UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

**Refer to NMFS No: WCR-2014-832**

February 9, 2015

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Re: Programmatic Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Habitat Restoration Projects in the Salmon River Basin (HUC 170602), Clearwater River Basin (HUC 170603), Hells Canyon Subbasin (HUC 17060101), and Lower Snake-Asotin Subbasin (HUC 17060103), Idaho

Dear Mr. Carrier, Ms. Rasure, Ms. Krueger, Mr. Murphy, Ms. Urbanek, Mr. Burwell, and Ms. Stark:

The enclosed document contains a programmatic biological opinion (Opinion) prepared by the National Marine Fisheries Service (NMFS) pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of habitat restoration projects in Idaho. Habitat restoration projects will be funded, permitted, or implemented by NMFS, U.S. Army Corps of Engineers (COE), Bureau of Reclamation (BOR), Natural Resources Conservation Service (NRCS), U.S. Forest Service (USFS), and the Bureau of Land Management (BLM). In this Opinion, NMFS concludes that the action, as proposed, is not likely to jeopardize the continued existence of Snake River sockeye salmon, Snake River fall Chinook salmon, Snake River spring/summer Chinook salmon, and Snake River Basin steelhead, or result in the destruction or adverse modification of designated critical habitat for Snake River sockeye salmon, Snake River fall Chinook salmon, Snake River spring/summer Chinook salmon, and Snake River Basin steelhead.

As required by section 7 of the ESA, NMFS provides an incidental take statement with the Opinion. The incidental take statement describes reasonable and prudent measures (RPMs) NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this action. The take statement sets forth nondiscretionary terms and conditions, including reporting requirements, that the Federal agency and any person who performs the action must comply with to carry out the RPMs. Incidental take from actions that meet these terms and conditions will be exempt from the ESA take prohibition.

This document also includes the results of our analysis of the action's likely effects on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and includes three Conservation Recommendations to avoid, minimize, or otherwise offset potential adverse effects on EFH. These Conservation Recommendations are an identical set of the ESA terms and conditions. Section 305(b)(4)(B) of the MSA requires Federal agencies to provide a detailed written response to NMFS within 30 days after receiving these recommendations.

If the response is inconsistent with the EFH Conservation Recommendations, the Federal action agency must explain why the recommendations will not be followed, including the justification for any disagreements over the effects of the action and the recommendations. In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many Conservation Recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, in your statutory reply to the EFH portion of this consultation, we ask that you clearly identify the number of Conservation Recommendations accepted.

If you have questions regarding this consultation, please contact Sarah Fesenmyer, Northern Snake Basin Branch Office, at (208) 378-5660, or sarah.fesenmyer@noaa.gov.

Sincerely,

Michael Tehan

for William W. Stelle, Jr.
Regional Administrator

Enclosure

(ccs on following page)

cc: Pam Druliner – USFWS
Deb Koziol – NRCS
Scott Hoefer – BLM
Duane Mitchell – COE
Jeff Peterson – BOR
Mike Edmondson – Idaho Governor's Office of Species Conservation
Scott Spaulding – USFS
Lee Jacobson – USFS
Katherine Thompson – USFS
Clayton Nalder – USFS
Mark Moulton – USFS
Bob Rose – USFS
Cecilia Seesholtz – USFS

bcc: SBAO Read File
SBAO File Copy
S. Fesenmyer (electronic copy)
K. Troyer (electronic copy)

Fesenmyer:Troyer:Habitat Restoration Projects:am:02/05/2015:WCR-2014-832

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**Endangered Species Act Section 7(a)(2) Programmatic Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation**

Habitat Restoration Projects in the Salmon River Basin (HUC 170602), Clearwater River Basin (HUC 170603), Hells Canyon Subbasin (HUC 17060101), and Lower Snake-Asotin Subbasin (HUC 17060103), Idaho

NMFS Consultation Number: WCR-2014-832

Action Agencies: National Marine Fisheries Service, U.S. Army Corps of Engineers, Bureau of Reclamation, Natural Resources Conservation Service, U.S. Forest Service, and the Bureau of Land Management

Affected Species and Determinations:

| ESA-Listed Species | Status | Is Action Likely to Adversely Affect Species or Critical Habitat? | Is Action Likely to Jeopardize the Species? | Is Action Likely to Destroy or Adversely Modify Critical Habitat? |
|---|---|---|---|---|
| Snake River Basin steelhead (*Oncorhynchus mykiss*) | Threatened | Yes | No | No |
| Snake River fall Chinook (*O. tshawytscha*) | Threatened | Yes | No | No |
| Snake River spring/summer Chinook (*O. tshawytscha*) | Threatened | Yes | No | No |
| Snake River sockeye salmon (*O. nerka*) | Endangered | Yes | No | No |

| Fishery Management Plan that Describes EFH in the Project Area | Does Action Have an Adverse Effect on EFH? | Are EFH Conservation Recommendations Provided? |
|---|---|---|
| Pacific Coast Salmon | Yes | Yes |

**Consultation Conducted by:** National Marine Fisheries Service, West Coast Region

**Issued By:** for William W. Stelle, Jr.
Regional Administrator

**Date:** February 9, 2015

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|---|---|
| BA | Biological Assessment |
| BLM | Bureau of Land Management |
| BMP | Best Management Practices |
| BOR | Bureau of Reclamation |
| BPA | Bonneville Power Administration |
| cfs | cubic feet per second |
| COE | U.S Army Corps of Engineers |
| CWA | Clean Water Act |
| dB | Decibel |
| DPS | Distinct Population Segment |
| DQA | Data Quality Act |
| EEC | Estimated Environmental Concentration |
| EFH | Essential Fish Habitat |
| ELJ | Engineered Logjam |
| EPA | U.S. Environmental Protection Agency |
| ESA | Endangered Species Act |
| ESU | Evolutionarily Significant Unit |
| FR | Federal Register |
| FCRPS | Federal Columbia River Power System |
| HIP | Habitat Improvement Program |
| HUC | Hydrologic Unit Code |
| ICBTRT | Interior Columbia Basin Technical Recovery Team |
| IDEQ | Idaho Department of Environmental Quality |
| IDFG | Idaho Department of Fish and Game |
| ITS | Incidental Take Statement |
| LWD | Large Woody Debris |
| MPG | Major Population Group |
| mph | Miles Per Hour |
| MSA | Magnuson Stevens Act |
| MSO | Methylated Seed Oil |
| NMFS | National Marine Fisheries Service |

| | |
|---|---|
| NRCS | Natural Resources Conservation Service |
| NTU | Nephelometric Turbidity Units |
| OHWM | Ordinary High Water Mark |
| Opinion | Biological Opinion |
| PCE | Primary constituent element |
| PCSRF | Pacific Coast Salmon Recovery Fund |
| PFMC | Pacific Fishery Management Council |
| PIT | Passive Integrated Transponder |
| RPM | Reasonable and Prudent Measure |
| Screen Shop | Idaho Department of Fish and Game Screen Shop |
| SERA | Syracuse Environmental Research Associates, Inc. |
| USFS | United States Forest Service |
| USFWS | U.S. Fish and Wildlife Service |
| VSP | Viable Salmonid Populations |
| WAF | Water Accommodated Fraction |

# 1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3 below.

## 1.1 Background

This biological opinion (Opinion) was prepared by the National Marine Fisheries Service (NMFS) in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531, *et seq*.), and implementing regulations at 50 CFR 402. NMFS also completed an essential fish habitat (EFH) consultation. It was prepared in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801, *et seq*.) and implementing regulations at 50 CFR 600. The Opinion and EFH Conservation Recommendations are both in compliance with section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-5444) ("Data Quality Act") and underwent pre-dissemination review.

## 1.2 Consultation History

NMFS, U.S. Army Corps of Engineers (COE), Bureau of Reclamation (BOR), Natural Resources Conservation Service (NRCS), U.S. Forest Service (USFS), and the Bureau of Land Management (BLM), collectively called the *action agencies*, initiated a programmatic consultation for routine aquatic habitat restoration projects throughout 18 subbasins in central Idaho (Table 5 in Section 1.4 of this Opinion). All of these action agencies fund, permit, or implement stream restoration projects in central Idaho. Such projects will restore degraded habitat conditions and promote recovery of ESA-listed salmon and steelhead. NMFS estimates that the action agencies will collectively implement between 10 and 20 projects per year under this programmatic consultation, based on the number of individual consultations in past years on habitat restoration projects, but a greater number of projects per year are possible. Projects are likely to occur throughout central Idaho.

NMFS drafted a biological assessment (BA) and circulated the first draft to the other action agencies on July 9, 2013. NMFS then revised the BA in response to suggestions from the other action agencies on how to refine the description of the action and provide appropriate conservation measures and protocols. On October 21, 2013, NMFS circulated a revised BA to the action agencies. On December 6, 2013, NMFS met with the U. S. Fish and Wildlife Service (USFWS) to discuss the proposed action. Between December 2013 and March 2014, NMFS worked with USFWS to further refine the proposed action in order to minimize impacts to bull trout and terrestrial ESA-listed species. NMFS finalized the BA and submitted it to USFWS on May 28, 2014, and this Opinion is based on information provided in that BA. A complete record of this consultation is on file at NMFS Snake Basin Area Office in Boise, Idaho.

Because this action has the potential to affect tribal trust resources, copies of the draft Opinion were provided to the Nez Perce Tribe and Shoshone-Bannock Tribes on May 28, 2014. Comments were not received from the tribes.

## 1.3 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02). There are no interrelated or interdependent actions associated with this action. The proposed action is the funding, permitting, or implementation of routine aquatic habitat restoration projects by one or more of the action agencies.

### 1.3.1 Action Agencies

The action agencies in this programmatic consultation are NMFS, COE, BOR, NRCS, USFS, and the BLM. Here we describe the mechanisms through which each agency funds, permits, or implements habitat restoration projects in Idaho.

NMFS provides funding for habitat restoration projects through the Pacific Coast Salmon Recovery Fund (PCSRF) and the Mitchell Act. The PCSRF was established by Congress to protect, restore, and conserve Pacific salmon and steelhead populations and their habitats. Under the PCSRF, NMFS manages a program to provide funding to states (including Idaho) and tribes of the Pacific Coast region. Congress passed the Mitchell Act in 1938 to provide for the conservation of salmon and steelhead fishery resources of the Columbia River. One component of the program is the construction, operation, and maintenance of screens at irrigation diversions to protect juvenile salmon and steelhead in Oregon, Washington, and Idaho. This component has been addressed in an existing informal consultation. This consultation incorporates by reference the analysis contained in the existing informal consultation on the Mitchell Act Irrigation Diversions Screening Programs, completed on January 31, 2000 (NMFS 2000a). The informal consultation covered the construction, operation, and maintenance of fish screens under the Mitchell Act program, except for projects involving significant instream construction. This programmatic habitat restoration consultation will also cover inwater work activities associated with fish screen installations that were not covered in the January 31, 2000, Mitchell Act informal consultation.

The COE regulates activities in waters of the United States through section 404 of the Clean Water Act (CWA) of 1972 and Section 10 of the Rivers and Harbors Act of 1899. Under Section 404 of the CWA, a Department of the Army permit, issued through the COE, is required for the discharge of dredged or fill material into all waters of the United States, including special aquatic sites such as wetlands and vegetated shallows. Under Section 10 of the Rivers and Harbors Act, a Department of the Army permit, issued through the COE, is required for any structure or work that occurs in, above or under navigable waters of the United States or affects the course, location, condition or capacity of such waters. Habitat restoration projects that alter stream channels or streambanks often require a permit from the COE.

Reclamation works in partnership with local landowners, representatives from states, tribes, other Federal agencies, and conservation groups on habitat projects to improve spawning and rearing habitat for Columbia River Basin salmon and steelhead listed under the ESA. Reclamation's Tributary Habitat Program was initiated in 2000 to mitigate for the impacts of the Federal Columbia River Power System on salmonids. The program is focused on providing technical services including project coordination, environmental compliance, permit application, engineering design, and construction monitoring to local project sponsors who obtain Federal, state, and private funding to construct the habitat projects. In Idaho, BOR's Tributary Habitat Program currently includes the Little Salmon, Upper Salmon, Lemhi, Yankee Fork and Pahsimeroi River subbasins, but could expand to other Idaho subbasins in the future. Projects in other subbasins occupied by ESA-listed anadromous fish would also be covered under this programmatic consultation. Reclamation contributions focus on instream habitat projects that: (1) Increase streamflow through acquisition or lease of water rights, or through improved irrigation efficiency; (2) remove barriers to improve access to a greater range of spawning and rearing habitat; (3) replace screens on water diversions to reduce entrainment of fish in water delivery systems; (4) increase channel complexity; or (5) reconnect side-channels and floodplains to main stream channels. Reclamation currently focuses on the project categories listed above, but could engage in any of the other project categories included in this programmatic consultation.

The NRCS provides technical and financial assistance to private landowners and others for habitat restoration projects with funding the agency administers under the Federal Farm Bill. The NRCS also participates as a partner organization in habitat restoration projects that utilize other funding sources. The NRCS contributes technical expertise in an array of disciplines to these projects.

The USFS administers public lands throughout Idaho, covering many miles of stream and riparian habitat. This consultation will cover USFS habitat restoration actions for which there is not a pre-existing consultation in place. For categories of habitat restoration activities for which the USFS has an existing programmatic consultation in place with NMFS for anadromous watersheds in Idaho (e.g., stream road crossings, weeds treatment), such activities will continue to be covered under the existing programmatic consultation, as explained below under descriptions of specific activity categories.

The BLM administers public lands throughout Idaho, covering many miles of stream and riparian habitat. This consultation will cover BLM habitat restoration actions for which there is not a pre-existing consultation in place. For categories of habitat restoration activities for which the BLM has an existing programmatic consultation in place with NMFS for anadromous watersheds in Idaho (e.g., stream road crossings, weeds treatment), such activities will continue to be covered under the existing programmatic consultation, as explained below under descriptions of specific activity categories.

1.3.2 Program Implementation Procedures

A habitat restoration project conducted under this consultation may involve multiple parties: one or more Federal agencies, a Project Sponsor, a private landowner, and contractors. This Opinion refers to the Project Sponsor as the entity planning and implementing an individual project. The Project Sponsor will most often be non-federal (e.g., Trout Unlimited or the Nez Perce Tribe), but could in some cases be the Federal action agency itself (e.g., USFS). If there are multiple action agencies involved in an individual project, the action agencies will choose one agency to be the lead action agency for the project. The lead action agency will ensure that the Project Sponsor follows all applicable conservation measures and submits all applicable pre- and post-project reports to NMFS and USFWS. A Federal action agency may also choose to complete project documentation for the Project Sponsor (e.g., NRCS or COE working with a private landowner).

If one or more action agency intends to fund, permit, or carry out an individual project under this programmatic consultation, the lead action agency will first briefly confirm, via a phone call or email to the local NMFS biologist or NMFS Snake Basin Area Office in Boise, that the project will fit under the parameters and conservation measures of this programmatic. The lead action agency will then provide the Project Sponsor with a Project Information Form (Appendix A). The Project Information Form will specify the lead action agency for the project. The lead action agency will ensure that the Project Sponsor completes and submits the Project Information Form to NMFS and USFWS (and simultaneously to all other action agencies involved in the project) at least 60 days before initiating the project (or 90 days in some cases, as explained below). NMFS and USFWS will review the project information and determine whether additional information or a site visit is necessary. If NMFS or USFWS determines that a site visit is necessary, the Project Sponsor and lead action agency will coordinate a site visit for NMFS and/or USFWS staff at least 30 days prior to the planned project start date. NMFS and USFWS will verify, through reviewing the Project Information Form and any additional information provided by the Project Sponsor, or a site visit, that the project falls under this programmatic consultation. Before the project begins, a NMFS biologist will email the Project Sponsor (and all action agencies involved in the project) to confirm that the project fits under this programmatic consultation for listed anadromous species; and a USFWS biologist will email the Project Sponsor (and all action agencies involved in the project) to confirm that the project fits under this programmatic consultation for all other listed species. For complex projects with engineering plans, the Project Sponsor will contact NMFS as early as possible in the project development phase to allow sufficient time for a NMFS and/or USFWS site visit and discussion of applicable project design and conservation measures.

If, during implementation of a restoration project, NMFS, USFWS, or the Project Sponsor becomes aware of new information or unforeseen circumstances such that the project cannot be completed according to the scope of effects or terms and conditions of the Opinion, then NMFS and USFWS will require that the Project Sponsor stop all project operations, except for efforts to avoid or minimize resource damage, pending completion of individual consultation on the project.

The Project Sponsor will email the Project Information Form to NMFS (SnakeBasin@noaa.gov), USFWS, and to all other action agencies included in the project. The Project Sponsor will submit the Project Completion Form (Appendix B) to NMFS and USFWS within 90 days of project completion, to the same email addresses as above. If the project required dewatering for instream work, the Project Completion Form will describe all fish handling. The Project Sponsor will also list on the form any herbicides used. Reasonable land access for post-project monitoring will be a condition required for any permits covered under this programmatic.

For some restoration categories, the Project Sponsor will submit engineering plans to NMFS (attached to the Project Notification Form) so that NMFS can evaluate the plans for their consistency with the criteria in *Anadromous Passage Facility Design* (NMFS 2011a). The Project Sponsor will submit engineering plans at least 90 days before the planned project start date. The Project Sponsor will email the engineering plans to NMFS along with the Project Notification Form to SnakeBasin@noaa.gov. The categories requiring engineering review include fish screens, fish passage facilities at dams, new diversion structures, installation of grade control structures greater than 3-foot height aggregate, and channel reconstruction projects. A checklist of information to provide to NMFS is included in this BA for screens (Appendix D). For the other types of projects, the Project Sponsor will submit design plans and engineering calculations. The Project Sponsor may need to adjust the project plans in response to NMFS review.

Each action agency in this consultation will submit an annual report to NMFS and USFWS by April 1 each year, listing all projects completed under the programmatic consultation for the previous year. A representative from each action agency will participate in an annual meeting or phone call to discuss the implementation of the program, types of variances approved, how to improve conservation under the program, and how to make the program more efficient.

### 1.3.3 Categories of Habitat Restoration Activities

The proposed action consists of nine categories of restoration activities: (1) Fish Screening; (2) Fish Passage; (3) Instream Flow; (4) Instream Structures; (5) Side Channels and Floodplain Function; (6) Channel Reconstruction; (7) Riparian Habitat; (8) Road and Trail Erosion Control, Maintenance, and Decommissioning; and (9) Surveying and Monitoring. Table 1 lists these action categories and identifies specific action types included under each category. Each of the action categories are then described in more detail in Section 3.3, *Description of Action Categories and Associated Conservation Measures*. Some restoration projects may involve multiple categories.

NMFS estimates that the action agencies will collectively implement between 10 and 20 projects per year under this programmatic consultation, based on the number of individual consultations in past years on habitat restoration projects, but a greater number of projects per year are possible. Based on individual consultations in past years, projects under this programmatic consultation are likely to be distributed throughout action area (Figure 1, below); and the most frequent action categories are likely to be riparian restoration, channel and floodplain reconstruction, and instream flow projects.

**Table 1. Categories of activities under the proposed action.**

| Action Category | Specific Actions Included in the Consultation |
|---|---|
| **Fish Screening** | Install, upgrade, or maintain fish screens *(NMFS must review engineering plans for installation or upgrading of screens)* |
| **Fish Passage** | Install or improve fish passage facilities (e.g., fish ladders or other fishways) at diversion structures and other passage barriers *(NMFS must review engineering plans)*<br><br>Remove or modify water control structures (e.g., irrigation diversion structures)<br><br>Replace culverts and bridges to provide fish passage and/or to reduce risk of culvert failure and chronic sedimentation, using the stream simulation methods from NMFS (2011b). |
| **Instream Flow** | Lease or purchase water rights to improve instream flows<br><br>Change or consolidate points of diversion *(NMFS must review engineering plans)*<br><br>Increase efficiency of irrigation practices (e.g., convert open ditches to pipes, or convert surface water diversions to ground water wells) |
| **Instream Structures** | Provide grade control with boulder weirs or roughened channels *(NMFS must review engineering plans for installation of structures with greater than 3 feet height)*<br><br>Install instream habitat structures including:<br>• Rootwads, large woody debris (LWD), and log jams<br>• Boulders<br>• Spawning gravels |
| **Side Channels and Floodplain Function** | Reconnect and restore historic side channels<br><br>Modify or remove levees, dikes, berms, and fill |
| **Channel Reconstruction** | Reconstruction of existing stream channels into historic or newly constructed channels *(NMFS must review engineering plans).* |
| **Riparian Habitat** | Plant riparian vegetation<br><br>Reduce riparian impacts from livestock:<br>• Install fencing<br>• Develop livestock watering facilities away from streams<br>• Install livestock stream crossings (culverts, bridges, or hardened fords)<br><br>Control invasive weeds through physical removal or with herbicides |

| Action Category | Specific Actions Included in the Consultation |
| --- | --- |
| | Stabilize streambanks through bioengineering |
| **Road and Trail Erosion Control, Maintenance, and Decommissioning** | Decommission or obliterate unneeded roads<br><br>Relocate portions of roads and trails away from riparian buffer areas<br><br>When part of a larger restoration project, reduce sediment from existing roads:<br>• Improve and maintain road drainage features<br>• Reduce road access and usage through gates, fences, boulders, logs, tank traps, and signs<br>• Remove or stabilize pre-existing cut and fill or slide material |
| **Surveying and Monitoring** | Survey project sites:<br>• Take physical measurements<br>• Install recording devices<br>• Determine fish presence (*electroshocking for research purposes is not included under this consultation*)<br><br>Monitor project site and stream habitat after project completion<br><br>Install passive integrated transponder (PIT) tag detection arrays |

The activities covered under this consultation will be aimed at protecting or restoring fish and wildlife habitat, with long-term benefits for ESA-listed species. However, project construction activities may adversely affect ESA-listed species in the short term. In order to minimize these adverse effects, the proposed action includes a general set of conservation measures applicable to all projects, as well a set of conservation measures specific to each category of activity. This Opinion first lists the general conservation measures, and then provides a detailed description of each action category, along with specific conservation measures for each category.

### 1.3.4 General Conservation Measures

In order to minimize the magnitude and duration of short-term adverse effects on ESA-listed species and critical habitat, and to avoid a chance of long-term adverse effects, all projects under this programmatic consultation will comply with the following set of conservation measures.

**Pre-construction and Project Design Conservation Measures**

***Timing of in-water work.*** In-water work will occur only within the preferred work windows listed in Appendix C. For the Upper Salmon River Basin, the work windows are from Upper Salmon Basin Watershed Project Technical Team (2005). If the Upper Salmon Basin Watershed Technical Team updates this list, project sponsors will follow the most recent recommendations.

***Fish screens.*** All water intakes in which fish could be entrained and injured, including pumps used to isolate an in-water work area, will have a fish screen installed, operated, and maintained according to the criteria in NMFS (2011b or most current version).

***Site assessment for contaminants.*** If an action involves excavation of more than 20 yards of material in an area with past mining impacts or other land uses known to cause chemical contamination, then the Project Sponsor will complete a site assessment for contaminants. Excavation could be for side-channel habitat restoration, or set-back or removal of an existing berm, dike or levee. The site assessment will include the following elements to identify the type, quantity, and extent of any potential contamination: (1) A review of readily available records, such as former site use, building plans, records of any prior contamination events; (2) a site visit to observe the areas used for various industrial processes and the condition of the property; (3) interviews with knowledgeable people, such as site owners, operators, occupants, neighbors, and local government officials; and (4) a report that includes an assessment of the likelihood that contaminants are present at the excavation site. If the site assessment finds potential for chemical contamination of surface waters from the action, then the project will not fit under the proposed action and individual consultation on the project will be necessary.

