the range of the Oregon spotted frog there is some level of population resilience in the form of multiple occupied sites or sufficient extent of suitable habitat for the species. However in three watersheds, the Lower Chilliwack River, the White River, and Keene Creek the entire reproductive population of Oregon spotted frogs is likely represented by less than 10 females or its status is completely unknown and the habitat is only marginally functional for species life history needs. Immediate, planned and coordinated conservation and recovery actions are needed for the species in those watersheds of they are likely to become locally extinct in the near future.

General criteria for Oregon spotted frog recovery (delisting) are currently being developed by the USFWS. A draft recovery plan is anticipated to be completed in 2020. Recovery will require removing and reducing threats to the species coupled with building self-sustaining populations of spotted frogs across their current and possibly historical range by maintaining, restoring, and expanding the habitat on which they depend. Portions of the historical range, including the Pit River Basin of California, Willamette Valley lowlands of Oregon and Central Puget Lowlands of Washington, will require further evaluation to determine if populations can be re-established within the current highly modified habitat condition. Development of recovery metrics may vary geographically in order to create discrete recovery goals across the range of the species. The USFWS does not have an estimated recovery time for this species.

Long and short-term spotted frog conservation and recovery needs include managing hydrology, reducing or removing invasive animals and plants, and improving connectivity among sites and populations. Conservation efforts will focus on maintaining and increasing population numbers and expanding distribution into suitable habitat within the current and historical range to allow for adequate genetic interchange and re-population of areas following stochastic events.

Literature Cited

See Literature Cited section for Oregon Spotted Frog Critical Habitat (below).

Oregon Spotted Frog Critical Habitat

The USFWS designated critical habitat for Oregon spotted frog on 65,038 acres and 20.3 stream miles in Washington and Oregon on May 11, 2016 (81 FR 29336). Critical habitat for Oregon spotted frog was designated within 14 units, delineated by river sub-basins where spotted frogs are extant: (1) Lower Chilliwack River; (2) South Fork Nooksack River; (3) Samish River; (4)

Black River; (5) White Salmon River; (6) Middle Klickitat River; (7) Lower Deschutes River; (8) Upper Deschutes River; (9) Little Deschutes River; (10) McKenzie River; (11) Middle Fork Willamette River; (12) Williamson River; (13) Upper Klamath Lake; and (14) Upper Klamath. The final rule for critical habitat provides descriptions of ownership, acreages and threats for each Unit (pp. 29356 – 29360). A summary of area or length and ownership can be found in Tables 7 and 8 below. In Washington State Oregon spotted frogs are known to occur outside of Critical Habitat in units 2, 4, and 6 and have the potential to occur in other areas not designated as Critical Habitat.

Table 2. Approximate area and landownership in designated CHUs for the Oregon spotted frog in Oregon and Washington.

	Critical Habitat Unit	Federal Ac (Ha)	State Ac (Ha)	County Ac (Ha)	Private/local municipalities Ac (Ha)	Total
Washington	1. Lower Chilliwack River	0	0	0	143 (58)	143 (58)
	2. South Fork Nooksack River	0	0	0	111 (45)	111 (45)
	3. Samish River	0	1 (<1)	7 (3)	976 (395)	984 (398)
	4. Black River	877 (355)	375 (152)	485 (196)	3,143 (1,272)	4,880 (1,975)
	5. White Salmon River	108 (44)	1,084	0	33 (13)	1,225 (496)
	6. Middle Klickitat River	4,069 (1,647)	0	0	151 (61)	4,220 (1,708)
Oregon	7. Lower Deschutes River	90 (36)	0	0	0	90 (36)
	8. Upper Deschutes River	23,213	185 (75)	45 (18)	589 (238)	24,032 (9,726)
	8A. Upper Deschutes River, Below Wickiup Dam	1,182 (479)	185 (75)	45 (18)	589 (238)	2,001 (810)
	8B. Upper Deschutes River, Above Wickiup Dam	22,031	0	0	0 (<1)	22,031 (8,916)
	9. Little Deschutes River	5,288 (2,140)	14 (6)	80 (32)	5,651 (2,287)	11,033 (4,465)
	10. McKenzie River	98 (40)	0	0	0	98 (40)
	11. Middle Fork Willamette River ...	292 (118)	0	0	0	292 (118)
	12. Williamson River	10,418	0	0	4,913 (1,988)	15,331 (6,204)
	13. Upper Klamath Lake	1,259 (510)	9 (4)	1 (<1)	1,068 (432)	2,337 (946)
	14. Upper Klamath	103 (42)	0	0	159 (64)	262 (106)
	Total	**45,815**	**1,668**	**618 (250)**	**16,937 (6,854)**	**65,038 (26,320)**

Note: Area sizes may not sum due to rounding. Area estimates reflect all land and stream miles within CHU boundaries.

Table 3. Approximate river mileage and ownership within proposed CHUs for the Oregon spotted frog in Washington State only. No river miles were designated in Oregon.

Critical habitat unit	Federal river mile (km)	Federal/ private * river mile (km)	State river mile (km)	State/private river mile (km)	County river mile (km)	County/ private river mile (km)	Private/local municipalities river mile (km)	Total
1. Lower Chilliwack River	0	0	0	0	0	0	4.38 (7.05)	4.38 (7.05)
2. South Fork Nooksack River	0	0	0	0	0	0	3.56 (5.73)	3.56 (5.73)
3. Samish River	0	0	0	0	0	0	1.73 (2.78)	1.73 (2.78)
4. Black River	0.06 (0.10)	0.06 (0.10)	0.49 (0.79)	0.05 (0.07)	0.64 (1.02)	0.26 (0.42)	5.90 (9.49)	7.46 (11.98)
5. White Salmon River	0.91 (1.46)	0	0	0	0	0	2.30 (3.70)	3.21 (5.16)
Total	**0.97 (1.56)**	**0.06 (0.09)**	**0.49 (0.79)**	**0.05 (0.07)**	**0.64 (1.02)**	**0.26 (0.42)**	**17.87 (28.75)**	**20.34 (32.7)**

* Ownership—multi-ownership (such as Federal/Private) indicates different ownership on each side of the river/stream/creek.

Note: River miles (km) may not sum due to rounding. Mileage estimates reflect stream miles within CHU boundaries that are not included in area estimates in Table 8.

Physical or Biological Features and Primary Constituent Elements

When designating critical habitat, the USFWS identifies "the physical or biological features [PBFs] essential to the conservation of the species and which may require special management considerations or protection" (50 CFR §424.12; 81 FR 29351). "These include, but are not limited to: 1) space for individual and population growth and for normal behavior; 2) food, water, air, light, minerals, or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for breeding, reproduction, or rearing (or development) of offspring; and 5) habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distributions of a species" (81 FR 29351). The final rule for critical habitat identifies the physical or biological features that are essential to the conservation of Oregon spotted frog (USDI USFWS 2016, pp. 29351 – 29354). Primary Constituent Elements (PCEs) are those specific elements of the physical and biological features that provide for a species' life history processes and are essential to the conservation of the species.

The following PCEs of critical habitat were identified for the Oregon spotted frog:

1. Nonbreeding (N), Breeding (B), Rearing (R), and Overwintering Habitat (O) - Ephemeral or permanent bodies of fresh water, including, but not limited to natural or manmade ponds, springs, lakes, slow-moving streams, or pools within oxbows adjacent to streams, canals, and ditches that have one of more of the following characteristics:

    - Inundated for a minimum of 4 months per year (B, R) – timing varies by elevation but may begin as early as February and last as long as September.
    - Inundated from October through March (O).
    - If ephemeral, areas are hydrologically connected by surface water flow to a permanent water body (e.g., pools, springs, ponds, lakes, streams, canals, or ditches) (B, R).
    - Shallow water areas (less than or equal to 30 cm (12 inches), or water of this depth over vegetation in deeper water (B, R).
    - Total surface area with less than 50% vegetative cover (N).
    - Gradual topographic gradient (<3% slope) from shallow water toward deeper, permanent water (B, R).
    - Herbaceous wetland vegetation (i.e. emergent, submergent, and floating-leaved aquatic plants), or vegetation that can structurally mimic emergent wetland vegetation through manipulation (B, R).
    - Shallow water areas with high solar exposure or low (short) canopy cover (B, R).
    - An absence or low density of nonnative predators (B, R, N).

2. Aquatic movement corridors - Ephemeral or permanent bodies of fresh water that have one or more of the following characteristics:

    - Less than or equal to 5 km (3.1 miles) linear distance from breeding areas;

- Impediment free (including, but not limited to, hard barriers such as dams, impassable culverts, lack of water, or biological barriers such as abundant predators, or lack of refugia from predators).

3. Refugia habitat – Nonbreeding, breeding, rearing, or overwintering habitat or aquatic movement corridors with habitat characteristics (e.g., dense vegetation and/or an abundance of woody debris) that provide refugia from predators (e.g., nonnative fish or bullfrogs).

Special Management Considerations

Threats to the physical or biological features that are essential to the conservation of this species and that may warrant special management considerations or protection include, but are not limited to: 1) habitat modifications brought on by nonnative plant invasions or native vegetation encroachment (trees and shrubs); 2) loss of habitat from conversion to other uses; 3) hydrologic manipulation; 4) removal of beavers and features created by beavers; 5) livestock grazing; and 6) predation by invasive fish and bullfrogs. These threats also have the potential to affect the PCEs if conducted within or adjacent to designated units.

Consulted-on Effects to Oregon Spotted Frog Critical Habitat

Consulted-on effects are those effects that have been analyzed through section 7 consultation as reported in a biological opinion. These effects are an important component of objectively characterizing the current condition of the Critical Habitat designated for Oregon spotted frog.

Formal Consultations have been completed for Oregon spotted frog habitat restoration activities in Critical Habitat Units 6, 8 (subunit 8A) and 9. All actions have had short-term adverse but long term beneficial effects to critical habitat. All consulted on activities to date, briefly described below, are designed to improve habitat conditions within Oregon spotted frog designated critical habitat.

Conboy Lake NWR in Klickitat County, WA, comprises the majority of the critical habitat in Unit 6. The USFWS determined that actions at Conboy NWR long-term beneficial effects to PCEs of the critical habitat, but in improving overall conditions there would be some loss of PCEs 1 and 2 through the decommissioning of 0.75 mile of ditches and a short term loss of PCE 3 through 0.75 miles of ditch cleaning.

The Ryan Ranch Restoration Project, located within CHU 8 (subunit 8A) on the Deschutes National Forest, in Deschutes County, OR, has resulted in the restoration of approximately 65 acres of critical habitat for the Oregon spotted frog. PCE 1 will be improved by increasing the extent and duration of inundation within a floodplain wetland that was historically occupied by Oregon spotted frogs. PCE 2 will be improved by re-establishing an aquatic movement corridor between this wetland and the Deschutes River.

The Marsh Project, located within CHU 9 on the Deschutes National Forest in Klamath County, OR, was implemented in 2018 and will improve all PCEs through hydrological restoration and lodgepole pine removal. The Big Marsh project area represents approximately 25% or 2,847 acres of critical habitat in CHU 9. Implementation of the Marsh Project is likely to enhance the recovery support function of CHU 9 by improving the physical and biological features of critical habitat that will support life history processes that are essential for the conservation of the Oregon spotted frog.

The Wickiup Hydro Project, located within CHU 8B, on the Deschutes National Forest, in Deschutes County, OR, will increase the number of non-native fish species, adversely affecting PCE 1 and PCE 2.

The Deschutes Project occurs within CHU 8 (Upper Deschutes River) and 9 (Little Deschutes River). These CHUs combined encompass approximately 35,065 acres of critical habitat for the Oregon spotted frog and represent 54 percent of the range-wide acreage of designated critical habitat (65,038 acres). Critical habitat acres and percentages of critical habitat do not include the approximately 30 miles of Oregon spotted frog critical habitat designated in Washington State. Of these 35,065 acres, approximately 22,688 acres of critical habitat (35 percent of critical habitat acreage range-wide) are within the geographic area influenced by the Deschutes Project, including private irrigation district actions that store and release water for irrigation. The conservation function of critical habitat within the large area affected by Deschutes Project operations has been significantly altered due to past and ongoing water management associated with the Deschutes Project and other threats. Improving the conservation function of critical habitat within this area is essential to meeting the recovery needs of the Oregon spotted frog.

The Thurston Country Beaver Creek Culvert Replacement Project occurred in Critical Habitat Unit 4: Black River and incorporated several conservation measures to minimize effects to the habitat. The project will result in a short-term loss in PCE 2 for one week due to dewatering of a 50-ft section (400 ft^2) of the creek. However, there will be an improvement to the overall condition of PCE 2. Additionally there will be a small loss of refugia and nonbreeding habitat where the culvert and bank vegetation is removed. The replanting will result in the reestablishment of bank over at the project site and that physical instream processes will result in a heterogeneous instream habitat over the course of several years. Therefore we expect insignificant effects to PCE 1 and 3 and a short term adverse effect to PCE 2 to result from this project. Overall this project will be a long-term improvement in the condition of critical habitat in the Beaver Creek Drainage. Upon completion of the project the area of the creek available as a movement corridor will double and aid in recovery of the species in the watershed.

The Nationwide Aerial Application of Fire Retardant on National Forest System Land consultation evaluates effects to Oregon spotted frog designated critical habitat from misapplication of fire retardants on National Forest lands. It is reasonable to assume that Oregon spotted frog and its designated critical habitat will likely be adversely affected by one misapplication, with potential for subsequent intrusion, over the next four years. We expect that the degradation of water quality due to retardant in aquatic areas will act as impediments, barriers, or reduced-function habitat. The low probability (0.093) of a misapplication, the lower probability of intrusion in designated critical habitat, and the incorporation of an expanded avoidance buffer reduces the risk of intrusion substantially.

All three PCEs are present within designated critical habitat for Oregon spotted frogs in the project area for the BPA Chehalis-Olympia No. 1 Transmission Line Right-of-Way Maintenance project. The action is likely to improve PCE 1 where the right-of-way crosses designated critical habitat by increasing the amount of habitat with less than 50 percent vegetation cover. The action will not impact PCEs 2 and 3 within the Black River Critical Habitat Unit.

Some of the BPA Monroe-Custer No. 2 Transmission Right-of-Way Vegetation Management Project vegetation maintenance will occur within Critical Habitat Unit 3: Samish River. The transmission line right-of-way overlaps designated critical habitat in two areas. The right-of-way on the Monroe-Custer No. 1 line overlaps an estimated 5 to 6 acres of critical habitat. The Monroe-Custer No. 2 line overlaps an estimated 10 to 12 acres of critical habitat. We expect insignificant effects to PCE 3 and benefits to critical habitat PCEs 1 and 2 to result from this project. Overall, this project will maintain designated suitable critical habitat by keeping the right-of-way in low vegetation benefiting the long-term condition of critical habitat in the Samish River watershed.

The Gifford Pinchot National Forest Beaver Pond restoration project will occur on 12 acres of designated critical habitat for Oregon spotted frog in Critical Habitat Unit 5 (White Salmon River Unit). Removal of invasive plant species via manual and herbicide treatment over a five-year period (2018-2023) may have short-term adverse effects to breeding and rearing habitat (PCE 1) and reduction in refugia habitat (PCE 3) for Oregon spotted frog; however, the long-term effects of invasive plant species removal and restoring more native species is expected to result in long-term benefits of suitable habitat. The action will not create permanent physical or biological barriers to movement of individuals (PCE 2).

Climate Change

Our analyses under the ESA include consideration of ongoing and projected changes in climate. The terms "climate" and "climate change" are defined by the Intergovernmental Panel on Climate Change (IPCC). The term "climate" refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007a, pg. 78). The term "climate change" thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007a, pg. 78).

Global climate projections are informative, and, in some cases, the only or the best scientific information available for us to use. However, projected changes in climate and related impacts can vary substantially across and within different regions of the world (e.g., IPCC 2007a, pp. 8–12). Therefore, we use "downscaled" projections when they are available and have been developed through appropriate scientific procedures, because such projections provide higher resolution information that is more relevant to spatial scales used for analyses of a given species (see Glick et al. 2011, pp. 58–61, for a discussion of downscaling). With regard to our analysis for the Oregon spotted frog, downscaled projections are available.

The climate in the Pacific Northwest (PNW) has already experienced a warming of 0.8 degrees Celsius (C) (1.4 degrees Fahrenheit (F)) during the 20th century (Mote et al. 2008, pg.3). Using output from eight climate models the PNW is projected to warm further by 0.6 to 1.9 degrees C (1.1 to 3.4 degrees F) by the 2020s, and 0.9 to 2.9 degrees C (1.6 to 5.2 degrees F) by the 2040s (Mote et al. 2008, pp. 5–6). Additionally, the majority of models project wetter winters and drier summers (Mote et al. 2008, pg.7), and of greatest consequence, a reduction in regional snowpack, which supplies water for ecosystems during the dry summer (Mote et al. 2003). The small summertime precipitation increases projected by a minority of models do not change the fundamentally dry summers of the PNW and do not lessen the increased drying of the soil column brought by higher temperatures (Mote et al. 2003, pg. 8).

Snowmelt-dominated watersheds, such as White Salmon in Washington and the Upper Deschutes, Little Deschutes, and Klamath River sub-basins in Oregon, will likely become transient, resulting in reduced peak spring streamflow, increased winter streamflow, and reduced late summer flow (Littell et al. 2009, pg. 8). In snowmelt-dominated watersheds that prevail in the higher altitude catchments and in much of the interior Columbia Basin, flood risk will likely decrease and summer low flows will decrease in most rivers under most scenarios (Littell et al. 2009, pg. 13).

Climate change models predict that water temperatures will rise throughout Oregon as air temperatures increase into the 21st century. A decline in summer stream flow may exacerbate water temperature increases as the lower volume of water absorbs solar radiation (Chang and Jones, pg. 134).

Analyses of the hydrologic responses of the upper Deschutes basin (including the Upper and Little Deschutes River sub-basins) and the Klamath River basin to climate change scenarios indicates that the form of precipitation will shift from predominately snow to rain and cause decreasing spring recharge and runoff and increasing winter recharge and runoff (Waibel 2011, pp., 57–60; Mayer and Naman 2011, pg. 3). However, there is spatial variation within the Deschutes sub-basins as to where the greatest increases in recharge and runoff will occur (Waibel 2011, pp., 57–60). Changes in seasonality of stream flows may be less affected by climate change along the crest of the Cascades in the upper watersheds of the Deschutes, Klamath, and Willamette River basins in Oregon, where many rivers receive groundwater recharge from subterranean aquifers and springs (Chang and Jones 2010, pg. 107). Summer stream flows may thus be sustained in High Cascade basins that are groundwater fed (Chang and Jones 2010, pg. 134). Conversely, Mayer and Naman (2011 pg. 1) indicate that streamflow into Upper Klamath Lake will display absolute decreases in July-September base flows in groundwater basins as compared to surface-dominated basins. This earlier discharge of water in the spring will result in less streamflow in the summer (Mayer and Naman 2011, pg. 12).

Although predictions of climate change impacts do not specifically address Oregon spotted frogs, short- and long-term changes in precipitation patterns and temperature regimes will likely affect wet periods, winter snow pack, and flooding events (Chang and Jones 2010). These changes are likely to affect amphibians through a variety of direct and indirect pathways, such as range shifts, breeding success, survival, dispersal, breeding phenology, aquatic habitats availability and quality, food webs, competition, spread of diseases, and the interplay among these factors (Blaustein et al. 2010 entire; Hixon et al. 2010, pg. 274; Corn 2003 entire). Amphibians have species-specific temperature tolerances, and exceeding these thermal thresholds is expected to reduce survival (Blaustein et al. 2010, pp. 286–287). Earlier spring thaws and warmer ambient temperatures may result in earlier breeding, especially at lower elevations in the mountains where breeding phenology is driven more by snow pack than by air temperature (Corn 2003, pg. 624). Shifts in breeding phenology may also result in sharing breeding habitat with species not previously encountered and/or new competitive interactions and predator/prey dynamics (Blaustein et al. 2010. pp. 288, 294). Oregon spotted frogs are highly aquatic and reductions in summer flows may result in summer habitat going dry, potentially resulting in increased mortality or forcing frogs to seek shelter in lower quality wetted areas where they are more susceptible to predation.