***Site layout and flagging***. Prior to construction, the action area will be flagged to identify the following: (1) Sensitive resource areas, such as areas below ordinary high water, spawning areas, springs, and wetlands; (2) equipment entry and exit points; (3) road and stream crossing alignments; (4) staging, storage, and stockpile areas; and (5) no-spray areas and buffers for herbicides.

***Temporary erosion controls.*** Temporary erosion controls will be in place before any significant alteration of the action site, and will be appropriately installed down slope of project activity within the riparian buffer area until site rehabilitation is complete. Once the site is stabilized, temporary erosion control measures must be removed.

***Emergency erosion and chemical spill controls***. The Project Sponsor will ensure that the following materials for emergency control of erosion and chemical spill control are onsite: (1) An adequate supply of sediment control materials (e.g., silt fence, straw bales[1]); and (2) an oil-absorbing floating boom and absorbent pads whenever surface water is present.

***Temporary access roads***.

1. Do not build temporary access roads where grade, soil, or geomorphic features suggest slope instability, including slopes greater than 30%.

2. Minimize the removal of riparian vegetation when creating temporary access roads. The Project Sponsor will estimate the amount of vegetation to be removed in the Project Information Form.

[1] Certified weed-free straw or hay bales will be used to prevent introduction of noxious weeds.

3. Minimize the number and length of temporary access roads, and design roads to avoid erosion and soil compaction.

4. Minimize soil disturbance and compaction whenever a new temporary road is necessary within 150 feet of a stream, waterbody, or wetland by clearing vegetation to ground level and placing clean gravel over geotextile fabric, unless otherwise approved in writing (email) by NMFS.

5. At temporary stream crossings, equipment will cross the stream in the wet only under the following conditions:

    a. No stream crossings may occur at sites where: (1) Adults are actively spawning, or immediately upstream (300 feet) of actively spawning adults; (2) holding adult listed fish are present; or (3) eggs or alevins are in the gravel.

    b. Do not place temporary crossings in areas that may increase the risk of channel re-routing or avulsion, or in potential spawning habitat, *e.g.*, pools and pool tailouts.

    c. Minimize the number of temporary stream crossings and trips across; use existing stream crossings whenever reasonable. In habitat occupied by ESA-listed fish species, limit stream crossings in the wet to no more than two round trips, unless otherwise approved by a NMFS and USFWS biologist.

    d. Equipment and vehicles may cross the stream in the wet only where the streambed is bedrock and where the streambed is naturally stable, or where mats or off-site logs are placed in the stream and used as a crossing. Vehicles and machinery will cross streams at right angles to the main channel wherever possible.

    e. Where necessary to minimize impacts to the stream, install temporary bridges and culverts to allow for equipment and vehicle crossing over perennial streams to access construction areas.

6. When the project is completed, all temporary access roads will be obliterated, and the soil will be stabilized and revegetated. Road obliteration refers to the most comprehensive degree of road decommissioning and involves decompacting the road surface and ditch, pulling the fill material onto the running surface, and reshaping the roadbed to match the hillside contour. The Project Sponsor will obliterate temporary roads in wet areas or areas prone to flooding as soon as possible after project completion and before the start of fall rains.

***Choice and use of equipment.*** Heavy equipment will be selected (when possible) and operated in a manner that minimizes adverse effects to the environment (e.g., minimally-sized, low pressure tires, minimal hard turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils).

***Vehicle staging***. All equipment shall be cleaned and leaks repaired at least 150 feet from any natural waterbody or wetland prior to entering the project area. The Project Sponsor will remove external oil and grease prior to arriving onsite. Thereafter, equipment will be inspected daily for leaks or accumulations of grease, and any identified problems fixed before operation within 150 feet of any natural waterbody or wetland.

***Invasive species***. Inspect and, if necessary, wash vehicles and equipment to prevent introducing terrestrial invasive species prior to bringing equipment on the work site. Inspect and sanitize water craft, waders, boots, and any other gear to be used in or near water to prevent the spread of invasive species or whirling disease.

***Erosion and sediment control***. Erosion and sediment control are paramount considerations for all ground-disturbing construction activities, particularly when activities occur in or near waterways. The Project Sponsor will describe all temporary and permanent erosion and sediment control measures to be used during the project on the Project Information Form. Erosion control measures will be appropriate for site and weather conditions. The following conservation measures are designed to prevent soil erosion or to collect, retain, and treat stormwater runoff and pollutant discharges during all phases of construction:

1. A supply of emergency erosion control materials will be on hand; and temporary erosion controls will be installed and maintained in place until site restoration is complete. Temporary erosion control measures may include, but not be limited to, fiber wattles, silt fences, jute matting, wood fiber mulch and soil binder, or geotextiles and geosynthetic fabric.

2. Ground disturbance will not occur during wet conditions (i.e., during or immediately following rain events).

3. Sequence or schedule work to reduce exposed bare soil subject to wind erosion. Water may be used to control dust.

4. Vegetation may be grubbed only from areas where permanent ground alteration will occur. Vegetation is to be cut at ground level and root wads retained where temporary clearing occurs.

5. Wood fiber mulch and tackifier (hydro-applied) may be used to reduce erosion of bare soil if the Project Sponsor provides certification from the manufacturer that the materials are noxious weed free and nontoxic to aquatic and terrestrial animals, soil microorganisms, and vegetation. This certification will be available for inspection upon request by NMFS and USFWS. See the Idaho Sate Noxious Weed List found in IDAPA 02.06.22 for a list of 64 different species of weeds which are designated noxious by state law.

6. Permanent soil stabilization outside the ordinary high water mark (OHWM) is best accomplished with reestablishment of native vegetation where possible. The Project

Sponsor will begin site restoration immediately following completion of ground disturbing activities. Temporary soil stabilization measures, e.g., jute matting, are required until permanent measures are established and functioning properly. Guidance on selecting and planting native seed or plant materials, including plant densities and species composition, will be provided by technical experts familiar with local site conditions. See the following reports for detailed information on planting appropriate riparian vegetation: *How to plant willows and cottonwoods for riparian restoration* (Hoag 2007); *Native shrubs and trees for riparian areas in the intermountain west* (Tilley *et al.* 2012); *Description, propagation, and establishment of wetland-riparian grass and grass-like species in the intermountain west* (Hoag *et al.* 2011).

7. For all projects, sediment will be removed from erosion controls once the sediment has reached one-third of the exposed height of the control. If inspections show that the pollution controls are ineffective, the Project Sponsor will immediately mobilize work crews to repair, replace, or reinforce controls as necessary.

***Rewatering stream channels***. For stream channels which have been isolated and dewatered during project construction: (1) Reconstructed stream channels will be "pre-washed" into a reach equipped with sediment capture devices, prior to reintroduction of flow to the stream; and (2) stream channels will be re-watered slowly to minimize a sudden increase in turbidity.

When reintroducing streamflow to a dewatered stream reach, the Project Sponsor will monitor the stream for turbidity. An appropriate and regularly calibrated turbidity meter, measuring nephelometric turbidity units (NTUs), is required. A sample must be taken prior to expected turbidity pulses at a relatively undisturbed area approximately 100 feet upstream from inwater disturbance to establish background turbidity levels. A sample must then be taken every hour and approximately 600 feet downstream from the point of discharge, or most appropriate downstream site, during sediment pulses and be compared against the background measurement. If turbidity levels exceed 50 NTUs over background levels for two consecutive readings (2 hours), the Project Sponsor must cease work immediately and take measures to reduce turbidity before continuing to reintroduce streamflow.

***Prevention of chemical contamination from construction equipment and materials.*** The use of heavy machinery increases the risk for accidental spills of fuel, lubricants, hydraulic fluid, or similar contaminants into the riparian zone, or directly into the water, where they could adversely affect habitat, injure or kill aquatic food organisms, or directly impact ESA-listed species. In order to minimize the potential for introducing hazardous materials to the aquatic system, the Project Sponsor will adhere to the following measures:

1. No uncured concrete or form materials will be allowed to enter the active stream channel.

2. All vehicle staging, fueling, storage and washout areas will be located at least 150 feet away from aquatic areas and adequately buffered such that runoff is incapable of being delivered to surface waters or wetlands.

3. Any waste liquids generated at the staging areas will be temporarily stored under cover on an impervious surface such as tarpaulins until such time they can be properly transported to and treated at an approved facility for treatment of hazardous materials.

4. Spill containment kits adequate for the types and quantity of hazardous materials stored at the site are required.

5. All vehicles will be thoroughly cleaned before use at the site.

6. Hydraulic fluids used in any vehicle that will be operated in live water will be non-toxic to salmonids[2].

***Stockpile materials***. Any large woody debris (LWD), topsoil, and native channel material displaced by construction will be stockpiled for use during site restoration.

***Pesticide and preservative-treated wood.*** Treated wood may not be used in a structure (e.g. bridge) that will be in or over water or permanently or seasonally flooded wetlands.

**Construction Conservation Measures**

***Work area isolation***. Any work area within the wetted channel will be isolated from the active stream whenever ESA-listed fish are reasonably certain to be present, or if the work area is 300 feet upstream from spawning habitats, unless NMFS and USFWS agree in writing (email) that the work can be done with less potential risk to listed fish without isolating and dewatering the work area (e.g., placing LWD). When work area isolation is required, engineering design plans will include all isolation elements, fish release areas, and, when a pump is used to dewater the isolation area and fish could be present, a fish screen that meets NMFS's fish screen criteria (NMFS 2011a, or most current).

***Removing fish from instream work areas***. When work area isolation is required, a fish biologist will determine how to remove ESA-listed fish, with least harm to the fish, before inwater work begins. This will involve either passive movement of fish out of the project reach through slow dewatering, or actively removing the fish from the project reach. Should active removal be warranted, a fish biologist will clear the area of fish before the site is dewatered using one or more of a variety of methods including seining, dipping, or electrofishing, depending on specific site conditions. A fish biologist will conduct or supervise the following activities: slowly remove approximately 80% of the streamflow from the work area to allow some fish to leave the work area volitionally[3]; install blocknets; capture fish through seining and relocate to streams;

[2] The following criteria should be met to determine if a hydraulic fluid is nontoxic to salmonids during acute exposure: (a) The test species used should be a salmonid (most often this will be rainbow trout, but occasionally Chinook salmon or coho salmon are tested); (b) The test duration should be 96 hours; (c) The test should be conducted using the water accommodated fraction (WAF) (the WAF is used in testing hydrophobic materials to provide a "worst case scenario" for exposure to aquatic organisms); and (d) The value of the $LC_{50}$ should be >1000 mg/L. Several products on the market meet these specifications.

[3] Initial removal of approximately 80% of streamflow is likely to result in the greatest number of fish volitionally moving out of the dewatered stream reach.

electrofish to capture and relocate fish not caught during seining; continue to slowly dewater the stream reach; collect any remaining fish in cold-water buckets and relocate to the stream. Use aerators or replace the water in the buckets at least every 15 minutes with cold clear water. While block nets are set, inspect them regularly for fish and remove any living to an area far enough away to avoid additional impingement risk. All of these activities will be completed on the same day. All handling of fish, using any method, will be conducted by or under the direction of a fish biologist, using methods directed by the following: NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed Under the ESA (http://www.westcoast.fisheries.noaa.gov/publications/reference_documents/esa_refs/section4d/electro2000.pdf). For each project, the Project Sponsor will report the number of fish handled to NMFS and USFWS in the Project Completion Form (Appendix B).

***Fish passage.*** Fish passage will be provided for any adult or juvenile ESA-listed fish likely to be present in the action area during construction, unless passage did not exist before construction or the stream is naturally impassable at the time of construction. After construction, adult and juvenile passage that meets NMFS' fish passage criteria (NMFS 2011a) will be provided for the life of the action.

***Earthwork.*** Complete earthwork (including drilling, excavation, dredging, filling and compacting) as quickly as possible. During excavation, stockpile native streambed materials above the bankfull elevation, where it cannot reenter the stream, for later use.

***Rock.*** Riprap may be used to protect culvert inlet/outlets within the road prism when culvert upgrades or installation are a component of the restoration project. Rock for instream structures will not be mined from the stream.

***Construction water***. Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate. Diversions for construction water will not exceed 10% of the available flow and will have the appropriate state of Idaho permitting (i.e., temporary water right) and hoses will be appropriately screened (NMFS 2011a).

***Discharge water.*** Design, build, and maintain facilities to collect and treat all construction discharge water using the best available technology applicable to site conditions. Provide treatment to remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present.

***Stationary power equipment***. Generators, cranes, and any other stationary equipment operated within 150 feet of any natural waterbody or wetland will be maintained as necessary to prevent leaks and spills from entering the water.

***Power equipment***. Gas-powered equipment with tanks larger than 5 gallons will be refueled in a vehicle staging area placed 150 feet or more from a natural waterbody or wetland.

***Work from top of bank.*** Heavy equipment will work from the top of the bank. Heavy equipment will only work from the stream channel if the channel has been dewatered or is naturally dry.

***High flows***. Project operations will cease under high flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.

**Post-construction Conservation Measures**

***Site restoration.*** When construction is finished, all streambanks, soils, and vegetation will be cleaned and restored as necessary using stockpiled LWD, topsoil, slash, and native channel material to renew ecosystem processes that form and maintain productive fish habitats.

***Revegetation.*** Each area requiring revegetation will be replanted prior to or at the beginning of the first growing season following construction. Reestablishment of vegetation will be achieved in disturbed areas to at least 70% of pre-project conditions within 3 years. An appropriate mix of species will be used to achieve establishment and erosion control objectives, preferably comprised of forb, grass, shrub, or tree species native to the project area or region and appropriate to the site. Invasive species will not be used. Vegetation, such as willow, sedge and rush mats, will be salvaged from disturbed or abandoned floodplains, stream channels, or wetlands to be replanted during site restoration. Fencing will be installed as necessary to protect the vegetation. Surface fertilizer will not be applied within 50 feet of any stream channel, waterbody, or wetland. Short-term stabilization measures may include the use of non-native sterile seed mix (when native seeds are not available), weed-free certified straw, jute matting, and other similar techniques.

***Site access***. The Project Sponsor and lead action agency will retain the right of reasonable access to the site of actions funded, permitted, or carried out using this Opinion, such that the Project Sponsor can monitor the success of the project.

***Obliteration.*** When the project is completed, all temporary access roads will be obliterated, the soil will be stabilized, and the site will be revegetated.

### 1.3.5 Action Categories and Specific Conservation Measures

#### *1.3.5.1 Fish Screening*

***Purpose:*** To prevent fish from entering and becoming entrained in unscreened or inadequately screened diversions.

***Description:*** This category includes installing, replacing, upgrading, or maintaining off-channel screens (and fish bypass systems where applicable) to prevent fish entrapment in irrigation canals or other surface water diversions, for existing legal water diversions. Diversion water intake and return points will be designed, modified, or replaced to prevent salmonids of all life stages from swimming or being entrained into the irrigation system. Intake pipes for all purposes will be screened with mesh sizes small enough to prevent fish from entering the pipes. Salmonids will be prevented from becoming entrained or impinged by improperly designed screens. This category also covers periodic maintenance of fish screens.

All fish screens will be built to NMFS criteria, detailed in *Anadromous Salmonid Passage Facility Design* (NMFS 2011a). Most fish screens will be installed a short distance downstream from the headgate, but some may be as much as 0.1 mile below the point of diversion. Installation of a fish screen typically involves excavation, installation of bedding material, construction of forms for pouring concrete, installation of the drum screen and paddle wheel, and backfilling of bedding and other material. For smaller diversions, a modular screen may be used that does not require concrete. Estimated total area of disturbance, depending on the size of screen, may be as large as 50 feet of ditch length with a disturbance width of 25 feet. A plastic fish bypass pipe will also be installed, directing approximately 0.8 cubic feet per second (cfs) of diverted flow back to the stream. Bypass pipes are usually 8 inches to 1 foot in diameter and are buried below the ground surface by a backhoe. Pipe distances will vary from tens to hundreds of feet. Fish bypass structures will be designed and located to facilitate safe reentry of fish into the stream channel.

Since 2000, the Idaho Department of Fish and Game (IDFG) Screen Shop (Screen Shop) has installed fish screens on pump diversions and within irrigation ditches, under an informal consultation on Mitchell Act funded projects (NMFS 2000a). The analysis in that informal consultation for ESA-listed salmon and steelhead is incorporated by reference in this Opinion. Because the Screen Shop has extensive experience with design and installation of fish screens and has successfully implemented Mitchell Act funded projects for more than a decade, the Screen Shop will continue to design and install fish screens without individual review of the designs by NMFS. In lieu of submitting a Project Notification Form and engineering plans for each individual screen project, the Screen Shop will submit semi-annual progress reports listing, and briefly describing, all covered projects in the Planning/Design (Phase I), Implementation (Phase II), and Operation and Maintenance (Phase III) stages.

For fish screen projects that are not implemented by the Screen Shop, NMFS (or an individual trained by NMFS to certify that fish screen designs meet NMFS criteria) will approve screen design plans prior to screen installation, to ensure that plans are consistent with NMFS' criteria (NMFS 2011a). During the conceptual design stage (generally 3 months to 2 years prior to construction), the Project Sponsor will complete and submit to NMFS the "Fish Screen Design Plans Checklist" (*Appendix D. Fish Screen Design Plans Checklist*). NMFS will review this checklist and may: (1) Give approval to move forward with the design; (2) remain engaged with the design process if the project is of sufficient scale to warrant this; or (3) waive further engineering involvement (if a small scale project). If NMFS does not waive further NMFS involvement in the design process, the Project Sponsor will submit the final design to NMFS for review at least 90 days prior to construction (or 60 days for small projects requiring less than 2 weeks construction time).

The owner or operator of the screen is responsible for seeing that debris is periodically removed from screens within irrigation ditches, thus ensuring that structures continue to function properly and do not increase the risk of erosion by blocking ditch flow.

***Conservation Measures***

- All fish screens, including screens installed in temporary and permanent pump intakes, will be designed to meet the criteria in NMFS' *Anadromous Salmonid Passage Facility Design* (NMFS 2011a, or most recent version). Irrigation diversion intake and return points will be designed (to the greatest degree possible) to prevent all native fish life stages from swimming or being entrained into the irrigation system.

- All fish screens will be sized to accommodate the current documented diversion rate or the maximum instantaneous diversion rate associated with the legal water right, whichever is less. "Accommodate" means that screens will not be overtopped and will remain effective over the entire range of expected water diversion.

### *1.3.5.2 Fish Passage*

***Purpose:*** Restore or maintain fish passage at man-made barriers, particularly at diversion structures and at road stream crossings. The objective of this category is to allow all life stages of salmonids access to historical habitats from which they have been excluded by non-functioning structures, or by instream profile discontinuities resulting from insufficient depth or excessive jump heights and velocities. Additionally, at road stream crossings, prevent streambank and roadbed erosion, facilitate natural sediment and wood movement, and eliminate or reduce excess sediment loading.

Fish passage improvement projects covered under this consultation include: (1) Installing or improving fish passage facilities at existing barriers; (2) removing or modifying artificial barriers (e.g., diversion structures) to create passage; and (3) replacing culverts or bridges at stream road crossings to benefit fish habitat. For projects covered under this consultation, the proposed action also includes periodic maintenance of fish passage facilities to ensure proper function, such as cleaning debris buildup or replacing parts.

Fish Passage Facilities

***Description:*** The Project Sponsor may propose to: (1) Re-engineer improperly designed fish passage facilities; (2) complete periodic maintenance of fish passage facilities to ensure proper function (*e.g.*, cleaning debris buildup, replacement of parts); or (3) install a fish ladder at an existing facility. Construction of fish passage facilities is limited to existing dams. The installation of fish passage facilities at new dams or new diversion structures is not included under the proposed action. All projects will follow the criteria in NMFS' *Anadromous Salmonid Passage Facility Design* (NMFS 2011a). NMFS will review engineering plans for installing or modifying fish ladders to ensure consistency with these criteria. During the conceptual design stage (generally 3 months to 2 years prior to construction), the Project Sponsor will submit engineering plans to NMFS. After reviewing the plans, NMFS may: (1) Give approval to move forward with the design; (2) remain engaged with the design process if the project is of sufficient scale to warrant this; or (3) waive further engineering involvement (if a small scale project). If NMFS does not waive further NMFS' involvement in the design process, the Project Sponsor will submit the final design to NMFS for review at least 90 days prior to construction (or 60 days for small projects requiring less than 2 weeks construction time).

***Conservation Measures***

- A completed or modified fish passage facility will be available for inspection by NMFS staff to verify the structure is successful in providing fish passage.

- For all passage projects at diversion structures, the diversion must be screened to NMFS criteria (NMFS 2011a) and have a measuring device, which will be a totalizing flow meter where possible, and an adjustable headgate.

- For periodic maintenance of fish passage facilities, any heavy equipment needed will work from the streambank.

Removal or Modification of Water Control Structures (e.g. Diversion Structures)

***Description:*** This action includes removal of water control structures, such as channel-spanning weirs, diversion structures, and other similar structures. Structures retaining contaminated sediments will require individual consultation.

***Conservation Measures***

- If a project involves the removal of multiple barriers on one stream or in one watershed over the course of a work season, the Project Sponsor will remove the most upstream barrier first if possible. This way, work at the upstream sites can be completed without ESA-listed anadromous fish in the project area.

- Modified diversion structures will be sized to accommodate current documented water use or the instantaneous maximum diversion rate allowed by state law; must be screened to NMFS criteria (NMFS 2011a); and must have a measuring device, which will be a totalizing flow meter where possible, and an adjustable headgate.

Bridge and Culvert Replacement or Removal

***Description:*** For unimpaired fish passage, it is desirable to have a crossing that is a larger than the channel bankfull width, allows for a functional floodplain, allows for a natural variation in bed elevation, and provides bed and bank roughness similar to the upstream and downstream channel. Projects covered under this consultation will use the Streambed Simulation Design Method in NMFS's *Anadromous Salmonid Passage Facility Design* document (NMFS 2011a). The structures for this design method are typically open-bottomed arches or boxes but could have buried floors in some cases. Bridges that span the stream channel are also appropriate. This method utilizes streambed materials that are similar to the adjacent stream channel. In general, streambed simulation should provide sufficient channel complexity to provide passage conditions similar to that which exists in the adjacent natural stream, including sufficient depth, velocity, and resting areas. The designers will be skilled in engineering, hydrology/fluvial geomorphology, and fisheries biology. Design plans will be included with the Project Information Form, describing how the project meets the conservation measures listed below. Construction times for such projects will depend on the complexity of the project and could take multiple weeks. For most culvert replacement projects, project design will call for rerouting of streamflows to isolate the project work area from the stream prior to excavation. In most cases, a pipe would carry the streamflow around the project site to a location immediately downstream of the construction zone. An excavated lined channel could also be used. Fish passage will be provided for any adult or juvenile ESA-listed salmonids likely to be present in the action area during construction, unless passage did not exist before construction (likely to be the case for most projects in this action category) or the stream is naturally impassable at the time of construction.

Restoration activities at stream crossings undertaken by USFS and BLM on federal land in Idaho are covered under a separate NMFS and USFWS programmatic consultation (NMFS 2012), and are therefore not covered under this consultation.

***Conservation Measures***

- *Stream Crossings*. Stream crossings shall be designed to the standards in NMFS (2011b, or more recent version)[4] and will use the Streambed Simulation Design Method.

- *Channel Width*. In addition, culverts and bridges will provide a clear, unobstructed opening that is at least as wide as 1.5 times the active channel width for un-incised channels.[5] If a stream is entrenched (entrenchment ratio[6] of less than 1.4), the crossing width will accommodate the floodprone width. Floodprone width is the channel width measured at twice the maximum bankfull depth (Rosgen and Silvey 1996).

- *Channel Vertical Clearance.* The minimum vertical clearance between the culvert bed and ceiling should be more than 6 feet, to allow access for debris removal. Smaller vertical clearances may be used if a sufficient inspection and maintenance plan is provided with the design that ensures that the culvert will be free of debris during the passage season.