Amphibians are susceptible to many types of pathogens including trematodes, copepods, fungi, oomycetes, bacteria, and viruses. Changes in temperature and precipitation could alter host-pathogen interactions and/or result in range shifts resulting in either beneficial or detrimental impacts on the amphibian host (Blaustein et al. 2010, pg. 296). Kiesecker et al. (2001a, pg. 682) indicate climate change events, such as El Nino/Southern Oscillation, that result in less precipitation and reduced water depths at egg-laying sites results in high mortality of embryos because their exposure to UV-B and vulnerability to infection (such as Saprolegnia) is increased. Warmer temperatures and less freezing in areas occupied by bullfrogs is likely to increase bullfrog winter survivorship, thereby increasing the threat from predation. Uncertainty about climate change impacts does not mean that impacts may or may not occur; it means that the risks of a given impact are difficult to quantify (Schneider and Kuntz-Duriseti 2002, pg. 54; Congressional Budget Office 2005, entire; Halsnaes et al. 2007, pg. 129). Oregon spotted frogs occupy habitats at a wide range of elevations, and all of the occupied sub-basins are likely to experience precipitation regime shifts; therefore, the Oregon spotted frog's response to climate change is likely to vary across the range and the population-level impacts are uncertain. The interplay between Oregon spotted frogs and their aquatic habitat will ultimately determine their population response to climate change. Despite the potential for future climate change throughout the range of the species, as discussed above, we have not identified, nor are we aware of any data on, an appropriate scale to evaluate habitat or population trends for the Oregon spotted frog or to make predictions about future trends and whether the species will be significantly impacted.

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Bull Trout

This section provides information about the bull trout's life history, habitat preferences, geographic distribution, population trends, threats, and conservation needs. This includes description of the effects of past human activities and natural events that have led to the current status of the bull trout. This information provides the background for analyses in later sections of the biological opinion. The proposed and final listing rules contain a physical species description (63 FR 31647, June 10, 1998; 64 FR 58910, November 1, 1999). Additional information can be found at https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=E065.

Listing Status and Current Range

The coterminous United States population of the bull trout (*Salvelinus confluentus*) was listed as threatened on November 1, 1999 (64 FR 58910). The threatened bull trout occurs in the Klamath River Basin of south-central Oregon; the Jarbidge River in Nevada; the Willamette River Basin in Oregon; Pacific Coast drainages of Washington, including Puget Sound; major rivers in Idaho, Oregon, Washington, and Montana, within the Columbia River Basin; and the St. Mary-Belly River, east of the Continental Divide in northwestern Montana (Bond 1992, pg. 2; Brewin and Brewin 1997, pg. 215; Cavender 1978, pp. 165-166; Leary and Allendorf 1997, pp. 716-719; 63 FR 31647; 64 FR 58910; 75 FR 2269, January 14, 2010; USFWS 2015a, pg. 1).

The final listing rule for the United States coterminous population of the bull trout discusses the consolidation of five DPSs into one listed taxon and the application of the jeopardy standard in accordance with the requirements of section 7 of the ESA of 1973, as amended (Act; 16 U.S.C. 1531 et seq.), relative to this species, and established five interim recovery units for each of these DPSs for the purposes of Consultation and Recovery (64 FR 58910).

Six draft recovery units were identified based on new information (75 FR 63898, October 18, 2010) that confirmed they were needed to ensure a resilient, redundant, and representative distribution of bull trout populations throughout the range of the listed entity. The final Recovery Plan for the Coterminous Bull Trout Population (bull trout recovery plan) formalized these six recovery units (USFWS 2015a, pg. 36-43) (see Figure BT-1). The final recovery units replace the previous five interim recovery units and will be used in the application of the jeopardy standard for Section 7 consultation proceedures.

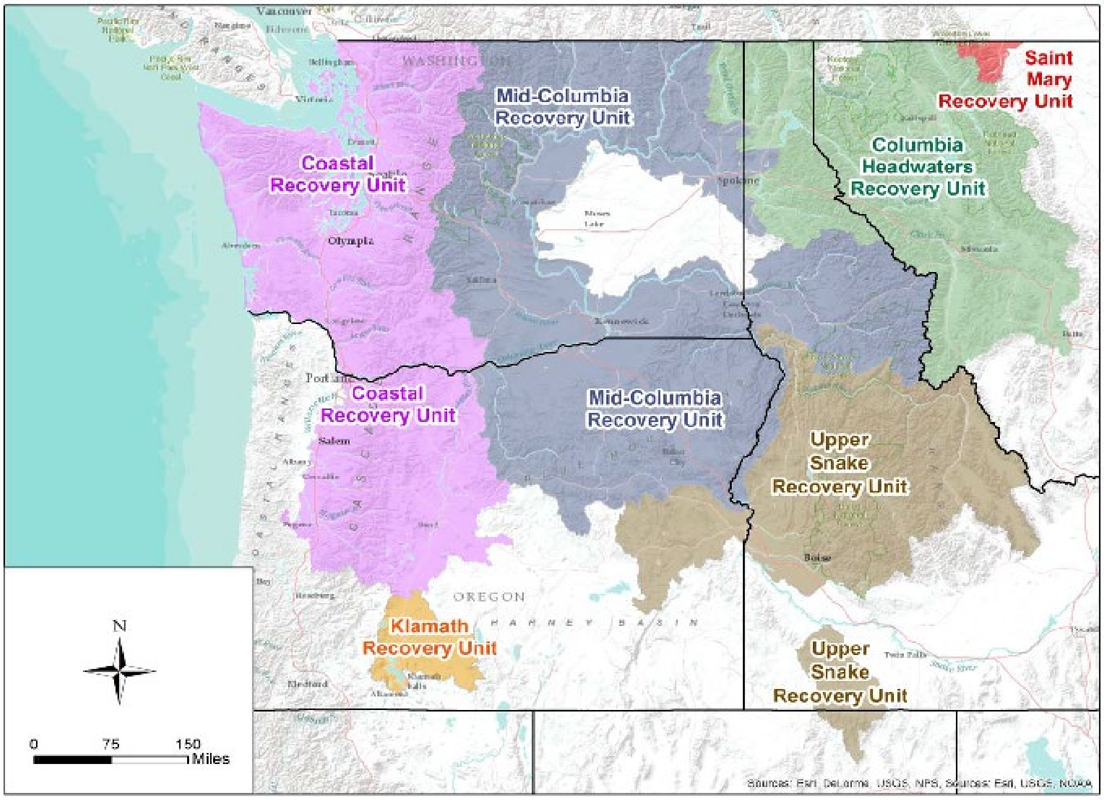

Figure BT-1. Locations of the six bull trout recovery units in the coterminous United States.

Reasons for Listing, Rangewide Trends and Threats

Throughout its range, the bull trout is threatened by the combined effects of habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, grazing, the blockage of migratory corridors by dams or other diversion structures, poor water quality; incidental angler harvest; entrainment (a process by which aquatic organisms are pulled through a diversion or other device) into diversion channels; and introduced non-native species (63 FR 31647; 64 FR 58910). Poaching and incidental mortality of bull trout during other targeted fisheries are identified described in the bull trout recovery plan (see Threat Factors B and D) as additional threats (USFWS 2015a, pg. 150). Since the time of coterminous listing the species (64 FR 58910) and designation of its critical habitat (69 FR 59996, October 6, 2004; 70 FR 56212, September 26, 2005; 75 FR 63898) a great deal of new information has been collected on the status of bull trout. The USFWS's Science Team Report (Whitesel et al 2004, entire), the bull trout core areas templates (USFWS 2005b, entire; USFWS 2009, entire), Conservation Status Assessment (USFWS 2005a), and 5-year Reviews (USFWS 2008, entire;

USFWS 2015h, entire) have provided additional information about threats and status. The final recovery plan lists other documents and meetings that compiled information about the status of bull trout (USFWS 2015a, pg. 3). As well, 2015 5-year review maintained the listing status as threatened based on the information compiled in the final bull trout recovery plan (USFWS 2015h, pg.3) and the recovery unit implementation plans (RUIPs) (USFWS 2015b-g, entire).

When first listed, the status of bull trout and its threats were reported by the USFWS at subpopulation scales. In 2002 and 2004, the draft recovery plans (USFWS 2002, entire; USFWS 2004a, entire; USFWS 2004b, entire) included detailed information on threats at the recovery unit scale (i.e. similar to subbasin or regional watersheds), thus incorporating the metapopulation concept with core areas and local populations. In the 2008, 5-year Review, the USFWS established threats categories (i.e. dams, forest management, grazing, agricultural practices, transportation networks, mining, development and urbanization, fisheries management, small populations, limited habitat, and wild fire.) (USFWS 2008, entire). In the final recovery plan, threats and recovery actions are described for 109 core areas, forage/migration and overwintering areas, historical core areas, and research needs areas in each of the six recovery units (USFWS 2015a, p 10-11). Primary threats are described in three broad categories: Habitat, Demographic, and Nonnative Fish for all recovery areas described in the listed range of the species. The 2015 5-year status review (USFWS 2015h, entire) references the final recovery plan and the recovery unit implementation plans and incorporates by reference the threats described therein. Although significant recovery actions have been implemented since the time of listing, the 5-year review concluded that bull trout still meets the definition of a “threatened” species (USFWS 2015h, entire).

New or Emerging Threats

The final Recovery Plan for the Coterminous Bull Trout Population (USFWS 2015a, pg. 17) describes new or emerging threats, climate change, and other threats. Climate change was not addressed as a known threat when bull trout was listed. The 2015 bull trout recovery plan and RUIPs (USFWS 2015b-g, entire) summarize the threat of climate change and acknowledge that some bull trout local populations and core areas may not persist into the future due to small populations, isolation, and effects of climate change (USFWS 2015a, pg. 48). The recovery plan further states that use of best available information will ensure future conservation efforts that offer the greatest long-term benefit to sustain bull trout and their required coldwater habitats (USFWS 2015a, pg. vii, and pp. 17-20). Mote et al. (2014, entire) summarized climate change effects to include rising air temperature, changes in the timing of streamflow related to changing snowmelt, increases in extreme precipitation events, lower summer stream flows, and other changes. A warming trend in the mountains of western North America is expected to decrease snowpack, hasten spring runoff, reduce summer stream flows, and increase summer water temperatures (Poff et al. 2002, entire; Koopman et al. 2009, entire; PRBO Conservation Science 2011, entire). Lower flows as a result of smaller snowpack could reduce habitat, which might adversely affect bull trout reproduction and survival. Warmer water temperatures could lead to physiological stress and could also benefit nonnative fishes that prey on or compete with bull trout. Increases in the number and size of forest fires could also result from climate change (Westerling et al. 2006, entire) and could adversely affect watershed function by resulting in faster runoff, lower base flows during the summer and fall, and increased sedimentation rates.

Lower flows also may result in increased groundwater withdrawal for agricultural purposes and resultant reduced water availability in certain stream reaches occupied by bull trout (USFWS 2015c, pg. B-10). Although all salmonids are likely to be affected by climate change, bull trout are especially vulnerable given that spawning and rearing are constrained by their location in upper watersheds and the requirement for cold water temperatures (Battin et al. 2007, pp. 6672-6673; Rieman et al. 2007, pg. 1552). Climate change is expected to reduce the extent of cold water habitat (Isaak et al. 2015, entire), and increase competition with other fish species (lake trout (*Salvelinus namaycush*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), and northern pike (*Esox Lucius*))) for resources in remaining suitable habitat. Brook trout, a fish species that competes for resources with and predates on the bull trout, will continue increasing their range in several areas (an elevation shift in distribution) due to the effects from climate change (Ficke et al. 2009, pg. 1; Peterson et al. 2013, pg. 117; Howell 2017, pg. 2).

Life History and Population Dynamics

Distribution

The historical range of bull trout includes major river basins in the Pacific Northwest at about 41 to 60 degrees North latitude, from the southern limits in the McCloud River in northern California and the Jarbidge River in Nevada to the headwaters of the Yukon River in the Northwest Territories, Canada (Cavender 1978, pp. 165-166; Bond 1992, pg. 2). To the west, the bull trout's range includes Puget Sound, various coastal rivers of British Columbia, Canada, and southeast Alaska (Bond 1992, pg. 2). Bull trout occur in portions of the Columbia River and tributaries within the basin, including its headwaters in Montana and Canada. Bull trout also occur in the Klamath River basin of south-central Oregon. East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta and Montana and in the MacKenzie River system in Alberta and British Columbia, Canada (Cavender 1978, pp. 165-166; Brewin and Brewin 1997, entire).

Reproductive Biology

The iteroparous reproductive strategy (fishes that spawn multiple times, and therefore require safe two-way passage upstream and downstream) of bull trout has important repercussions for the management of this species. Bull trout require passage both upstream and downstream, not only for repeat spawning but also for foraging. Most fish ladders, however, were designed specifically for anadromous semelparous salmonids (fishes that spawn once and then die, and require only one-way passage upstream). Therefore, even dams or other barriers with fish passage facilities may be a factor in isolating bull trout populations if they do not provide a safe downstream passage route. Additionally, in some core areas, bull trout that migrate to marine waters must pass both upstream and downstream through areas with net fisheries at river mouths. This can increase the likelihood of mortality to bull trout during these spawning and foraging migrations.

Growth varies depending upon life-history strategy. Resident adults range from 6 to 12 inches total length, and migratory adults commonly reach 24 inches or more (Goetz 1989, pg. 30; Pratt 1985, pp. 28-34). The largest verified bull trout is a 32-pound specimen caught in Lake Pend Oreille, Idaho, in 1949 (Simpson and Wallace 1982, pg. 95).

Bull trout typically spawn from August through November during periods of increasing flows and decreasing water temperatures. Preferred spawning habitat consists of low-gradient stream reaches with loose, clean gravel (Fraley and Shepard 1989, pg. 141). Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989, pp. 15-16; Pratt 1992, pp. 6-7; Rieman and McIntyre 1996, pg. 133). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992, pg. 1). After hatching, fry remain in the substrate, and time from egg deposition to emergence may surpass 220 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows (Pratt 1992, pg. 1; Ratliff and Howell 1992, pg. 10).

Early life stages of fish, specifically the developing embryo, require the highest inter-gravel dissolved oxygen (IGDO) levels, and are the most sensitive life stage to reduced oxygen levels. The oxygen demand of embryos depends on temperature and on stage of development, with the greatest IGDO required just prior to hatching.

A literature review conducted by the Washington Department of Ecology (WDOE 2002, pg. 9) indicates that adverse effects of lower oxygen concentrations on embryo survival are magnified as temperatures increase above optimal (for incubation). Normal oxygen levels seen in rivers used by bull trout during spawning ranged from 8 to 12 mg/L (in the gravel), with corresponding instream levels of 10 to 11.5 mg/L (Stewart et al. 2007, pg. 10). In addition, IGDO concentrations, water velocities in the water column, and especially the intergravel flow rate, are interrelated variables that affect the survival of incubating embryos (ODEQ 1995, Ch. 2 pp. 23-24). Due to a long incubation period of 220+ days, bull trout are particularly sensitive to adequate IGDO levels. An IGDO level below 8 mg/L is likely to result in mortality of eggs, embryos, and fry.

Population Structure

Bull trout exhibit both resident and migratory life history strategies. Both resident and migratory forms may be found together, and either form may produce offspring exhibiting either resident or migratory behavior (Rieman and McIntyre 1993, pg. 2). Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. The resident form tends to be smaller than the migratory form at maturity and also produces fewer eggs (Goetz 1989, pg. 15). Migratory bull trout spawn in tributary streams where juvenile fish rear 1 to 4 years before migrating to either a lake (adfluvial form), river (fluvial form) (Fraley and Shepard 1989, pg. 138; Goetz 1989, pg. 24), or saltwater (anadromous form) to rear as subadults and to live as adults (Brenkman and Corbett 2005, entire; McPhail and Baxter 1996, pg. i; WDFW et al. 1997, pg. 16). Bull trout normally reach sexual maturity in 4 to 7 years and may live longer than 12 years. They are iteroparous (they spawn more than once in a lifetime). Repeat- and alternate-year spawning has been reported, although repeat-spawning frequency and post-spawning mortality are not well documented (Fraley and Shepard 1989, pg. 135; Leathe and Graham 1982, pg. 95; Pratt 1992, pg. 8; Rieman and McIntyre 1996, pg. 133).

Bull trout are naturally migratory, which allows them to capitalize on temporally abundant food resources and larger downstream, and resident forms may develop where barriers (either natural or manmade) occur or where foraging, migrating, or overwintering habitats for migratory fish are minimized (Swanberg, 1997, entire; Brenkman and Corbett 2005, pp. 1075-1076; Goetz et al.

2004, pg. 105, Starcevich et al 2012, entire; USFWS 2016, pg. 170). For example, multiple life history forms (e.g., resident and fluvial) and multiple migration patterns have been noted in the Grande Ronde River (Baxter 2002, pp. 96, 98-106). Some river systems have retained habitat conditions that allow free movement between spawning and rearing areas and the mainstem Rivers. In these areas with connectivity bull trout can migrate between large rivers lakes, and spawning tributaries. Other migrations in Central Washington have shown that fluvial and adfluvial life forms travel long distances, migrate between core areas, and mix together in many locations where there is connectivity (Ringel et al 2014, entire; Nelson and Nelle 2008, entire). Such multiple life history strategies help to maintain the stability and persistence of bull trout populations to environmental changes. Benefits of connected habitat for migratory bull trout include greater growth in the more productive waters of larger streams, lakes, and marine waters; greater fecundity resulting in increased reproductive potential; and dispersing the population across space and time so that spawning streams may be recolonized should local populations suffer a catastrophic loss (Frissell 1999, pp. 861-863; MBTSG 1998, pg. 13; Rieman and McIntyre 1993, pp. 2-3). In the absence of the migratory bull trout life form, isolated populations cannot be replenished when disturbances make local habitats temporarily unsuitable. Therefore, the range of the species is diminished, and the potential for a greater reproductive contribution from larger size fish with higher fecundity is lost (Rieman and McIntyre 1993, pg. 2).

Whitesel et al. (2004, pg. 2) noted that although there are multiple resources that contribute to the subject, Spruell et al. (2003, entire) best summarized genetic information on bull trout population structure. Spruell et al. (2003, entire) analyzed 1,847 bull trout from 65 sampling locations, four located in three coastal drainages (Klamath, Queets, and Skagit Rivers), one in the Saskatchewan River drainage (Belly River), and 60 scattered throughout the Columbia River Basin. They concluded that there is a consistent pattern among genetic studies of bull trout, regardless of whether examining allozymes, mitochondrial DNA, or most recently microsatellite loci. Typically, the genetic pattern shows relatively little genetic variation within populations, but substantial divergence among populations. Microsatellite loci analysis supports the existence of at least three major genetically differentiated groups (or evolutionary lineages) of bull trout (Spruell et al. 2003, pg. 17). They were characterized as:

- "Coastal", including the Deschutes River and all of the Columbia River drainage downstream, as well as most coastal streams in Washington, Oregon, and British Columbia. A compelling case also exists that the Klamath Basin represents a unique evolutionary lineage within the coastal group.
- "Snake River", which also included the John Day, Umatilla, and Walla Walla rivers. Despite close proximity of the John Day and Deschutes Rivers, a striking level of divergence between bull trout in these two systems was observed.
- "Upper Columbia River" which includes the entire basin in Montana and northern Idaho. A tentative assignment was made by Spruell et al. (2003, pg. 25) of the Saskatchewan River drainage populations (east of the continental divide), grouping them with the upper Columbia River group.
- Spruell et al. (2003, pg. 17) noted that within the major assemblages, populations were further subdivided, primarily at the level of major river basins. Taylor et al. (1999, entire) surveyed bull trout populations, primarily

> from Canada, and found a major divergence between inland and coastal populations. Costello et al. (2003, pg. 328) suggested the patterns reflected the existence of two glacial refugia, consistent with the conclusions of Taylor and Costello (2006, pg. 1165-1170), Spruell et al. (2003, pg. 26) and the biogeographic analysis of Haas and McPhail (2001, entire). Both Taylor et al. (1999, pg. 1166) and Spruell et al. (2003, pg. 21) concluded that the Deschutes River represented the most upstream limit of the coastal lineage in the Columbia River Basin.

More recently, the USFWS identified additional genetic units within the coastal and interior lineages (Ardren et al. 2011, pg. 18). Based on a recommendation in the USFWS's 5-year review of the species' status (USFWS 2008, pg. 45), the USFWS reanalyzed the 27 recovery units identified in the 2002 draft bull trout recovery plan (USFWS 2002, pg. 48) by utilizing, in part, information from previous genetic studies and new information from additional analysis (Ardren et al. 2011, entire). In this examination, the USFWS applied relevant factors from the joint USFWS and NMFS Distinct Population Segment (DPS) policy (61 FR 4722, February 7, 1996) and subsequently identified six draft recovery units that contain assemblages of core areas that retain genetic and ecological integrity across the range of bull trout in the coterminous United States. These six draft recovery units were used to inform designation of critical habitat for bull trout by providing a context for deciding what habitats are essential for recovery (75 FR 63898). These six recovery units, adopted in the final bull trout recovery plan (USFWS 2015a, entire) and described further in the RUIPs (USFWS 2015b-g, entire) include: Coastal, Klamath, Mid-Columbia, Columbia Headwaters, Saint Mary, and Upper Snake. A number of additional genetic analyses within core areas have been completed to understand uniqueness of local populations (Hawkins and Von Bargen 2006, entire; 2007, entire; Small et al. 2009, entire; DeHaan and Neibauer 2012, entire).