- *Channel Slope.* The slope of the reconstructed streambed within the culvert should approximate the average slope of the adjacent stream from approximately 10 channel widths upstream and downstream of the site in which it is being placed, or in a stream reach that represents natural conditions outside the zone of the road crossing influence.

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[4] NMFS (National Marine Fisheries Service). 2011b. Anadromous Salmonid Passage Facility Design. NMFS, Northwest Region, Portland, Oregon. Available at: http://www.westcoast.fisheries.noaa.gov/publications/hydropower/fish_passage_design_criteria.pdf

[5] Active channel width means the stream width measured perpendicular to streamflow between the ordinary high water lines, or at the channel bankfull elevation if the ordinary high water lines are indeterminate. This width includes the cumulative active channel width of all individual side- and off-channel components of channels with braided and meandering forms, and measure outside the area influence of any existing stream crossing, e.g., five to seven channel widths upstream and downstream.

[6] The entrenchment ratio is determined by dividing the width of the flood prone area by the bankfull width.

For purposes of maintaining streambed integrity within the road crossing, the maximum slope of streambed simulation where closed bottom culverts are used should not exceed 6%. Design detail and/or a long-term maintenance plan should be included that reflects how the streambed within the culvert will be maintained in its design condition over time.

- *Embedment.* If a culvert is used, the bottom of the culvert should be buried into the streambed not less than 30% and not more than 50% of the culvert height, and a minimum of 3 feet. For bottomless culverts the footings or foundation must be designed for the largest anticipated scour depth. The ability to maintain the engineered streambed in the design configuration over the life of the project must be demonstrated by the design (such as by using size analysis of streambed material in the adjacent stream reaches).

- *Maximum Length of Road Crossing.* The length for streambed simulation should be less than 150 feet. If the length is greater than 150 feet, a bridge should be considered.

- *Fill Materials.* Fill materials should be comprised of materials of similar size composition to natural bed materials that form the natural stream channels adjacent to the road crossing. The design must demonstrate long-term stability of the passage corridor, through assessment of hydraulic conditions through the passage corridor over the fish passage design flow range, and through assessment of the ability of the stream to deliver sufficient transported bed material to maintain the integrity of the streambed over time. Larger material may be used to assist in grade retention and to provide resting areas for migratory fish.

- *Water Depth and Velocity.* Water depth and velocity must closely resemble those that exist in the adjacent stream. To provide resting zones, special care should be used to provide areas of greater than average depth and lower than average velocity throughout the length of the streambed simulation, reasonably replicating those found in the adjacent stream. Hydraulic controls to maintain depth at low flows may be required.

- *Bridge Replacement*. Bridge replacements must be single-span structures (*i.e.,* no bents, piers, or other support structures below the OHWM).

- *Existing Culvert Replacement.* For replacement of an existing culvert or bridge with a new bridge, the Project Sponsor will remove all other artificial constrictions within the functional floodplain of the project area as follows: (1) Remove existing roadway fill, embankment fill, approach fill, or other fills; (2) install relief conduits through existing fill; (3) remove vacant bridge supports below total scour depth, unless the vacant support is part of the rehabilitated or replacement stream crossing; and (4) reshape exposed floodplains and streambanks to match upstream and downstream conditions.

- *Hard Bank Stabilization*. Hard bank stabilization (e.g., riprap) at crossing structures will be limited to the width of the existing road fill prism.

- *Grade Control Structures.* Grade control structures to prevent head-cutting above or below the culvert or bridge being replaced or upgraded may be built using rock or wood. Grade control structures typically consist of boulder and/or wood structures that are keyed into the banks, span the channel, and are buried in the substrate. Grade control structures will provide fish passage for juvenile and adult salmonids, and will be designed to most current version of the *Anadromous Salmonid Passage Facility Design* manual (NMFS 2011a).

- *Streamflow During Project Construction*. During project construction, streamflow will be routed through a pipe or an excavated lined channel in order to minimize sediment delivery to the stream.

- *Excavated, Lined Channel to Dewater the Project Area*. Where the project design calls for an excavated, lined channel to dewater the project area (rather than a pipe), excavation would be required from the diversion point through the floodplain and road fill, and down to a reentry point below the project site. Excavation would not be conducted in the live channel. Excavated material from the diversion channel would be stored at a designated stockpile site (subject to erosion control measures) for use in filling the excavated channel after the stream is re-watered or other site rehabilitation actions. The bypass channel or pipe will provide fish passage for any adult or juvenile ESA-listed salmonids likely to be present in the action area during construction, unless passage did not exist before construction or the stream reach is naturally impassable at the time of construction.

#### *1.3.5.3 Instream Flow*

***Purpose:*** Increase instream flows to improve fish spawning, rearing, and migration conditions; and to restore riparian functions. This consultation will cover the acquisition of water to improve streamflow, and will also cover activities that would modify irrigation systems so as to leave more water instream or allow the water to flow farther downstream before being diverted. This consultation will not provide take coverage to the action agencies or Project Sponsors for the impacts of diverting water.

***Description*:** This action category includes: (1) Leasing or purchasing water to improve instream flows; (2) moving or consolidating points of diversion in order to leave more water instream for a longer downstream distance; (3) converting surface water diversions to groundwater sources to leave more water instream during the irrigation season; and (4) increasing the efficiency of water transmission facilities in order to leave “saved” water in the stream. No projects under this category will result in the diversion of more water than the current use or legal water right, whichever is less. Construction of new diversion structures is only eligible for coverage under this programmatic consultation if the new structures provide fish passage based on NMFS criteria. (NMFS 2011a).

Multiple existing diversions may be consolidated into one diversion. The consolidated diversion will be located at the most downstream existing diversion point. Moving points of diversion downstream in order to rewater severely impaired stream reaches would typically involve installation of a pumping system to offset the loss of head, and possibly installation of engineered riffles (including rock structures) where old diversions are removed. Small instream rock structures that facilitate proper pump station operations are allowed when designed in association with the pump station. Infiltration galleries and lay-flat stanchions are not proposed as part of this programmatic action. NMFS estimates that individual projects to move or consolidate diversions will take between 1 and 14 days of in-channel work, depending on the complexity of the project.

If diversion consolidation involves building a new diversion structure, NMFS will review engineering plans based on fish passage criteria (NMFS 2011a) to determine eligibility for inclusion in the programmatic. During the conceptual design stage (generally 3 months to 2 years prior to construction), the Project Sponsor will submit engineering plans to NMFS. After reviewing the plans, NMFS may: (1) Give approval to move forward with the design; (2) remain engaged with the design process if the project is of sufficient scale to warrant this; or (3) waive further engineering involvement (if a small scale project). If NMFS does not waive further NMFS' involvement in the design process, the Project Sponsor will submit the final design to NMFS for review at least 90 days prior to construction (or 60 days for small projects requiring less than two weeks construction time).

Flood or other inefficient irrigation systems may be converted to drip or sprinkler irrigation. This proposed activity will involve the installation of pipe, possibly trenched and buried into the ground. Pumps may be installed to pressurize the system. The criteria, plans and specifications, and operation and maintenance protocols of the NRCS conservation practice standards for "Irrigation System, Sprinkler" may be consulted for guidance (NRCS 2011b). Open ditch irrigation water conveyance systems will be replaced with pipelines to reduce evaporation and transpiration losses. Leaking irrigation ditches and canals will be converted to pipeline or lined with concrete, bentonite, or appropriate lining materials, following guidance from NRCS (2011a; 2011c).

Ground water wells can be drilled as an alternative water source to surface water withdrawals. No wells will be drilled within 0.25 miles from a stream, unless the Project Sponsor can demonstrate (in the Project Information Form) that the new well is not likely to decrease streamflow in the adjacent stream. Water from the wells will be pumped into ponds or troughs for livestock, or used to irrigate agricultural fields. Abandoned instream diversion infrastructure will be removed or downsized. The criteria, plans and specifications, and operation and maintenance protocols of the NRCS conservation practice standards for water well code (NRCS 2010) may be consulted for guidance.

### *Conservation Measures*

- If a project opens up fish passage to a previously inaccessible tributary, the lead action agency will ensure that all diversions in this tributary that could entrain ESA-listed fish species are on the Screen Shop's list for diversions needing screening and that water users will agree to allow installation of a fish screen and bypass system.

- The water diversion rate after a project is completed will not exceed the current water use (documented or estimated) or legal water right, whichever is less.

- Periodic maintenance of irrigation diversions completed under this programmatic will be conducted to ensure their proper function (*i.e*., cleaning debris buildup, and replacement of parts). Heavy equipment will not enter streams for maintenance of diversions

- Removal of unneeded diversion structures will follow the conservation measures described above under *Fish Passage*.

- Any change in the point of diversion to be covered under this consultation must leave more water instream than current conditions or must leave water instream for a greater downstream distance than the current point of diversion.

- Abandoned ditches and other similar structures that are in continuity with the stream will be converted into off channel habitat where feasible and appropriate. In all other instances, abandoned ditches will be plugged or backfilled, as appropriate, to prevent fish from getting trapped in them.

- For ground water wells and irrigation efficiency actions, the Project Sponsor will include information in the Project Notification Form to demonstrate that the project will not increase consumptive use of water.

- When making improvements to pressurized irrigation systems, the Project Sponsor will install a totalizing flow meter capable of measuring rate and duty of water use. For non-pressurized systems, the Project Sponsor will install a staff gage or other measuring device capable of measuring instantaneous rate of water flow, ensuring that the measuring device does not compromise fish passage at the site. Acceptable types of measuring devices include all those approved by the Idaho Department of Water Resources (see http://www.idwr.idaho.gov/WaterManagement/WaterMeasurement/PDFs/MinAccepStand.pdf)

*1.3.5.4 Instream Structures*

***Purpose:*** Restore instream habitat structures and provide grade control. The purpose of these enhancements is to decrease flow velocities; increase instream structural complexity and diversity; and provide instream spawning, rearing, and resting habitat for fish.
This category includes: (1) Installing grade control structures such as boulder weirs; and (2) installing instream habitat structures (e.g., LWD, stream gravels). Such activities will be implemented in stream reaches with degraded habitat conditions caused by human land uses. In the Project Information Form, the Project Sponsor will demonstrate how the project is linked to a salmonid habitat limiting factor identified in a subbasin plan or recovery plan, or that the project is a recommended restoration activity identified by a local technical oversight and steering

committee (e.g., the Upper Salmon Basin Watershed Project Technical Team). Individual projects may include a combination of the activities in this category.

Grade Control through Boulder Weirs or Roughened Channels

***Description:*** The Project Sponsor may install boulder weirs and roughened channels for grade control at culverts, to mitigate headcuts, and to provide passage at small dams or other channel obstructions that cannot otherwise be removed. Structures will be constructed from rock or wood. For wood-dominated systems, grade control engineered log jams (ELJs) should be considered as an alternative. Grade control ELJs are designed to arrest channel downcutting or incision and retain sediment, lower stream energy, and increase water elevations to reconnect floodplain habitat and diffuse downstream flood peaks. Grade control ELJs also serve to protect infrastructure that is exposed by channel incision and to stabilize over-steepened banks. Unlike hard weirs or rock grade control structures, a grade control ELJ is a complex broad-crested structure that dissipates energy more gradually.

For boulder weirs, roughened channels, and other grade control structures that have an aggregate height of greater than 3 feet, NMFS will review the design plans and engineering calculations. The Project Sponsor should provide NMFS with the following information, plus any additional information requested:

1. A longitudinal profile of the stream channel thalweg for 20 channel widths upstream and downstream of the structure shall be used to determine the potential for channel degradation.

2. A minimum of three cross-sections; one downstream of the structure, one through the reservoir area upstream of the structure, and one upstream of the reservoir area outside of the influence of the structure, to characterize the channel morphology and quantify the stored sediment.

***Conservation Measures***

- All structures will be designed to fish passage standards described in NMFS (2011a or most recent version).

- Boulder weirs will be installed low in relation to channel dimensions so that they are completely overtopped during channel-forming flow events (approximately a 1.5-year flow event).

- Boulder weirs are to be placed diagonally across the channel, or in more traditional upstream pointing “V” or “U” configurations with the apex oriented upstream. The apex should be lower than the structure wings to support low flow consolidation.

- Boulder weirs are to be constructed to allow upstream and downstream passage of all native fish species and life stages that occur in the stream. This can be accomplished by providing plunges no greater than 6 inches in height, allowing for juvenile fish passage at all flows.

- Key weirs into the stream bed to minimize structure undermining due to scour, preferably at least 2.5 times their exposure height.  The weir should also be keyed into both banks, if feasible greater than 8 feet.

- Include fine material in the weir material mix to help seal the weir/channel bed, thereby preventing subsurface flow.  Geotextile material can be used as an alternative approach to prevent subsurface flow.

- Rock for boulder weirs shall be durable and of suitable quality to ensure permanence in the climate in which it is to be used.  Rock sizing depends on the size of the stream, maximum depth of flow, planform, entrenchment, and ice and debris loading.

- Full spanning boulder weir placement shall be coupled with measures to improve habitat complexity (LWD placement, etc.) and protection of riparian areas.

- The use of gabions, cable, or other means to prevent the movement of individual boulders in a boulder weir is not allowed.

- Headcut stabilization shall incorporate the following measures:

  1. Armor head-cut with sufficiently sized and amounts of material to prevent continued up-stream movement.  Materials can include both rock and organic materials which are native to the area.

  2. Focus stabilization efforts in the plunge pool, the head cut, as well as a short distance of stream above the headcut.

  3. Minimize lateral migration of channel around head cut ("flanking") by placing rocks and organic material at a lower elevation in the center of the channel cross section to direct flows to the middle of channel.

  4. Provide fish passage over a stabilized head-cut through a series of log or rock weir structures or a roughened channel.

  5. Construct headcut stabilization structures using streambed simulation bed material, which will be washed into place until there is apparent surface flow and minimal subsurface material, to ensure fish passage immediately following construction if natural flows are sufficient.

  6. Construct headcut stabilization structures with stream simulation materials and fines added and pressure-washed into the placed matrix.  Successful washing will be determined by minimization of voids within placed matrix such that ponding occurs with little to no percolation losses, to ensure fish passage during low flows immediately following construction.

  7. If possible, also address the cause of the head cut as a part of the restoration action.

Large Wood, Boulder, and Gravel Placement

***Description:*** This action includes large wood and boulder placement, ELJs, gravel placement and tree removal for large wood projects. Such activities will occur in areas where channel structure is lacking due to past stream cleaning (i.e., large wood removal), riparian timber harvest, or other riparian and channel modifications, and in areas where natural gravel supplies are low due to anthropogenic disruptions. These projects will occur in stream channels and adjacent floodplains to increase channel stability, rearing habitat, pool formation, spawning gravel deposition, channel complexity, hiding cover, low velocity areas, and floodplain function.

The ELJs are structures designed to redirect flow and change scour and deposition patterns. While providing valuable fish and wildlife habitat, they are also designed to redirect flow and can provide stability to a streambank or downstream gravel bar. To the extent practical, ELJs are designed to simulate stable natural log jams and can be either naturally stable due to large wood size and/or stream width or anchored in place using rebar, rock, or posts. They are also designed to create a hydraulic shadow, a low-velocity zone downstream that allows sediment to settle out and scour holes adjacent to the structure.

For instream structures, the Project Sponsor will use materials that are appropriate for the particular channel type, project objectives, and site conditions. In most cases, wood for instream structures will come from outside of riparian areas. In projects where logs would be hauled to the site, the logs would be obtained from upland areas or would be salvaged and hauled by the

***Project Sponsor.*** The Project Sponsor will include sketches or engineering plans in the Project Information Form. The Project Sponsor can refer to following references of techniques for the installation of instream habitat structures:

- WDFW Stream Habitat Restoration Guidelines: http://wdfw.wa.gov/publications/pub.php?id=00043
- WDFW Integrated Streambank Protection Guidelines: http://wdfw.wa.gov/publications/00046/
- NRCS National Engineering Handbook Part 654, Stream Restoration: http://directives.sc.egov.usda.gov/viewerFS.aspx?hid=21433

***Conservation Measures (large wood and boulder projects)***

- Place large wood and boulders in areas where they would naturally occur, and in a manner that closely mimics natural accumulations for that particular stream type. For example, boulder placement may not be appropriate in low-gradient meadow streams.
- Structure types shall simulate disturbance events to the greatest degree possible and include, but are not limited to, log jams, debris flows, windthrow, and tree breakage.

- No limits are to be placed on the size or shape of structures as long as such structures are within the range of natural variability of a given location and do not block fish passage.

- The partial burial of large wood and boulders is permitted and may constitute the dominant means of placement. This applies to all stream systems but more so for larger stream systems where use of adjacent riparian trees or channel features is not feasible or does not provide the full stability desired.

- Large wood includes whole conifer and hardwood trees, logs, and rootwads. Large wood size (diameter and length) should account for bankfull width and stream discharge rates. When available, trees with rootwads should be a minimum of 1.5 times bankfull channel width in length, while logs without rootwads should be a minimum of 2.0 times bankfull widths long.

- The Project Sponsor will procure logs from an upland area to use as large wood. However, if a NMFS and USFWS biologist approves, riparian trees may be dislodged or felled for constructing instream habitat in areas where the project will not significantly impact stream shading or streambank stability, sufficient natural recruitment of native woody vegetation is expected, the threat of invasive vegetation filling created gaps is minimal and replanting with native woody species is planned, and the trees to be felled are not providing suitable habitat for ESA-listed terrestrial species.

- Structures may partially or completely span stream channels or be positioned along streambanks.

- Stabilizing or key pieces of large wood will be intact, hard, with little decay, and if possible have root wads (untrimmed) to provide functional refugia habitat for fish. Consider orienting key pieces such that the hydraulic forces upon the large wood increase stability.

- Anchoring large wood alternatives may be used in preferential order:

  1. Use adequately-sized wood sufficient for stability.

  2. Orient and place wood in such a way that movement is limited.

  3. Use ballast (gravel or rock) to increase the mass of the structure to resist movement.

  4. Use vertical piles of untreated wood.

  5. Use large boulders as anchor points for the large wood.

  6. Pin large wood with rebar to large rock to increase its weight. For streams that are entrenched (Rosgen Channels F, G, A, and potentially B), or for other streams with very low width to depth ratios (less than 12), an additional 60% ballast weight may be

necessary due to greater flow depths and higher velocities. The tips of any rebar posts should be curved to reduce hazards to humans and wildlife.

7. Anchoring large wood by cable is not included in this programmatic.

***Conservation Measures (ELJs)***

- The ELJs will be patterned, to the greatest degree possible, after stable natural log jams.

- Grade control ELJs will be designed to arrest channel down-cutting or incision by providing a grade control that retains sediment, lowers stream energy, and increases water elevations to reconnect floodplain habitat and diffuse downstream flood peaks.

- Stabilizing or key pieces of large wood that will be relied on to provide streambank stability or redirect flows will be intact and solid (little decay).

- If possible, acquire large wood with untrimmed rootwads to provide functional refugia habitat for fish.

- When available, trees with rootwads attached should be a minimum length of 1.5 times the bankfull channel width, while logs without rootwads should be a minimum length of 2.0 times the bankfull width.

- The partial burial of large wood and boulders may constitute the dominant means of placement, and key boulders (footings) or large wood can be buried into the streambank or channel.

- Angle and offset. The large wood portions of ELJ structures should be oriented such that the force of water upon the large wood increases stability. If a rootwad is left exposed to the flow, the bole placed into the streambank should be oriented downstream parallel to the flow direction so the pressure on the rootwad pushes the bole into the streambank and bed. Wood pieces that are oriented parallel to flow are more stable than members oriented at 45 or 90 degrees to the flow.

- If large wood anchoring is required, a variety of methods may be used. These include buttressing the wood between riparian trees, or the use of manila, sisal, or other biodegradable ropes for lashing connections. If hydraulic conditions warrant use of structural connections, rebar pinning or bolted connections may be used. Rock may be used for ballast but are limited to that needed to anchor the large wood. The tips of any rebar posts should be curved to reduce hazards to humans and wildlife.

***Conservation Measures (Gravel Augmentation)***

- Gravel can be placed directly into the stream channel, at tributary junctions, or other areas in a manner that mimics natural debris flows and erosion.

- Augmentation will only occur in areas where the natural supply has been eliminated, significantly reduced through anthropogenic disruptions, or used to initiate gravel accumulations in conjunction with other projects, such as simulated log jams and debris flows.

- Gravel to be placed in streams shall be a properly sized gradation for that stream, clean alluvium with similar angularity as the natural bed material. When possible, use gravel of the same lithology as found in the watershed. Reference *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings* (USFS 2008) to determine gravel sizes appropriate for the stream.

- Crushed rock is not permitted.

- After gravel placement in areas accessible to higher streamflow, allow the stream to naturally sort and distribute the material.

- Do not place gravel directly on bars and riffles that are known spawning areas, which may cause fish to spawn on the unsorted and unstable gravel, thus potentially resulting in redd destruction.

- Imported gravel will be free of invasive species and non-native seeds. If necessary, wash gravel prior to placement.

#### *1.3.5.5 Side Channels and Floodplain Function*

***Purpose:*** To restore historic side-channel habitat and floodplain function. Off-channel habitat has been reduced by human activities in the floodplain including diking, removal of LWD, straightening of the channel, road and railroad construction, and bank armoring. Thus, there is a need in many Idaho watersheds for off-channel habitat restoration, through reestablishment of side channels, removal of levees, and floodplain restoration.

Reconnection of Historical Side Channels

***Description:*** Side channel habitats are generally small watered remnants of river meanders. They provide important rearing habitat for juveniles and refuge habitat during high flows. They are most common in floodplains with alluvial material along a flat valley floor. Off-channel habitat includes abandoned river channels, spring-flow channels, oxbows, and flood swales.

Projects under this consultation will restore self-sustaining off-channel habitat. Self-sustaining is not synonymous with maintaining a static condition. Self-sustaining means the restored habitat would not require major or periodic maintenance but would function naturally within the processes of the floodplain. However, up to two project adjustments, including adjusting the elevation of the created side channel habitat, are included under this proposal. The long-term development of a restored side channel will depend on natural processes like floods and mainstem channel migration. Over time, the side channel may naturally get drier or be taken over by the main river flow. Designs for such projects must be completed with input from a technical expert and must demonstrate a thorough understanding of the hydrology of the project area.

The following off-channel restoration activities are included in the proposed action:

- Restoration of existing side channels, including one-time dredging, and then up to two project adjustments for the elevation of the created side channel habitat.

- Reconnecting existing side channels with a focus on restoring fish access and habitat-forming processes (hydrology, riparian vegetation), including installation of culverts or bridges through road and railroad grades, where feasible.[7]

- Installation of engineered log jams, barbs, or groins to direct some flow through a side channel.

To allow the action agency(ies) and NMFS to determine whether the project fits within the proposed action the Project Sponsor will include the following additional information about design plans in the Project Information Form:

1. Evidence of historical channel location, such as land use surveys, historical photographs, topographic maps, remote sensing information, or personal observation.

2. Hydrologic evidence that the project will be self-sustaining over time. Self-sustaining means the restored habitat would not require major or periodic maintenance, but function naturally within the processes of the floodplain.

3. Indication that the proposed action will mimic natural conditions for gradient, width, sinuosity and other hydraulic parameters.

4. Indication that the proposed action will not result in the creation of fish passage issues or post construction stranding of juvenile or adult fish.

***Conservation Measures***

- Side channel habitat will be constructed to prevent fish stranding by providing a continual positive grade to the intersecting river or stream, or by providing a year-round water connection.

- Ditches previously constructed to drain wetlands will be filled with native material, primarily obtained from the spoil material generated when the ditch was first constructed. The final contour will approximate the natural topography to the degree the available

[7] Breaching road or railroad grades to access historic channels can only be accomplished with complex coordination with state, tribal, Federal and private stakeholders. It is the intent of this proposed action to use the most appropriate means of accessing the historical channel, which will be decided on a case-by-case basis with the appropriate stakeholders.

material allows. If the natural contour cannot be obtained with on-site material, clean imported material of similar composition to the adjacent, native banks may be used.