Population Dynamics

Although bull trout are widely distributed over a large geographic area, they exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993, pg. 4). Increased habitat fragmentation reduces the amount of available habitat and increases isolation from other populations of the same species (Saunders et al. 1991, entire). Burkey (1989, entire) concluded that when species are isolated by fragmented habitats, low rates of population growth are typical in local populations and their probability of extinction is directly related to the degree of isolation and fragmentation. Without sufficient immigration, growth for local populations may be low and probability of extinction high (Burkey 1989, entire; Burkey 1995, entire).

Metapopulation concepts of conservation biology theory have been suggested relative to the distribution and characteristics of bull trout, although empirical evidence is relatively scant (Rieman and McIntyre 1993, pg. 15; Dunham and Rieman 1999, entire; Rieman and Dunham 2000, entire). A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994, pp. 189-190). For inland bull trout, metapopulation theory is likely most applicable at the watershed scale where habitat consists of discrete patches or collections of habitat capable of supporting local populations; local populations are for the most part independent and represent discrete reproductive units; and long-term, low-rate dispersal patterns among component populations influences the persistence of at least some of the local populations (Rieman and Dunham 2000, entire). Ideally, multiple local populations distributed throughout a watershed provide a mechanism for spreading risk because the simultaneous loss of all local populations is unlikely. However, habitat alteration, primarily through the construction of impoundments, dams, and water diversions has fragmented habitats, eliminated migratory corridors, and in many cases isolated bull trout in the headwaters of tributaries (Rieman and Clayton 1997, pp. 10-12; Dunham and Rieman 1999, pg. 645; Spruell et al. 1999, pp. 118-120; Rieman and Dunham 2000, pg. 55).

Human-induced factors as well as natural factors affecting bull trout distribution have likely limited the expression of the metapopulation concept for bull trout to patches of habitat within the overall distribution of the species (Dunham and Rieman 1999, entire). However, despite the theoretical fit, the relatively recent and brief time period during which bull trout investigations have taken place does not provide certainty as to whether a metapopulation dynamic is occurring (e.g., a balance between local extirpations and recolonizations) across the range of the bull trout or whether the persistence of bull trout in large or closely interconnected habitat patches (Dunham and Rieman 1999, entire) is simply reflective of a general deterministic trend towards extinction of the species where the larger or interconnected patches are relics of historically wider distribution (Rieman and Dunham 2000, pp. 56-57). Research does, however, provide genetic evidence for the presence of a metapopulation process for bull trout, at least in the Boise River Basin of Idaho (Whiteley et al. 2003, entire), while Whitesel et al. identifies that bull trout fit the metapopulation theory in several ways (Whitesel et al, 2004, pg. 18-21).

Habitat Characteristics

The habitat requirements of bull trout are often generally expressed as the four “Cs”: cold, clean, complex, and connected habitat. Cold stream temperatures, clean water quality that is relatively free of sediment and contaminants, complex channel characteristics (including abundant large wood and undercut banks), and large patches of such habitat that are well connected by unobstructed migratory pathways are all needed to promote conservation of bull trout throughout all hierarchical levels.

Bull trout have more specific habitat requirements than most other salmonids (Rieman and McIntyre 1993, pg. 4). Habitat components that influence bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrate, and migratory corridors (Fraley and Shepard 1989, entire; Goetz 1989, pp. 23, 25; Hoelscher and Bjornn 1989, pp. 19, 25; Howell and Buchanan 1992, pp. 30, 32; Pratt 1992, entire; Rich 1996, pg. 17; Rieman and McIntyre 1993, pp. 4-6; Rieman and McIntyre 1995, entire; Sedell and Everest 1991, entire; Watson and Hillman 1997, entire). Watson and Hillman (1997, pp. 247-250) concluded that watersheds must have specific physical characteristics to provide the habitat requirements necessary for bull trout to successfully spawn and rear and that these specific characteristics are not necessarily present throughout these watersheds. Because bull trout exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993, pp. 4-6), bull trout should not be expected to simultaneously occupy all available habitats.

Migratory corridors link seasonal habitats for all bull trout life histories. The ability to migrate is important to the persistence of bull trout (Rieman and McIntyre 1993, pg. 2). Migrations facilitate gene flow among local populations when individuals from different local populations interbreed or stray to nonnatal streams. Local populations that are extirpated by catastrophic events may also become reestablished by bull trout migrants. However, it is important to note that the genetic structuring of bull trout indicates there is limited gene flow among bull trout populations, which may encourage local adaptation within individual populations, and that reestablishment of extirpated populations may take a long time (Rieman and McIntyre 1993, pg. 2; Spruell et al. 1999, entire). Migration also allows bull trout to access more abundant or larger prey, which facilitates growth and reproduction. Additional benefits of migration and its relationship to foraging are discussed below under "Diet."

Cold water temperatures play an important role in determining bull trout habitat quality, as these fish are primarily found in colder streams, and spawning habitats are generally characterized by temperatures that drop below 9 °C in the fall (Fraley and Shepard 1989, pg. 137; Pratt 1992, pg. 5; Rieman and McIntyre 1993, pg. 2).

Thermal requirements for bull trout appear to differ at different life stages. Spawning areas are often associated with cold-water springs, groundwater infiltration, and the coldest streams in a given watershed (Pratt 1992, pp 7-8; Rieman and McIntyre 1993, pg. 7). Optimum incubation temperatures for bull trout eggs range from 2 °C to 6 °C whereas optimum water temperatures for rearing range from about 6 °C to 10 °C (Buchanan and Gregory 1997, pg. 4; Goetz 1989, pg. 22). In Granite Creek, Idaho, Bonneau and Scarnecchia (1996, entire) observed that juvenile bull trout selected the coldest water available in a plunge pool, 8 °C to 9 °C, within a temperature gradient of 8 °C to 15 °C. In a landscape study relating bull trout distribution to maximum water temperatures, Dunham et al. (2003, pg. 900) found that the probability of juvenile bull trout occurrence does not become high (i.e., greater than 0.75) until maximum temperatures decline to 11 °C to 12 °C.

Although bull trout are found primarily in cold streams, occasionally these fish are found in larger, warmer river systems throughout the Columbia River basin (Buchanan and Gregory 1997, pg. 2; Fraley and Shepard 1989, pp. 133, 135; Rieman and McIntyre 1993, pp. 3-4; Rieman and McIntyre 1995, pg. 287). Availability and proximity of cold water patches and food productivity can influence bull trout ability to survive in warmer rivers (Myrick 2002, pp. 6 and 13).

All life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Fraley and Shepard 1989, pg. 137; Goetz 1989, pg. 19; Hoelscher and Bjornn 1989, pg. 38; Pratt 1992, entire; Rich 1996, pp. 4-5; Sedell and Everest 1991, entire; Sexauer and James 1997, entire; Thomas 1992, pp. 4-6; Watson and Hillman 1997, pg. 238). Maintaining bull trout habitat requires stable and complex stream channels and stable stream flows (Rieman and McIntyre 1993, pp. 5-6). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997, pg. 364). These areas are sensitive to activities that directly or indirectly affect stream channel stability and alter natural flow patterns. For example, altered stream flow in the fall may disrupt bull trout during the spawning period, and channel instability may decrease survival of eggs and young juveniles in the gravel from winter through spring (Fraley and

Shepard 1989, pg. 141; Pratt 1992, pg. 6; Pratt and Huston 1993, pg. 70). Pratt (1992, pg. 6) indicated that increases in fine sediment reduce egg survival and emergence.

Diet

Bull trout are opportunistic feeders, with food habits primarily a function of size and life-history strategy. Fish growth depends on the quantity and quality of food that is eaten, and as fish grow their foraging strategy changes as their food changes, in quantity, size, or other characteristics (Quinn 2005, pp. 195-200). Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macrozooplankton, and small fish (Boag 1987, pg. 58; Donald and Alger 1993, pp. 242-243; Goetz 1989, pp. 33-34). Subadult and adult migratory bull trout generally feed on various fish species (Donald and Alger 1993, pp. 241-243; Fraley and Shepard 1989, pp. 135, 138; Leathe and Graham 1982, pp. 13, 50-56). Bull trout of all sizes other than fry have been found to eat fish half their length (Beauchamp and VanTassell 2001, pg. 204). In nearshore marine areas of western Washington, bull trout feed on Pacific herring (*Clupea pallasi*), Pacific sand lance (*Ammodytes hexapterus*), and surf smelt (*Hypomesus pretiosus*) (Goetz et al. 2004, pg. 105; WDFW et al. 1997, pg. 23).

Bull trout migration and life history strategies are closely related to their feeding and foraging strategies and their environment. Migration allows bull trout to access optimal foraging areas and exploit a wider variety of prey resources both within and between core areas. Connectivity between the spawning, rearing, overwintering, and forage areas maintains this diversity. There have been recent studies documenting movement patterns in the Columbia River basin that document long distance migrations (Borrows et al 2016, entire; Schaller et al 2014, entire; USFWS 2016, entire). For example, a data report documented a juvenile bull trout from the Entiat made over a 200-mile migration between spawning grounds in the Entiat River to foraging and overwintering areas in Columbia and Yakima River near Prosser Dam (PTAGIS 2015, Tag Code 3D9.1C2CCD42DD). As well, in the Skagit River system, anadromous bull trout make migrations as long as 121 miles between marine foraging areas in Puget Sound and headwater spawning grounds, foraging on salmon eggs and juvenile salmon along their migration route (WDFW et al. 1997, pg. 25). Anadromous bull trout also use marine waters as migration corridors to reach seasonal habitats in non-natal watersheds to forage and possibly overwinter (Brenkman and Corbett 2005, pp. 1078-1079; Goetz et al. 2004, entire).

Conservation Needs

The 2015 recovery plan for bull trout established the primary strategy for recovery of bull trout in the coterminous United States: (1) conserve bull trout so that they are geographically widespread across representative habitats and demographically stable in six recovery units; (2) effectively manage and ameliorate the primary threats in each of six recovery units at the core area scale such that bull trout are not likely to become endangered in the foreseeable future; (3) build upon the numerous and ongoing conservation actions implemented on behalf of bull trout since their listing in 1999, and improve our understanding of how various threat factors potentially affect the species; (4) use that information to work cooperatively with our partners to design, fund, prioritize, and implement effective conservation actions in those areas that offer the greatest long-term benefit to sustain bull trout and where recovery can be achieved; and (5) apply adaptive management principles to implementing the bull trout recovery program to account for new information (USFWS 2015a, pg. 24.) .

Information presented in prior draft recovery plans published in 2002 and 2004 (USFWS 2002, entire; 2004a, entire; 2004b, entire) provided information that identified the original list of threats and recovery actions across the range of the species and provided a framework for implementing numerous recovery actions by our partner agencies, local working groups, and others with an interest in bull trout conservation. Many recovery actions were completed prior to finalizing the recovery plan in 2015.

The 2015 recovery plan (USFWS 2015a, entire) integrates new information collected since the 1999 listing regarding bull trout life history, distribution, demographics, conservation successes, etc., and integrates and updates previous bull trout recovery planning efforts across the range of the coterminous bull trout listing

The USFWS has developed a recovery approach that: (1) focuses on the identification of and effective management of known and remaining threat factors to bull trout in each core area; (2) acknowledges that some extant bull trout core area habitats will likely change (and may be lost) over time; and (3) identifies and focuses recovery actions in those areas where success is likely to meet our goal of ensuring the certainty of conservation of genetic diversity, life history features, and broad geographical representation of remaining bull trout populations so that the protections of the ESA are no longer necessary (USFWS 2015a, pg. 45-46).

To implement the recovery strategy, the 2015 recovery plan establishes the recovery of bull trout will entail effectively managing threats to ensure the long-term persistence of populations and their habitats, ensuring the security of multiple interacting groups of bull trout, and providing habitat conditions and access to them that allow for the expression of various life history forms within each of six recovery units (USFWS 2015a, pg. 50-51)." The recovery plan defines four categories of recovery actions that, when implemented and effective, should:

1. Protect, restore, and maintain suitable habitat conditions for bull trout;
2. Minimize demographic threats to bull trout by restoring connectivity or populations where appropriate to promote diverse life history strategies and conserve genetic diversity;
3. Prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout;
4. and result in actively working with partners to conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks, and considering the effects of climate change (USFWS 2015a, pg. 50-51).

Bull trout recovery is based on a geographical hierarchical approach. Bull trout are listed as a single DPS within the five-state area of the coterminous United States. The single DPS is subdivided into six biological-based recovery units: (1) Coastal Recovery Unit; (2) Klamath Recovery Unit; (3) Mid-Columbia Recovery Unit; (4) Upper Snake Recovery Unit; (5) Columbia Headwaters Recovery Unit; and (6) Saint Mary Recovery Unit (USFWS 2015a, pg. 23). A viable recovery unit should demonstrate that the three primary principles of biodiversity have been met: representation (conserving the genetic makeup of the species); resiliency (ensuring that each population is sufficiently large to withstand stochastic events); and redundancy (ensuring a sufficient number of populations to withstand catastrophic events) (USFWS 2015a, pg. 33).

Each of the six recovery units contain multiple bull trout recovery areas which are non-overlapping watershed-based polygons, and each core area includes one or more local population. Currently there are 109 occupied core areas, which comprise 611 local populations (USFWS 2015a, pg. 3, Appendix F). There are also six core areas where bull trout historically occurred but are now extirpated, and one research needs area where bull trout were known to occur historically, but their current presence and use of the area are uncertain (USFWS 2015a, pg. 3, Appendix F). Core areas can be further described as complex or simple (USFWS 2015a, pg. 3-4). Complex core areas contain multiple local bull trout populations, are found in large watersheds, have multiple life history forms, and have migratory connectivity between spawning and rearing habitat and foraging, migration, and overwintering habitats (FMO). Simple core areas are those that contain one bull trout local population. Simple core areas are small in scope, isolated from other core areas by natural barriers, and may contain unique genetic or life history adaptations.

A core area is a combination of core habitat (i.e., habitat that could supply all elements for the long-term security of bull trout) and a core population (a group of one or more local bull trout populations that exist within core habitat) and constitutes the basic unit on which to gauge recovery within a recovery unit. Core areas require both habitat and bull trout to function, and the number (replication) and characteristics of local populations inhabiting a core area provide a relative indication of the core area's likelihood to persist. A core area represents the closest approximation of a biologically functioning unit for bull trout. Core areas are presumed to reflect the metapopulation structure of bull trout.

A local population is a group of bull trout that spawn within a particular stream or portion of a stream system (USFWS 2015a, pg. 73). A local population is considered to be the smallest group of fish that is known to represent an interacting reproductive unit. For most waters where specific information is lacking, a local population may be represented by a single headwater tributary or complex of headwater tributaries. Gene flow may occur between local populations (*e.g.*, those within a core population), but is assumed to be infrequent compared with that among individuals within a local population.

Population Units

The final recovery plan (USFWS 2015a, entire) designates six bull trout recovery units as described above. These units replace the 5 interim recovery units previously identified (USFWS 1999, entire). The USFWS will address the conservation of these final recovery units in our section 7(a)(2) analysis for proposed Federal actions. The recovery plan (USFWS 2015a, entire), identified threats and factors affecting the bull trout within these units. A detailed description of recovery implementation for each recovery unit is provided in separate recovery unit implementation plans (RUIPs)(USFWS 2015b-g, entire), which identify recovery actions and conservation recommendations needed for each core area, forage/ migration/ overwinter (FMO) areas, historical core areas, and research needs areas. Each of the following recovery units (below) is necessary to maintain the bull trout's numbers and distribution, as well as its genetic and phenotypic diversity, all of which are important to ensure the species' resilience to changing environmental conditions. For more details on Federal, State, and tribal conservation actions in this unit see the actions since listing, contemporaneous actions, and environmental baseline discussions below.

Coastal Recovery Unit

The Coastal RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015b, entire). The Coastal Recovery Unit is divided into three Geographic Regions: Puget Sound, Olympic Peninsula, and the Lower Columbia River regions. This recovery unit contains 20 core areas comprising 84 local populations and a single potential local population in the historic Clackamas River core area where bull trout had been extirpated and were reintroduced in 2011. This recovery unit also has four historically occupied core areas that could be re-established (USFWS 2015a, pg. 47; USFWS 2015b, pg. A-2).

Although population strongholds do exist across the three regions, populations in the Puget Sound region generally have better demographic status while the Lower Columbia River region exhibits the least robust demography (USFWS 2015b, pg. A-6). Puget Sound and the Olympic Peninsula currently support the only anadromous local populations of bull trout. This recovery unit also contains ten shared FMO habitats which allow for the continued natural population dynamics in which the core areas have evolved (USFWS 2015b, pg. A-5). There are four core areas within the Coastal Recovery Unit that have been identified as current population strongholds: Lower Skagit, Upper Skagit, Quinault River, and Lower Deschutes River (USFWS 2015a, pg.79; USFWS 2015b, pg. A-3). These are the most stable and abundant bull trout populations in the recovery unit. The Puget Sound region supports at least two core areas containing a natural adfluvial life history.

The demographic status of the Puget Sound populations is better in northern areas. Barriers to migration in the Puget Sound region are few, and significant amounts of headwater habitat occur in protected areas (USFWS 2015b, pg. A-7). The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, loss of functioning estuarine and nearshore marine habitats, development and related impacts (e.g., flood control, floodplain disconnection, bank armoring, channel straightening, loss of instream habitat complexity), agriculture (e.g., diking, water control structures, draining of wetlands, channelization, and the removal of riparian vegetation, livestock grazing), fish passage (e.g., dams, culverts, instream flows) residential development, urbanization, forest management practices (e.g., timber harvest and associated road building activities), connectivity impairment, mining, and the introduction of non-native species (USFWS 2015b, pg. A-1 – A-25). Conservation measures or recovery actions implemented or ongoing include relicensing of major hydropower facilities that have provided upstream and downstream fish passage or complete removal of dams, land acquisition to conserve bull trout habitat, floodplain restoration, culvert removal, riparian revegetation, levee setbacks, road removal, and projects to protect and restore important nearshore marine habitats (USFWS 2015b, pg. A-33 – A-34).

Klamath Recovery Unit

The Klamath recovery unit implementation plan describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015c, entire). The Klamath Recovery Unit is located in southern Oregon and northwestern California. The Klamath Recovery Unit is the most significantly imperiled recovery unit, having experienced considerable extirpation and geographic contraction of local populations and declining demographic condition, and natural re-colonization is constrained by dispersal barriers and presence of nonnative brook trout (USFWS 2015a, pg. 39). This recovery unit currently contains three core areas and eight local populations (USFWS 2015a, pg. 47; USFWS 2015c, pg. B-1). Nine historic local populations of bull trout have become extirpated (USFWS 2015c, pg. B-1). All three core areas have been isolated from other bull trout populations for the past 10,000 years (USFWS 2015c, pg. B-3). The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, habitat degradation and fragmentation, past and present land use practices, agricultural water diversions, nonnative species, and past fisheries management practices (UFWS 2015c, pg. B-13 – B-14). Conservation measures or recovery actions implemented or ongoing include removal of nonnative fish (e.g., brook trout, brown trout, and hybrids), acquiring water rights for instream flows, replacing diversion structures, installing fish screens, constructing bypass channels, installing riparian fencing, culver replacement, and habitat restoration (USFWS 2015c, pg. B-10 – B-11).

Mid-Columbia Recovery Unit

The Mid-Columbia RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015d, entire). The Mid-Columbia Recovery Unit is located within eastern Washington, eastern Oregon, and portions of central Idaho. The Mid-Columbia Recovery Unit is divided into four geographic regions: Lower Mid-Columbia, Upper Mid-Columbia, Lower Snake, and Mid-Snake Geographic regions. This recovery unit contains 24 occupied core areas comprising 142 local populations, two historically occupied core areas, one research needs area, and 7 FMO habitats (USFWS 2015a, pg. 47; USFWS 2015d, pg. C-1 – C-4). The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, agricultural practices (e.g. irrigation, water withdrawals, livestock grazing), fish passage (e.g. dams, culverts), nonnative species, forest management practices, and mining (USFWS 2015d, pg. C-9 – C-34). Conservation measures or recovery actions implemented or ongoing include road removal, channel restoration, mine reclamation, improved grazing management, removal of fish barriers, and instream flow requirements (USFWS 2015d, C-37 – C-40).

Columbia Headwaters Recovery Unit

The Columbia headwaters RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015e, entire). The Columbia Headwaters Recovery Unit is located in western Montana, northern Idaho, and the northeastern corner of Washington. The Columbia Headwaters Recovery Unit is divided into five geographic regions: Upper Clark Fork, Lower Clark Fork, Flathead, Kootenai, and Coeur d'Alene geographic regions (USFWS 2015e, pg. D-2 – D-4). This recovery unit contains 35 bull trout core areas; 15 of which are complex core areas as they represent larger interconnected habitats and 20 simple core areas as they are isolated headwater lakes with single local populations. The 20 simple core areas are each represented by a single local population, many of which may have persisted for thousands of years despite small populations and isolated existence (USFWS 2015e, pg. D-1). Fish passage improvements within the recovery unit have reconnected some previously fragmented habitats (USFWS 2015e, pg. D-42), while others remain fragmented. Unlike other recovery units in Washington, Idaho and Oregon, the Columbia Headwaters Recovery Unit does not have any anadromous fish overlap (USFWS 2015e, pg. D-42). Therefore, bull trout within the Columbia Headwaters Recovery Unit do not benefit from the recovery actions for salmon (USFWS 2015e, pg. D-42). The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, mostly historical mining and contamination by heavy metals, expanding populations of nonnative fish predators and competitors, modified instream flows, migratory barriers (e.g., dams), habitat fragmentation, forest practices (e.g., logging, roads), agriculture practices (e.g. irrigation, livestock grazing), and residential development (USFWS 2015e, pg. D-10 – D-25). Conservation measures or recovery actions implemented or ongoing include habitat improvement, fish passage, and removal of nonnative species (USFWS 2015e, pg. D-42 – D-43).

Upper Snake Recovery Unit

The Upper Snake RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015f, entire). The Upper Snake Recovery Unit is located in central Idaho, northern Nevada, and eastern Oregon. The Upper Snake Recovery Unit is divided into seven geographic regions: Salmon River, Boise River, Payette River, Little Lost River, Malheur River, Jarbidge River, and Weiser River. This recovery unit contains 22 core areas and 207 local populations, with over 70 percent being present in the Salmon River Region (USFWS 2015a, pg. 47; USFWS 2015f, pg. E-1 – E-2). The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, dams, mining, forest management practices, nonnative species, and agriculture (e.g., water diversions, grazing) (USFWS 2015f, pg. E-15 – E-18). Conservation measures or recovery actions implemented or ongoing include instream habitat restoration, instream flow requirements, screening of irrigation diversions, and riparian restoration (USFWS 2015f, pg. E-19 – E-20).

St. Mary Recovery Unit

The St. Mary RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015g, entire). The Saint Mary Recovery Unit is located in Montana but is heavily linked to downstream resources in southern Alberta, Canada. Most of the Saskatchewan River watershed which the St. Mary flows into is located in Canada. The United States portion includes headwater spawning and rearing habitat and the upper reaches of FMO habitat. This recovery unit contains four core areas, and seven local populations (USFWS 2015g, pg. F-1) in the U.S. Headwaters. The current condition of the bull trout in this recovery unit is attributed primarily to the outdated design and operations of the Saint Mary Diversion operated by the Bureau of Reclamation (e.g., entrainment, fish passage, instream flows), and, to a lesser extent habitat impacts from development and nonnative species (USFWS 2015g, pg. F-7 – F-8). The primary issue precluding bull trout recovery in this recovery unit relates to impacts of water diversions, specifically at the Bureau of Reclamations

Milk River Project (USFWS 2015g, pg. F-5). Conservation measures or recovery actions implemented or ongoing are not identified in the St. Mary RUIP; however, the USFWS is conducting interagency and tribal coordination to accomplish conservation goals for the bull trout (USFWS 2015g, pg. F-9)

Federal, State and Tribal Actions Since Listing

Since our listing of bull trout in 1999, numerous conservation measures that contribute to the conservation and recovery of bull trout have been and continue to be implemented across its range in the coterminous United States. These measures are being undertaken by a wide variety of local and regional partnerships, including State fish and game agencies, State and Federal land management and water resource agencies, Tribal governments, power companies, watershed working groups, water users, ranchers, and landowners.

In many cases, these bull trout conservation measures incorporate or are closely interrelated with work being done for recovery of salmon and steelhead, which are limited by many of the same threats. These include removal of migration barriers (culvert removal or redesign at stream crossings, fish ladder construction, dam removal, etc.) to allow access to spawning or FMO habitat; screening of water diversions to prevent entrainment into unsuitable habitat in irrigation systems; habitat improvement (riparian revegetation or fencing, placement of coarse woody debris in streams) to improve spawning suitability, habitat complexity, and water temperature; instream flow enhancement to allow effective passage at appropriate seasonal times and prevent channel dewatering; and water quality improvement (decommissioning roads, implementing best management practices for grazing or logging, setting pesticide use guidelines) to minimize impacts from sedimentation, agricultural chemicals, or warm temperatures.

At sites that are vulnerable to development, protection of land through fee title acquisition or conservation easements is important to prevent adverse impacts or allow conservation actions to be implemented. In several bull trout core areas, it is necessary to continue ongoing fisheries management efforts to suppress the effects of non-native fish competition, predation, or hybridization; particularly brown trout, brook trout, lake trout, and northern pike (DeHaan et al. 2010, entire; DeHaan and Godfrey 2009, entire; Rosenthal and Fredenberg 2017, pg. 2). A more comprehensive overview of conservation successes from 1999-2013, described for each recovery unit, is found in the Summary of Bull Trout Conservation Successes and Actions since 1999 (Available at: http://www.fws.gov/pacific/ecoservices/endangered/recovery/documents/Service_2013_summary_of_conservation_successes.pdf).

Projects that have undergone ESA section 7 consultation have occurred throughout the range of bull trout. Singly or in aggregate, these projects could affect the species' status. The USFWS has conducted periodic reviews of prior Federal "consulted-on" actions. A detailed discussion of consulted-on effects in the proposed action area is provided in the environmental baseline section below.

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Streaked Horned Lark

Legal Status

The streaked horned lark was listed as a threatened species in 2013, under the ESA of 1973, as amended (16 U.S. C. 1531 et seq.) (USFWS 2013a, entire). Critical habitat was also designated for the species at four sites on the outer coast of Washington, nine islands in the lower Columbia River, and on three units of the USFWS's Willamette Valley National Wildlife Refuge Complex (USFWS 2013b, entire).

A special rule under section 4(d) of the ESA was promulgated when the species was listed (USFWS 2013a, pg. 61500). The 4(d) rule recognizes that the lark's use of working and industrial lands demands flexibility, and it encourages landowners to continue those practices that provide habitat for the streaked horned lark, even though creation of suitable habitat causes some adverse effects. The 4(d) rule exempts take associated with: 1) management activities at non-Federal airports to minimize hazardous wildlife; 2) routine agricultural and ranching activities consistent with State laws on non-Federal lands in the Willamette Valley; and 3) routine removal or management of noxious weeds on non-Federal lands.

Species Description

The streaked horned lark is endemic to the Pacific Northwest and is a subspecies of the wide-ranging horned lark (Eremophila alpestris) (Beason 1995, pg. 4). Horned larks are small, ground dwelling birds, approximately 6–8 inches (in) (16–20 centimeters (cm)) in length (Beason 1995, pg. 2). Adults are pale brown, but shades of brown vary geographically among the subspecies. The male's face has a yellow wash in most subspecies. Adults have a black bib, black whisker marks, black "horns" (feather tufts that can be raised or lowered), and black tail feathers with white margins (Beason 1995, pg. 2). Juveniles lack the black face pattern and are varying shades of gray, from almost white to almost black with a silver speckled back (Beason 1995, pg. 2). The streaked horned lark has a dark brown back, yellowish underparts, a walnut brown nape, and yellow eyebrow stripe and throat (Beason 1995, pg. 4). This subspecies is conspicuously more yellow beneath and darker on the back than almost all other subspecies of horned lark. The combination of small size, dark brown back, and yellow underparts distinguishes this subspecies from all adjacent forms.

The horned lark is found throughout the northern hemisphere (Beason 1995, pg. 1); it is the only true lark (Family Alaudidae, Order Passeriformes) native to North America (Beason 1995, pg. 1). There are 42 subspecies of horned lark worldwide (Clements et al. 2017, entire). Twenty-one subspecies of horned larks are found in North America; 15 subspecies occur in western North America (Beason 1995, pg. 4). Subspecies of horned larks are based primarily on differences in color, body size, and wing length. Molecular analysis has further borne out these morphological distinctions (Drovetski et al. 2005, pg. 875). Western populations of horned larks are generally paler and smaller than eastern and northern populations (Beason 1995, pg. 3). The streaked horned lark was first described as *Otocorys alpestris strigata* by Henshaw (1884, pp. 261–264, 267– 3 268); the type locality was Fort Steilacoom, Washington (Henshaw 1884, pg. 267). There are four other breeding subspecies of horned larks in Washington and Oregon: the

St. Helens or "Alpine" horned lark (*E. a. alpina*); the dusky horned lark (*E. a. merrilli*); the Oregon or Warner Valley horned lark (*E. a. lamprochroma*); and the pallid or "Arctic" horned lark (*E. a. arcticola*) (Behle 1942, pp. 219-231; Jewett 1943, pg. 262; Marshall et al. 2003, pg. 426; Wahl et al. 2005, pg. 268). None of these other subspecies breed within the range of the streaked horned lark, but all four subspecies may be found in the winter in mixed-species flocks in the Willamette Valley (Marshall et al. 2003, pp. 425– 427).

Drovetski et al. (2005, pg. 877) evaluated the genetic distinctiveness, conservation status, and level of genetic diversity of the streaked horned lark using the complete mitochondrial ND2 gene. Streaked horned larks were closely related to the California samples and only distantly related to the three closest localities (alpine Washington, eastern Washington, and eastern Oregon). There was no evidence of immigration into the streaked horned lark's range from any of the sampled localities. Analyses indicate that the streaked horned lark rangewide population is well-differentiated and isolated from all other sampled localities, including coastal California, and has "remarkably low genetic diversity" (Drovetski et al. 2005, pg. 875). The streaked horned lark is differentiated and isolated from all other sampled localities, and although it was ". . . historically a part of a larger Pacific Coast lineage of horned larks, it has been evolving independently for some time and can be considered a distinct evolutionary unit" (Drovetski et al. 2005, pg. 880). Thus, genetic analyses support the subspecies designation for the streaked horned lark (Drovetski et al. 2005, pg. 880), which has been considered a relatively well-defined subspecies based on physical (phenotypic) characteristics (Beason 1995, pg. 4). The streaked horned lark is recognized as a valid subspecies by the Integrated Taxonomic Information System (Integrated Taxonomic Information System 2018, entire).

Habitat Selection

Habitat used by streaked horned larks is generally flat with substantial areas of bare ground and sparse low-stature vegetation, mainly grasses and forbs (Pearson and Hopey 2005, pg. 27). Suitable habitat averages 17 percent bare ground (Altman 1999, pg. 18); nest sites generally have substantially more bare ground (Willamette Valley, 31 percent bare ground (Altman 1999, pg. 18), Puget lowlands, 17.5 percent bare ground (Pearson and Hopey 2005, pg. 22), and Washington Coast, 66.7 percent bare ground (Pearson and Hopey 2005, pg. 22). Vegetation height is generally less than 13 inches (Altman 1999, pg. 18; Pearson and Hopey 2005, pg. 27). Larks eat a wide variety of seeds and insects (Beason 1995, pg. 6) and appear to select habitats based on the structure of the vegetation rather than the presence of any specific food plants (Moore 2008b, pg. 19). A key attribute of habitat used by larks is open landscape context. Data indicate that sites used by larks are generally found in open (i.e., flat, treeless) landscapes of 300 acres (120 ha) or more (Converse et al. 2010, pg. 21).

Some patches with the appropriate characteristics (i.e., bare ground, low stature vegetation) may be smaller in size if the adjacent areas provide the required open landscape context; this situation is common in agricultural habitats and on sites next to water (Anderson and Pearson 2015, pg. 11). For example, many of the sites used by streaked horned larks on the islands in the Columbia River are small (less than 100 acres [40 ha]), but are adjacent to open water, which provides the open landscape context needed. Local populations of streaked horned larks are found at many airports within the subspecies' range, since airfields typically have the ideal landscape context, and the aircraft safety and wildlife hazard management regime provides the appropriate vegetation structure.

Although streaked horned larks use a wide variety of habitats, local populations are vulnerable because the habitats used are often ephemeral or subject to frequent human disturbance. Ephemeral habitats include bare ground in agricultural fields and wetland mudflats; habitats subject to frequent human disturbance include mowed fields at airports, managed road margins, agricultural crop fields, and disposal sites for dredge material (Altman 1999, pg. 19). It is important to note the key role of anthropogenically maintained landscapes in providing habitat for the streaked horned lark; without large-scale, manmade disturbance (e.g., burning, mowing, cropping, and deposition of dredge spoils), available habitat would decrease rapidly, but these same activities can kill or injure individuals, especially when they occur during the breeding season.

Foraging

Horned larks forage on the ground in low vegetation or on bare ground (Beason 1995, pg. 6); adults feed mainly on grass and forb seeds, but feed insects to their young (Beason 1995, pg. 6). At coastal sites, streaked horned larks forage in the wrack line and in intertidal habitats (Pearson and Altman 2005, pg. 8). A study of winter diet selection found that streaked horned larks in the Willamette Valley eat seeds of introduced weedy grasses and forbs, focusing on the seed source that is most abundant (Moore 2008b, pg. 9).

Breeding and Nesting

Horned larks form pairs in the spring (Beason 1995, pg. 11) and establish territories approximately 1.9 acres in size (range 1.5 to 2.5 acres) (Altman 1999, pg. 11). Horned larks create nests in shallow depressions in the ground and line them with soft vegetation (Beason 1995, pg. 12). Female horned larks select the nest site and construct the nest without help from the male (Beason 1995, pg. 12). Streaked horned larks establish their nests in areas of extensive bare ground, and nests are placed adjacent to clumps of bunchgrass (Pearson and Hopey 2004, pg. 23). Studies from Washington sites (the open coast, Puget lowlands and the Columbia River islands) have found that streaked horned larks have strong natal fidelity to nesting sites, returning each year to the place they were born (Pearson *et al.* 2008, pg. 11).

Historically, nesting habitat was found on grasslands, estuaries, and sandy beaches in British Columbia, in dune habitats along the coast of Washington, in western Washington and western Oregon prairies, and on the sandy beaches and spits along the Columbia and Willamette Rivers. Today, the streaked horned lark nests in a broad range of habitats, including native prairies, coastal dunes, fallow and active agricultural fields, wetland mudflats, sparsely-vegetated edges of grass fields, recently planted Christmas tree farms with extensive bare ground, moderately- to heavily-grazed pastures, gravel roads or gravel shoulders of lightly-traveled roads, airports, and dredge deposition sites in the lower Columbia River (Altman 1999, pg. 18; Pearson and Altman 2005, pg. 5; Pearson and Hopey 2005, pg. 15; Moore 2008, pp. 9-10, 12-14, 16). Wintering streaked horned larks use habitats that are very similar to breeding habitats (Pearson *et al*. 2005, pg. 8).

The nesting season for streaked horned larks begins in early April and ends mid- to late August (Pearson and Hopey 2004, pg. 11; Moore 2011, pg. 32). Clutches range from 1 to 5 eggs, with a mean of 3 eggs (Pearson and Hopey 2004, pg. 12). After the first nesting attempt in April, streaked horned larks will often re-nest in late June or early July (Pearson and Hopey 2004, pg. 11). Young streaked horned larks leave the nest 8-10 days after hatching, and are cared for by the parents until they are about four weeks old when they become independent (Beason 1995, pg. 15).

Nest success studies (*i.e.*, the proportion of nests that result in at least one fledged chick) in streaked horned larks report highly variable results. Nest success on the Puget lowlands of Washington is low, with only 28 percent of nests successfully fledging young (Pearson and Hopey 2004, pg. 14; Pearson and Hopey 2005, pg. 16). According to reports from sites in the Willamette Valley, Oregon, nest success has varied from 23 to 60 percent depending on the site (Altman 1999, pg. 1; Moore and Kotaich 2010, pg. 23). At one site in Portland, Oregon, Moore (2011, pg. 11) found 100 percent nest success among 8 nests monitored.

Current and Historical Range

The current range and distribution of the streaked horned lark can be divided into three regions: (1) the south Puget Lowlands in Washington; (2) the Washington coast and lower Columbia River islands (including dredge spoil deposition and industrial sites near the Columbia River in Portland, Oregon); and (3) the Willamette Valley in Oregon.

The streaked horned lark's breeding range historically extended from southern British Columbia, Canada, south through the Puget lowlands and outer coast of Washington, along the lower Columbia River, through the Willamette Valley, the Oregon coast and into the Umpqua and Rogue River Valleys of southwestern Oregon (Altman 2011, pg. 201). The subspecies has been extirpated as a breeding species throughout portions of its range, including all of its former range in British Columbia, the San Juan Islands, the northern Puget Trough, the Washington coast north of Grays Harbor County, the Oregon coast, and the Rogue and Umpqua Valleys in southwestern Oregon (Pearson and Altman 2005, pg. 213).

<u>Breeding Range</u>

Streaked horned larks currently breed on nine sites in the south Puget Sound. Six of these sites are on Joint Base Lewis McChord: 13th Division Prairie, Gray Army Airfield, McChord Field, and range 50, 52 and 76 of the Artillery impact Area (Wolf *et al*. 2018, pg. 13). The largest population of streaked horned larks in Washington breeds at the Olympia Regional Airport (Stinson 2016, pg. 5). Small populations of larks also breed at the Tacoma Narrows Airport and the Port of Shelton's Sanderson Field airport (Stinson 2016, pg. 5).

On the Washington coast, there are four known breeding sites in Grays Harbor and Pacific Counties: Damon Point; Midway Beach; Graveyard Spit; and Leadbetter Point (Stinson 2005, pg. 63). On the lower Columbia River, streaked horned larks breed on several of the sandy islands and river bank sites downstream of Portland, Oregon. Larks also breed at the Rivergate Industrial Complex and the Southwest Quad at Portland International Airport; both sites are owned by the Port of Portland, and are former dredge spoil deposition fields (Port of Portland 2017, pg. 8-13; Moore 2001, pg. 10).

In the Willamette Valley, streaked horned larks breed in Benton, Clackamas, Lane, Linn, Marion, Polk, Washington, and Yamhill Counties. Larks are most abundant in the southern part of the Willamette Valley. The largest known population of larks is resident at Corvallis Municipal Airport in Benton County (Moore 2008, pg. 9); other resident populations occur at the Baskett Slough, William L. Finley, and Ankeny units of the USFWS's Willamette Valley National Wildlife Refuge Complex (Moore 2008, pg. 8). Breeding populations also occur at the Eugene Airport, Salem Airport, McMinnville Municipal Airport, and Independence State Airport in the valley (Moore 2008, pg. 9; Thompson 2013, entire). Much of the Willamette Valley is private agricultural land, and has not been surveyed for streaked horned larks, except along public road margins. There are numerous other locations on private and municipal lands on which streaked horned larks have been observed in the Willamette Valley, particularly in the southern valley (Linn, Polk, and Benton Counties) (eBird 2013, ebird.org). In 2008, a large population of streaked horned larks colonized a wetland and prairie restoration site on M–DAC Farms, a privately owned parcel in Linn County; early in the breeding season in 2007, Moore (2008a, pg. 10) detected a single pair of larks on the gravel road at the site; a controlled burn in June 2007 attracted 30 pairs of larks to the site during that breeding season. In 2008, the breeding population of larks grew to about 75 pairs (Moore 2008a, pg. 11). As the vegetation at the site matured in the following years, the site became less suitable for larks, and the population declined to just two to three pairs in 2012 (Randy Moore in litt. 2012). This is likely a common pattern, as breeding streaked horned larks opportunistically shift sites as habitat becomes available among private agricultural lands in the Willamette Valley (Moore 2008, pp. 9-11).

<u>Winter Range</u>

Pearson *et al*. (2005, pg. 2) found that most streaked horned larks winter in the Willamette Valley (72 percent) and on the islands in the lower Columbia River (20 percent); the rest spend the winter on the Washington coast (8 percent) or in the south Puget Sound (1 percent). In the winter, most of the streaked horned larks that breed in the south Puget Sound migrate south to the Willamette Valley or west to the Washington coast; streaked horned larks that breed on the Washington coast either remain on the coast or migrate south to the Willamette Valley; birds that breed on the lower Columbia River islands remain on the islands or migrate to the Washington coast; and birds that breed in the Willamette Valley remain there over the winter (Pearson *et al*. 2005, pp. 5-6). Streaked horned larks spend the winter in large groups of mixed subspecies of horned larks in the Willamette Valley, and in smaller flocks along the lower Columbia River and Washington Coast (Pearson *et al*. 2005, pg. 7; Pearson and Altman 2005, pg. 7).

Threats / Reasons for Listing

The streaked horned lark was listed as a threatened species because of the following:

- The streaked horned lark has disappeared from all formerly documented locations in the northern portion of its range, the Oregon coast, and the southern edge of its range.