- Side-channel improvements can include minor excavation ($\leq$ 10%) of naturally accumulated sediment within historical channels. There is no limit as to the amount of excavation of fill within historic side channels as long as such channels can be clearly identified through field and/or aerial photographs.

- Excavated material removed from off- or side-channels shall be hauled to an upland site or spread across the adjacent floodplain in a manner that does not restrict floodplain capacity.

- Excavation depth will never exceed the maximum thalweg depth in the main channel.

- Restoration of existing side channels including one-time dredging and an up to two times project adjustment including adjusting the elevation of the created side channel habitat.

- Adequate precautions will be taken to prevent the creation of fish passage issues or stranding of juvenile or adult fish.

- Excavation and construction work for side channels will be conducted in isolation from the main channel. Reintroduction of flow between the main channel and the reconstructed side channel will follow the measures for rewatering of stream channels described in *1.3.4 General Conservation Measures* of this Opinion.

Set-back or Removal of Existing Berms, Dikes, Levees, and Fill, and Revegetation

***Description:*** Set-back or removal of existing berms, dikes, levees, and fill, and revegetation of the floodplain, will be conducted to reconnect stream channels with floodplains and restore floodplain function. Such projects will take place where floodplains have been disconnected from adjacent rivers through drain pipes and anthropogenic fill.

***Conservation Measures***

- Design actions to restore floodplain characteristics; elevation, width, gradient, length, and roughness, in a manner that closely mimics, to the extent possible, those that would naturally occur at that stream and valley type.

- Any non-native levee material removed will be hauled to an upland site. Native material may be spread across the floodplain provided it does not restrict riparian vegetation establishment, floodplain capacity, and does not result in stranding of juvenile salmonids. If material is used to create or alter micro-topography it must be done in a manner to prevent juvenile stranding. Overburden or fill comprised of native materials, which originated from the project area, may be used within the floodplain to create set-back dikes and fill anthropogenic holes provided that does not impede floodplain function. When necessary, loosen compacted soils once overburden material is removed.

- Remove drain pipes, fences, and other man-made structures to the greatest degree possible.

- Where it is not possible to remove or set-back portions of dikes and berms, or in areas where existing berms, dikes, and levees support abundant riparian vegetation, openings may be created with breaches. Berms, dikes, or levees shall always be breached in a manner that ensures flows will naturally recede back into the main channel to minimize the likelihood of fish entrapment.

- When full removal is not possible and a setback is required, the new structure locations should be prioritized, if possible, to the outside of the meander belt width or to the outside or the channel meander zone margins.

- Revegetation of floodplain will follow the conservation measures in Section 1.3.5.7. *Riparian Habitat* of this Opinion.

### *1.3.5.6 Channel Reconstruction/Relocation*

***Purpose*:** To reconstruct existing stream channels into historic or newly constructed channels that are typically more sinuous and complex. This proposed action applies to stream systems that have been straightened, channelized, dredged, or otherwise modified for the purpose of flood control, increasing arable land, realignment, or other land use management goals. This action could also be appropriate for streams that are incised or otherwise disconnected from their floodplains resulting from watershed disturbances. The purpose of channel reconstruction is to improve aquatic and riparian habitat diversity and complexity, reconnect stream channels to floodplains, reduce bed and bank erosion, increase hyporheic exchange, provide long-term nutrient storage, provide substrate for macroinvertebrates, moderate flow disturbance, increase retention of organic material, and provide refuge for fish and other aquatic species. Channel reconstruction and relocation generally occur in alluvial stream systems that are free to adjust their boundaries over time.

***Description*:** Projects may include reconstruction of existing stream channels through excavation and structure placement (LWD and boulders) or relocation (rerouting of flow) into historic or newly constructed channels that are typically more sinuous and complex. The reconstructed stream system shall be composed of a naturally sustainable and dynamic planform, cross-section, and longitudinal profile that incorporate unimpeded passage and temporary storage of water, sediment, organic material, and species. Stream channel adjustment over time is to be expected in naturally dynamic systems and is a necessary component to restore a wide array of stream functions. It is expected that for most projects that there will be a primary channel with secondary channels that are activated at various flow levels to increase floodplain connectivity to improve aquatic habitat through a range of flows. This proposed action is not intended to artificially stabilize streams into a single location or into a single channel for the purposes of protecting infrastructure or property.

Channel reconstruction consists of re-meandering or movement of the primary active channel, and may include structural elements such as streambed simulation materials, streambank structures, and hydraulic roughness elements. For bed stabilization and hydraulic control structures, constructed riffles shall be preferentially used in pool-riffle stream types, while roughened channels and boulder weirs shall be preferentially used in step-pool and cascade stream types. Material selection (large wood, rock, gravel) shall also mimic natural stream system materials.

The reconstruction or relocation of existing stream channels will be accomplished through excavation and structure placement (large wood and boulders), or by rerouting streamflow into historic or newly constructed channels that are typically more sinuous and complex. The Project Sponsor would design the overall project to restore floodplain characteristics; elevation, width, gradient, length, and roughness, in a manner that closely mimics, to the greatest degree possible, those that would naturally occur at that stream and valley type. Equipment such as excavators, bull dozers, dump trucks, or front-end loaders will be used to implement such projects. A project might include one or more of the following activities: excavation of an existing channel; construction of new low and high flow channels, side channels, and alcoves, adjacent floodplains, flood channels, and wetlands; and installation of structural elements such as streambed simulation materials, streambank restoration, and hydraulic roughness elements.

Construction work and excavation will only take place in dry channels. If necessary to create dry conditions for excavation work, streamflow will be diverted to an existing channel, side channel, or pipe. The proposed action does not include excavating new bypass channels. NMFS estimates that such projects may take 2 to 4 weeks of construction work, and possibly longer. NMFS encourages Project Sponsors to use the River Restoration Analysis Tool during project development ("River RAT," www.restorationreview.com).

To allow the action agency(ies) and NMFS to determine whether the project fits within the proposed action the Project Sponsor will provide the following additional information to NMFS, attached to the Project Information Form:

1. Background and Problem Statement
    a. Site history
    b. Environmental baseline
    c. Problem description
    d. Cause of problem
2. Project Description
    a. Goals/objectives
    b. Project elements

   c. Sequencing, implementation

   d. Stream channel trajectory; how does the reconstructed channel develop and evolve?

3. Detailed construction drawings

4. Design analysis includes technical analyses, computations relating design to analysis, and references. Analyses shall be appropriate to the level of project complexity. At a minimum, analyses must include the following:

   a. Hydraulic analysis

   b. Sediment assessment

   c. Vegetation plan

   d. Risk analysis

5. Monitoring and adaptive management; develop a 10-year monitoring and adaptive management plan.

For overall design goals, the channel reconstruction design data must demonstrate:

1. The use of both analytical approaches and natural analogs for determination of the reconstructed channel cross-section, longitudinal channel geometry, and planform.

2. Geomorphic appropriateness of structural elements.

3. Appropriate self-sustaining hydrologic design (taking into account potential changes in streamflow volume and timing due to climate change, as appropriate) such that the restored or created habitat will not require regular maintenance.

4. Indication that the proposed action will not result in the creation of fish passage issues or post construction stranding of juvenile or adult fish.

***Conservation Measures***

- To the greatest degree possible, remove nonnative fill material from the floodplain to an upland site.

- When necessary, loosen compacted soils once overburden material is removed. Overburden or fill comprised of native materials, which originated from the project area, may be used within the floodplain where appropriate to support the project goals and objectives.

- Ensure that structural elements fit the geomorphic context of the stream system. For bed stabilization and hydraulic control structures, constructed riffles shall be preferentially used in pool-riffle stream types, while roughened channels and boulder weirs shall be preferentially used in step-pool and cascade stream types. Material selection (large wood, rock, gravel) shall also mimic natural stream system materials.

- Construct the streambed using Stream Simulation Design principles as described in section 6.2 of the 2008 USFS document *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings* (USFS 2008), or another appropriate design guidance document.

- All channel reconstruction work and excavation will occur in dry channels. If dewatering of the existing channel is necessary, streamflow will be rerouted through a pipe or bypass channel prior to work beginning. Work area isolation and rewatering of stream channels will follow the measures in *1.3.4 General Conservation Measures* of this Opinion.

- Fish passage will be provided for any ESA-listed adult or juvenile fish likely to be migrating through the action area during construction, unless passage did not exist before construction or the stream reach is naturally impassable at the time of construction.

### *1.3.5.7 Riparian Habitat*

***Purpose:*** To reestablish native riparian vegetation in order to stabilize streambanks, provide shade and future source of LWD, and encourage the development of protective cover for fish and other aquatic species. This category includes planting riparian vegetation, managing livestock access to riparian areas, removing nonnative invasive weeds mechanically and with herbicides, and streambank stabilization through bioengineering techniques.

<u>Planting Riparian Vegetation</u>

***Description***: Planting riparian vegetation involves planting appropriate species along streams in order to stabilize streambanks and improve riparian function.

***Conservation measures***

- Use only native plant species.

- Use certified noxious weed-free seed (99.9%), hay, straw, mulch, or other vegetation material.

<u>Livestock Restrictions</u>

***Description***: In many areas in Idaho, livestock have degraded riparian corridors and instream habitat. Riparian vegetation is negatively affected by livestock grazing and trampling. Generally the result is increased and chronic sedimentation and reduced riparian functions including impacts to shading and recruitment of large woody debris.  Livestock fencing, stream crossings, and off-channel livestock watering facility projects will be implemented by constructing fences to exclude riparian grazing, providing controlled access for walkways that livestock use to transit across streams and through riparian areas, and reducing livestock use in riparian areas and stream channels by providing upslope water facilities.  The proposed action does not include the installation of projects that are interrelated or interdependent to a Federal grazing allotment subject to separate consultation with NMFS and USFWS.

Permanent or temporary livestock fences will be installed.  For permanent fences, individual fence posts will be pounded or dug using hand tools or augers on backhoes or similar equipment.  Fence posts will be set in the holes, backfilled, and fence wire strung or wooden rails placed.  Wood fence that does not require setting posts may also be used, as may temporary electric fence.  Temporary electric fence involves less ground disturbance but potentially requires more maintenance.  Installation of fences may involve the removal of native or non-native vegetation along the proposed fence line.

Livestock stream crossings will provide controlled access for walkways that livestock use to transit across streams and through riparian areas.  Culverts or bridges will be installed for frequent crossing locations.  Hardened stream crossings will involve the placement of river rock along the stream bottom and at approaches streams to armour streambanks.

Watering facilities will consist of various low-volume pumping or gravity-feed systems to move the water to a trough or pond at an upland site.  Either above-ground or underground piping will be installed between the troughs or ponds and the water source.  Water sources may include springs and seeps, streams, or groundwater wells.  Placement of the pipes in the ground will typically involve minor trenching using a backhoe or similar equipment.

***Conservation Measures (fencing)***

- To the extent possible, fences will be placed outside the channel migration zone and allow for lateral stream movement.

- Minimize vegetation removal, especially potential LWD recruitment sources, when constructing fence lines.

- Where appropriate, construct fences at water gaps in a manner that allows passage of LWD and other debris.

- When using pressure treated lumber for fence posts, complete all cutting/drilling offsite (to the extent possible) so that treated wood chips and debris do not enter water or floodprone areas.  Pressure-treated lumber will not be used for fence posts in areas with frequent water contact.  In these instances, alternative materials such as steel, concrete, and rot resistant wood (*e.g.*, locust) will be used.

- Riparian fencing is not to be used to create livestock handling facilities.

***Conservation Measures (livestock stream crossings)***

- The number of crossings will be minimized.

- Locate crossings or water gaps where streambanks are naturally low. Livestock crossings or water gaps will not be located in areas where compaction or other damage can occur to sensitive soils and vegetation (*e.g.*, wetlands) due to congregating livestock.

- To the extent possible, crossings will not be placed in areas where ESA-listed species spawn or are suspected of spawning (*e.g.*, pool tailouts where spawning may occur), or within 300-feet upstream of such areas.

- Existing access roads and stream crossings will be used whenever possible, unless new construction will result in less habitat disturbance and the old trail or crossing is retired.

- Livestock trails to the stream crossings will have a vegetated buffer that is adequate to avoid or minimize runoff of sediment and other pollutants to surface waters.

- Crossings will be designed and constructed or improved to handle reasonably foreseeable flood risks, including associated bedload and debris, and to prevent the diversion of streamflow out of the channel and down the trail if the crossing fails.

- If necessary, the streambank and approach lanes can be stabilized with native vegetation or angular rock to reduce chronic sediment delivery. The stream crossing or water gap should be armored with sufficient sized rock (*e.g.*, cobble-size rock); or angular rock will be used if natural substrate is not of adequate size.

- Livestock crossings will not create barriers to the passage of adult or juvenile fish.

- The Project Sponsor will monitor completed fords to determine if the fords are a low flow fish passage barrier. If the ford appears to be a barrier, the action agency(ies) and Project Sponsor will discuss measures to address this problem with NMFS immediately. Solutions may include installation of sills or groins.

- Stream crossings and water gaps will be designed and constructed to a width of 10 to 15 feet in the upstream-downstream direction to minimize the time livestock will spend in the crossing or riparian area.

***Conservation Measures (off-channel livestock watering facilities)***

- The development of a spring is not allowed if the spring is occupied by ESA-listed species.

- Water withdrawals will not dewater habitats or cause low streamflow conditions that could affect ESA-listed fish. Troughs or tanks fed from a stream or river will have an existing valid water right.

- Surface water intakes will be screened to meet the most recent version of NMFS fish screen criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2011a), and will be self-cleaning, or regularly maintained by removing debris buildup. A responsible party will be designated to conduct regular inspection and as-needed maintenance to ensure pumps and screens are properly functioning.

- Troughs will be placed far enough from a stream or will be surrounded with a protective surface to prevent mud and sediment delivery to the stream. Steep slopes and areas where compaction or damage could occur to sensitive soils, slopes, or vegetation due to congregating livestock will be avoided. Watering facilities will be located sufficiently far from streams so that congregating livestock are unlikely to damage riparian areas.

- Each livestock water development shall have a float valve or similar device, a return flow system, a fenced overflow area, or similar means to minimize water withdrawal and potential runoff and erosion. All troughs or tires will be equipped with bird ladders.

- Removal of vegetation around springs and wet areas will be avoided or minimized.

- When necessary, a fence will be constructed around the spring development to prevent livestock damage.

- All new wells or other stock watering sources installed under this activity will be permitted by the appropriate state or Federal agency, and the Project Sponsor will document relevant permits in the Project Information Form. The water diversion rate from a project will not exceed the legal water right. The Project Information Form will specify who is going to maintain the facility.

<u>Removal of Non-native Invasive Plants</u>

***Description:*** Under the proposed action, nonnative invasive weeds will be removed through both physical means and with herbicides. The root systems of many invasive weeds lack the fibrous character of native grasses, and fail to knit the soil together effectively. This could lead to increases in soil erosion (Lacey *et al.* 1989; DeBaets *et al.* 2007), which could increase sediment delivery to streams, ultimately degrading salmonid habitat. Treatment of weeds by BLM and the USFS in Idaho is covered under separate NMFS consultations, and is therefore not covered under this consultation.

For other action agencies, three mechanisms are proposed for control of invasive plants. These methods may be combined using an integrated weed management plan.

- Manual – Manual control includes hand pulling and grubbing with hand tools; bagging plant residue for burning or other proper disposal; mulching with organic materials;

shading or covering unwanted vegetation; and controlling brush and pruning using hand and power tools such as chain saws and machetes.

- Mechanical – Mechanical control includes techniques such as mowing, tilling, disking, or plowing. Mechanical control may be carried out over large areas or be confined to smaller areas (known as scalping). Ground-disturbing mechanical activity will be restricted adjacent to streams, lakes, ponds, wetlands and other identified sensitive habitats. For slopes over 20%, no ground-disturbing mechanical equipment will be used. For slopes less than 20%, ground-disturbing mechanical activity will not occur within 150 feet of a waterbody.

- Chemical - The Project Sponsor may also propose to kill invasive weeds with herbicides. Herbicides will be applied in liquid or granular form using wand or boom sprayers mounted on or towed by trucks, backpack equipment containing a pressurized container with an agitation device, injection, hand wicking cut surfaces, and ground application of granular formulas. Herbicides will be mixed with water as a carrier (no oil-based carriers will be used) and may also contain one of several additives (see adjuvant paragraph below) to promote saturation and adherence, to stabilize, to enhance chemical reactions, or to provide a dye. Aerial treatment is not part of this proposed action. Treatment of aquatic weeds with herbicides is also not part of the proposed action.

The following herbicides may be used under this consultation:

**Table 2. Active ingredients and end-use products that may be used for weed control.**

| Herbicide (Active Ingredient) | End-Use Product | General Application |
|---|---|---|
| 2,4-D amine | Amine 4<br>Weedar 64<br>Riverdale Weedestroy AM-40 | Upland-Riparian |
| Aminopyralid | Milestone | Upland and Riparian spot spraying |
| Chlorsulfuron | Telar XP | Upland-Riparian |
| Clopyralid | Transline | Generally Upland |
| Dicamba | Banvel<br>Vanquish | Upland |
| Glyphosate | Rodeo<br>GlyPro<br>Accord Concentrate<br>AquaMaster<br>AquaNeat Aquatic Herbicide<br>Foresters | Upland-Riparian |
| Imazapic | Plateau | Upland |
| Metsulfuron-methyl | Escort XP | Upland-Riparian |
| Picloram | Tordon 22K<br>Tordon K | Upland |
| Sulfometuron methyl | Oust XP | Upland-Riparian |

| Herbicide (Active Ingredient) | End-Use Product | General Application |
|---|---|---|
| Triclopyr[1] | Garlon 3A<br>Renovate 3<br>Tahoe 3A<br>Triclopyr 3A<br>Triclopyr 3SL | Upland-Riparian |

Several adjuvants may be combined with the herbicides listed above prior to application. Adjuvants are generally defined as any substance added separately to a pesticide end-use product (typically as part of a spray tank mixture). Adjuvants can either enhance the activity of an herbicide's active ingredient or offset any problems associated with spray application. Typical adjuvants include surfactants, anti-foaming agents, crop oil or crop oil concentrates, drift retardants, compatibility agents, dyes, and pH buffers. Adjuvants proposed for this action include Activator 90, Spread 90, LI700, Syl-Tac, R11, Agri-Dex, and methylated seed oil (MSO); two drift retardants, 41-A and Valid; as well as three dyes (Bullseye, Insight, and Hilight).

Activator 90, Spread 90, Agri-Dex, and LI700 are non-ionic surfactants, meaning they have no ionic charge and are hydrophilic (water-loving). They are generally biodegradable. The R11 is a spreading agent that lowers the surface tension on the droplet so it covers the target plant more efficiently. The MSO is an adjuvant that increases the penetration of oil-soluble herbicides into a plant. Drift retardants are used to maximize droplet size during spraying operations. The three dyes (Bullseye, Insight, and Hilight) provide a bright blue color and are non-hazardous. The dyes make it easier to see where the herbicide has been applied, and where or whether it has dripped, spilled, or leaked. Dyes also make it easier to detect missed spots, helping the applicator avoid spraying a plant or area twice. Use of dyes can thus reduce overall pesticide use. Both the herbicide and the adjuvant labels include instructions on the use of additives such as these for proper herbicide application. Adjuvant should be used when recommended on product labels to achieve the required efficacy and reduce need for follow-up applications.

Several inert ingredients may also be included in the herbicide. Inert ingredients are any substances, other than the active ingredient, that are intentionally added to a pesticide formulation. Inert ingredients serve to enhance the action of the active ingredient. Inert ingredients may include carriers, surfactants, preservatives, dyes, and anti-foaming agents among other chemicals. Because many manufacturers consider inert ingredients in their herbicide formulations to be proprietary, they do not list specific chemicals. Therefore, we do not know the complete list of inert ingredients in the end-use products listed in Table 2 above. A partial list of inert ingredients for the herbicide end-use products in Table 2 (those listed by the manufacturers) includes water, ethanol, isopropanol, isopropanolamine, kerosene, and polyglycol 26-2. The U.S. Environmental Protection Agency (EPA) has classified many of these chemicals as "List 3" compounds (inert ingredients of unknown toxicity) or "List 4B" compounds (other ingredients for which EPA has sufficient information to reasonably conclude that the current use pattern in pesticide products will not adversely affect public health or the environment).
No herbicides will be applied to open water, and a stream buffer of either 15 feet, 50 feet, or 100 feet is required for many of the chemicals proposed under this consultation. For each individual herbicide, Table 3 lists the stream buffer in which no herbicide application is allowed. Table 4 shows additional buffer restrictions for different herbicide application methods and different

windspeeds. For example, broadcast spraying is not allowed within 100 feet of a stream's OHWM. Furthermore, of the adjuvants proposed for this action, Activator 90, Spread 90, LI700, Sylatac, Valid, Hilight, and R11 would not be used within 50 feet of open water. The MSO, Agridex, and 41-A could be used up to within 15 feet of open water.

Herbicide application within 100 feet of live water would be limited to 200 acres per year for the entire program, with no more than 50 acres per year in any particular subbasin. No acreage limits would be placed on herbicide application farther than 100 feet from live water. The riparian limits are based on application rates in Idaho under Bonneville Power Administration (BPA's) habitat improvement program (HIP) consultation. From 2008 through 2011, BPA or its Project Sponsors treated 377 riparian acres in North Idaho (north of the Salmon River), which translates to approximately 95 acres per year (BPA 2012). To estimate herbicide use under this programmatic consultation, NMFS doubled the BPA Clearwater River average to accommodate potential herbicide use in the Salmon River drainage arriving at an estimate of 200 acres per year.

Also see Table 4 for additional buffer restrictions for different herbicide application methods and different windspeeds.

**Table 3. Buffer restrictions associated with herbicide use.**

| Active Ingredient | End-Use Product | Buffer from Open Water |
|---|---|---|
| 2,4-D | 2,4-D Amine 4 | 50 ft. |
| | Weedar 64 | 50 ft. |
| | Weedestroy AM-40 | 50 ft. |
| Aminopyralid | Milestone | 50 ft. |
| Chlorsulfuron | Telar XP | 15 ft. |
| Clopyralid | Transline | 15 ft. |
| Dicamba | Banvel | 50 ft. |
| | Vanquish | 50 ft. |
| Glyphosate | Rodeo | 15 ft. |
| | AquaMaster | 15 ft. |
| | AquaNeat Herbicide | 15 ft. |
| | Foresters | 15 ft. |
| Imazapic | Plateau | 15 ft. |
| Metsulfuron-methyl | Escort XP | 15 ft. |
| Picloram | Tordon 22K | 100 ft. |
| | Tordon K | 100 ft. |
| Sulfometuron-methyl | Oust XP | 15 ft. |
| Triclopyr TEA | Garlon 3A | 50 ft. |
| | Tahoe 3A | 50 ft. |
| | Trichlopyr 3A | 50 ft. |
| | Triclopyr 3SL | 50 ft. |

**Table 4. Additional buffer restrictions for different herbicide application methods and different windspeeds.**

| Herbicide Application Method | | |
|---|---|---|
| **Broadcast Spray** | **Spot Spray** | **Hand Application** |
| Ground-based only broadcast application methods via truck/ATV with motorized low-pressure, high-volume sprayers using spray guns, broadcast nozzles, or booms. | Spot and localized foliar and basal/stump applications using a hand-pump backpack sprayer or field-mixed or pre-mixed hand-operated spray bottle. | Hand applications to a specific portion of the target plant using wicking, wiping or injection techniques. This technique implies that herbicides do not touch the soil during the application process. |
| If windspeed > 10 mph, no spraying<br><br>If windspeed < 10 mph, 100 feet minimum buffer from OHWM | If windspeed > 10 miles per hour (mph), no spraying<br><br>If windspeed 5 to 10 mph, 50 feet minimum buffer from OHWM (100 feet minimum buffer for picloram)<br><br>If windspeed < 5 mph, 15 feet minimum buffer from high OHWM or buffer from Table 3, whichever is greater | Minimum buffer from Table 3. |

***Conservation Measures***

- For mechanical treatment of weeds, keep ground disturbance and exposed soil to the minimum amount needed to successfully eradicate weeds.