- There were estimated to be about 1,600 streaked horned larks rangewide, and population numbers are declining.
- Their range is small and may be continuing to contract;
- The south Puget Sound breeding population was estimated to be fewer than 170 individuals.
- The Washington coast and Columbia River islands breeding population was estimated to be fewer than 140 individuals.
- Recent research estimates the number of streaked horned larks in Washington and on the Columbia River islands were declining. This decline considered with evidence of inbreeding depression on the south Puget Sound indicates that the lark's range may contract further in the future.
    - Their habitat is threatened throughout their entire range from loss of natural disturbance regimes, invasion of unsuitable vegetation that alter habitat structure, and incompatible land management practices.
    - Large winter congregations are limited to one region, Oregon's Willamette Valley, which may put larks at risk from stochastic weather events.
    - Most sites currently used by larks require some level of disturbance or management to maintain the habitat structure they need. The natural processes that previously provided this disturbance no longer operate.

In addition to the threats identified in 2013 when the lark was listed, three new potential threats have been identified: male-skewed sex ratio (Stinson 2016, pg. 6; Randy Moore, Oregon State University, Corvallis, Oregon, pers. comm., 2016a), avian pox on the Puget Lowlands (Stinson 2016, pg. 11), and potential poisoning by the rodenticide zinc phosphide at Corvallis Airport (National Wildlife Health Center 2015, pp. 1-2).

Population Estimates and Current Status of the Streaked Horned Lark

The most recent rangewide population estimate for streaked horned larks is about 1,170–1,610 individuals (Altman 2011, pg. 213); this analysis was based on 2008 to 2010 data collected at all known breeding sites in Washington and all accessible breeding sites and roadside point counts in Oregon (Altman 2011, pg. 213). See Table SHL-1 for the most recent survey data from sites across the range of the streaked horned lark.

Puget Lowlands

In the south Puget lowlands, the streaked horned lark is currently known to occur at nine sites; three of these sites are municipal airports (Olympia Airport, Shelton Airport, and Tacoma Narrows Airport), and six sites are on Joint Base Lewis-McChord (JBLM) (13th Division Prairie, Gray Army Airfield, McChord Air Field, Range 50, 52 and 76 at the Artillery Impact Area). In 2015, surveys indicated that there were 48 pairs of larks at the Olympia Airport, 13 pairs at Shelton Airport, and 2 pairs at Tacoma Narrows (Stinson 2016, pg. 5). Approximately 96 -100 breeding pairs of streaked horned larks were detected at the JBLM sites in 2017 (Wolf *et al.* 2018, pg. 13). See Table SHL-1 for raw data from 2018.

Washington Coast and Lower Columbia River

In the past decade, streaked horned larks have been found at six sites on the outer coast of Washington (Leadbetter Point, Graveyard Spit, Midway Beach, Damon Point, Oyhut Spit and Johns River Island). Lark populations appear to have been declining at most of these sites recently, and in 2015, larks were found only at Leadbetter Point, with 11 pairs detected (Stinson 2016, pg. 5). In 2016, two pairs of breeding larks were detected at Graveyard Spit, after several years of no detections (Cyndie Sundstrom, Washington Department of Fish and Wildlife, Montesano, Washington, pers. comm., 2016). More recently, larks have been detected at Midway Beach (6 pairs). See Table SHL-1 for raw data from 2018.

Along the lower Columbia River, streaked horned larks are found on islands and at mainland sites adjacent to the river. In the last several years, surveys have detected breeding larks on 12 islands (Rice Island, Miller Sands Spit, Pillar Rock Island, Welch Island, Tenasillahe Island, Wallace Island, Whites/Browns Island, Crims Island, Sandy Island, Lower Deer Island, Sand Island, Howard Island) and 6 mainland sites (Dibblee Point, North Port Kalama, Port of Longview, Columbia Gateway Vancouver, Rivergate and Portland International Airport's Southwest Quad) in Wahkiakum and Cowlitz Counties in Washington, and Columbia and Clatsop Counties in Oregon (Stinson 2016, pg. 5; Slater and Treadwell 2016, pg. 3). Most of the Lower Columbia River sites with lark detections are active dredge material disposal sites, although the two sites farthest upriver (at the Port of Portland's Rivergate Industrial Complex and Portland International Airport Southwest Quad) are old fill sites that retain suitable habitat characteristics (Stinson 2016, pg. 5). The most recent data indicate that there are at least 59 pairs of larks on the lower Columbia River downstream of Portland (Slater and Treadwell 2018, pg. 27). The most recent count at Portland International Airport was 3 pairs. See Table SHL-1 for raw data from 2018.

When the lark was listed as threatened in 2013, a recently published analysis predicted a rapid decline in the Washington populations, including breeding sites on the Puget Lowlands, outer coast and Columbia River islands (Camfield *et al.* 2011, pg. 8). One study of the lark population at 13th Division Prairie at JBLM speculated that small population size, high nest site fidelity and low egg hatching rates indicated that the population is suffering from inbreeding depression (Anderson 2010, pg. 33). Recent efforts at JBLM to manage habitat and reduce the adverse effects of airfield maintenance and military training, however, have resulted in an increased population of streaked horned larks and improved productivity (Wolf *et al.* 2018, pg. 13). Recent data also indicate that the Puget Lowlands and Columbia River breeding sites have relatively stable or increasing lark populations (Stinson 2016, pg. 6).

Willamette Valley

In Oregon, lark populations have not been surveyed as regularly or intensively as the populations in Washington, due to the lack of access to habitat on private agricultural lands. In 2011, Altman (2011, pg. 213) estimated that there were about 900 to 1,300 breeding streaked horned larks in the Willamette Valley.

Data from the North American Breeding Bird Survey (BBS) indicate that most grassland-associated birds, including the horned lark species, have declined across their ranges in the past three decades (Sauer *et al.* 2014, pp. 7-9). The BBS can provide population trend data only for those species with sufficient sample sizes for analyses. There are insufficient data in the BBS for a rangewide analysis of the streaked horned lark population trend (Altman 2011, pg. 214). However, data from the BBS may provide additional insight into the trend of the streaked horned lark population in the Willamette Valley. Although the BBS does not track bird counts by subspecies, the streaked horned lark is the only subspecies of horned lark that breeds in the Oregon portion of the Northern Pacific Rainforest Bird Conservation Region, therefore it is reasonable to assume that counts of horned larks from the breeding season in the Willamette Valley are actually counts of the streaked horned lark. The BBS data regularly detect horned larks on several routes in the Willamette Valley, and counts from these routes show that horned larks in this Bird Conservation Region have been declining since 1960s, with an estimated annual trend of -5.41 percent (95 percent confidence intervals -7.60, -3.35) (Sauer *et al.* 2014, pg. 4). The U.S. Geological Survey, which manages the BBS data, recommends caution when analyzing these data due to the small sample size, high variance, and potential for observer bias in the raw BBS data.

The best information on trends throughout the Willamette Valley comes from surveys by ODFW; the agency conducted surveys for grassland-associated birds, including the streaked horned lark, in 1996 and again in 2008 (Altman 1999, pg. 2; Myers and Kreager 2010, pg. 2). Point count surveys were conducted at 544 stations in the Willamette Valley (Myers and Kreager 2010, pg. 2); over the 12-year period between the surveys, measures of relative abundance of streaked horned larks increased slightly from 1996 to 2008, according to this report. Both detections at point count stations and within regions showed moderate increases (3 percent and 6 percent, respectively) (Myers and Kreager 2010, pg. 11). Population numbers decreased slightly in the northern Willamette Valley and increased slightly in the middle and southern portions of the valley (Myers and Kreager 2010, pg. 11). This is the best information currently available on the trend of the lark population in the Willamette Valley; additional studies are needed to understand the valley-wide and subregional trends of the lark in Oregon.

The largest known population of streaked horned larks breeds at the Corvallis Municipal Airport; depending on the management conducted at the airport and the surrounding grass fields each year, the population has been as high as 100 breeding pairs (Moore and Kotaich 2010, pp. 13-15). Surveys from 2007 to 2013 found 80 to 100 pairs in most years during the breeding season (Moore 2008, pg. 16; Moore and Kotaich 2010, pp. 14-15; Moore 2013, pg. 15); the population dropped precipitously in 2014, when deep snow in the southern Willamette Valley apparently depressed the lark population. In June 2014, Moore detected only 23 mated pairs of larks and 16 unmated males (Moore 2015, pg. 18). The population has rebounded; in 2015, Moore detected 30 mated pairs at the Corvallis Airport, and early season counts in 2016 indicate that the number of nests has increased to more than 65 pairs (Randy Moore, Oregon State University, Corvallis, Oregon, pers. comm., 2016a). Outside of the breeding season, the resident breeding population at the Corvallis Airport is augmented by mixed flocks of wintering streaked horned larks and other subspecies of horned larks (Moore 2008, pg. 9).

Streaked horned larks have been detected at four other airports in the Willamette Valley (Eugene Airport, Salem Municipal Airport, McMinnville Municipal Airport and Independence State Airport) (Moore 2008, pg. 9; Thompson 2013, entire). None of these airports have been comprehensively surveyed; our knowledge of the lark population at each site is the result of focused surveys done for pre-project clearances. See Table SHL-1 for raw data from 2018 for the Willamette Valley airports.

Streaked horned larks can are found on three units of the Willamette Valley National Wildlife Refuge Complex (Ankeny, Baskett Slough and W.L. Finley). Larks mainly use the refuge's agricultural fields, during both the breeding and winter seasons (USFWS 2018, pg. 2). Portions of each of the three refuges have been designated as Critical Habitat for the lark (78 FR 61506); most of the Critical Habitat designations are on agricultural lands that produce green forage for wintering Canada geese (*Branta canadensis*) (USFWS 2018, pg. 2).

On Ankeny National Wildlife Refuge (NWR), streaked horned larks primarily use the central farm fields. Of the three units, Ankeny consistently appears to have the smallest breeding population, generally from one to five pairs (Moore 2008, pg. 8). Refuge staff have been conducting surveys in recent years. The count at Ankeny in 2018 was six breeding pairs of larks (USFWS 2018, pg. 4). The consistently low lark numbers at Ankeny may reflect the landscape setting of this refuge unit; the farm fields are bordered by rows of tall trees, which limit the extent of suitable habitat for the lark (Moore 2008, pg. 8).

At Baskett Slough NWR, larks use a wider range of the refuge's fields, including both agricultural fields and wetland edges (Moore 2008, pg. 8). Surveys from 2006 to 2008 consistently found 18 to 20 pairs at Baskett Slough (Moore 2008, pg. 8). In 2018, the count at Baskett Slough was about 37 breeding pairs of larks (USFWS 2018, pg. 4).

At W.L. Finley NWR, larks inhabit portions of the southern and eastern agricultural fields (Moore 2008, pg. 8). The number of territorial male larks at W.L. Finley NWR varied from 15 to 22 pairs over the 2006 to 2008 surveys (Moore 2008, pg. 8). In 2018, Refuge staff detected 11 breeding pairs (USFWS 2018, pg. 4).

We have limited data on other sites in the Willamette Valley. M-DAC Farms, a privately owned prairie and wetland restoration project in Linn County, illustrates the pattern of streaked horned lark colonization of ephemeral habitats. Early in the breeding season in 2007, Moore (2008, pg. 10) detected a single pair of larks on the gravel road at the site; a controlled burn in June 2007 attracted 30 pairs of larks to the site during that breeding season. In 2008, the breeding population of larks grew to about 75 pairs (Moore 2008, pg. 11). As the vegetation at the site matured in the following years, the site became less suitable for larks, and the population declined to just two to three pairs in 2012 (Randy Moore, Oregon State University, Corvallis, Oregon, pers. comm., 2012). This is likely a common pattern, as breeding streaked horned larks opportunistically shift sites as habitat becomes available among private agricultural lands in the Willamette Valley (Moore 2008, pp. 9-11).

Much of the Willamette Valley is private agricultural land, and has not been surveyed for streaked horned larks, except along public road margins (Altman 1999, pg. 2; Myers and Kreager

2010, pp. 2-3). There are numerous locations on private agricultural and industrial lands on which streaked horned larks have been observed in the Willamette Valley, particularly in the southern valley on grass seed fields. These lands may contain a large percentage of the population of streaked horned larks in Oregon, but no comprehensive survey has been conducted to date.

Umpqua and Rogue River Valleys

In the winter of 2015 to 2016, streaked horned larks were detected at the Lost Creek Lake reservoir in Jackson County, in the Rogue River Valley; other subspecies of horned larks have been detected at this location in the past, but this appears to be the first confirmed report of the *strigata* subspecies in about 40 years (Randy Moore, Oregon State University, Corvallis, Oregon, pers. comm., 2016b). Surveys the following spring did not find any breeding streaked horned larks in the Rogue Valley (Robinson 2016, pg.1).

Table SHL-1. Range-wide survey data for streaked horned larks (2015-2018). Rows highlighted in gray are not within the action area for the NW Area Contingency Plan consultation. (From Treadwell 2019, pp. 4-5).

	Site	2015	2016	2017	2018	+/-	Notes (*NS = no survey, YOY= young-of-the-year*)
Washington	**South Puget Sound**	(max males)					
	13th Division	10	11	15	**15**	=	
	Gray Army	22	30	33	**28**	-	
	McChord	15	25	22	**21**	-	
	91st Range 76	6	15	16	**18**	+	
	Range 50	3	9	5	**1**	-	Western portion surveyed, no access to East, where most birds were concentrated in 2017
	Range 53	NS	2	2	**1**	-	
	Olympia	48	34	43	**21**	-	AT not performed in 2016 or 2017; #s from Banded Bird Survey
	Shelton	13	5	5	**6**	-	AT not performed in 2016, or 2017; #s from Banded Bird Survey
	Tacoma Narrows	2	NS	NS	**3**	+	
	SPS Total	119	131	141	**114**		
	Washington Coast	(max males)					
	Damon Point	0	NS	NS	**0**		
	Graveyard Spit	0	NS	NS	**NS**		Three nests discovered & some YOY observed
	Johns River Island	0	NS	NS	**NS**		
	Leadbetter Point	11	7	11	**5**	-	Five nests w/in 12 territories were discovered. Additional unsurveyed areas were occupied.
	Midway Beach	0	NS	NS	**6**	+	
	Oyhut Spit	0	NS	NS	**0**		

Table SHL-1. Range-wide survey data for streaked horned larks (2015-2018). Rows highlighted in gray are not within the action area for the NW Area Contingency Plan consultation. (From Treadwell 2019, pp. 4-5).

	WC Total	*11*	*7*	*11*	***11***		
WA & OR	**Columbia River**	(max males)					Abundance protocol followed all four years unless otherwise noted.
	Brown Island	17	17	11	**15**	+	
	Rice Island	14	20	14	**17**	+	
	Crims Island	6	5	3	**4**	+	
	Miller Sands Island	12	11	7	**10**	+	
	Pillar Rock Island	2	6	3	**2**	-	
	Sandy Island	3	3	4	**5**	+	
	Martin Bar	0	0	1	**2**	+	Occupancy protocol conducted in 2015/16, abundance in 2017/18
	Tenasillahee	2	2	1	**1**	=	Only two abundance surveys conducted at this site in 2018
	Howard Island	0	4	8	**7**	-	Surveys conducted w/occ. protocol in 2015, abundance in 2016-18
	Lower Deer	0	1	1	**3**	+	Surveys conducted w/occ. protocol in 2016, abundance in 2015, 2017, 2018
	Gateway	0	1	0	**0**	=	Abundance protocol in 2015-2017, occupancy in 2018
	Sand Island	2	1	2	**1**	-	
	Welch Island	0	0	1	**1**	=	Occupancy protocol followed in 2015-17, abundance in 2018
	CR Total						
	Other Sites: Larks also detected at Austin Point and Hump Island in 2018 following occupancy protocol.						
Oregon	**Port of Portland, etc.**	(pairs)					
	SW Quad PDX	3	1-2	1	**1**	=	
	PDX Airfield	0	1-2	3-4	**3**	=	
	Rivergate	5	2	3	**2**	-	Up to two pairs in 2018
	St. Johns (Metro)	0	0	0	**0**	=	2018: 1; one singing male detected May 25, 26 and 27; not seen after.
	Sauvie Island (4 sites)	0	0	0	**0**	=	
	PoP Total	*8*	*4-6*	*7-8*	***6***		
	WV Airports	(pairs)					
	Eugene	12	NS	NS	NS	*n/a*	
	McMinnville	12-15	NS	NS	TBT	*n/a*	
	Salem	0	NS	NS	**TBT**	*n/a*	
	Corvallis	29	61	34	**60+**	-	Est. number. Additional habitat in surrounding ag fields not surveyed
	WVA Total	*53-56*	*61*	34			

Table SHL-1. Range-wide survey data for streaked horned larks (2015-2018). Rows highlighted in gray are not within the action area for the NW Area Contingency Plan consultation. (From Treadwell 2019, pp. 4-5).

WV Refuges & other	(pairs)					
Ankeny	8	12	4	**6**	+	April=4 June=6 July=2 August=6; Indep. Fledglings=13
Baskett	23	17	26	**37**	+	April=23 June=37 July=36 August=28; Indep. Fledglings=77
Finley	8	7	6	**11**	+	April=7 June=9 July=11 August=3 +6 unk; Indep. Fledglings=14
Private Lands - WRPs	15	27	*	*	-	*Numbers are opportunistic sightings. No official surveys conducted. 19 pairs detected in 5 WRPs in 2017, 8 males detected in 3 WRPs in 2018.
Herbert Farm	2	3	0	**0**	=	
Coyote Creek South	-	-	5	**4-5**	=	
WVR/other Total	*56*	*66*				In the Willamette Valley, there are many sites that have not been surveyed due to lack of access.

Maximum counts of male streaked horned larks from annual surveys following standardized protocols as described in Pearson et al. 2016, entire. Please note that these numbers are uncorrected for detectability and transect length; (NS = no survey). Population estimates (and error values) are generated using N-mixture models (Keren and Pearson 2016, pg.1).

Western Snowy Plover

Legal Status

The Pacific coast population of the western snowy plover (*Charadrius nivosus*, hereafter western snowy plover) was federally listed as threatened on March 5, 1993, in California, Oregon, and Washington (USFWS 1993, entire). The western snowy plover is defined as those individuals nesting adjacent to tidal waters within 80 km (50 miles) of the Pacific Ocean, including all nesting birds on the mainland coast, peninsulas, offshore islands, adjacent bays, estuaries and coastal rivers of the United States and Baja California, Mexico (USFWS 1993, pg. 12864 and 12874). Primary threats to the species included loss and modification of habitat resulting from European beachgrass (*Ammophila arenaria*) encroachment and human development, extensive recreational activity in western snowy plover habitat, and predation exacerbated by human disturbance. A final recovery plan for the western snowy plover was published on September 24, 2007 (USFWS 2007, entire).

Species Description

Taxonomy

The western snowy plover is a small shorebird in the family Charadriidae, and was formerly considered a subspecies of the Kentish plover (*C. alexandrinus*). In 2010, the American Ornithologist's Union (AOU), the recognized body on ornithological naming and scientific nomenclature, adopted a proposal to recognize the western snowy plover as a species separate from the Kentish plover (AOU 2010, pg. 2; Chesser et al. 2011, pg. 603). The proposal cited genetic, morphological, and behavioral differences between *C. alexandrinus* and *C. nivosus* (Funk et al. 2007, pp. 1294-1299; Küpper et al. 2009, pp. 843-847). The Kentish plover now consists of Palaearctic populations (zoogeographical region consisting of Europe, Africa north of the Sahara, and most of Asia north of the Himalayas), and the western snowy plover consists of the populations in South, Central and North America. There are three recognized subspecies, ranging in three distinct areas of the Americas: *C. nivosus* (all of the continental United States and portions of Mexico), *C. nivosus tenuirostris* (Cuba, Puerto Rico, the Caribbean and the Yucatan Peninsula) and *C. nivosus occidentalis* (South America) (Funk et al. 2007, pg. 1303; AOU 2010, pg. 2).

Physical Description

The western snowy plover is a small shorebird weighing between 34 to 58 grams and ranges in length from 15 to 17 centimeters (Page et al. 2009, pg. 2). It is pale gray-brown above and white below, with a white hindneck collar and dark lateral breast patches, forehead bar, and eye patches. The bill and legs are blackish. In breeding plumage, males usually have black markings on the head and breast; in females, usually one or more of these marking are dark brown. Early in the breeding season a rufous crown may be evident on breeding males, but it is not typically seen on females. In non-breeding plumage the sexes cannot be distinguished because the breeding markings disappear. Fledged juveniles have buffy edges on their upper parts and can be distinguished from adults until approximately July through October, depending on when in the nesting season they hatched. After this period, molt and feather wear makes fledged juveniles indistinguishable from adults.