- Follow the buffer requirements listed in Tables 3 and 4.

- No aerial application of herbicides is proposed under this consultation, nor is any application of herbicides to open water.

- A state or Federal licensed applicator will develop an herbicide application plan for any action involving herbicide use under this proposed action. The plan will identify herbicides specifically targeted for a particular plant species and those that will cause the least impact to non-target plant species. The state or Federally licensed applicator will perform or directly supervise all applications of Restricted Use Pesticides (e.g., picloram).

- The applicator will prepare and carry out an herbicide safety/spill response plan to reduce the likelihood of spills or misapplication, to take remedial actions in the event of spills, and to fully report the event. At a minimum, the plans will: (1) Address spill prevention and containment; (2) estimate and limit the daily quantity of herbicides to be transported to treatment sites; (3) require that impervious material be placed beneath mixing areas in such a manner as to contain small spills associated with mixing/refilling; (4) require a spill cleanup kit be readily available for herbicide transportation and storage; (5) outline reporting procedures, including reporting spills to the appropriate regulatory agency; (6) ensure applicators are trained in safe handling and transportation procedures and spill cleanup; (7) require that equipment used in herbicide storage, transportation and handling are maintained in a leak proof condition; (8) address transportation routes so that hazardous conditions are avoided to the extent possible; (9) specify mixing and loading locations away from waterbodies so that accidental spills do not contaminate surface waters; (10) require that spray tanks be mixed or washed further than 150 feet of surface water and wellheads; (11) ensure safe disposal of herbicide containers and rinsate; (12) identify sites that may only be reached by water travel and limit the amount of herbicide that may be transported by watercraft; and (13) require regular maintenance and calibration of spray equipment through the spray season to ensure proper application rates.

- All chemicals will be applied in accordance with EPA registration label requirements and restrictions. Specific label directions, recommendations, and guidelines will be followed to reduce drift potential (i.e., nozzle size and pressure, additives, wind speed).

- *2,4-D.* As a result of the National Consultation, this herbicide shall comply with all relevant reasonable and prudent alternatives from the 2011 Opinion (NMFS 2011b): (1) Do not apply when wind speeds are below 2 mph or exceed 10 mph, except when winds in excess of 10 mph will carry drift away from salmonid-bearing waters; (2) do not apply when a precipitation event, likely to produce direct runoff to salmonid bearing waters from the treated area, is forecasted by National Oceanic and Atmospheric Administration National Weather Service or other similar forecasting service within 48 hours following application; (3) control of invasive plants within the riparian habitat shall be by individual plant treatments for woody species, and spot treatment of less than 1/10 acre for herbaceous species.

- Herbicide applicators will obtain a weather forecast for the area prior to initiating a spraying project to ensure no extreme precipitation or wind events could occur during or immediately after spraying that could allow runoff or drift into streams.

- Herbicide drift and leaching will be minimized as follows for action agencies: (1) Will not spray when wind speeds exceed 10 miles per hour, or when wind speeds are less than 2 mph if the potential for temperature inversion exists; (2) will be aware of wind directions and potential for herbicides to affect aquatic habitat area downwind; (3) will keep boom or spray as low as possible to reduce wind effects; (4) will increase spray droplet size whenever possible by decreasing spray pressure, using high flow rate nozzles, using water diluents instead of oil, and adding thickening agents; (5) will not apply herbicides during temperature inversions, or when ground temperatures exceed 80

- degrees Fahrenheit; (6) will not spray when rain, fog, or other precipitation is falling or expected within 24 hours; (7) will ensure that products with leaching hazard are applied only to appropriate soil types and textures as indicated on label. Wind and other weather data will be monitored and reported for all broadcast applications.

- To address potential concerns with the use of the listed adjuvants, Activator 90, Spread 90, LI700, Syl-Tac, R11, Agri-Dex, Valid, and Hilight will not be used within 50 feet of open water. The MSO surfactant could be used up to within 15 feet of open water.

- All mixing of herbicides will occur at least 150 feet from surface water or well heads to minimize the risk of an accidental discharge.

- All hoses used to add dilution water to spray containers will be equipped with a device to prevent back-siphoning.

- Applicators will mix only those quantities of herbicides that can be reasonably used in a day.

- All empty containers will be triple rinsed and rinsate disposed of by spraying near the treatment site at rates that do not exceed those on the treatment site.

- No chemical herbicides will be used within a 100-foot radius of any potable water spring development.

- Herbicides will be applied at the lowest effective label rates, including the typical and maximum rates given. For broadcast spraying, application of herbicide or surfactant will not exceed the typical label rates.

- Dyes (e.g., Insight) will be used in riparian areas, and other locations as appropriate to provide visual evidence of treated vegetation. Dyes should be used around any sensitive areas, or where larger areas are sprayed (especially when using boom sprayers, for example), to reduce overlap and overapplication. Hilight, however, will not be used within 50 feet of the water's edge.

- The Project Sponsor will use herbicides and surfactants with the least toxicity to ESA-listed fish and other non-target organisms whenever possible.

- The Project Sponsor will use caution when applying herbicides near streams or roadside ditches that drain directly into streams. Herbicides containing glyphosate without surfactants or toxic additives, such as Rodeo®, will be the product of choice under appropriate site conditions.

- The Project Sponsor will avoid the use of picloram, clopyralid, chlorsulfuron, dicamba, imazapic, triclopyr, and metsulfuron-methyl within annual floodplains where the water table is within 6 feet of the surface and soil permeability is high (silt loam and sand soils).

- The Project Sponsor will ensure that herbicides are not applied when wind speeds are less than 2 mph if the potential for temperature inversions exists.

- Most weed patches are expected to have overland access. However, some sites may be reached only by water travel, either by wading or inflatable raft (or kayak). The following measures will be used to reduce the risk of a spill during water transport: (1) No more than 2.5 gallons of herbicide will be transported per person or raft, and typically it will be 1 gallon or less; (2) herbicide will be carried in 1 gallon or smaller plastic containers. The containers will be wrapped in plastic bags and then sealed in a dry-bag. If transported by raft, the dry-bag will be secured to the watercraft.

- On the Project Completion Form, the Project Sponsor will list all herbicides use and acres treated.

<u>Streambank Stabilization</u>

***Description:*** This proposed action includes the restoration of eroding streambanks through bank shaping and installation of coir logs or other soil reinforcements; bioengineering techniques as necessary to support development of riparian vegetation and/or planting or installing large wood, trees, shrubs, and herbaceous cover as necessary to restore ecological function in riparian and floodplain habitats. The goal of streambank restoration is to reestablish long-term riparian processes through revegetation, or to ameliorate chronic erosion in locations where roads, bridges or other permanent floodplain developments preclude lateral channel migration.

The following bioengineering techniques may be used either individually or in combination: (1) Woody plantings and variations (*e.g.*, live stakes, brush layering, fascines, brush mattresses); (2) herbaceous cover, where analysis of available records (*e.g*., historical accounts and photographs) shows that trees or shrubs did not exist on the site within historic times, primarily for use on small streams or adjacent wetlands; (3) deformable soil reinforcement, consisting of soil layers or lifts strengthened with biodegradable coir fabric and plantings that are penetrable by plant roots; (4) coir logs (long bundles of coconut fiber), straw bales, and straw logs used individually or in stacks to trap sediment and provide a growth medium for riparian plants; (5) bank reshaping and slope grading, when used to reduce a bank slope angle without changing the location of its toe, to increase roughness and cross section, and to provide more favorable planting surfaces; (6) tree and LWD rows, live siltation fences, brush traverses, brush rows and live brush sills in floodplains, used to reduce the likelihood of avulsion in areas where natural floodplain roughness is poorly developed or has been removed; and (7) floodplain flow spreaders, consisting of one or more rows of trees and accumulated debris used to spread flow across the floodplain.

***Conservation Measures***

- Without changing the location of the bank toe, damaged streambanks will be restored to a natural slope and profile suitable for establishment of permanent woody vegetation. This may include sloping of unconsolidated bank material to a stable angle of repose, or the use of benches in consolidated, cohesive soils. The purpose of bank shaping is to provide a more stable platform for the establishment of riparian vegetation, while also reducing the depth to the water table, thus promoting better plant survival.

- Streambank restoration projects shall include the placement of a riparian buffer strip consisting of a diverse assemblage of species native to the action area or region, including trees, shrubs, and herbaceous species, as appropriate to site conditions. Certified seed sources that are free of noxious or invasive species will be used.

- Large wood may be used as an integral component of streambank protection treatments. Large wood will be placed to maximize near bank hydraulic complexity and interstitial habitats through use of various large wood sizes and configurations of the placements.

- Structural placement of large wood should focus on providing bankline roughness for energy dissipation vs. flow redirection that may affect the stability of the opposite bankline.

- Wood that is already within the stream or suspended over the stream may be repositioned to allow for greater interaction with the stream.

- Large wood anchoring will not utilize cable or chain. Manila, sisal or other biodegradable ropes may be used for lashing connections. If hydraulic conditions warrant use of structural connections, then wooden posts should be used in preference to rebar or steel posts. If rebar or steel posts with a height less than 4 feet tall are used, the tops of the posts must be bent downward to reduce the hazards to humans and wildlife.

- Rock will not be used for streambank restoration, except as ballast to stabilize large wood, unless it is necessary to prevent scouring or downcutting of an existing flow control structure (*e.g.*, culvert or bridge support, headwall). In this case, rock may be used as the primary structural component for construction of vegetated riprap with LWD. Rock may also be used for barbs to protect an existing structure (see below) in conjunction with bioengineering streambank stabilization techniques.

- Fencing will be installed as necessary to prevent access and grazing damage to revegetated sites and project buffer strips.

- Surface fertilizer will not be applied within 50 feet of any stream.

*1.3.5.8 Road and Trail Erosion Control, Maintenance and Decommissioning*

***Purpose:*** To reduce sediment delivery to streams from man-made sources.

***Description:*** This category includes road projects aimed at reducing sediment delivery to streams and thereby improving aquatic habitat, where necessary as part of a larger aquatic habitat restoration project. This includes road obliteration, relocating roads and trails away from riparian areas, road drainage system improvements, and other sediment reduction projects. Road maintenance activities within the riparian zone may include: (1) Creating barriers to human access: gates, fences, boulders, logs, tank traps, vegetative buffers, and signs; (2) surface maintenance, such as building and compacting the road prism, grading, and spreading rock or surfacing material; (3) drainage maintenance and repair of inboard ditch lines, waterbars, and sediment traps; (4) removing and hauling or stabilizing pre-existing cut and fill material or road-related slide material from a hillslope[8]; (5) water spraying for dust abatement; and (6) relocating portions of roads and trails to less sensitive areas outside of riparian buffer areas. The proposed activity does not include asphalt resurfacing, widening roads, or new construction or relocation of any permanent road inside a riparian buffer area except for a bridge approach in accordance to the section on *Fish Passage***.** Road grading and shaping will maintain, not destroy, the designed drainage of the road, unless modification is necessary to improve drainage problems that were not anticipated during the design phase. Road maintenance will not be attempted when surface material is saturated with water and erosion problems could result. Where road maintenance on Federal lands is covered under a separate existing consultation with NMFS, this consultation will not apply.

The Project Sponsor may decommission and obliterate roads that are no longer needed, e.g., logging roads. Water bars will be installed, road surfaces will be insloped or outsloped, asphalt and gravel will be removed from road surfaces, culverts and bridges will be altered or removed, streambanks will be recontoured at stream crossings, cross drains will be installed, fill or sidecast materials will be removed, road prism will be reshaped, sediment catch basins will be created, all surfaces will be revegetated to reduce surface erosion of bare soils, surface drainage patterns will be recreated, and dissipaters, chutes or rock will be placed at remaining culvert outlets. Ground cover on the old road bed will be provided by transplanted bushes or placement of branches from nearby vegetation. Grass and forb seeds will typically be applied to any bare soil. These activities will be conducted during dry-field conditions with low to moderate soil moisture levels. Slide and waste material will be disposed in stable, non-floodplain sites, unless materials are needed to restore natural or near-natural contours, and approved by a geotechnical engineer or other qualified personnel.

***Conservation Measures***

- For road obliteration projects, disturbance of existing vegetation in ditches and at stream crossings will be minimized to the extent necessary to restore hydrologic functions.

- For road obliteration projects, culvert removal will be designed to restore the natural drainage pattern.

- Only water may be used for dust abatement. This proposed action does not include use of dust-abatement and stabilization chemicals.

- Waste material generated from road maintenance activities and slides will be disposed of on stable, non-floodplain sites, approved by a geotechnical engineer or other qualified personnel.

[8] The proposed action does not include removal of slide material from a stream.

- Disturbance of existing vegetation in ditches and at stream crossings will be minimized to the greatest extent possible.

- Ditches and culverts will be promptly cleaned of materials resulting from slides or other debris.

- Berms will not be left along the outside edge of roads, unless an outside berm was specifically designed to be a part of the road, and low-energy drainage is provided.

- Ditch back slopes will not be undercut, to avoid slope destabilization and erosion acceleration.

- When blading and shaping roads, road surface material will not be sidecast onto the fill. All excess material that cannot be bladed into the surface will be hauled to a site where sediment will not enter water. Slides and rock failures including fine material of more than approximately one-half yard at one site will be hauled to disposal sites. Fine materials (1 inch or smaller) from slides, ditch maintenance, or blading may be worked into the road. Scattered clean rocks (1 inch or larger) may be raked or bladed off the road in locations where there is a sufficient buffer between the road and stream to prevent materials from washing into the water.

- Road maintenance will not be attempted when surface material is saturated with water and erosion problems could result. When replacing or adding cross drains, coarse rock shall be used at outlets of the cross drains to dissipate energy in locations where the water is likely to create gullies.

#### *1.3.5.9 Surveying and Monitoring*

***Purpose:*** To collect information about the project site, current habitat conditions, and species presence and abundance; and to monitor the site for several years after project completion to assess the effectiveness of the project. In addition, this consultation covers the installation of PIT tag detection arrays for monitoring fish movement.

<u>Surveying and Monitoring at Habitat Restoration Project Sites</u>

***Description:*** Conduct habitat and animal inventories in riparian areas, streams, and wetlands, and install monitoring equipment. Electroshocking for research purposes is not included under this consultation, as this work must have an ESA Section 10 Research Permit. (However, electroshocking and other fish removal methods are covered under this program for the purpose of removing fish from an instream work area prior to dewatering, as described under *General Conservation Measures.*) Under this category, work may include survey equipment and crews using hand tools for the following activities:

- Measuring and recording physical measurements by visual estimates or with survey instruments.

- Manually installing rebar or other markers along transects or at reference points.
- Manually installing piezometers and staff gauges to assess hydrologic conditions.
- Manually installing recording devices for streamflow and temperature.
- Excavating cultural resource test pits using hand shovel only.

***Conservation Measures***

- Hydraulic and topographic measurement within the wetted channel may be completed anytime except during the spawning and incubation periods for ESA-listed species, unless a natural resource specialist with experience in fish handling verifies that no redds occur within 300 feet downstream from the measurement site.
- No inwater work will occur within 300 feet of spawning areas during anadromous fish spawning and incubation times, which will be dictated by the approved work window.
- Workers will avoid redds and ESA-listed spawning fish while walking within or near stream channels to the extent possible. Avoidance will be accomplished by examining pool tailouts and low-gradient riffles for clean gravel and characteristic shapes and flows prior to walking or snorkeling through these areas.
- If redds or listed spawning fish are observed at any time, workers will step out of the channel and walk on dry land at a distance from the active channel.
- Surveyors will coordinate with local agencies to prevent redundant surveys.
- Excavated material from cultural resource test pits will be placed away from stream channels. All material will be replaced back into test pits when testing is completed.
- Multiple stream sites will be used for field trips to minimize effects on any given stream or riparian buffer area.
- Rebar stakes left on site must have the tops bent downward to reduce hazards to humans and wildlife.

<u>Installation of PIT Tag Detection Arrays</u>

***Description:*** This category may also include the installation and maintenance of PIT tag detection arrays. The PIT tag detection arrays consist of antennas laid out on stream substrate perpendicular to streamflow in order to detect and identify fish marked with PIT tags. This habitat restoration programmatic consultation would cover only the installation and maintenance of PIT tag arrays in Idaho, and not the actual fish studies (capture, handling, tagging, sampling, live release, etc.) associated with the operation of the PIT tag arrays, which would be covered under separate NMFS and USFWS permits or consultations.

The PIT tag antennas can be fixed to stream substrate using manta ray anchors, all thread, and end caps, which are driven into the substrate with hand tools. A trench may be excavated for cable placement. Excavation of substrate would be completed using hand tools, including a hydraulic pump and jackhammer where necessary to dislodge embedded substrate. All excavated substrate material would be redistributed within the channel at the project site. On-shore construction could include installation of posts with concrete footers to support electrical equipment; and installation of a power source (domestic, thermoelectric generator, or solar panels). Where thermoelectric power is used, propane tanks (up to 250 gallons) would be placed onsite.

The PIT tag detection array installations are often completed within a day, although some sites could require multiple days of instream or on-shore work. The PIT tag array sites are typically selected for substrate and channel structure most readily classified as "migration corridors." As a result, sites are typically downstream of spawning habitat and have low habitat complexity, little LWD, uniform depth, larger substrate, and high velocities. Generally, these conditions result in sites with little potential for spawning and lower value as juvenile rearing habitat.

***Conservation Measures***

- Installation would occur during periods of low instream flow, preferably in advance of adult migration. If the Project Sponsor proposes to install a PIT tag array outside of the preferred instream work window, the Project Sponsor must specify an alternative low-water work window in the Project Information Form. NMFS must provide electronic approval of this variance prior to the work proceeding.

- Instream and bank disturbance will be minimized to preserve the current condition of each site and all work will be conducted by hand.

- Staging of equipment and materials will occur more than 150 feet from all streams.

- Arrays must not be placed in areas that are likely to be used for spawning. Prior to installations, the Project Sponsor will review available redd survey data to evaluate the possible presence of redds near project locations. Additionally, a reach no shorter than 100 yards upstream and downstream of each site will be surveyed for the presence of redds and adult salmonids immediately prior to installation. If redds or spawning activity are observed, installation will be delayed until the next NMFS-approved work window.

- Uncured concrete will not be in contact with water.

## 1.4 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). Under the proposed action, individual projects could occur anywhere within the 18 subbasins in Idaho that contain ESA-listed anadromous fish species (Figure 1; Table 5). Potential effects of stream habitat restoration projects would occur immediately downstream of the project site and would not be expected to extend downstream outside of the subbasins in which the projects occur. The action area therefore consists of the subbasins shown in Figure 1.

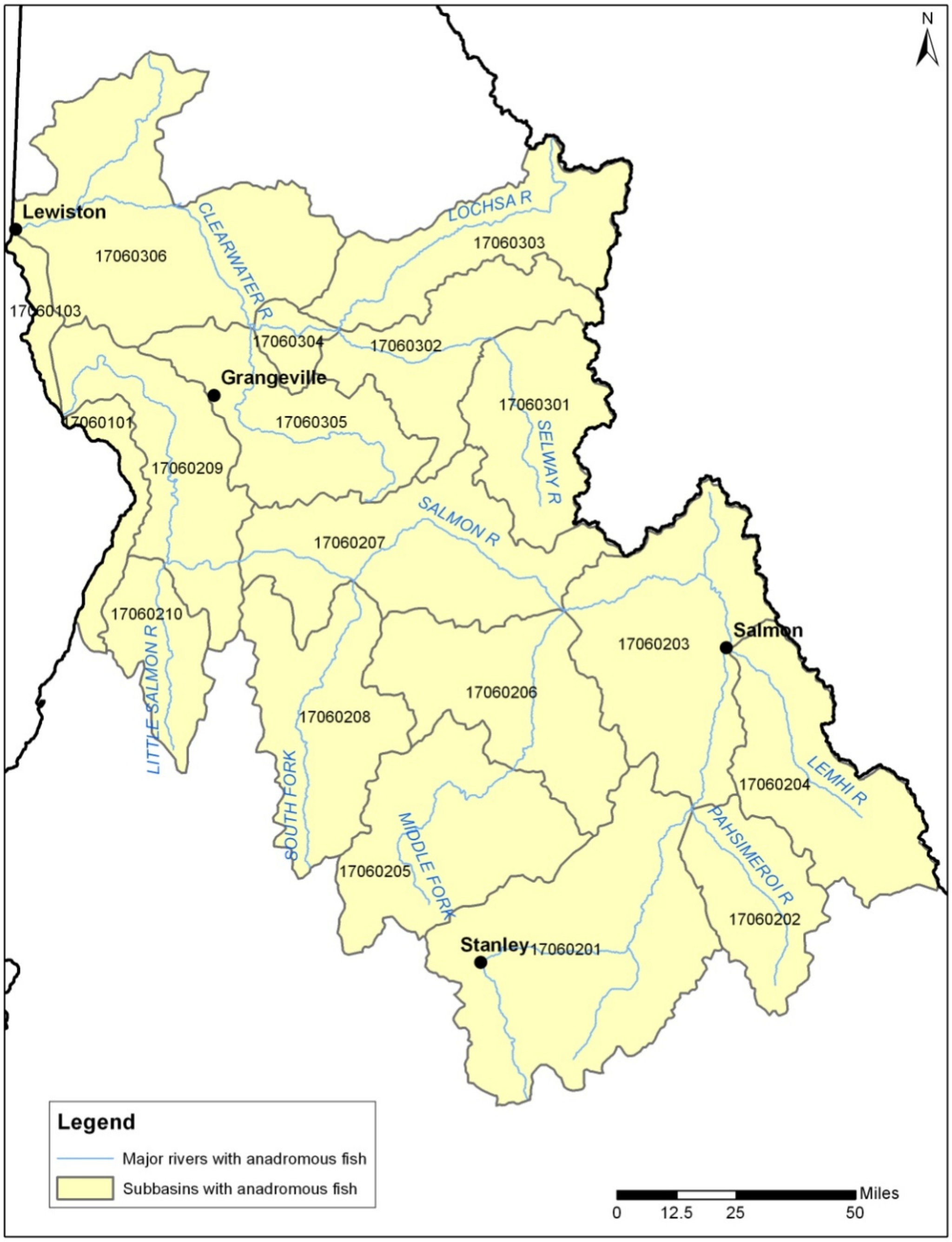


**Figure 1. Subbasins in Idaho occupied by ESA-listed anadromous fish species.**

**Table 5. Subbasins in Idaho with ESA-listed anadromous fish.**

| 4th-field HUC | HUC Name |
|---|---|
| 17060101 | Hells Canyon |
| 17060103 | Lower Snake-Asotin |
| 17060201 | Upper Salmon |
| 17060202 | Pashimeroi |
| 17060203 | Middle Salmon-Panther |
| 17060204 | Lemhi |
| 17060205 | Upper Middle Fork Salmon |
| 17060206 | Lower Middle Fork Salmon |
| 17060207 | Middle Salmon-Chamberlain |
| 17060208 | South Fork Salmon |
| 17060209 | Lower Salmon |
| 17060210 | Little Salmon |
| 17060301 | Upper Selway |
| 17060302 | Lower Selway |
| 17060303 | Lochsa |
| 17060304 | Middle Fork Clearwater |
| 17060305 | South Fork Clearwater |
| 17060306 | Clearwater |

# 2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with the United States Fish and Wildlife Service, NMFS, or both, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitat. Section 7(b)(3) requires that at the conclusion of consultation, NMFS provides an opinion stating how the agencies' actions will affect listed species or their critical habitat. If incidental take is expected, section 7(b)(4) requires the provision of an incidental take statement (ITS) specifying the impact of any incidental taking, and including reasonable and prudent measures (RPMs) to minimize such impacts.