Current and Historical Range

The western snowy plover breeds from southern Washington, to southern Baja California, Mexico, and winters mainly in coastal areas from southern Washington to Central America (Page et al. 2009, pg. 3). Historically, six areas supported nesting western snowy plovers in Washington (WDFW 1995, pg. 3). In recent years they have nested at three sites (Pearson et al. 2014, pg. 8). In Oregon, the majority of western snowy plovers breed at locations between Heceta Head and Cape Blanco (Lauten et al. 2015, pp. 39-50), though historic sites at Nehalem Bay State Park and Sitka Sedge State Natural Area have recently become re-occupied by small numbers of western snowy plovers since 2015 (OPRD unpublished data). In California, the majority of western snowy plovers are present from San Francisco Bay southward (USFWS unpublished data).

Life History

Reproductive Biology

Along the west coast of the United States, the breeding period of the western snowy plover extends from early March through late September (Page et al. 2009, pg. 19). Nests consist of a depression in the sand, and are lined with small pebbles, shell fragments, vegetation fragments, and other beach debris (Page et al. 2009, pg. 20). Clutches are usually comprised of three small eggs with cryptic markings that help to camouflage them on the sand (Page et al. 2009, pg. 21). Incubation begins at the laying of the final egg and continues for 26 to 31 days, when hatching begins (Warriner et al. 1986, pg. 24). Western snowy plover chicks are precocial, leaving the nest within hours after hatching to search for food (Boyd 1972 pg. 53). Adult western snowy plovers do not feed their chicks but lead them to suitable feeding areas (Page et al. 2009, pg. 24). Fledging requires 28 to 33 days (Warriner et al. 1986, pg. 26). During this time, broods and the attending male may move away from the nesting territory; movement of up to 9.7 km (6 miles) from the natal area has been reported (Castelein et al. 2001, pg. 10).

Population Structure

Warriner et al. (1986, pp. 29-30) reported on the western snowy plover's serially polygamous mating system. They suggested that males have slightly higher survival rates than females, estimated the male to female sex ratio to be 1.40:1, and discussed the possibility that female serial polyandry may be a response to this skewed sex ratio. Local hatching success rates (percentage of nests in a study area hatching at least one egg) have been reported to range from 0 to 90 percent (USFWS 2007, pg. 14). The fledging success of western snowy plovers (percentage of hatched young that reach flying age) varies greatly by location and year, and has ranged between 10 and 75 percent (USFWS 2007, pp. 15-16). The variability of these estimates is most likely due to differences in beach management, recreational pressure, predation pressure, and localized natural events such as high tides coinciding with heavy surf.

Breeding Population (Numbers, Distribution, and Reproduction)

Historical records indicate that nesting western snowy plovers were once more widely distributed throughout the listed range. Six areas supported nesting western snowy plovers in Washington (WDFW 1995, pg. 3) and more than twenty locations were identified in Oregon (ODFW 1994, Figure 2a). Annual surveys of western snowy plovers began in Oregon in 1978, with counts prior to Federal listing ranging from a high in 1981 of 139 at 13 sites to a low in 1992 of 30 observed at nine sites (USFWS 2007, pg. 25).

In California, coast-wide breeding period surveys in 1977-80 totaled 1,593 adult western snowy plovers (USFWS 2007, pg. 28). Follow up surveys in 1989 and 1991 produced 1,371-1,376 western snowy plovers (USFWS 2007, pg. 28). A survey of breeding western snowy plovers along the Pacific coast of Baja California, Mexico between 1991 to1992 found 1,344 adults, mostly at four coastal wetland complexes: Bahia San Quintin (25 percent), Lagunas Ojo de Liebre (28 percent), Laguna San Ignacio (28 percent), and Bahia Magdalena (7 percent) (Palacios et al. 1994, pg. 491). Annual window surveys are a one-time pass of a single surveyor or team of surveyors through potential western snowy plover nesting habitat during May or June, and have been conducted across the U.S. Pacific coast range since 1993 (USFWS 2007, pg. J-10 – J-23). The survey does not include the interior (greater than 80 km (50 miles) inland) population of the species. Based on the annual breeding window survey, the estimated 2015 western snowy plover was 2,260 (USFWS unpublished data).

Within the recovery plan, the recovery criteria recommend that the western snowy plover be maintained at 3,000 breeding birds along the U.S. Pacific coast (USFWS 2007, pg. 141). The Washington and Oregon coast populations are intensively monitored throughout the breeding period, with many of the adults and chicks being uniquely color-banded, and the breeding adult population can be estimated based on nesting records and daily observational data. Using these methods, an estimated 449 breeding adults were observed in Washington and Oregon in 2015 (Table WSP-1).

Table WSP-1. Estimated breeding adult population observed in Washington and Oregon (2011 to 2015); (Lauten et al. 2015, pg. 12; WDFW unpublished data).

Year	Washington	Oregon	WA/OR combined
2011	31	233	278
2012	33	274	326
2013	43	299	347
2014	41	327	368
2015	75	449	524

The increase in the numbers of western snowy plovers observed in recent years has corresponded with intensive management that began at the time of Federal listing (USFWS 2007, pp. 87-127). Integrated predator management is an essential component of western snowy plover recovery (USFWS 2007, pp. 90-93, 178-183). Productivity has improved following the implementation of integrated predator management, averaging 1.31 fledglings per male across all Oregon nesting sites from 2004-2014 (Lauten et al. 2015, pg. 12).

The annual number of young fledged per adult male is an important measure of the reproductive success of the western snowy plover. One of the primary recovery criterion is to maintain a yearly average productivity of at least one fledged chick per male in each recovery unit in the last five years prior to delisting (USFWS 2007, pg. 141). Males are used in measuring reproductive success because their population parameters can be estimated with greater certainty than for females (USFWS 2007, pg. D-7). In addition, the availability of males limits reproductive success because they are responsible for post-hatching parental care, and females can lay clutches for more than one male (Warriner et al. 1986, pp. 27-29). Biologists monitored 396 nests in Washington and Oregon in 2014 that fledged a minimum of 304 chicks (Lauten et al. 2014, pg. 24; Pearson et al. 2015, pg. 12). In recent years, the overall number of fledglings per male within Washington and Oregon has come close to or exceeded the recovery goal of 1.0 fledgling per male in Recovery Unit 1 (Table WSP-2).

Table WSP-2. Estimated number of western snowy plover chicks fledged per adult male in Washington and Oregon (2010 to 2014) (Lauten et al. 2014, pg. 26; Pearson et al. 2015, pg. 13).

Year	Washington	Oregon
2010	0.57	0.97
2011	1.70	1.61
2012	0.68	1.41
2013	1.04	1.04
2014	1.88	1.68

In addition to Oregon and Washington (Recovery Unit 1), coastal northern California (Del Norte, Humboldt, and Mendocino counties (Recovery Unit 2) and Monterey Bay region (Recovery Unit 4) are two areas in California where western snowy plovers are intensively monitored through long-term banding studies.

In northern California, monitoring occurs in Humboldt County at eight locations including: Gold Bluffs Beach, Stone Lagoon, Big Lagoon, Clam Beach, Mad River Beach, Eel River Wildlife Area, Centerville Beach, and Tenmile Beach. The breeding population in northern California increased slightly from 2014 to 2015 (51 to 61 adults), and population size has increased for the sixth consecutive year largely owing to immigrants originating from other Recovery Units (Colwell et al. 2015, pg. 4). Males fledged 27 chicks in 2015, averaging 0.90 fledged chicks per male, and continuing a pattern of low productivity over the past 13 years (Colwell et al. 2015, pg. 13), and below the level needed to prevent the population from declining. western snowy plovers nesting on river gravel bars consistently achieved greater fledging success in previous years (3.00 +/- 0.00) relative to those nesting on ocean beaches (0.31 +/- 0.63) (Colwell et al. 2010, pg. 5). Western snowy plovers, however, have not nested on river gravel bars since 2010 (Colwell et al. 2015, pg. 5), and partially accounts for an overall lower productivity level in northern California.

The Monterey Bay region staff and research associates of Point Blue Conservation Science (formerly Point Reyes Bird Observatory) have monitored nesting western snowy plovers annually on the shores of Monterey Bay since 1984 and on small pocket beaches in northern Santa Cruz County since 1988. In 2015, at least 469 western snowy plovers nested in the Monterey Bay area (Page et al. 2016, pg. 5). The 2015 fledging success rate of 1.30 young per male was identical to the 1999-2014 average (Page et al. 2016, pg. 7).

<u>Population Viability</u>

A population viability analysis was conducted to aid the recovery team in developing recovery criteria for the recovery plan (USFWS 2007, pp. D-1 – D-25). The analysis makes the following conclusions. "Under status quo scenarios, even with intensive management in some areas, the population is almost certain to decline. Without question, ceasing current management efforts (area closures, predator exclosures, and predator control) would be disastrous for the Pacific coast population…. Recovery is plausible. It will require, however, short-term intensive management and long-term commitments to maintaining gains." These conclusions emphasize the immediate need for intensive management. The most direct means to increase population size is to enhance reproductive success throughout the listed range.

The population viability analysis suggests that reproductive success between 1.2 to 1.3 fledglings per male per year, with adult survival of 76 percent and juvenile survival of 50 percent, provides a 57 to 82 percent probability of reaching a population of 3,000 or more western snowy plovers within 25 years (USFWS 2007, pp. D-1 – D-25). Enhancing productivity is critical to population growth. Once the population size criterion is met, a lower rate of productivity can sustain the population (USFWS 2007, pg. 141).

Habitat Description

Nesting habitat

The western snowy plover breeds primarily on coastal beaches from southern Washington to southern Baja California, Mexico. Western snowy plovers nest in depressions in open, relatively flat areas, near to tidal waters but far enough away to avoid being inundated by daily tides. Western snowy plovers primarily breed above the high tide line on sandy or pebbly beaches, but western snowy plovers may also lay their eggs in existing depressions on harder ground such as salt pan, cobblestones, or dredge tailings (USFWS 2012, pp. 36746-36747). This habitat is variable because of unconsolidated soils, high winds, storms, wave action, and colonization by plants.

Foraging habitat

Western snowy plovers typically forage in open areas by locating small invertebrates visually and capturing with their beaks (Page et al. 1995, pg.12). Deposits of tide-cast wrack such as kelp or driftwood tend to attract certain invertebrates, and so provide important foraging sites for western snowy plovers (Page et al. 1995, pg. 12). Western snowy plovers forage both above and below high tide, but not while those areas are underwater. Therefore, foraging habitats consist of open, sandy areas which may contain tide-cast wrack or other vegetative debris to attract prey (USFWS 2012, pp. 36746-36747).

Wintering habitat

Some western snowy plovers nesting on the Pacific coast migrate north or south to other Pacific coastal wintering sites, while other stay at their breeding sites year round (USFWS 2006, pg. 20610). Western snowy plovers winter on many of the beaches used for nesting as well as on beaches where they do not nest including manmade salt ponds and on estuarine sand and mud flats (USFWS 2012, pg. 36746). In Washington, Oregon, and California, the majority of wintering western snowy plovers concentrate on sand spits and dune-backed beaches.

In the recovery plan (USFWS 2007, pp. B-1 – B-17), we identified 130 wintering locations that are important for recovery. The western snowy plover population has experienced widespread loss and degradation of wintering habitat due to human disturbance, development, and encroachment of introduced European beachgrass (USFWS 2007, pp. 33-45). Small changes in the adult survival rate can have relatively large effects on population stability (USFWS 2007, pg. D-13), so the maintenance of quality overwintering habitat is important to conservation (USFWS 2012, pg. 36746).

The number of western snowy plovers wintering on the Washington coast has increased to approximately 70 birds, which are concentrated at just two locations in Pacific County, Midway Beach and Leadbetter Point (USFWS unpublished data). The number of Oregon locations used by wintering western snowy plovers between the Columbia River in Clatsop County, however, has increased to over 20 sites (USFWS unpublished data). The majority of wintering western snowy plovers on the California coast are found from Bodega Bay, Sonoma County, southward (USFWS unpublished data). The 2015 winter window survey numbers for Washington, Oregon, and California totals 3,762 individuals (USFWS unpublished data).

Threats

Permanent or long-term loss of nesting habitat through destruction, modification, or curtailment of habitat or range has led to a decline in active nesting areas, as well as an overall decline in the breeding and wintering population. Development has resulted in the loss of many historic western snowy plover locations in Oregon. For example, of the more than 20 historic nesting locations listed in the recovery plan (USFWS 2007, pg. 24), only ten still support western snowy plovers and suitable nesting habitat (Lauten et al. 2015, pg. 6). Many unoccupied historic locations are located near urban areas or have been developed to promote ATV use or camping.

Colonization of non-native plant species, particularly European beachgrass, has eliminated habitat and continues to threaten the remaining nesting areas. Without treatment (hand pulling, disking, bulldozing, or herbicide application) European beachgrass quickly recolonizes open sand. In addition to losing essential nesting habitat, the constriction of the nesting areas forces birds to concentrate efforts within smaller areas, which increases competition, obscures predators, and increases the likelihood of predation. Natural disturbance, such as inclement weather, have also affected the quality and quantity of western snowy plover habitat (USFWS 1993, pg. 12872). Poor reproductive success resulting from disturbance by humans and domestic animals and predation are described in detail below.

<u>Pedestrians</u>

Human disturbance, especially recreation in and near western snowy plover habitat, has been an ongoing factor affecting western snowy plover populations in Oregon and across the range. At South Beach in Newport, for example, the number of western snowy plovers declined from 25 in 1969 to five in 1979 to none in 1981 (ODFW 1994, pg. 21). During this time South Beach State Park was opened and that habitat became more accessible to people and vehicles (Hoffman 1972 in ODFW 1994, pg. 21). Pedestrians can cause both direct and indirect mortality and injury of western snowy plovers.

Western snowy plovers respond to pedestrians that approach too closely by flattening their profile and remaining motionless, increasing vigilance behavior, calling, performing distraction displays, flushing, or changing other normal breeding, feeding, and sheltering activities (Page et al. 2009, pg. 42; Montgomerie and Weatherhead 1988, pg. 2). Western snowy plovers that flush may or may not return to the original site or may take several minutes to return depending on age and breeding status (Lafferty 2001a, pg. 323; Weston and Elgar 2007, pg. 572), food and habitat availability (Yasué 2006, pg. 51), body condition (Beale and Monaghan 2004, pg.1067), and previous disturbance exposure (Page et al. 1977, pg. I-7; Burger et al. 2004, pg. 287) at the time of disturbance. Western snowy plovers nesting on beaches that experience low levels of pedestrian traffic may be highly sensitive to human intrusion. Western snowy plovers may also flush off nests and stay off nests for much longer periods than western snowy plovers nesting on beaches with higher levels of pedestrian traffic. Suspended feeding and the expenditure of energy during a flushing event (i.e., disturbance) may affect both reproduction and survival (Brown et al. 2000, pp. 10-11; Lafferty 2001a, pg. 323).

Western snowy plovers have been observed leaving nests in response to pedestrians at distances greater than 200 m (Page et al. 1977, pg. I-7; Muir and Colwell 2010, pg. 509). Incubating western snowy plovers have been observed leaving their nest up to 84 percent of the time when approached at distances less than 50 m of the nest, and remaining off the nest for up to five minutes following disturbance by pedestrians (Page et al. 1977, pg. I-7). Return times are significantly greater for humans that remain stationary nearby an active nest, and were more than 60 minutes for similar plover species (Weston et al. 2011, pg. 254).

Displacing nesting plovers during incubation for even short periods of time has the potential to expose clutches to lethal levels of thermal stress when the ambient temperature is extreme (Amat and Masero 2004, pg. 1; USFWS 2007, pg. 58), or result in nest burial by sand drift during extremely windy weather (Farrar et al. 2012, entire). Nests that are not continuously incubated may also take longer to hatch, making the nest and incubating adults vulnerable to predation for a longer period of time.

Human disturbance can also prevent tending parents from brooding chicks, force chicks into suboptimal habitat or adjacent territories, cause chicks to become separated and abandoned from the rest of their brood or tending parent, reduce foraging time, and increase vigilance and predator avoidance behaviors of chicks (Flemming et al. 1988, pp. 328-329). Human disturbance, therefore, has the potential to increase the thermoregulatory needs of chicks, particularly during periods of inclement weather, as well as their vulnerability predation (Colwell et al. 2007, pg.645). In Nova Scotia, piping plover chicks, a closely related species with similar biological and behavioral traits to western snowy plovers, foraged less and were brooded less often when humans were within 160 m (525 feet), and significantly fewer chicks survived in areas with heightened levels of disturbance (Flemming et al. 1988, pp. 327-328). In one California study, three times as many chicks were lost on weekends and holidays as on weekdays, suggesting that increased recreational activity is linked to increased chick loss (Ruhlen et al. 2003, pg. 303).

Western snowy plover eggs and young chicks (less than 10 days old) are small, difficult to detect, and at risk of being inadvertently stepped on by pedestrians, which could result in injury or death (Page et al. 1977, pg. I-5). Pedestrians have been known to inadvertently step on eggs and chicks, deliberately take eggs from nests, and remove chicks from beaches, erroneously thinking they have been abandoned (USFWS 2007, pg. 58).

<u>Camping and Beach Fires</u>

The effects of camping on the beach are similar to those described for pedestrian traffic and picnicking; however, effects may be increased if people remain in or near breeding areas for extended periods. Beach fires and camping may disrupt incubation and brooding for long periods, potentially causing temporary nest abandonment and increasing the exposure of nearby chicks and eggs to hypothermia. Garbage left behind by campers and abandoned beach fires may attract scavengers such as gulls (*Larus* spp.) and predators such as coyotes, crows, and ravens. Also, human presence near nests may increase predator detection of nests or chicks.

Nighttime collection of wood or other human movement increases the risk of direct mortality or injury from stepping on nests and chicks, which are difficult to see even during daylight hours. Beach fires and camping may be harmful to nesting western snowy plovers when valuable driftwood is removed or burned. Occasionally fires escape into nearby driftwood, and the resulting fire suppression activities may disturb and threaten western snowy plover nests and chicks.

Prolonged camping and beach fire activities near these areas can potentially impact nests, especially those that are close to the edge of protected areas (compared to those further from camping and beach fire activities). Since broods rarely stay in their nesting area until fledging and may travel along the beach as far as 9.7 km (6 miles) from their natal area (Castelein et al. 2001, pg. 10), camping and beach fires could also cause disturbance to feeding or resting western snowy plovers, or potentially crush adults and/or their broods.

<u>Dog Exercising</u>

Dogs have a disproportionate effect on western snowy plovers compared to other sources of recreational disturbance; western snowy plovers react sooner, at greater distances, and for longer periods of time (Page et al. 1977, pg. I-7; Lafferty 2001a, pg. 323; and 2001b, pg. 4; Burger et al. 2004, pg. 286; Baudains and Lloyd 2007, pg. 405). Unleashed dogs may deliberately chase and kill western snowy plovers, or inadvertently trample and destroy nests. Even when not chasing birds, unleashed dogs may traverse a large area of the beach, and have a tendency to move up and down the beach in an exploratory manner making rapid or erratic movements similar in behavior to other natural predators (e.g., coyotes and foxes). Western snowy plovers, in kind, respond to dogs as predators and use avoidance behaviors (e.g., flushing) and distraction displays to avoid predation and conceal the location of nests and broods.

Prolonged absences of tending adults related to dog encounters may increase the exposure or access of eggs and chicks to other predators, lethal levels of thermal stress, nest burial by wind-blown sand, permanent separation of chicks from the rest of their brood or tending adult, or result in other adverse effects that ultimately reduce reproductive success. Several studies have reported higher nest failure rates and mortality rates of chicks on beaches where dogs were relatively prevalent compared to beaches with few dogs (Dowling and Weston 1999, pg. 266; Baudains and Lloyd 2007, pg. 405). Lafferty's (2001b, pg. 9) management model predicted that intense disturbances to western snowy plovers could be dramatically reduced by removing dogs.

Driving

Motorized and non-motorized vehicles (including ATVs and off-highway vehicles) on beaches may adversely affect western snowy plovers and their habitat. Use of motor vehicles on coastal dunes may be destructive to dune vegetation, especially sensitive native dune plants. Vehicles may affect remote stretches of beach where human disturbance would otherwise be slight if access were limited to pedestrians. The magnitude of this threat varies, depending on level of use and type of terrain covered.

Vehicles can displace and sometimes kill foraging, roosting, brooding, or incubating adult western snowy plovers (USFWS unpublished data). Western snowy plover adults, chicks and eggs are small, cryptically colored and extremely difficult to detect. Adults and chicks also roost and spend time in sand depressions including tire tracks. Western snowy plover adults and older chicks generally respond to approaching sources of danger by moving or flushing away from the source of danger, though young chicks tend to crouch and remain motionless, and nests are placed on the ground. These characteristics create the potential for motorized vehicles to collide with western snowy plover adults and chicks, and to crush western snowy plover chicks and eggs. Driving vehicles in breeding habitat may cause destruction of eggs, chicks, and adults, abandonment of nests, and considerable stress and injury to western snowy plover family groups (Stern et al. 1990, pp. 8-9; USFWS 2007, pp. 61, 65-66). At wintering sites, disturbance from motorized vehicles may cause injury western snowy plovers and disrupt their foraging and roosting activities, thereby decreasing energy reserves needed for migration and reproduction (USFWS 2007, pg. 66).