## 2.1 Introduction to the Biological Opinion

Section 7(a)(2) of the ESA requires Federal agencies, in consultation with NMFS, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. The jeopardy analysis considers both survival and recovery of the species. The adverse modification analysis considers the impacts to the conservation value of the designated critical habitat.

"To jeopardize the continued existence of a listed species" means to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02).

This Opinion does not rely on the regulatory definition of 'destruction or adverse modification' of critical habitat at 50 CFR 402.02. Instead, NMFS has relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.[9]

NMFS uses the following approach to determine if the proposed action described in Section 1.3 is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- *Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action*. This section describes the current status of each listed species and its critical habitat relative to the conditions needed for recovery. For listed salmon and steelhead, NMFS has developed specific guidance for analyzing the status of the listed species' component populations in a "viable salmonid populations" (VSP) paper (McElhany *et al.* 2000). The VSP approach considers the abundance, productivity, spatial structure, and diversity of each population as part of the overall review of a species' status. For listed salmon and steelhead, the VSP criteria, therefore, encompass the species' "reproduction, numbers, or distribution" (50 CFR 402.02). In describing the range-wide status of listed species, NMFS relies on viability assessments and criteria in technical recovery team documents and recovery plans, where available, that describe how VSP criteria are applied to specific populations, major population groups (MPG), and species. NMFS determines the rangewide status of critical habitat by examining the condition of its physical or biological features (also called "primary constituent elements" or PCEs in some designations) - which were identified when the critical habitat was designated. Species and critical habitat status are discussed in Section 2.2.

- *Describe the environmental baseline for the proposed action*. The environmental baseline includes the past and present impacts of Federal, state, or private actions and other human activities *in the action area*. It includes the anticipated impacts of proposed Federal projects that have already undergone formal or early section 7 consultation and the impacts of state or private actions that are contemporaneous with the consultation in process. The environmental baseline is discussed in Section 2.3 of this Opinion.

- *Analyze the effects of the proposed actions*. In this step, NMFS considers how the proposed action would affect the species' reproduction, numbers, and distribution or, in the case of salmon and steelhead, their VSP characteristics. NMFS also evaluates the

[9] Memorandum from William T. Hogarth to Regional Administrators, Office of Protected Resources, NMFS (Application of the "Destruction or Adverse Modification" Standard Under Section 7(a)(2) of the Endangered Species Act) (November 7, 2005).

proposed action's effects on critical habitat features. The effects of the action are described in Section 2.4 of this Opinion.

- *Describe any cumulative effects.* Cumulative effects, as defined in NMFS' implementing regulations (50 CFR 402.02), are the effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area. Future Federal actions that are unrelated to the proposed action are not considered because they require separate section 7 consultation. Cumulative effects are considered in Section 2.5 of this Opinion.

- *Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat.* In this step, NMFS adds the effects of the action (Section 2.4) to the environmental baseline (Section 2.3) and the cumulative effects (Section 2.5) to assess if the action could reasonably be expected to: (1) Appreciably reduce the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species. These assessments are made in full consideration of the status of the species and critical habitat (Section 2.2). Integration and synthesis occurs in Section 2.6 of this Opinion.

- *Reach jeopardy and adverse modification conclusions*. Conclusions regarding jeopardy and the destruction or adverse modification of critical habitat are presented in Section 2.7. These conclusions flow from the logic and rationale presented in the Integration and Synthesis Section (2.6).

- *If necessary, define a reasonable and prudent alternative to the proposed action.* If, in completing the last step in the analysis, NMFS determines that the action under consultation is likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat, NMFS must identify a reasonable and prudent alternative (RPA) to the action in Section 2.8. The RPA must not be likely to jeopardize the continued existence of ESA-listed species nor adversely modify their designated critical habitat and it must meet other regulatory requirements.

## 2.2 Rangewide Status of the Species and Critical Habitat

This section describes the status of each ESA-listed species (Section 2.2.1) and their designated critical habitat (Section 2.2.2) that occur within the action area as well as the general effects of climate change on ESA-listed species and their critical habitat (Section 2.2.3). More detailed information on the status and trends of these ESA-listed species, and their biology and ecology, can be found in the listing regulations and critical habitat designations published in the Federal Register (Table 6). Another source of information is the most recent 5-year review of ESA-listed Pacific salmonid species, including the four ESA-listed species in Idaho, which was published on August 15, 2011 (Ford 2011). The action area also contains EFH for Chinook salmon and coho salmon.

**Table 6. Listing status, status of critical habitat designations and protective regulations, and relevant Federal Register (FR) decision notices for ESA-listed species considered in this opinion.**

| | Listing Status | Critical Habitat | Protective Regulations |
|---|---|---|---|
| **Chinook salmon *(Oncorhynchus tshawytscha)*** | | | |
| Snake River spring/summer-run | T 8/15/11; 76 FR 50488 | 10/25/99; 64 FR 57399 | 6/28/05; 70 FR 37160 |
| Snake River fall-run | T 8/15/11; 76 FR 50488 | 12/28/93; 58 FR 68543 | 6/28/05; 70 FR 37160 |
| **Sockeye salmon *(O. nerka)*** | | | |
| Snake River | E 8/15/11; 76 FR 50488 | 12/28/93; 58 FR 68543 | ESA section 9 applies |
| **Steelhead (*O. mykiss*)** | | | |
| Snake River Basin | T 8/15/11; 76 FR 50488 | 9/02/05; 70 FR 52630 | 6/28/05; 70 FR 37160 |

### 2.2.1 Status of Listed Species

When evaluating the status of an ESA-listed species, the parameters considered in recovery plans, status reviews, and listing decisions are relevant. For Pacific salmon and steelhead, viability of the populations that make up the species can be assessed using four parameters: spatial structure, diversity, abundance, and productivity (McElhany *et al.* 2000). These VSP criteria therefore encompass the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. When these parameters are at appropriate levels, collectively, they maintain a population's capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment. These attributes are influenced by survival, behavior, and experiences throughout the entire life cycle, characteristics that are influenced, in turn, by habitat and other environmental conditions.

"Spatial structure" refers both to the spatial distributions of individuals in the population and the processes that generate that distribution. A population's spatial structure depends fundamentally on habitat quality and spatial configuration, and the dynamics and dispersal characteristics of individuals in the population. "Diversity" refers to the distribution of traits within and among populations. These range in scale from deoxyribonucleic acid sequence variation at single genes to complex life history traits (McElhany *et al.* 2000). "Abundance" generally refers to the number of naturally-produced adults (i.e., the progeny of naturally-spawning parents) in the natural environment (e.g., on spawning grounds).

"Productivity" as applied to viability factors refers to the entire life cycle (i.e., the number of naturally-spawning adults produced per parent). When progeny replace or exceed the number of parents, a population is stable or increasing. When progeny fail to replace the number of parents, the population is declining. McElhany *et al.* (2000) use the terms "population growth rate" and "productivity" interchangeably when referring to production over the entire life cycle. They also refer to "trend in abundance," which is the manifestation of long-term population growth rate.

Once the biological status of a species' populations has been determined, NMFS assesses the status of the entire species using criteria for groups of populations, as described in recovery plans and guidance from technical recovery teams. Considerations for species viability include having multiple populations that are viable, ensuring that populations with unique life histories and phenotypes are viable, and that some viable populations are both widespread to avoid concurrent extinctions from mass catastrophes and spatially close to allow functioning as metapopulations (McElhany *et al.* 2000).

The four anadromous ESA-listed fish species in Idaho fall under the Interior Columbia Recovery Domain. Recovery domains are geographically-based areas that NMFS is using to prepare multi-species recovery plans for salmon and steelhead. For each domain, NMFS appointed an interagency team of scientists to provide a scientific foundation for recovery plans. The Interior Columbia Basin Technical Recovery Team (ICBTRT) has delineated populations for each species in its domain, assessed the current viability of each population, and made recommendations for recovery of the species based on viability goals for the species' component populations. The rangewide species status summaries in this Opinion rely on several ICBTRT reports, such as population status assessments and viability criteria. These reports can be found at http://www.nwfsc.noaa.gov/trt/pubs.cfm, or by contacting the NMFS Boise office.

NMFS and the state of Idaho are currently developing a recovery plan for the four Snake River species, based on the recommendations of the ICBTRT. The recovery plan will describe the status of the species and their component populations, limiting factors, recovery goals, and actions to address limiting factors. The most recent working drafts of the Idaho Snake River recovery plans are posted at http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/snake_river/current_snake_river_recovery_plan_documents.html.

*2.2.1.1 Snake River Spring/Summer Chinook Salmon*

The Snake River spring/summer Chinook salmon evolutionarily significant unit (ESU) was listed as threatened on April 22, 1992 (57 FR 14653). This ESU occupies the Snake River basin, which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Several factors led to NMFS' conclusion that Snake River spring/summer Chinook were threatened: (1) Abundance of naturally produced Snake River spring and summer Chinook runs had dropped to a small fraction of historical levels; (2) short-term projections were for a continued downward trend in abundance; (3) hydroelectric development on the Snake and Columbia Rivers continued to disrupt Chinook runs through altered flow regimes and impacts on estuarine habitats; and (4) habitat degradation existed throughout the region, along with risks associated with the use of outside hatchery stocks in particular areas (Good *et al* 2005). On August 15, 2011, in the agency's most recent 5-year review for the Snake River ESU, NMFS concluded that the species should remain listed as threatened (76 FR 50448).

Adult spring and summer Chinook destined for the Snake River enter the Columbia River on their upstream spawning migration from February through March and arrive at their natal tributaries between June and August. Spawning occurs in August and September. Eggs incubate over the winter and hatch in late winter and early spring of the following year. Juveniles exhibit a river-type life history strategy, rearing in tributary streams during their first year of life before migrating to the ocean the following spring. Depending on the tributary and the specific habitat conditions, juveniles may migrate extensively from natal reaches into alternative summer-rearing or overwintering areas. After reaching the ocean as smolts, the fish typically spend 2 to 3 years in the ocean before beginning their migration back to their natal freshwater streams.

***Spatial Structure and Diversity.*** The Snake River ESU includes all naturally spawning populations of spring/summer Chinook in the mainstem Snake River (below Hells Canyon Dam) and in the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins (57 FR 23458), as well as the progeny of 15 artificial propagation programs (70 FR 37160). The hatchery programs include the South Fork Salmon River (McCall Hatchery), Johnson Creek, Lemhi River, Pahsimeroi River, East Fork Salmon River, West Fork Yankee Fork Salmon River, and Upper Salmon River (Sawtooth Hatchery) programs in Idaho; and the Tucannon River (conventional and captive broodstock programs), Lostine River, Catherine Creek, Lookingglass Creek, Upper Grande Ronde River, Imnaha River, and Big Sheep Creek programs in Oregon. The historical Snake River spring/summer Chinook ESU likely also included populations in the Clearwater River drainage and extended above the Hells Canyon Dam complex.

Within the Snake River ESU, the ICBTRT identified 28 extant and four extirpated or functionally extirpated populations of spring/summer-run Chinook salmon, listed in Table 7 (ICBTRT 2003; McClure *et al.* 2005). The ICBTRT aggregated these populations into five MPGs, of which the South Fork Salmon, Middle Fork Salmon, and Upper Salmon River MPGs are in central Idaho. All populations in Idaho are extant with the exception of Panther Creek, which the ICBTRT classified as functionally extirpated due to severe water quality and habitat degradation in Lower Panther Creek during the 1950s and 1960s from Blackbird Mine operations (ICBTRT 2003). For each population, Table 7 shows the current risk ratings that the ICBTRT assigned to the four parameters of a viable salmonid population (spatial structure, diversity, abundance, and productivity).

In general, current spatial structure risk is low in this ESU and is not preventing the recovery of the species. Spring/summer Chinook spawners are distributed throughout the ESU albeit at very low numbers. Diversity risk, on the other hand, is somewhat higher, driving the moderate and high combined spatial structure/diversity risks shown in Table 7 for some populations. In the Upper Salmon, high diversity risks are caused by chronically high proportions of hatchery spawners in natural areas, and by loss of access to tributary spawning and rearing habitats and the associated reduction in life history diversity (Ford *et al.* 2011). Diversity risk will need to be lowered in multiple populations in order for the ESU to recover (NMFS 2011c).

***Abundance and Productivity.*** Historically, the Snake River drainage is thought to have produced more than 1.5 million adult spring/ summer Chinook salmon in some years (Matthews and Waples 1991), yet by the mid-1990s counts of natural-origin fish passing Lower Granite Dam dropped to less than 10,000 (IDFG 2007). Natural-origin returns have since increased somewhat but remain highly variable and a fraction of historic estimates (Ford *et al.* 2011). Between 2002 and 2012, the number of natural-origin adult fish passing Lower Granite Dam ranged from 8,808 to 31,619 (IDFG 2014). For individual populations, abundance remains below viability thresholds for all populations, reflected in the ICBTRT's high risk rating for abundance/productivity for each population listed in Table 7 (Ford *et al.* 2011). For some populations, mean abundance from 2000 to 2009 was extremely low, such as for the Yankee Fork and Camas Creek populations, which had recent mean abundances of just 21 and 30 natural spawners, respectively, compared to minimum viability targets of at least 500 spawners (Ford *et al.* 2011). Relatively low natural production rates and spawning levels remain a major concern across the ESU, and each population in the ESU currently faces a high risk of extinction over the next 100 years (Table 7).

**Table 7. Summary of VSP parameter risks and overall current status for each population in the Snake River spring/summer Chinook salmon ESU (Ford *et al.* 2011; ICBTRT 2010a; 2010b; 2010c).**

| MPG | Population | VSP Parameter Risk | | Overall Viability Rating |
|---|---|---|---|---|
| | | Abundance/ Productivity | Spatial Structure/ Diversity | |
| South Fork Salmon River (Idaho) | Little Salmon River | High | High | High Risk |
| | South Fork Salmon River mainstem | High | Moderate | High Risk |
| | Secesh River | High | Low | High Risk |
| | East Fork South Fork Salmon River | High | Low | High Risk |
| Middle Fork Salmon River (Idaho) | Chamberlain Creek | High | Low | High Risk |
| | Middle Fk. Salmon River below Indian Ck. | High | Moderate | High Risk |
| | Big Creek | High | Moderate | High Risk |
| | Camas Creek | High | Moderate | High Risk |
| | Loon Creek | High | Moderate | High Risk |
| | Middle Fk. Salmon River above Indian Ck. | High | Moderate | High Risk |
| | Sulphur Creek | High | Moderate | High Risk |
| | Bear Valley Creek | High | Low | High Risk |
| | Marsh Creek | High | Low | High Risk |
| Upper Salmon River (Idaho) | North Fork Salmon River | High | Low | High Risk |
| | Lemhi River | High | High | High Risk |
| | Salmon River Lower Mainstem | High | Low | High Risk |
| | Pahsimeroi River | High | High | High Risk |
| | East Fork Salmon River | High | High | High Risk |
| | Yankee Fork Salmon River | High | High | High Risk |
| | Valley Creek | High | Moderate | High Risk |
| | Salmon River Upper Mainstem | High | Moderate | High Risk |
| | Panther Creek | | | Extirpated |
| Lower Snake (Washington) | Tucannon River | High | Moderate | High Risk |
| | Asotin River | | | Extirpated |
| Grande Ronde and Imnaha Rivers (Oregon/ Washington) | Wenaha River | High | Moderate | High Risk |
| | Lostine/Wallowa River | High | Moderate | High Risk |
| | Minam River | High | Moderate | High Risk |
| | Catherine Creek | High | Moderate | High Risk |
| | Upper Grande Ronde R. | High | High | High Risk |
| | Imnaha River | High | Moderate | High Risk |
| | Big Sheep Creek | | | Extirpated |
| | Lookingglass Creek | | | Extirpated |

***Limiting Factors.*** Limiting factors and threats to the Snake River spring/summer-run Chinook salmon ESU include the following (NOAA Fisheries 2011; NMFS 2011c):

- Mainstem Columbia River and Snake River hydropower impacts.
- Degraded freshwater habitat; floodplain connectivity and function, channel structure and complexity, riparian areas and large wood supply, stream substrate, elevated water temperature, streamflow, and water quality have been degraded as a result of cumulative impacts of agriculture, mining, forestry, road-building, and development.
- Hatchery impacts.
- Predation by pinnipeds, birds, and piscivorous fish in the mainstem river and estuary migration corridor.
- Harvest-related effects.

#### *2.2.1.2 Snake River Basin Steelhead*

The Snake River steelhead was listed as a threatened ESU on August 18, 1997 (62 FR 43937), with a revised listing as a distinct population segment (DPS) on January 5, 2006 (71 FR 834). This DPS occupies the Snake River basin, which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Reasons for the decline of this species include substantial modification of the seaward migration corridor by hydroelectric power development on the Snake and mainstem Columbia Rivers, and widespread habitat degradation and reduced streamflows throughout the Snake River basin (Good *et al.* 2005). Another major concern for the species is the threat to genetic integrity from past and present hatchery practices, and the high proportion of hatchery fish in aggregate run of Snake River Basin steelhead over Lower Granite Dam (Good *et al.* 2005; Ford *et al.* 2011). On August 15, 2011, in the agency's most recent 5-year review for the Snake River DPS, NMFS concluded that the species should remain listed as threatened (76 FR 50448).

Adult Snake River Basin steelhead enter the Columbia River from late June to October to begin their migration inland. After holding over the winter in larger rivers in the Snake River basin, steelhead disperse into smaller tributaries to spawn from March through May. Earlier dispersal occurs at lower elevations and later dispersal occurs at higher elevations. Juveniles emerge from the gravels in 4 to 8 weeks, and move into shallow, low-velocity areas in side channels and along channel margins to escape high velocities and predators (Everest and Chapman 1972). Juvenile steelhead then progressively move toward deeper water as they grow in size (Bjornn and Rieser 1991). Juveniles typically reside in fresh water for 1 to 3 years, although this species displays a wide diversity of life histories. Smolts migrate downstream during spring runoff, which occurs from March to mid-June depending on elevation, and typically spend 1 to 2 years in the ocean.

***Spatial Structure and Diversity.*** This species includes all naturally-spawning steelhead populations below natural and manmade impassable barriers in streams in the Snake River basin of southeast Washington, northeast Oregon, and Idaho, as well as the progeny of six artificial propagation programs (71FR834). The hatchery programs include Dworshak National Fish Hatchery, Lolo Creek, North Fork Clearwater River, East Fork Salmon River, Tucannon River, and the Little Sheep Creek/Imnaha River steelhead hatchery programs. The Snake River Basin steelhead listing does not include resident forms of *O. mykiss* (rainbow trout) co-occurring with steelhead.

The ICBTRT identified 24 extant populations within this DPS, organized into five MPGs (ICBTRT 2003). The ICBTRT also identified a number of potential historical populations associated with watersheds above the Hells Canyon Dam complex on the mainstem Snake River, a barrier to anadromous migration. Two of the five MPGs with extant populations are in Idaho: the Clearwater River MPG (five extant populations, one extirpated); and the Salmon River MPG (12 populations). In the Clearwater River, the historic North Fork population was blocked from accessing spawning and rearing habitat by Dworshak Dam. Current steelhead distribution extends throughout the DPS, such that spatial structure risk is generally low. For each population in the DPS, Table 8 shows the current risk ratings that the ICBTRT assigned to the four parameters of a viable salmonid population (spatial structure, diversity, abundance, and productivity).

The Snake River Basin DPS steelhead exhibit a diversity of life-history strategies, including variations in fresh water and ocean residence times. Traditionally, fisheries managers have classified Snake River Basin steelhead into two groups, A-run and B-run, based on ocean age at return, adult size at return, and migration timing. A-run steelhead predominantly spend 1 year at sea and are assumed to be associated with low to mid-elevation streams in the Snake River basin. B-run steelhead are larger with most individuals returning after 2 years in the ocean. The ICBTRT has identified each population in the DPS as either A-run or B-run. Recent research, however, suggests that some populations may support multiple life history strategies. Within one population in the Clearwater River, IDFG reports at least nine different phenotypes, with steelhead spending 1, 2, or 3 years in the ocean (Bowersox 2011). Maintaining life history diversity is important for the recovery of the species.

Diversity risk for the DPS is low to moderate, and drives the moderate combined spatial structure/diversity risks shown in Table 8 for some populations. Moderate diversity risks for some populations are caused by the high proportion of hatchery fish on natural spawning grounds. The current moderate diversity risks for populations in Idaho do not preclude those populations from achieving viability goals under the draft recovery plan for Idaho's salmon and steelhead (NMFS 2011c).

***Abundance and Productivity.*** Historical estimates of steelhead production for the entire Snake River basin are not available, but the basin is believed to have supported more than half the total steelhead production from the Columbia River basin (Mallet 1974, as cited in Good *et al.* 2005). Historical estimates do exist for portions of the basin. Estimates of steelhead passing Lewiston Dam (removed in 1973) on the lower Clearwater River were 40,000 to 60,000 adults (Ecovista *et al.* 2003). Based on relative drainage areas, the Salmon River basin likely supported substantial production as well (Good *et al.* 2005). In contrast, at the time of listing, the 5-year (1991 to 1996) mean abundance for natural-origin steelhead passing Lower Granite Dam was

11,462 adults (Ford *et al.* 2011). Steelhead passing Lower Granite Dam includes those returning to: (1) The Grande Ronde and Imnaha Rivers in Oregon; (2) Asotin Creek in Washington; and (3) the Clearwater and Salmon Rivers in Idaho. The most recent 5-year (2003 to 2008) mean abundance passing Lower Granite Dam was substantially larger at 18,847 natural-origin fish (Ford *et al.* 2011). These natural-origin fish represent just 10% of the total steelhead run over Lower Granite Dam of 162,323 adults for the same time period. However, a large proportion of the hatchery run returns to hatchery racks or is removed by hatchery selective harvest and therefore does not contribute to natural production in most Snake River tributaries (Ford *et al.* 2011).

Despite recent increases in steelhead abundance, population-level natural origin abundance and productivity inferred from aggregate data indicate that many populations in the DPS are likely below the viability targets necessary for species recovery (ICBTRT 2010d). Population-specific abundance estimates are not available for most Snake River steelhead populations, including all populations in Idaho. Instead, the ICBTRT estimated average population abundance and productivity using annual counts of wild steelhead passing Lower Granite Dam, generating separate estimates for a surrogate A-run and B-run population. Most population abundance/productivity risks shown in Table 8 are based on a comparison of the surrogate population current abundance and productivity estimates to a population viability threshold of 1,000 natural-origin spawners and a productivity of 1.14 recruits per spawner. The surrogate A-run population has a mean abundance of 556 spawners and productivity of 1.86, indicating a moderate abundance/productivity risk. The surrogate B-run population has a mean abundance of 345 spawners and productivity of 1.09, indicating a high abundance/productivity risk (NMFS 2011b). Based on these tentative risk ratings, all populations in Idaho are currently at either high or moderate risk of extinction over the next 100 years. Joseph Creek in Oregon, for which population-specific abundance information is available, is the only population in the DPS currently rated as viable (Ford *et al.* 2011).

***Limiting Factors***. Limiting factors and threats to the Snake River Basin steelhead DPS include the following (NOAA Fisheries 2011; NMFS 2011c):

- Mainstem Columbia River and Snake River hydropower impacts.

- Degraded freshwater habitat: Floodplain connectivity and function, channel structure and complexity, riparian areas and large wood supply, stream substrate, elevated water temperature, streamflow, and water quality have been degraded as a result of cumulative impacts of agriculture, mining, forestry, road-building, and development.