Beachcombing and Driftwood Collection/Removal

Driftwood can be an important component of western snowy plover breeding and wintering habitat. Driftwood contributes to dune-building and adds organic matter to the sand as it decays (USFWS 2007, pg. 36). Additionally, driftwood provides western snowy plovers with year-round protection from wind and blowing sand. Often, western snowy plovers build nests beside driftwood, so its removal may reduce the number of suitable nesting sites. Driftwood is also used to escape detection by predators (USFWS 2007, pg.12). However, too much driftwood can change the open nature of the habitat and large driftwood provides perches for avian predators.

Driftwood removed for firewood or decorative items can result in destruction of nests and newly-hatched chicks that frequently crouch by driftwood to hide from predators and people. Chainsaw noise may disrupt nesting, and vehicles used to haul wood may crush nests and chicks. Also, driftwood beach structures built by visitors are used by avian predators of western snowy plover chicks such as northern harriers and American kestrels, and predators of adults such as merlins and peregrine falcons.

Kite Flying

In a study on western snowy plovers, the reaction of western snowy plovers to kites “ranged from increased vigilance while continuing roosting in close proximity to the kite flying, to walking or running approximately 10 to 50 m (32.8 to 164.0 feet) away and resting again while remaining alert" (Hatch 1997, pp.27-28). Hoopes (1993, pp. v, 68) found that piping plovers are intolerant of kites. Compared to other human disturbances (i.e., pedestrian, off-road vehicle, and dogs), kites caused piping plovers to flush or move at a greater distance from the disturbance, to move the longest distance away from the disturbance, and to move for the longest duration. Piping plovers responded to kites at an average distance of 85 m (279 feet); moved an average distance of over 100 m (328 feet); and the average duration of the response was 70 seconds.

Biologists believe western snowy plovers perceive kites as potential avian predators (Hoopes 1993, pg. 72; Hatch 1997, pg. 27). Kites may disturb western snowy plovers when flown near nesting, feeding, or resting areas. Kites can cause adults to flush from nests, leaving eggs exposed extreme temperatures. Furthermore, the movement of flushed adults may draw the attention of predators to adults or their nest. Kites also may cause adults and broods to spend less time foraging and result in increased energy expenditure, which could result in reduced fitness and delayed ability to fledge.

It is expected that stunt-kites would cause a greater response from western snowy plovers than traditional, more stationary kites. Stunt kites include soaring-type, two-string kites with noisy, fluttering tails, which often exhibit rapid, erratic movements, similar to the behavior of falcons or other avian predators. As with kites, it is expected that model airplanes may also have a detrimental impact to western snowy plovers because western snowy plovers may perceive them as potential predators (Hatch 1997, pg. 72).

<u>Horseback Riding</u>

Horses can affect nesting and wintering western snowy plovers in ways similar to pedestrians. Additionally, horses may trample nests. Lafferty (2001b, pg. 1952) observed western snowy plovers' response to people, pet dogs, equestrians, crows and other birds. Observations were made at Devereux Slough in Santa Barbara County, Santa Rosa Island, San Nicolas Island, and Naval Base Ventura County (Point Mugu). This study found that western snowy plovers are most frequently disturbed when approached closely (within 30 m (98 feet)) by people and animals. The most intense disturbance (causing the western snowy plover to fly away) was in response to crows, followed by horses, dogs, humans, and other birds.

<u>Other Recreational Activities (Picnicking, Near Shore Activities/Surf Sports)</u>

Beach-related recreational activities that are concentrated in one location (e.g., sunbathing, picnicking, sandcastle building, birding, and photography) can negatively affect incubating adult western snowy plovers when these activities occur too close to their nests. Recreational activities that occur in the wet sand area (sand sailing) can adversely affect western snowy plovers when they disturb western snowy plover adults or broods, which feed at the edge of the surf along the wrack line.

Recreational activities that occur in or over deep water (such as the beach- and water-oriented activities of surfing, kayaking, wind surfing, jet skiing, and boating, and the coastal-related recreational activity of hang gliding) may not directly affect western snowy plovers; however, they can potentially be detrimental to western snowy plovers when recreationists use the beach to take a break from these activities, or as access, exit, or landing points.

Predation

Predation, by a variety of native and nonnative species, has been identified as a major factor limiting western snowy plover reproductive success at many Pacific coast sites. Known mammalian and avian predators of western snowy plover eggs, chicks, or adults are listed in Table WSP-3. A more detailed description of the range-wide threats to western snowy plovers is available in the recovery plan for the species (USFWS 2007, pp. 33-78).

Table WSP-3. Native and non-native predators known to prey on western snowy plover eggs, chicks, and adults (USFWS 2007, pg. 48; Fancher et al. 2002, pg. 11; Powell et al. 2002, pg. 161).

Native Species	Non-native Species
Gray fox (*Urocyon cinereoargenteus*) Santa Rosa Island fox (*Urocyon littoralis santarosae*) Coyote (*Canis latrans*) Striped skunk (*Mephitis mephitis*) Spotted skunk (*Spilogale putorius*) Raccoon (*Procyon lotor*) California ground squirrel (*Citellus beecheyi*) Long-tailed weasel (*Mustela frenata*) American crow (*Corvus brachyrhynchos*) Common raven (*Corvus corax*) Ring-billed gull (*Larus delawarensis*) California gull (*Larus californicus*) Western gull (*Larus occidentalis*) Glaucous-winged gull (*Larus glaucescens*) Gull-billed tern (*Gelochelidon nilotica*) American kestrel (*Falco sparverius*) Peregrine falcon (*Falco peregrinus*) Northern harrier (*Circus cyaneus*) Loggerhead shrike (*Lanius ludovicianus*) Merlin (*Falco columbarius*) Great horned owl (*Bubo virginianus*) Burrowing owl (*Speotyto cunicularia*) Great blue heron (*Ardea herodias*)	Eastern red fox (*Vulpes regalis*) Norway rat (*Rattus norvegicus*) Virginia opossum (*Didelphis marsupialis*) Domestic and feral dog (*Canis familiaris*) Cat (*Felis domesticus*) Fire ant (*Solenopsis geminate*) Argentine ant (*Linepithema humile*)

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Appendix H: General Environmental Baseline Information (applies to all species and critical habitats – literature cited section for this information is contained in the main text).

Environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. 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. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR Part 402.0; 84 FR 44976, August 27, 2019).

Oil (and Hazardous Substance) Facilities and Transport in the Action Area

The production of crude oil in the US has been increasing since 2008. According to a 2015 Ecology report, the increased domestic oil production in the US between 2008 and 2013 resulted in 66% of its oil demand being met from within North America (Ecology 2015, Figure 4, pg. 27). As a result of the increased domestic oil production, the type of oil being transported throughout the NW and the methods used to transport the oil are changing. Specifically, while marine tanker vessel transport is still the dominant mode of transportation, trends are shifting toward rail and pipeline transport. For example, in Washington, oil transport by tanker historically accounted for 90% of oil transportation in the state; however, oil transport by tanker had decreased to less than 70% as of 2014 (Ecology 2015, pg. 16) and to 47% as of the last quarter of 2016 (Ecology 2017, pg. 10).

The relative decline of oil transport by marine vessel in Washington is explained by the increasing transport of oil by rail, which is predicted to increase up to sixfold by 2035 in response to greater extraction of Bakken crude oil (Ecology 2015, pg. 43). All three states covered by the NWACP are experiencing a similar upsurge in rail traffic. Rail traffic from oil transport in Oregon, for example had increased from zero to approximately five unit trains per week as of 2014 (Johnson 2016, pg. 1). Most of the unit trains carrying crude oil to Washington refineries are transporting oil from North Dakota through Idaho and along the Columbia River (Ecology 2017, pg. 6).

Increased production of two oils—Bakken crude oil and diluted bitumen (also referred to as "dilbit")—accounts for the notable changes to oil transport in the NW. Bakken crude oil, which is sourced from the Bakken formation in Montana, North Dakota, and southern Canada, makes up most of the crude oil entering Washington State (Ecology 2015, pg. 18).

Diluted bitumen is a heavy oil that sinks in water when spilled, and it can vary in flammability and toxicity depending on the diluent used to treat it prior to transport (Ecology 2015, pg. 411). Diluent is added to heavy bitumen to decrease its viscosity and thereby improve transportability by pipeline. There is currently one pipeline in northwest Washington that carries crude oil (Ecology 2015, pg. 524). Although U.S. crude oil cannot be exported due to a federal export ban, bitumen and Canadian oils imported into Washington are refined and then exported via barge or tanker at the mouth of the Columbia River, Grays Harbor, and the Puget Sound (Ecology 2015, pg. 35). Several other pipelines in Washington, Oregon, and Idaho also transport refined petroleum products. Although diluted bitumen is mostly transported through Washington via a single pipeline, rail transport also occurs (Ecology 2015, pg. 30). Diluted bitumen is currently transported via rail from Alberta to Tacoma, Washington, and oil moving along this route may increase in the future.

As noted, marine vessels remain the major means for transporting oil in the NW (and Washington State in particular), and many domestic and foreign tankers and articulated tug-barges enter Puget Sound every year. In 2013, approximately 700 vessels entered the Puget Sound, excluding those destined for Canada (Ecology 2015, Figure 74, pg. 271), while 264 tankers and articulated tug-barges entered the Columbia River and 17 entered Grays Harbor (Ecology 2015, Figure 111, pg. 27).

Facility expansions are projected to increase vessel traffic threefold by 2030 (Ecology 2015, pg. 334). Two new facility expansions are proposed for Grays Harbor. These projects would allow the number of rail cars offloading oil at Grays Harbor facilities to increase to 350 per month; storage space at those facilities would also be increased.

The shift toward using rail to transport Bakken crude oil may increase the difficulty and effectiveness of spill response in the NW (e.g., resulting from unit train car derailments). Because Bakken crude oil is more soluble, volatile, and flammable than most other transported oils (e.g., West Texas crude oil), it can more easily contaminate groundwater (Ecology 2015, pg. 29), and it also has a greater propensity to burn. Hazardous fumes associated with Bakken crude oil may also create unsafe conditions (Ecology 2015, pg. 342). The majority of crude oil rail traffic occurs along the Columbia River Gorge (Ecology 2015, pg. 35). As the amount of oil transported by rail has increased (approximately 44 times more than 30 years ago), the volume of oil spilled by rail cars has increased by 42%, even though the number of spills per gallon transported has decreased (Ecology 2015, pg. 77).

In August 2016, Ecology adopted a new rule as a result of legislative direction. The rule establishes a system for monitoring oil transport in Washington State and notifying the public about how oil is being transported and in what quantities (Ecology 2017, pg. 1; Washington Administrative Code 173-185). The purpose of the rule is to better understand how oil transport is changing in the state and to inform first responders about oil traffic, which will better prepare them for a spill response. Facilities moving oil by rail must report quarterly details, including the region of origin, the route of transport, scheduled time and volume, and the specific gravity of the transported oil. Information reported for pipelines must include a biannual notice of all crude oil transported in the state. Spill volumes must also be reported each quarter (Ecology 2017, pg. 8; Washington Administrative Code 173-185).

Size and Types of Spills in the NW

In order to provide context for spill response, it is important to consider the sizes and types of spills that have actually occurred in the action area, as well as those likely to occur in the future. As noted, changes in the energy sector—including the recent and rapid increases in Bakken crude oil extraction and export through the NW—may alter the profile of oil spills, particularly along rail corridors near inland waters. Within the marine environment, there is a long history of spills and responses by the USCG that can be drawn upon to help describe spills and provide some context for response activities in the NW.

Coastal Zone

Oil spill response data for marine waters are maintained at the USCG Sectors. USCG Sectors Puget Sound and Columbia River have compiled information on oil spills within their respective coastal zone areas of responsibility since 2011; a summary of the information follows. It is important to note that equipment was not deployed in all instances of response. The intent of this summary is not to characterize response, but rather the describe spill amounts and types that have occurred in the NW.

In Sector Columbia River between 2011 and 2016, there were 470 records of petroleum spills, which ranged from 0.1 to 6,762 gallons in volume. The types of oil were diesel (32%), hydraulic (14%), automobile (8%), and unknown oil type (32%), while the remaining percentage comprised small numbers of spills of bilge slop, vegetable, lubricating, motor, and other oils. In Sector Puget Sound, there was a similar number of records, with spills ranging from 0.01 to 3,400 gallons. The types of oil were the same as those in Sector Columbia River: diesel, hydraulic, gasoline, unknown oil types, bilge slop, lubricating oil, and others.

According to data from the Sectors, the majority of spills or potentials spills in the marine area are due to equipment failure or boat groundings, or from sunken pleasure craft or fishing vessels. In most of these cases, the spills are small, and the responses are correspondingly small and do not involve establishing an Incident Command Post and Unified Command. Most often, spills are responded to with a single Incident Commander and small response team, following ICS constructs.

A recent review by the Fraser Institute on the safety of oil and gas transport indicates that risk of spills in the marine environment, actual incidents, and amounts of oil spilled have all declined significantly since the 1970s (see Figures 8 and 9 in Green and Jackson (2017)). Much of this decline is attributable to regulations implemented after the Exxon Valdez accident and oil spill that have reduced the occurrence of vessel incidents.

The Oil Spill Task Force (OSTF) for the Pacific states and British Columbia compiles data for oil spills occurring along the West Coast of the US, British Columbia, and Alaska, and tracks regional trends in spills and related causal factors. The analyses provided in the OSTF annual report (OSTF 2017, pg. 5) indicate that most reported spills are minor (less than 1,000 gallons in the coastal region). These finding are consistent with information collected by the USCG Sectors. For example, the majority of spills are diesel oil, and there are many small spills of less than 42 gallons in the region (OSTF 2017, pg. 5). In Oregon, 70% of reported spills in 2016 were 42 gallons or less; in Washington, 90% of reported spills were 42 gallons or less. In a review of spills greater than 10,000 gallons from 2002 through 2016, there were no spills of that size in the marine environment off the coasts of Oregon or Washington (OSTF 2017, pg. 5).

Inland Zone

As in the marine zone, the vast majority of reported spills in the inland zone are for small amounts of oil, or for oil that does not threaten surface water. In the last two years, the EPA has been notified of approximately 1,000 oil spills in Washington, Oregon, and Idaho. By law, spillers are required to notify the National Response Center of any oil release that may threaten surface water. Typically, spillers will conservatively notify the EPA after any release of oil even if it does not threaten surface water. Of the 1,000 notifications since 2016, fewer than 10 resulted in the EPA deploying an FOSC, and only five required multi-day operations and the formation of Unified Command.

Typical Response Time and Type

The amount of time spent on an individual spill response depends on the type of oil, the extent of oiling, whether the oil reaches the shoreline, and the nature of the response. In the marine environment, it is often possible to remove oil from the water's surface before the spill reaches a shoreline, so the response is limited to on-water cleanup. The use of chemicals (e.g., dispersants) or *in situ* burning must occur quickly, before the oil begins to change texture or becomes too diluted for the techniques to be successful. There is generally a 96-hour window to respond to oil using dispersants or *in situ* burning. The use of mechanical methods (e.g., booming and then skimming) or sorbents generally lasts from one day to one week (typically no more than four days), depending on the type of spill. As noted, most spills in the marine zone are the result of equipment failure or sinking vessels; for such spills, a boom is laid out to control the oil, which is then cleaned up. Unlike other regions of the US, where offshore drilling for oil may result in a continuous spill, there is no offshore drilling in the action area, so any spill would result in all or most of the oil being spilled at once. Therefore, these two types of response—chemical and mechanical—and their associated actions (e.g., vessels and planes to apply and/or monitor effectiveness) would be short-term, lasting as little as a few hours and typically no more than four days.

The evaluation and cleanup of shorelines is generally more time consuming than on-water operations. Because the majority of spills in this area are minor (i.e., less than 42 gallons), there is usually very little, if any, shoreline impact, and thus no need for extensive cleaning. Shoreline cleanup is usually expected to take less than one week and considered short-term. If a cleanup operation were to take more than one week, it would be characterized as long-term.

Influence of Spilled Material on Species Habitats in the Action Area

For evaluating a response action under the proposed action, the baseline condition assumes the occurrence of a spill or potential spill of hazardous substance (e.g., crude oil, diesel fuel) and the interaction of species and their habitats under the conditions of a spill.

Regarding the toxicity of oil in the environment, the following is excerpted from the NMFS concurrence for the CDP consultation (NMFS 2017, pg. 7-9; see BA Appendix E):

Oils are a mixture of thousands of petroleum compounds and other contaminants of varying volatility, water solubility and toxicity (NRC 2005, pg. 215). Most oils spilled on the surface of the action area will spread into a slick, with thickness ranging from several millimeters (mm) to one micrometer (μm) depending on the type of oil and other environmental factors (NRC 1998, pg. 28). Since oil does not spread uniformly, slicks are irregular in shape and thickness. They generally are elongated in the direction of the wind (NRC 2005, pg. 137). Some oils will sink. There is a large variety of crude oils and refined oil products that are transported through the action area off the California coast with some oils identified as readily dispersible and numerous others that are known to not be dispersible.

Wind driven waves will break up an oil slick, producing droplets of various sizes that may be stabilized by natural surfactants, leading to some natural dispersion. Generally, oil droplets are prominent under a slick up to a meter deep in the low parts per million range under natural dispersion scenarios (3-5 ppm up to 1 m depth, 0.03-0.63 ppm 1-2 m deep; see NRC 1989, pg. 47).

Movement of the surface slick is generally dictated by the wind in both direction and speed. Lighter molecular weight fractions of the oil (*e.g.* short-chained alkanes, benzene, toluene, ethylbenzene, xylenes and some other two and three ringed Polycyclic Aromatic Hydrocarbons (PAHs) are soluble and they can diffuse away from the surface slick into the waters below the surface layer although many volatilize rapidly as discussed below. They will not coalesce and resurface and these compounds can cause toxic effects (e.g. narcosis) in the water column to exposed biota (NRC 2005). During conditions that slow evaporation rates (*e.g.* night time, cold temperatures) a greater percentage of these more acutely toxic compounds dissolve into the water column where they may impact zooplankton and other near surface life.

Movement of water below the surface layer may proceed in a different direction based upon the direction of local currents (Fingas 2014, pg. 24; Mearns *et. al.,* 2001, pg. 101). In the action area, the California current generally moves water from the north to the south, while prevailing winds push the surface waters to the east towards the mainland shore. There are counter currents and gyres in the Southern California area that influence local transport processes as well (Howard, *et. al.*, 2014, pg. 287). Therefore, an oil spill can actually spread in multiple directions and result in a larger contaminated volume of water than is readily evident from just surface observations. A surface slick can serve as a reservoir of oil droplets that undergo natural dispersion as the slick spreads resulting in a prolonged oil exposure event (Carls *et. al.*, 2008, pg. 1). Evaporation is the most important and rapid of all weathering processes and it can account for the loss of 20-50% of many crude oils and 75% or more of refined petroleum products (NRC 2005, pg. 145). This often leads to a significant loss of the lighter weight, soluble and acutely toxic components of oil and they will not be present to affect organisms in the water column when dispersant applications actually take place. While this may benefit water column organisms, inhalation or aspiration of these compounds by air breathing organisms is also possible during this time and this may cause toxic effects.

Following spreading, evaporation/volatilization and natural dispersion of the spilled oil, wave action may cause some oils to emulsify, forming what is commonly referred to as a mousse. The oil absorbs water and this causes the volume of the spill that must be dealt with to increase dramatically. Mousses are difficult to remove from the ocean by mechanical means or the use of dispersants although some crude oil mousses have been successfully dispersed (NRC 2005, pg.156). Ultimately, oil that is introduced into the ocean undergoes some level and form of microbial biodegradation. Biodegradation rates are highly variable based upon the properties of the oil, environmental conditions and the microbes present. In warmer waters, and in waters with natural oil seeps and microbes evolved to take advantage of this carbon source, this process tends to be more rapid than in cooler waters and waters where oil is rare. Microbial growth on open ocean oil slicks is likely to be limited by nutrient availability and may be a slow process relative to the formation of emulsions, which are often very difficult to biodegrade (NRC 2005, pg. 167).

Incomplete biodegradation may result in the formation of high molecular weight residues such as "tar balls" or asphaltenes that may sink in open waters and later wash up on shorelines…

The toxicity of oil comes from the bioavailability and toxicity of individual hydrocarbons that make up the oil and relates to their solubility in water. Dissolved hydrocarbons, whether chemically or naturally dispersed, may diffuse across gills, skin and other membranes of organisms (NRC 2005, pg. 216). The sensitivity of individual species and life stages is highly variable, but embryonic and larval life stages are usually more sensitive than adults (NRC 2005, pg. 207). Narcosis is a typical form of impact from these exposures and can result from both PAHs and monaromatic or heterocyclic aromatic hydrocarbons (NRC 2005, pg. 216). Other work has shown cardiac toxicity to developing fish embryos (Incardona *et. al.*, 2014, pg. 1; Carls *et. al.*, 1999, p 1) resulting in mortality.