- Impaired tributary fish passage.

- Harvest impacts, particularly for B-run steelhead.

- Predation by pinnipeds, birds, and piscivorous fish in the mainstem river and estuary migration corridor.

- Genetic diversity effects from out-of-population hatchery releases.

**Table 8. Summary of viable salmonid population (VSP) parameter risks and overall current status for each population in the Snake River Basin steelhead DPS (Ford *et al.* 2011; ICBTRT 2010d).**

| MPG | Population | VSP Parameter Risk | | Overall Viability Rating |
|---|---|---|---|---|
| | | Abundance/ Productivity | Spatial Structure/ Diversity | |
| Lower Snake River | Tucannon River | High | Moderate | High Risk? |
| | Asotin Creek | Moderate | Moderate | High/Moderate Risk? |
| Grande Ronde River | Lower Grande Ronde | | Moderate | Moderate Risk? |
| | Joseph Creek | Very Low | Low | Highly Viable |
| | Wallowa River | High | Low | High Risk? |
| | Upper Grande Ronde | Moderate | Moderate | Moderate Risk |
| Imnaha River | Imnaha River | Moderate | Moderate | Moderate Risk |
| Clearwater River (Idaho) | Lower Mainstem Clearwater River | Moderate | Low | Moderate Risk? |
| | South Fork Clearwater River | High | Moderate | High Risk? |
| | Lolo Creek | High | Moderate | High Risk? |
| | Selway River | High | Low | High Risk? |
| | Lochsa River | High | Low | High Risk? |
| | North Fork Clearwater River | | | Extirpated |
| Salmon River (Idaho) | Little Salmon River | Moderate | Moderate | Moderate Risk? |
| | South Fork Salmon River | High | Low | High Risk? |
| | Secesh River | High | Low | High Risk? |
| | Chamberlain Creek | Moderate | Low | Moderate Risk? |
| | Lower Middle Fork Salmon River | High | Low | High Risk? |
| | Upper Middle Fork Salmon River | High | Low | High Risk? |
| | Panther Creek | Moderate | High | Moderate Risk? |
| | North Fork Salmon River | Moderate | Moderate | Moderate Risk? |
| | Lemhi River | Moderate | Moderate | Moderate Risk? |
| | Pahsimeroi River | Moderate | Moderate | Moderate Risk? |
| | East Fork Salmon River | Moderate | Moderate | Moderate Risk? |
| | Upper Mainstem Salmon River | Moderate | Moderate | Moderate Risk? |
| Hells Canyon | Hells Canyon Tributaries | | | Extirpated |

### *2.2.1.3 Snake River Fall Chinook Salmon*

The Snake River fall Chinook salmon ESU was listed as threatened on April 22, 1992 (57 FR 14653). This ESU occupies the Snake River basin, which drains portions of southeastern Washington, northeastern Oregon, and north/central Idaho. Snake River fall Chinook salmon have substantially declined in abundance from historic levels, primarily due to the loss of primary spawning and rearing areas upstream of the Hells Canyon Dam complex (57 FR 14653). Additional concerns for the species have been the high percentage of hatchery fish returning to natural spawning grounds and the relatively high aggregate harvest impacts by ocean and in-river fisheries (Good *et al.* 2005). On August 15, 2011, NMFS completed a 5-year review for the Snake River fall Chinook salmon ESU and concluded that the species should remain listed as threatened (76 FR 50448).

Fall Chinook salmon are larger on average than spring/summer Chinook salmon and spawn in larger, mainstem river reaches and the lower sections of larger tributaries (e.g., the Snake, Clearwater, and Salmon River mainstems in Idaho). Adults typically return to fresh water beginning in July, migrate past the lower Snake River dams from August through November, and spawn from October through early December. Juveniles emerge from the gravels in March and April the following spring. Snake River fall Chinook salmon generally exhibit an ocean-type life history. Parr undergo a smolt transformation usually as subyearlings in the spring and summer, at which time they migrate to the ocean. However, in recent years many Snake River fall Chinook juveniles have been overwintering in the reservoirs upstream of the Columbia River and Snake River dams and migrating to the ocean as yearlings the following year (ICBTRT 2010e). Adult Snake River fall Chinook return from the ocean to spawn when they are between 2 and 5 years of age, with 4 years being the most common.

***Spatial Structure and Diversity.*** The Snake River fall Chinook salmon ESU includes one extant population of fish spawning in the lower mainstem of the Snake River and the lower reaches of several of the associated major tributaries including the Tucannon, Grande Ronde, Clearwater, Salmon, and Imnaha Rivers. The ESU also includes four artificial propagation programs: the Lyons Ferry Hatchery and the Fall Chinook Acclimation Ponds Program in Washington; the Nez Perce Tribal Hatchery in Idaho; and the Oxbow Hatchery in Oregon and Idaho (70 FR 37160). Historically, this ESU included two large additional populations spawning in the mainstem of the Snake River upstream of the Hells Canyon Dam complex, an impassable migration barrier. The spawning and rearing habitat associated with the current extant population represents approximately 15% of the total historical habitat available to the ESU (ICBTRT 2010e). Although most current spawning is concentrated in a relatively small section of the Snake River upstream from Asotin Creek, spawner surveys in recent years have documented spawning across almost the entire occupied area (ICBTRT 2010e). Therefore, spatial structure risk for the existing ESU is low and is not precluding recovery of the species.

There are several diversity concerns for Snake River fall Chinook. The hydropower system and associated reservoirs on the Snake and Columbia Rivers appear to impose some selection on juvenile downstream and adult return migration timing (ICBTRT 2010e). Additionally, the natural run of Snake River fall Chinook salmon was historically predominated by a subyearling ocean-migration life history, but currently half of the adult returns have overwintered in freshwater reservoirs as juveniles (yearling migration life history). This change in life history strategy may be due to mainstem river flow and temperature conditions, which have been altered from historic conditions by the hydropower system, and may ultimately reduce the ESU's extinction risk (ICBTRT 2010e). On the other hand, substantial diversity risk is generated by the high proportion of hatchery fish spawning naturally. For the 5-year period ending in 2008, 78% of the estimated total spawners were of hatchery origin (Ford *et al.* 2011). Based on these factors, the ICBTRT gave the one extant population a moderate diversity risk, which leads to a moderate cumulative spatial structure/diversity risk. Diversity risk will need to be reduced to low in order for this population to be considered highly viable, a requirement for recovery of the species (ICBTRT 2007).

***Abundance and Productivity.*** Historical abundance of Snake River fall Chinook salmon is estimated to have been 416,000 to 650,000 fish (NMFS 2006a), but numbers declined drastically over the 20th century to natural returns of less than 100 fish in 1978 (ICBTRT 2010e). The first hatchery-reared Snake River fall Chinook salmon returned to the Snake River in 1981, and since then the number of hatchery returns has increased steadily, such that hatchery fish dominate the Snake River fall Chinook run. However, natural returns have also increased. The most recent 10-year (1998 to 2008) mean abundance of natural-origin fall Chinook passing Lower Granite Dam was 2,200 adults, and the most recent short-term trend in natural-origin spawners was strongly positive, with the population increasing at an average rate of 16% per year (Ford *et al.* 2011). However, current abundance remains below the ICBTRT's recovery goal of a minimum mean of 3,000 natural-origin spawners for the species' single extant population (Ford *et al.* 2011). Therefore, the ICBTRT assigned the population an abundance/productivity risk of moderate. The cumulative moderate risks for both abundance/productivity and spatial structure/diversity put this population at moderate risk of extinction over the next 100 years (ICBTRT 2010e).

***Limiting Factors.*** Limiting factors and threats to Snake River fall-run Chinook salmon include the following (NOAA Fisheries 2011; NMFS 2006b):

- Lost access to historic spawning and rearing habitat above the Hells Canyon Dam complex.
- Mainstem Columbia River and Snake River hydropower impacts to spawning, rearing, and migration habitat.
- Alteration to freshwater habitat caused by upriver dams and water management. Major effects include changes in river flows, temperature regime, dissolved oxygen, substrate condition, and riparian vegetation.
- Hatchery-related effects.
- Harvest-related effects.
- Degraded estuarine and nearshore habitat.

### *2.2.1.4 Snake River Sockeye Salmon*

This ESU includes all anadromous and residual sockeye salmon from the Snake River basin, Idaho, as well as artificially propagated sockeye salmon from the Redfish Lake captive propagation program. The ESU was first listed as endangered under the ESA in 1991, the listing was reaffirmed in 2005 (70 FR 37160 & 37204). Reasons for the decline of this species include high levels of historic harvest, dam construction including hydropower development on the Snake and Columbia Rivers, water diversions and water storage, predation on juvenile salmon in the mainstem river migration corridor, and active eradication of sockeye from some lakes in the 1950s and 1960s (56 FR 58619; ICBTRT 2003). On August 15, 2011, NMFS completed a 5-year review for the Snake River sockeye salmon ESU and concluded that the species should remain listed as endangered (76 FR 50448).

Snake River sockeye salmon adults enter the Columbia River primarily during June and July, and arrive in the Sawtooth Valley peaking in August. The Sawtooth Valley supports the only remaining run of Snake River sockeye salmon. The adults spawn in lakeshore gravels, primarily in October (Bjornn *et al.* 1968). Eggs hatch in the spring between 80 and 140 days after spawning. Fry remain in the gravel for 3 to 5 weeks, emerge from April through May, and move immediately into the lake. Once there, juveniles feed on plankton for 1 to 3 years before they migrate to the ocean, leaving their natal lake in the spring from late April through May (Bjornn *et al.* 1968). Snake River sockeye salmon usually spend 2 to 3 years in the Pacific Ocean and return to Idaho in their fourth or fifth year of life.

***Spatial Structure and Diversity.*** Within the Snake River ESU, the ICBTRT identified historical sockeye salmon production in five Sawtooth Valley lakes, in addition to Warm Lake and the Payette Lakes in Idaho and Wallowa Lake in Oregon (ICBTRT 2003). The sockeye runs to Warm, Payette, and Wallowa Lakes are now extinct, and the ICBTRT identified the Sawtooth Valley lakes as a single MPG for this ESU. The MPG consists of the Redfish, Alturas, Stanley, Yellowbelly, and Pettit Lake populations (ICBTRT 2007). The only extant population is Redfish Lake, supported by a captive broodstock program. Hatchery fish from the Redfish Lake captive propagation program have also been outplanted in Alturas and Pettit Lakes since the mid-1990s in an attempt to reestablish those populations (Ford *et al.* 2011). With such a small number of populations in this MPG, increasing the number of populations would substantially reduce the risk faced by the ESU (ICBTRT 2007).

Currently, the Snake River sockeye salmon run is highly dependent on a captive broodstock program operated at the Sawtooth Hatchery and Eagle Hatchery. Although the captive brood program rescued the ESU from the brink of extinction, diversity risk remains high without sustainable natural production (Ford *et al.* 2011).

***Abundance and Productivity.*** Prior to the turn of the twentieth century (ca. 1880), around 150,000 sockeye salmon ascended the Snake River to the Wallowa, Payette, and Salmon River basins to spawn in natural lakes (Evermann 1896, as cited in Chapman *et al*. 1990). The Wallowa River sockeye run was considered extinct by 1905, the Payette River run was blocked by Black Canyon Dam on the Payette River in 1924, and anadromous Warm Lake sockeye in the South Fork Salmon River basin may have been trapped in Warm Lake by a land upheaval in the early 20th century (ICBTRT 2003). In the Sawtooth Valley, the IDFG eradicated sockeye from Yellowbelly, Pettit, and Stanley Lakes in favor of other species in the 1950s and 1960s, and irrigation diversions led to the extirpation of sockeye in Alturas Lake in the early 1900s (ICBTRT 2003) leaving only the Redfish Lake sockeye. From 1991 to 1998, a total of just 16 natural-origin adult anadromous sockeye salmon returned to Redfish Lake. These 16 natural-origin fish were incorporated into a captive broodstock program that began in 1992 and has since expanded so that the program currently releases hundreds of thousands of juvenile fish each year in the Sawtooth Valley (Ford *et al.* 2011). With the increase in hatchery production, adult returns to Sawtooth Valley have increased in past few years to 605 adults in 2008, 833 adults in 2009, and 1,355 adults in 2010 (IDFG 2011). The increased abundance of hatchery reared Snake River sockeye reduces the risk of immediate loss, yet levels of naturally produced sockeye returns remain extremely low (Ford *et al.* 2011). The ICBTRT's viability target is at least 1,000 naturally produced spawners per year in each of Redfish and Alturas Lakes and at least 500 in Pettit Lake (ICBTRT 2007).

The species remains at high risk across all four risk parameters (spatial structure, diversity, abundance, and productivity). Although the captive brood program has been highly successful in producing hatchery *O. nerka*, substantial increases in survival rates across all life history stages must occur in order to reestablish sustainable natural production (Ford *et al.* 2011).

***Limiting Factors.*** Low survival rates outside of the Sawtooth Valley are limiting the recovery of the species (NOAA Fisheries 2011):

- Migrating juvenile sockeye are heavily impacted by the hydrosystem on the mainstem Snake and Columbia Rivers.

- Predation on juvenile sockeye in the migration corridor is assumed to be high; piscivorous fish consume an estimated 8% of migrating juvenile salmon and terns and cormorants consume 12% of all salmon smolts reaching the estuary (NOAA Fisheries 2011).

- For returning adults, portions of the migration corridor in the Salmon River are impeded by water quality and high temperature (IDEQ 2011). The natural hydrological regime in the upper mainstem Salmon River Basin has been altered by water withdrawals, which can lead to elevated summer water temperatures. In many years, sockeye adult returns to Lower Granite Dam suffer relatively high losses before reaching the Sawtooth Valley, perhaps due to high migration corridor water temperatures and poor initial fish condition or parasite loads (Ford *et al.* 2011).

### 2.2.2 Status of Critical Habitat

NMFS reviews the status of designated critical habitat affected by the proposed action by examining the condition and trends of essential physical and biological features throughout the designated area. These features are essential to the conservation of the listed species because they support one or more life stages of the species. NMFS refers to these features as the PCEs of critical habitat. Since the ESA-listed species addressed in this consultation occupy many of the same geographic areas and have similar life history characteristics, PCEs are also similar (Table 9). In general, these PCEs include sites essential to support one or more life stages of the ESA-listed species (e.g., spawning, rearing, or migration), and contain physical or biological features essential to the conservation of the listed species (e.g., spawning gravels, water quality and quantity, side channels, or food).

**Table 9. Types of sites and essential physical and biological features designated as PCEs, and the species life stage each PCE supports (70 FR 52630 and 58 FR 68543).**

| Site Type | Essential Physical and Biological Features | Species Life Stage |
|---|---|---|
| **Snake River Steelhead[a]** | | |
| Freshwater spawning | Water quality, water quantity, and substrate | Adult spawning, embryo incubation, and larval development |
| Freshwater rearing | Floodplain connectivity, forage[b], natural cover[c], water quality, and water quantity | Fry emergence from gravel, juvenile growth and development |
| Freshwater migration | Free of artificial obstructions, water quality and quantity, and natural cover[c] | Juvenile migration, adult migration and holding |
| **Snake River Spring/Summer Chinook, Fall Chinook, & Sockeye Salmon** | | |
| Spawning and juvenile rearing | Spawning gravel, water quality and quantity, cover/shelter (Chinook only), food, riparian vegetation, space (Chinook only); water temperature and access (sockeye only) | Adult spawning, embryo incubation, and juvenile growth and development |
| Migration | Substrate, water quality and quantity, water temperature, water velocity, cover/shelter, food[d], riparian vegetation, space, safe passage (sockeye and Chinook) | Juvenile migration, adult migration and holding |

[a] Additional PCEs pertaining to estuarine, nearshore, and offshore marine areas have also been described for Snake River steelhead. These PCEs will not be affected by the proposed action and have therefore not been described in this Opinion.
[b] Forage includes aquatic invertebrate and fish species that support growth and maturation.
[c] Natural cover includes shade, large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
[d] Food applies to juvenile migration only.

Table 10 describes the geographical extent within Idaho of critical habitat for each of the four anadromous ESA-listed species. Critical habitat includes the stream channel and water column with the lateral extent defined by the ordinary high-water line, or the bankfull elevation where the ordinary high-water line is not defined. In addition, critical habitat for the three salmon species includes the adjacent riparian zone, which is defined as the area within 300 feet of the line of high water of a stream channel or from the shoreline of standing body of water (58 FR 68543). The riparian zone is critical because it provides shade, streambank stability, organic matter input, and regulation of sediment, nutrients, and chemicals.

**Table 10. Geographical extent of designated critical habitat in Idaho for ESA-listed anadromous species.**

| ESU/DPS | Designation | Geographical Extent of Critical Habitat in Idaho |
|---|---|---|
| Snake River sockeye salmon | 58 FR 68543; December 28, 1993 | Snake and Salmon Rivers; Alturas Lake Creek; Valley Creek, Stanley Lake, Redfish Lake, Yellowbelly Lake, Pettit Lake, Alturas Lake; all inlet/outlet creeks to those lakes |
| Snake River spring/summer Chinook salmon | 58 FR 68543; December 28, 1993. 64 FR 57399; October 25, 1999. | All river reaches presently or historically accessible, except river reaches above impassable natural falls and Dworshak and Hells Canyon Dams |
| Snake River fall Chinook salmon | 58 FR 68543; December 28, 1993 | Snake River to Hells Canyon Dam, Clearwater River from its confluence with the Snake River upstream to Lolo Creek, North Fork Clearwater River from its confluence with the Clearwater River upstream to Dworshak Dam, and all other river reaches presently or historically accessible within the Clearwater, Lower Clearwater, Lower Snake Asotin, Hells Canyon and Lower Salmon subbasins |
| Snake River Basin steelhead | 70 FR 52630; September 2, 2005 | Specific stream reaches are designated within the Snake, Salmon, and Clearwater River basins. Table 21 in the Federal Register details habitat areas within the DPS's geographical range that are excluded from critical habitat designation. |

Spawning and rearing habitat quality in tributary streams in the Snake River varies from excellent in wilderness and roadless areas to poor in areas subject to intensive human land uses (NMFS 2011c). Critical habitat throughout much of the Snake River basin has been degraded by intensive agriculture, alteration of stream morphology (*i.e.*, channel modifications and diking), riparian vegetation disturbance, wetland draining and conversion, livestock grazing, dredging, road construction and maintenance, logging, mining, and urbanization. Reduced summer streamflows, impaired water quality, and reduction of habitat complexity are common problems for critical habitat in non-wilderness areas. Human land use practices throughout the basin have caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations.

In many stream reaches designated as critical habitat in the Snake River basin, streamflows are substantially reduced by water diversions (NMFS 2011c). Withdrawal of water, particularly during low-flow periods that commonly overlap with agricultural withdrawals, often increases summer stream temperatures, blocks fish migration, strands fish, and alters sediment transport (Spence *et al.* 1996). Reduced tributary streamflow has been identified as a major limiting factor for Snake River spring/summer Chinook and Snake River Basin steelhead in particular (NOAA Fisheries 2011; NMFS 2011c).

Many stream reaches designated as critical habitat are listed on the state of Idaho's CWA section 303(d) list for impaired water quality, such as elevated water temperature (IDEQ 2011). Many areas that were historically suitable rearing and spawning habitat are now unsuitable due to high summer stream temperatures. Removal of riparian vegetation, alteration of natural stream morphology, and withdrawal of water for agricultural or municipal use all contribute to elevated stream temperatures.  Water quality in spawning and rearing areas has also been impaired by high levels of sedimentation and by heavy metal contamination from mine waste (e.g., IDEQ and USEPA 2003; IDEQ 2001).

Migration habitat quality for Snake River salmon and steelhead has also been severely degraded, primarily by the development and operation of dams and reservoirs on the mainstem Columbia and Snake Rivers (NMFS 2008).  Hydroelectric development has modified natural flow regimes in the migration corridor causing higher water temperatures and changes in fish community structure that have led to increased rates of piscivorous and avian predation on juvenile salmon and steelhead, and delayed migration for both adult and juveniles.  Physical features of dams such as turbines also kill migrating fish.

### 2.2.3  Climate Change Implications for ESA-listed Species and their Critical Habitat

Climate change is likely to play an increasingly important role in determining the abundance of ESA-listed species, and the conservation value of designated critical habitats, in the Pacific Northwest.  These changes will not be spatially homogeneous across the Pacific Northwest. Areas with elevations high enough to maintain temperatures well below freezing for most of the winter and early spring will be less affected.  Low-elevation areas are likely to be more affected. During the last century, average regional air temperatures increased by 1.5°F, and increased up to 4°F in some areas (USGCRP 2009).  Warming is likely to continue during the next century as average temperatures increase another 3°F to 10°F (USGCRP 2009).  Overall, about one-third of the current cold-water fish habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (USGCRP 2009).

Precipitation trends during the next century are less certain than for temperature but more precipitation is likely to occur during October through March and less during summer months, and more of the winter precipitation is likely to fall as rain rather than snow (ISAB 2007; USGCRP 2009).  Where snow occurs, a warmer climate will cause earlier runoff so streamflows in late spring, summer, and fall will be lower and water temperatures will be warmer (ISAB 2007; USGCRP 2009).

Higher winter streamflows increase the risk that winter floods in sensitive watersheds will damage spawning redds and wash away incubating eggs.  Earlier peak streamflows will also flush some young salmon and steelhead from rivers to estuaries before they are physically mature, increasing stress and the risk of predation.  Lower streamflows and warmer water temperatures during summer will degrade summer rearing conditions, in part by increasing the prevalence and virulence of fish diseases and parasites (USGCRP 2009).  Other adverse effects are likely to include altered migration patterns, accelerated embryo development, premature emergence of fry, variation in quality and quantity of tributary rearing habitat, and increased competition and predation risk from warm-water, non-native species (ISAB 2007).

The earth's oceans are also warming, with considerable interannual and inter-decadal variability superimposed on the longer-term trend (Bindoff *et al.* 2007).  Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmon and steelhead, while cooler ocean periods have coincided with relatively high abundances (Scheuerell and Williams 2005; Zabel *et al.* 2006; USGCRP 2009). Ocean conditions adverse to salmon and steelhead may be more likely under a warming climate (Zabel *et al.* 2006).

## 2.3 Environmental Baseline

The "environmental baseline" includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

### 2.3.1 Biological Requirements of Salmonids

The biological requirements of salmonids in the action area vary depending on the life history stage and natural range of variation present within that system. Generally, during spawning migrations, adult salmonids require clean water with cool temperatures and access to thermal refugia, dissolved oxygen near 100% saturation, low turbidity, adequate flows and depths to allow passage over barriers to reach spawning sites, and sufficient holding and resting sites. Salmonids select spawning areas that are based on species-specific requirements of flow, water quality, substrate size, and groundwater upwelling. Embryo survival and fry emergence depend on substrate conditions (e.g., gravel size, porosity, permeability, and oxygen concentrations), substrate stability during high flows, and, for most species, water temperatures of 55.4°F or less. Habitat requirements for juvenile rearing include seasonally suitable microhabitats for holding, feeding, and resting. Migration of juveniles to rearing areas; whether the ocean, lakes, or other stream reaches, requires access to these habitats. Physical, chemical, and thermal conditions may all impede movements of adult or juvenile fish.

Each ESA-listed fish species considered here resides in or migrates through the action area. Thus, for this action area, the biological requirements for salmonids are the habitat characteristics that would support those species' successful spawning, rearing, and migration (i.e., the PCEs for freshwater spawning sites, rearing sites, and freshwater migration corridors associated with those species).