Many studies also identified photoenhanced toxicity of PAHs as a potential means of impacting surface and near surface resources exposed to an oil spill (NRC 2005, pg. 206). The DWH NRDA Trustees report (2016, pg. 1-14) found DWH oil to be ~10-100 times more toxic to invertebrates and larval fish species such as red snapper, mahi-mahi, and bay anchovies. These impacts are most likely to occur to translucent or semi-transparent pelagic larvae and organisms living in shallow water areas that ingest or otherwise absorb some PAHs and where ultraviolet light exposure is greatest. This may include oiled shorelines. This type of impact may not be prominent among opaque organisms (e.g. adult fish, invertebrates, mammals, etc.) or organisms that migrate into the photic zone during the night and retreat to depths during the day (NRC 2005, pg. 225). The effects will occur in the shallow ocean waters whether the oil is naturally or chemically dispersed, but dispersion of an oil slick may reduce the surface area of oil impacting the photic zone and the time it is there.

Influence of Climate Change on Species Habitats in the Action Area

Climate change has an influence on baseline conditions related to both habitat and species, and the status of ESA-listed and proposed species and their designated and proposed critical habitat that cannot be ignored but is difficult to assess. The increasing rate of global climate change is supported by a preponderance of scientific evidence (Ecology 2012, pg. 40). Observed and predicted impacts to NW habitats include: warmer air and water temperatures; more frequent and severe extreme weather events (e.g., heavy rainfall, flooding, high temperatures, and drought) and wildfires; increasing winter temperature shifting snowfall to rain and timing of melting snow and ice to earlier in the season; rising sea levels; and increased marine salinity and reduced marine pH (acidification). These impacts are predicted to continue (and in some cases accelerate), which may substantially affect the ESA-listed species and their habitats considered in the BA, the incidence of oil and hazardous substance spills, and, consequently, spill responses.

The changing climate is expected to affect species and habitats in many different ways. For example, the distribution of shoreline-dependent species will shift as a consequence of rising sea levels. The California Current Large Marine Ecosystem will see northern shifting isotherms, which will shift species distribution as well as increase ocean stratification, impeding nutrient transport and plankton production (NOAA Fisheries 2016, pg. 11).

Migration patterns of salmonids are also expected to be affected by changing water temperatures (Ecology 2012, pg. 22). As a result of increasing typhoon frequency, changing water temperatures, and increasing oceanic salinity (each related to climate change), green sea turtles (*Chelonia mydas*) may experience threats, including (but not limited to), nest failure and an unstable prey base (Duarte 2002, pg. 193).

The reduction of prey and alteration of food webs caused by climate change and ocean acidification have the potential to impact ESA-listed species.

Climate change has the potential to impact the number or rate of oil and hazardous substance spill incidences and subsequent spill responses. Oil refineries and associated storage tanks are located along shorelines to facilitate the offloading and transfer of oil and petroleum products. As a result, these facilities are located in areas vulnerable to sea level rise. Industrial infrastructure, including pipelines, tanks, and containment areas, was designed and built based on current water levels, and changing water levels could cause ground and infrastructure instability (Ecology 2012, pg. 18).

Increased flooding from heavy rains, sea level rise, saltwater intrusion, and storm surge could also play a role in changing oil spill incidences from facilities, as many facilities were built for the current environment without regard to climate change (Ecology 2012, pg. 17). Increased storm event frequency and severity could increase risk of spills (e.g., vessel incidents) (Ecology 2012, pg. 84).

Appendix I: Effects of the Action Considerations (applies to all species and critical habitats – literature cited section for this information is contained in the main text)

Analytical Approach Used in the BA

The potential consequences from implementation of the proposed action on ESA-listed species and their critical habitat were evaluated in the BA in a step-wise process by first assessing the likelihood of exposure to spill response actions and then analyzing the consequences of those spill response actions on ESA-listed species and critical habitat.

In the first step of the BA analysis, if there was no likelihood of exposure, then effects of the action were concluded to be discountable. If effects of the action were not discountable (i.e., individuals may be exposed to the action or stressors of the action), then the potential consequences of a spill response on species or their critical habitat were analyzed in greater detail. In this second step of the analysis, consequences of spill response actions on ESA-listed species and critical habitat were evaluated to assess if they can be concluded to be insignificant. The second step considers the implementation of conservation measures. Species for which the consequences of response activities are concluded to be neither discountable nor insignificant (i.e., measureable and potentially adverse) were evaluated further. Table ES-1 in the BA presents the outcome of this analysis and the determinations for the ESA-listed species and designated critical habitat that overlap with the action area.

Environmental Fate and Toxicity of Dispersant and Dispersed Oil

Recent BAs for Alaska and California provide comprehensive reviews of the properties, toxicity, and fate and transport of dispersants when applied to oil (USCG and EPA 2014, entire; USCG and EPA 2015, entire). Appendix B from the BA prepared for the Alaska Unified Plan is included in Appendix E of the subject BA. The EPA and USCG received a copy of the completed consultation on the California Dispersant Plan (CDP) from the NMFS (NMFS 2018, entire; see BA Appendix E). The concurrence letter from the NMFS included the most recently available information on dispersants, including the Natural Resources Damage Assessment (NRDA) report from the DWH oil spill. In order to meet its obligation to include the best available science, the EPA and USCG incorporated the CDP analysis of dispersants into the subject BA together with the concurrence letters from the NMFS (2018, entire; see BA Appendix E) and USFWS (2017, entire, see BA Appendix E).

As noted above, one of the objectives in using dispersants is to reduce the concentration of oil in water. The following is excerpted from the NMFS CDP letter to the EPA and USCG:

Bejarano et. al. (2014, pp. 732-742) conducted a recent review of oil spill literature and noted that field trials showed initial high oil concentrations within the top few meters rapidly declining within minutes to hours (≤4 hours) to concentrations of 1 ppm or less following dispersant application. This is also evident from monitoring during the DWH response that showed a maximum total petroleum hydrocarbon concentration of 2 ppm at 1m depth approximately 30 minutes after chemical dispersion of a weathered oil slick at the surface. BenKinney et. al. (2011, pp. abs368) noted that dispersed oil concentrations at 10m depth were consistent with background concentrations while monitoring aerial dispersant applications during the DWH response. Several additional older studies showing similar patterns (NMFS 2018, pg. 9; see BA Appendix E).

The primary potential impacts associated with the application of dispersants are direct toxicity of the dispersant and dispersed oil to exposed prey organisms (e.g., plankton and larval fish) and hypothermia due to a loss of insulating oils and disruption of feather structure (Duerr et al. 2011, pg. abs252). Direct contact with dispersants or dispersed oil has been speculated to irritate eye tissues, and aspiration thought to result in chemical pneumonia (CDC and ATSDR 2010, pg. 2). Depending on the formulation and application rate, dispersant toxicity will vary. However, exposure and toxicity are expected to be acute (rather than chronic) because of the rapid rate at which dilution occurs after application (Gallaway et al. 2012, pg. 718), as well as the short half-life of dispersants (e.g., less than 28 days for individual components of Corexit® EC9500A) (EPA an USCG 2018, Appendix B).

The toxicity of oil comes from the bioavailability and toxicity of individual hydrocarbons that make up the oil and relates to their solubility in water. Dissolved hydrocarbons, whether chemically or naturally dispersed, may diffuse across gills, skin and other membranes of organisms (NRC 2005, pg. 216). The sensitivity of individual species and life stages is highly variable, but embryonic and larval life stages are usually more sensitive than adults (NRC 2005, Chapter 5, entire; DWH NRDA Trustees 2016, pg. 4-95; Bejarano et al. 2014, pg. 738). Narcosis is a typical form of impact from these exposures and can result from both PAHs [polycyclic aromatic hydrocarbons] and monaromatic or heterocyclic aromatic hydrocarbons (NRC 2005, pg. 219). Other work has shown cardiac toxicity to developing fish embryos (Incardona et. al., 2014, pg. E1510; Carls et. al. 1999, pg. 489) resulting in mortality.

Many studies also identified photoenhanced toxicity of PAHs as a potential means of impacting surface and near surface resources exposed to an oil spill (NRC 2005, pg. 223). The DWH NRDA Trustees report (2016, pg. 4-95) found DWH oil to be ~10-100 times more toxic to invertebrates and larval fish species such as red snapper, mahi-mahi, and bay anchovies. These impacts are most likely to occur to translucent or semi-transparent pelagic larvae and organisms living in shallow water areas that ingest or otherwise absorb some PAHs and where ultraviolet light exposure is greatest. This may include oiled shorelines. This type of impact may not be prominent among opaque organisms (e.g., adult fish, invertebrates, mammals, etc.) or organisms that migrate into the photic zone during the night and retreat to depths during the day (NRC 2005, pg. 225). The effects will occur in the shallow ocean waters whether the oil is naturally or chemically dispersed, but dispersion of an oil slick may reduce the surface area of oil impacting the photic zone and the time it is there.

The National Research Council (NRC) (1989, pg. 154) concluded that the acute lethality of dispersed oil is primarily associated with the dissolved oil constituents, and very little with the dispersant itself. The NRC (2005) presented data from many studies to further illustrate that COREXIT 9500 and 9527 are significantly less toxic to multiple species compared to oil and dispersed oil. EPA (2010a, Hemmer et. al., 2011) tested several dispersant formulations during the DWH oil spill response due to the concerns of the public about the volume of COREXIT dispersants being applied. These tests included COREXIT 9500 and the two NOKOMIS products subject to the CDP consultation. The EPA reconfirmed that COREXIT 9500 and the NOKOMIS dispersants were much less toxic than the test oil (Louisiana sweet crude) and the dispersed oil. Numerous other studies have also found that dispersants alone were less toxic than the oils they were tested with (Adams et. al., 2014, pg. 7; Coelho et. al., 2011, pg. abs416; M. Fuller et. al., 2004, pg. 3).

The NRC (2005, pg. 229) further concluded that there was no compelling evidence that chemically dispersed oil is more toxic than physically dispersed oil when the comparisons of toxicity are based upon the measured concentrations of petroleum hydrocarbons in the water column rather than the nominal concentration of oil in water. The NRC (1989, pg. 84) noted that dispersant toxicity thresholds were often reported as nominal concentrations (the total amount of dispersant or oil divided by the total volume of water in the experiment's design) rather than measured concentration of the compounds to which organisms were actually exposed. The (NRC 1989, pg. 129) noted that 2/3 of the literature published prior to 1987 presented nominal concentration data rather than measured concentrations and they concluded that a substantial number of these early studies misinterpreted the toxicity data because of this experimental technique. The NRC (2005, pg. 84) determined that the nominal concentration method was no longer generally acceptable for toxicity evaluations involving oil and that standardized protocols (Aurand and Coehlo 2005, pg. 1) were necessary for future work.

To provide further analysis of this point following a number of papers published post-DWH that used the nominal concentration method, Bejarano et. al. (2014, entire) compiled a large number of paired data sets from studies conducting water accommodated fractions (WAF or naturally dispersed) and chemically enhanced water accommodated fractions (CEWAF or chemically dispersed) exposure experiments. It differentiated between the data by experimental design (nominal v. measured concentrations of oil loading) and found that the acute toxicity of CEWAF can be grossly over predicted when using the outdated nominal concentration methods. For the COREXIT products, there were 329 measured WAF-CEWAF paired data points for individual species from 36 independent studies. 89% of this paired data for COREXIT 9527 (n=67) had CEWAF ≤ WAF in toxicity. When CEWAF was determined to be more toxic, it was only between 1.62 and 1.76 fold more toxic, which is within the degree of repeatability for standard acute toxicity testing. However, when nominal concentrations were used, CEWAF was more toxic than WAF in 80% of the paired-data set by 1.1 to >1000 fold.

There are 262 paired records available for COREXIT 9500 in this examination and 78% of measured data points showed CEWAF ≤ WAF in toxicity with most (76%) within threefold of the WAF value. However for the nominal concentration information, 93% of the data had CEWAF as more toxic than WAF by 1.2 to >1000-fold. The critical review (Bejarano et al. 2014, entire) determined that the nominal concentration method is not a reliable metric of toxicity.

Dispersants also mitigate the toxic effects of oil exposure to water column resources by reducing the duration and concentration of exposure through increased, rapid dilution (NMFS 2015, pg. 109; NRC 2005, pg. 216; 2003). This results in another conflict with large portions of the scientific literature (especially older studies but also many recent studies following DWH) regarding the time of exposure and determinations of toxicity based upon experiments with unrealistic exposure scenarios. The environmentally realistic scenario for the use of oil spill dispersants under consideration in the preapproval zone of the CDP will result in an exposure to dispersed oil that will rapidly spike and then dilute as the treated oil disperses deeper into the water column and is advected away from the surface slick (Aurand and Coelho 2005, pg. 2). As discussed previously, the concentrations to which an organism may be exposed in the water column rapidly dilutes within minutes to hours (≤4 hours) to low (≤1 ppm) or background levels (Bejarano et. al. 2014, pg. 733). However, a very large proportion of the studies generate information using traditional toxicological experiment designs, i.e., continuous 24 to 96-hour exposures of organisms to dispersants and dispersed oil, despite these time periods being considered invalid. Longer than realistic exposures lead to overestimates of toxicity.

Clark et. al., (2001, pg. 1249) found that spiked exposure conditions were up to 36 times less toxic than constant exposure conditions for COREXIT 9500 and 9527 when tested with three types of oil on five different species. Fuller et. al. (2004, pg. 2946) found declining exposures of dispersed oil to be clearly less toxic than constant exposures by a factor of nine while, in a paper that compared the results of numerous published data sets, George-Ares and Clark (2000, pg. 897) found that the LC50 values for the most sensitive species in the spiked exposure experiments exceeded the maximum measured COREXIT 9500 and 9527 concentrations in field trials in most cases. Greer et. al. (2012, pg. 1324) found that pulse exposures of Arabic light crude with COREXIT 9500 were not toxic to Atlantic herring while COREXIT 9500 and Alaska north slope crude resulted in toxicity at concentrations 15 minutes post mixing, but not at 30 or 60 minutes.

Dispersants may also aid in the biodegradation process by greatly increasing the surface area of the spilled oil available to bacteria although the observed rates vary among studies with some even showing the rate of biodegradation initially slows (Abbriano et al. 2011, pg. 297; Kleindienst et al. 2015, pg. 14900; Prince 2015, pg. 6378). The COREXIT dispersants themselves are biodegradable (George-Ares and Clark 2000, pg. 897; NRC 2005, pg. 166), but no information was found regarding the NOKOMIS products. In general, biodegradation will take place over a matter of weeks to years and may never be complete based upon the type of oil spilled, the microbial community present and a number of environmental factors (Fingas 2014, pg. 2; NRC 2005, pg. 194). The application of dispersants may affect the biodegradation rate, but removing the oil from the surface of the ocean and causing the rapid dilution of the resultant oil droplets in suspension is their intended purpose.

Appendix J: Cumulative Effects Analysis Included in the BA

Water Management

The Federal Columbia River Power System (FCRPS) comprises 33 hydroelectric projects, located on the mainstem Columbia River and in several of its major tributaries in the Columbia River Basin. FCRPS provides about one third of the electricity used in the Pacific Northwest. The Bureau of Reclamation and the U.S. Army Corps of Engineers planned, designed, constructed; and own and operate the federal water projects in the Pacific Northwest.

FCRPS operations affect 13 anadromous species of salmon and steelhead and two resident species (bull trout and sturgeon), all listed for protection and impacted by the federal dams (see https://www.usbr.gov/pn/fcrps/index.html). The ESA requires the three agencies that operate the FCRPS, called the FCRPS action agencies (action agencies), to ensure their actions are not likely to jeopardize the continued existence of a listed species, or result in the destruction of critical habitat. The action agencies consult with the NMFS on FCRPS operations for salmon and steelhead, and with the USFWS on hydrosystem impacts to sturgeon and bull trout. The regulatory agencies issue biological opinions to the action agencies on the operation and maintenance of the FCRPS. The action agencies are currently operating under the 2019 FCRPS biological opinion issued by NOAA Fisheries, working closely with the affected states and 13 tribes. A consultation on species and critical habitats in USFWS jurisdiction is in progress.

Urban and Agricultural Development

As urban populations and agricultural demands grow in the NW, urban and agricultural development is increasing. Loss and alteration of wetland habitat due to urbanization is a major stressor contributing to the decline in Oregon spotted frog occurrence and population size (Hallock 2013, pg. 37). Development has resulted in the fragmentation of habitat for t the Oregon spotted frog, limiting metapopulation dynamics including migration.

Urban and agricultural development has resulted in widespread depletion, fragmentation, and modification of plant and butterfly habitat. The species listed have narrow ecological requirements, which make them particularly vulnerable to changes or loss in their habitat. This is true for Taylor's checkerspot butterfly and golden paintbrush that are affected by the continued degradation, loss, and fragmentation of their native prairie ecosystem (USFWS 2010, pg. II-37). The degradation of habitat includes invasion by non-native plant species (Potter 2016, pg. 6).

Applegate's milk-vetch occurs at six locations around the city of Klamath Falls, Oregon. Two of the locations are on state-protected lands but the other four are threatened by continued development. For example, the largest occurrence of Applegate's mild-vetch is found at the Klamath Falls Airport, which is expanding into wetlands important for the species (USFWS 2009, pg. 4).

The Oregon silverspot butterfly's primary habitat is salt-spray meadows. Good habitat has been in steady decline due to an increase in residential, business, and recreational development in the coastal prairie habitat (USFWS 2011b, pg. 11).

At the time of listing, water howellia habitats were threatened by destruction or modification by timber harvesting practices, livestock grazing, human-related development, altered hydrology, and invasive species (59 FR 35860, July 14, 1994). USFWS has updated the status of water howellia and concluded that water howellia more widely distributed than known at the time of listing, and have recently proposed to remove the water howellia from the Federal List of Endangered and Threatened Plants (84 FR 53380, October 7, 2019).

Spalding's catchfly is threatened by habitat loss due to human development, habitat degradation associated with grazing and trampling by domestic livestock and wildlife, and invasions of aggressive nonnative plants (USFWS 2007, pg. 65).

Timber harvest in the NW, particularly in Washington, has resulted in significant degradation of marbled murrelet nesting habitat. In Washington, there was a 30% net loss of potential murrelet nesting habitat between 1993 and 2012 as a result of timber harvest (Desimone 2016, pg. 5).

Increased human activity in the marine environment (e.g., increased vessel traffic, increased fishing, and shoreline alteration) has had a long-term influence on marbled murrelet populations in the Salish Sea (Desimone 2016, pg. 12).

Due to the location of western snowy plover populations, urban and agricultural development are less significant threats to the plover, aside from "human encroachment" due to increased recreational use of marine shoreline habitat. Human recreational activities may degrade important nesting and foraging habitat and disturb nesting, brooding, or foraging plovers (77 FR 36727, June 19, 2012).

Agricultural and urban development is one of the primary long-term threats to the streaked horned lark due to the conversion (i.e., loss) and degradation of lark habitats. In the Willamette Valley, Oregon, the human population is projected to double by 2050 (78 FR 61451, October 3, 2013), which will require increased development of urban infrastructure and, in turn, the potential loss of streaked horned lark habitat. Airports are a common habitat for streaked horned larks, and airport expansions have resulted in lost foraging habitat. While there are stressors associated with agricultural activities, agricultural lands also provide some important habitat features for the streaked horned lark. Permanent loss of farmland supporting the species may result from increased population growth and associated suburban development (78 FR 61451, October 3, 2013).

Permitted Discharges

Pollution is introduced into freshwater, estuarine, and marine habitats from private (e.g., industrial) and public (e.g., municipal wastewater) sources, and this pollution is regulated by a permitting process. Although the National Pollution Discharge Elimination System program is overseen by the EPA at the federal level, many states, including Washington and Oregon, have primacy over the permitting process for discharges of waste to surface waters within the respective states. Therefore, consequences resulting from exposures to permitted discharges within Oregon and Washington can be considered cumulative.

By consuming either contaminated fish or invertebrates, marbled murrelet, western snowy plover, and streaked horned lark may in turn be exposed to and accumulate contamination in their bodies (Fry 1995, pp. 257-260). The accumulation of pollutants such as dioxins/furans, polychlorinated biphenyls, and mercury (among many others) in birds can cause toxic consequences resulting in reduced growth, reproduction, and survival (e.g., Scheuhammer 1987, pp. 263-295; Henning et al. 2003, pp. 2783-2788; Augspurger et al. 2008, pp. 659-669; Burgess and Meyer 2008, pp. 83-91).