### 2.3.2 Effects of Land Management and Development

In general, the environment for ESA-listed salmon and steelhead in the referenced basins has been dramatically affected by the development and operation of the Federal Columbia River Power System (FCRPS). Storage dams have eliminated mainstem spawning and rearing habitat, and have altered the natural flow regime of the Snake and Columbia Rivers, decreasing spring and summer flows, increasing fall and winter flow, and altering natural thermal patterns. The FCRPS kills or injures a portion (approximately 46%) of the smolts passing through the system (NMFS 2004). Slowed water velocity and increased temperatures in reservoirs delays smolt migration timing and increases predation in the migratory corridor (NMFS 2004; Independent

Scientific Group 2000; National Research Council 1996). Formerly complex mainstem habitats have been reduced to predominantly single channels, with reduced floodplains and off-channel habitats eliminated or disconnected from the main channel (Sedell and Froggatt 2000; Independent Science Group 2000; Coutant 1999). The amount of LWD in these rivers has declined, reducing habitat complexity and altering the rivers' food webs (Maser and Sedell 1994).

Other anthropogenic activities that have degraded aquatic habitats or affected native fish populations in the Snake River basin include stream channelization, elimination of wetlands, construction of flood-control dams and levees, construction of roads (many with impassable culverts), timber harvest, splash dams, mining, water withdrawals, unscreened water diversions, agriculture, livestock grazing, urbanization, outdoor recreation, fire exclusion/suppression, artificial fish propagation, fish harvest, and introduction of non-native species (Henjum *et al.* 1994; Rhodes *et al.* 1994; National Research Council 1996; Spence *et al.* 1996; Lee *et al.* 1997; NMFS 2004). In many watersheds, land management and development activities have:

- Reduced connectivity (i.e., the flow of energy, organisms, and materials) between streams, riparian areas, floodplains, and uplands;
- Elevated fine sediment yields, degrading spawning and rearing habitat;
- Reduced large woody material that traps sediment, stabilizes streambanks, and helps form pools;
- Reduced vegetative canopy that minimizes solar heating of streams;
- Caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations;
- Altered peak flow volume and timing, leading to channel changes and potentially altering fish migration behavior; and,
- Altered floodplain function, water tables and base flows (Henjum *et al.* 1994; McIntosh *et al.* 1994; Rhodes *et al.* 1994; Wissmar *et al.* 1994; National Research Council 1996; Spence *et al.* 1996; and Lee *et al.* 1997).

### 2.3.3 Basins in Action Area

The action area covers 18 subbasins (4th -field HUCs), encompassing all areas potentially affected directly or indirectly by this programmatic consultation. Because of the potential for downstream effects and additive effects within watersheds, the action area encompasses entire subbasins where ESA-listed species and designated critical habitat occur. A general review of the environmental baseline has been divided up into the three major basins within the action area: (1) Clearwater River basin; (2) Salmon River basin; and (3) Snake River basin. All but two of the 18 subbasins in the action area (see Figure 1) fall within the Clearwater River and the Salmon River basins, so NMFS assumes that most projects under this programmatic consultation would occur in these first two basins. Whereas the action area encompasses the entire

Clearwater River and Salmon River basins, for the Snake River basin the action area includes only the Snake River and its tributaries along the Idaho-Oregon border from Hells Canyon Dam down to the Clearwater River confluence.

***Clearwater River Basin.*** The Clearwater River Basin is located in north-central Idaho between the 46$^{th}$ and 47$^{th}$ latitudes in the northwestern portion of the continental United States. It is a region of mountains, plateaus, and deep canyons within the Northern Rocky Mountain geographic province. The basin is bracketed by the Salmon River basin to the south and St. Joe River subbasin to the north.

The Clearwater River drains approximately a 9,645-square mile area. The basin extends approximately 100 miles north to south and 120 miles east to west. There are four major tributaries that drain into the mainstem of the Clearwater River: the Lochsa, Selway, South Fork Clearwater, and North Fork Clearwater Rivers. The Idaho-Montana border follows the upper watershed boundaries of the Lochsa and Selway Rivers, and the eastern portion of the North Fork Clearwater River in the Bitterroot Mountains. The North Fork Clearwater River then drains the Clearwater Mountains to the north, while the South Fork Clearwater River drains the divide along the Selway and Salmon Rivers. Dworshak Dam, located 2 miles above the mouth of the North Fork Clearwater River, is the only major water regulating facility in the basin. Dworshak Dam was constructed in 1972 and eliminated access to one of the most productive systems for anadromous fish in the basin. The mouth of the Clearwater is located on the Washington-Idaho border at the town of Lewiston, Idaho, where it enters the Snake River 139 river miles upstream of the Columbia River.

More than two-thirds of the total acreage of the Clearwater River Basin is evergreen forests (over 4 million acres), largely in the mountainous eastern portion of the basin. The western third of the basin is part of the Columbia plateau and is composed almost entirely of crop and pastureland. Most of the forested land within the Clearwater Basin is owned by the Federal government and managed by the USFS (over 3.5 million acres), but the state of Idaho and Potlatch Corporation also own extensive forested tracts. The western half of the basin is primarily in the private ownership of small forest landowners and timber companies, as well as farming and ranching families and companies. There are some small private in-holdings within the boundaries of USFS lands in the eastern portion of the basin. Nez Perce Tribe lands are located primarily within or adjacent to Lewis, Nez Perce, and Idaho Counties within the current boundaries of the Nez Perce Indian Reservation. These properties consist of both fee lands owned and managed by the Nez Perce Tribe, and properties placed in trust status with the Bureau of Indian Affairs. Other agencies managing relatively small land areas in the Clearwater basin include the National Park Service, the BLM, the Idaho Transportation Department, and IDFG (Ecovista 2004a).

Water quality limited segments are streams or lakes which are listed under section 303(d) of the CWA for either failing to meet their designated beneficial uses, or for exceeding state water quality criteria. The current list of 303(d) listed segments was compiled by the Idaho Department of Environmental Quality (IDEQ) in 2010, and includes many stream reaches within the Clearwater basin (IDEQ 2011). Individual stream reaches are often listed for multiple parameters, making tabular summary difficult. However, please refer to the following website for reach-specific 303(d) listed stream segments: http://www.deq.idaho.gov/water-quality/surface-water/monitoring-assessment/integrated-report.aspx.

Small-scale irrigation, primarily using removable instream pumps, is relatively common for hay and pasture lands scattered throughout the lower elevation portions of the subbasin, but the amounts withdrawn have not been quantified. The only large-scale irrigation/diversion system within the Clearwater basin is operated by the Lewiston Orchards Irrigation District within the Lower Clearwater subbasin. Seventy dams currently exist within the boundaries of the Clearwater basin. The vast majority of existing dams exist within the Lower Clearwater subbasin (56), although dams also currently exist in the Lower North Fork (3), Lolo/Middle Fork (5), and South Fork (6) watersheds (Ecovista 2004a).

Agriculture primarily affects the western third of the basin on lands below 2,500 feet elevation, primarily on the Camas Prairie both south and north of the mainstem Clearwater and the Palouse. Additional agriculture is found on benches along the main Clearwater and its lower tributaries such as Lapwai, Potlatch, and Big Canyon Creeks. Hay production in the meadow areas of the Red River and Big Elk Creek in the American River watershed accounts for most of the agriculture in the South Fork Clearwater. Total cropland and pasture in the subbasin exceeds 760,000 acres. Agriculture is a particularly large part of the economy in Nez Perce, Latah, Lewis, and Idaho Counties, which all have large areas of gentle terrain west of the Clearwater Mountains. Small grains are the major crop, primarily wheat and barley. Landscape dynamics, hydrology, and erosion in these areas are primarily determined by agricultural practices (Ecovista 2004a).

Subwatersheds with the highest proportion of grazeable area within the Clearwater basin are typically associated with USFS grazing allotments in lower-elevation portions of their ownership areas. However, the majority of lands managed by the USFS within the Clearwater basin are not subjected to grazing by cattle or sheep, including all or nearly all of the Upper Selway, Lochsa, and Upper and Lower North Fork watersheds. Subwatersheds outside of the USFS boundaries typically have less than 25% of the land area defined as grazeable, although this is as much as 75% for some. Privately owned property within the basin typically contains a high percentage of agricultural use, with grazeable lands found only in uncultivated areas. In contrast, grazing allotments on USFS lands are typically large, often encompassing multiple HUCs, resulting in higher proportions of grazeable area than those contained in primarily privately owned lands (Ecovista 2004a).

Mines are distributed throughout all eight subbasins in the Clearwater basin, with the fewest being located in the Upper and Lower Selway. Ecological hazard ratings for mines (delineated by the Interior Columbian Basin Ecosystem Management Project) indicate that the vast majority of mines throughout the subbasin pose a low relative degree of environmental risk. However, clusters of mines with relatively high ecological hazard ratings are located in the South Fork Clearwater River and in the Orofino Creek drainage (Ecovista 2004a).

***Salmon River Basin.*** The Salmon River flows 410 miles north and west through central Idaho to join the Snake River. The Salmon River is one of the largest basins in the Columbia River drainage, and has the most stream miles of habitat available to anadromous fish. The total basin is approximately 14,000 square miles in size. Public lands account for approximately 91% of the Salmon River basin, with most of this being in Federal ownership and managed by seven national forests or the BLM. Public lands within the basin are managed to produce wood products, forage for domestic livestock, mineral commodities, and to provide recreation, wilderness, and terrestrial and aquatic habitats. Approximately 9% of the basin land area is privately owned.

Primary land use on private lands is agricultural cultivation, which is concentrated in valley bottom areas within the upper and lower portions of the basin. Other land management practices within the basin vary among landowners. The greatest proportion of national forest lands are Federally designated wilderness area or are areas with low resource commodity suitability. One-third of the national forest lands in the basin are managed intensively for forest, mineral, or range resource commodity production. The BLM lands in the basin are managed to provide domestic livestock rangeland and habitats for native species. State of Idaho endowment lands within the basin are managed for forest, mineral, or range resource commodity production.

Water quality in many areas of the basin is affected to varying degrees by land uses that include livestock grazing, road construction, logging and mining (Ecovista, 2004b). The IDEQ has classified many water bodies in the Salmon River basin as impaired under section 303(d) of the CWA (IDEQ 2011). The primary parameters of concern are sediments, nutrients, flow alteration, high stream temperatures, and habitat alteration. Please refer to the following website for reach-specific 303(d) listed stream segments within the basin: [http://www.deq.idaho.gov/water-quality/surface-water/monitoring-assessment/integrated-report.aspx](http://www.deq.idaho.gov/water-quality/surface-water/monitoring-assessment/integrated-report.aspx).

Agricultural diversions within the Salmon River basin have a major impact near developed areas, particularly the Lemhi River, Pahsimeroi River, the mainstem Salmon River, and several other tributaries of the Salmon River. Although the majority of diversions accessible to ESA-listed species are screened, several need repair and upgrading. A major problem is localized stream dewatering due to water diversion. In addition to water diversions, numerous small pumping operations for private use occur throughout the subbasin. Impacts of water withdrawal on fish production are greatest during the summer month when streamflows are critically low (Ecovista 2004b).

Grazing on private lands continues to impact aquatic and riparian habitat. Grazing impacts are particularly noticeable in the lower reaches of most of Lemhi River tributaries, the Pahsimeroi subbasin, Panther Creek subbasin (upper Napias Creek above Smith Gulch, in Sawpit Creek and Phelan Creek), and the North Fork Salmon River subbasin (Hull Creek, Hughes Creek, and Indian Creek subwatersheds) (USFS 2000).

Mining, though no longer as active as it was historically, is still prevalent in parts of the Salmon River basin. Impacts from mining include severe alteration of substrate composition, channel displacement, bank and riparian destruction, and loss of instream cover and pool forming structures. Natural stream channels within the Yankee Fork, East Fork South Fork, and Bear Valley Creek have all had documented spawning and rearing habitat destroyed by dredge mining. Furthermore, heavy metal pollution from mine wastes and drainage can eliminate all aquatic life and block access to valuable habitat as seen in Panther Creek (IDFG *et al.* 1990).

***Snake River Basin.*** The Snake River originates at 9,500 feet, along the continental divide in the Wyoming portion of Yellowstone National Park. The Snake River flows 1,038 miles westward to the Idaho-Oregon border, and then to Pasco, Washington, where it flows into the Columbia River as a major tributary. At the Idaho-Oregon border (in the action area), the Snake River passes through Hells Canyon and Idaho Power Company's Hells Canyon Dam complex, which blocks upstream access for anadromous fish. The Snake River basin includes rugged mountains, semi-arid desert, fertile agricultural land (primarily irrigated), and barren outcrops of lava flows. Rangeland, lava flows, and timber are the dominant land covers in the basin, with pine and spruce forests at the higher elevations. Most of the land in the basin is owned by the Federal government (BLM, USFS, and U.S. Department of Energy).

Irrigated agriculture is one of the primary land uses in the Snake River basin. Upstream from the Hells Canyon Dam complex there are 31 dams and reservoirs with at least 20,000 acre-feet of storage each. The BOR, Idaho Power Company, and a host of other organizations own and operate various water storage facilities, which have substantial influence on water resources and the movement of surface and groundwater through the region. As of 2002, about 3.3 million acres were being irrigated in the state of Idaho, much of this along the Snake River plain.

The middle Snake River is thus a managed water system where normal flow regimes are no longer present. Development of the middle and upper Snake River for irrigation, and later for hydroelectricity, has severely altered aquatic conditions. Development for irrigation began in the late 1860s when the first major irrigation diversion was built. The first hydroelectric dam (Swan Falls) was built in 1901. Today, there are at least 44 hydroelectric projects and countless diversions, all of which have cumulatively affected the hydrology of the Snake River and its tributaries and the aquatic species present. The downstream hydroelectric and water storage projects act as barriers to fish migration and have eliminated anadromous fish, not only impacting the fisheries populations, but also resulting in a significant decrease in biomass input to the terrestrial ecosystems and influencing wildlife population potentials. Upstream projects (e.g., Milner and American Falls Dams) have greatly changed the Snake River hydrograph, decreasing spring high flows for example.

Within the Snake River portion of the action area, the IDEQ has listed several streams under section 303(d) of the CWA for either failing to meet their designated beneficial uses, or for exceeding state water quality criteria. The IDEQ updated the 303(d) list in 2010, and it includes seven stream reaches within the Hells Canyon and Lower Snake River Asotin subbasins. These stream reaches are listed for parameters such as water temperature, sedimentation/siltation, *escherichia coli*, dissolved oxygen, pH, and nutrient/eutrophication biological indicators. Please refer to the following website for reach-specific 303(d)-listed stream segments: http://www.deq.idaho.gov/water-quality/surface-water/monitoring-assessment/integrated-report.aspx.

### 2.4 Effects of the Action on the Species and its Designated Critical Habitat

"Effects of the action" means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.

The habitat improvement projects in the proposed action will all have long-term beneficial effects to salmonids and their habitats. These beneficial effects will improve three salmon and steelhead VSP parameters: abundance, productivity, and spatial structure. These improvements will translate into decreased risk of extinction and increased probability of recovery for all of the species addressed by this consultation. Habitat improvement projects carried out in critical habitat will improve the condition of that habitat at the site and watershed scales. The categories of actions selected for this programmatic consultation all have predictable effects regardless of where in Idaho they are carried out. NMFS has conducted a number of individual consultations on each activity type over the past 15 years.

The implementation of many activities in the proposed action will have some minor, unavoidable, short-term adverse effects such as increased stream turbidity and riparian disturbance, in order to gain more permanent habitat improvements. Conservation measures incorporated into the proposed action will reduce these adverse effects, but short-term effects are not completely avoidable. Most short-term adverse effects of the proposed activities would result from riparian or instream construction, fish handling when isolating inwater work sites, or application of chemical herbicides. This analysis first summarizes the long-term benefits to salmonid habitat from the proposed action, and then describes the short-term adverse effects.

NMFS estimates that the action agencies will collectively implement between 10 and 20 projects per year under this programmatic consultation. Taking into account that there may be circumstances under which the action agencies might implement a larger number of projects, NMFS therefore assumes that not more than 40 projects would be implemented in any given year (twice the expected yearly number). Based on individual consultations in past years, NMFS expects that individual projects under this programmatic consultation will be distributed throughout action area, and that short-term adverse effects will therefore be distributed across all of the populations in the action area.

### 2.4.2 Long-term Benefits to Salmonids and their Habitat

The activities covered under this consultation are aimed at protecting or restoring aquatic habitat, with long-term benefits for ESA-listed species and their habitat. Projects that improve stream habitat conditions can lead to increases in population abundance, productivity, and spatial structure.

- **Fish screening** projects will prevent fish from entering and becoming stranded in unscreened or inadequately-screened diversion ditches. This will decrease mortality caused by diversion ditches and could thus increase population productivity and abundance.

- **Fish passage** projects will restore fish passage at human-made barriers, increasing access for all salmonid life stages to historical habitat, thereby potentially increasing population spatial structure. Culvert replacement projects will also be designed to prevent streambank and roadbed erosion and facilitate natural sediment and wood movement.

- **Instream flow** projects will increase streamflows in some reaches, thereby improving spawning, rearing, and migration conditions for salmonids, as well as restoring riparian functions. Benefits of habitat restoration projects that improve streamflow have been documented for stream-dwelling salmonids (Pierce *et al.* 2013). Acquiring water from irrigators through purchase or lease has the potential to improve habitat quality in all stream reaches downstream from the original point of diversion. Moving points of diversion downstream from severely water limited reaches can result in improved habitat function in short reaches, which can dramatically improve habitat function of entire drainages if the water limited reach impaired upstream or downstream fish passage. Converting surface water diversions to groundwater sources can improve streamflow during the irrigation season, as can increasing the efficiency of water transmission facilities (and thus reducing the amount of water diverted). On the other hand, activities that increase the ability of irrigators to efficiently deliver water to fields have the potential to increase the amount of water consumptively used and thereby reduce streamflow (Samani and Skaggs 2006; Ward and Pulido-Velazquez 2008). However, this Opinion only covers irrigation efficiency actions and groundwater conversion actions where the Project Sponsor has demonstrated that the project will not increase consumptive use of water.

- **Instream structures** will enhance spawning, rearing, and migration habitat for salmonids through a combination of the following mechanisms: increasing pockets of low-velocity holding habitat; increasing instream structural complexity and diversity including pool formation; providing high flow refugia; increasing interstitial spaces for benthic organisms; reducing embeddedness in spawning gravels and promoting spawning gravel deposition; reducing siltation in pools; reducing the width/depth ratio of the stream; mimicking natural input of LWD (*e.g.*, whole conifer and hardwood trees, logs, root wads); deflecting flows into adjoining floodplain areas to increase channel and floodplain function; and increasing bank stability and riparian vegetation. These improvements in habitat can increase population productivity and abundance.

- **Side-channel, floodplain, and channel reconstruction** projects will restore and provide access to historic side-channel habitat and will increase floodplain function. Restoring side-channels will improve aquatic and riparian habitat diversity and complexity, reconnect stream channels to floodplains, reduce bed and bank erosion, increase hyporheic exchange, provide long-term nutrient storage, provide substrate for macroinvertebrates, moderate high flow disturbance, increase retention of organic material, and provide refuge for fish and other aquatic species when flows or temperatures are unsuitable in the main stream channel. Levee modification or removal can improve fish habitat, reduce erosion, improve water quality, reduce high flow velocities, enhance groundwater recharge, and reduce flooding in other sections of the river. These improvements in stream habitat can increase salmonid population productivity and abundance.

- **Riparian vegetation** projects will reestablish native riparian vegetation in order to stabilize streambanks, provide shade and future sources of LWD, and encourage the development of protective cover and undercut banks for fish and other aquatic species.

- **Sediment reduction** projects will reduce fine sediment delivery to streams from human-made sources, thereby reducing turbidity and cobble embeddedness and increasing pool habitat.

2.4.3 Short-term Adverse Effects to Salmonids and their Habitat

Despite a thorough list of conservation measures to minimize adverse effects, project construction activities may adversely affect ESA-listed species and their habitat in the short term, largely though turbidity plumes below project sites, fish handling while dewatering project sites, or application of herbicides. The magnitude of these effects would vary as a result of the nature, extent, and duration of the individual project activities, though the major factors would be whether or not any work occurs in the stream and whether ESA-listed fish are present at the time of implementation. The proposed activities would directly affect individual fish (temporarily) through noise at construction sites, handling and stranding at temporarily dewatered stream reaches, exposure to reduced water quality, and exposure to reduced habitat quality. The proposed action would also lead to small negative impacts to habitat through sediment deposition.

Projects that involve operation of heavy equipment within the stream channel are most likely to cause short-term adverse effects, even though the conservation measures require that such work will occur only in the dry. Such projects will require fish handling during work area isolation and dewatering, and such projects are likely to cause a turbidity plume upon reintroduction of streamflow to the dewatered stream reach. The categories of actions most likely to require work area isolation and instream work are culvert and bridge replacement; channel reconstruction; and changes to diversions structures. Other categories may require instream work in some cases (e.g. habitat structures, fish screens, side channel reconstruction). Table 11 lists potential short-term adverse effects from each category.

**Table 11. Potential short-term adverse effects from each category of action.**

| Action Category | Specific Actions Included in the Opinion | Potential Short-term Adverse Effects |
|---|---|---|
| **Fish Screening** | Install, upgrade, or maintain fish screens | Fish handling; turbidity and sediment deposition; noise and disturbance. |
| **Fish Passage** | Install or improve fish passage facilities (e.g., fish ladders or other fishways) at diversion structures and other passage barriers<br>Remove or modify water control structures (e.g., irrigation diversion structures)<br>Replace culverts and bridges to provide fish passage and/or to reduce risk of culvert failure and chronic sedimentation, using the stream simulation methods from NMFS (2011b). | Fish handling; turbidity and sediment deposition; noise and disturbance. |
| **Instream Flow** | Lease or purchase water rights to improve instream flows<br>Change or consolidate points of diversion<br>Increase efficiency of irrigation practices (e.g., convert open ditches to pipes, or convert surface water diversions to ground water wells) | Fish handling; turbidity and sediment deposition; noise and disturbance. |
| **Instream Structures** | Provide grade control with boulder weirs or roughened channels<br>Install instream habitat structures:<br>Rootwads, large woody debris, log jams, boulders, spawning gravels. | Fish handling; turbidity and sediment deposition; noise and disturbance. |
| **Side Channels and Floodplain Function** | Reconnect and restore historic side channels<br>Modify or remove levees, dikes, berms, and fill | Fish handling; turbidity and sediment deposition; noise and disturbance. |
| **Channel Reconstruction** | Reconstruction of existing stream channels into historic or newly constructed channels | Fish handling; turbidity and sediment deposition; noise and disturbance. |
| **Riparian Habitat** | Plant riparian vegetation<br>Reduce riparian impacts from livestock:<br>• Install fencing<br>• Develop livestock watering facilities away from streams<br>• Install livestock stream crossings (culverts, bridges, or hardened fords)<br>Control invasive weeds through physical removal or with herbicides<br>Stabilize streambanks through bioengineering | Turbidity and sediment deposition; noise and disturbance; exposure to herbicides |

| Action Category | Specific Actions Included in the Opinion | Potential Short-term Adverse Effects |
|---|---|---|
| **Road and Trail Erosion Control, Maintenance, and Decommissioning** | Decommission or obliterate unneeded roads<br>Relocate portions of roads and trails away from riparian buffer areas<br>When part of a larger restoration project, reduce sediment from existing roads:<br>• Improve and maintain road drainage features<br>• Reduce road access and usage through gates, fences, boulders, logs, tank traps, and signs<br>• Remove or stabilize pre-existing cut and fill or slide material | Turbidity (minutes) |
| **Surveying and Monitoring** | Survey project sites:<br>• Take physical measurements<br>• Install recording devices<br>• Determine fish presence<br>Monitor project site and stream habitat after project completion<br>Install PIT tag detection arrays | Turbidity (minutes) |

### *2.4.3.1 Noise and Disturbance*

Noise from heavy equipment operating adjacent to water may disturb fish in the immediate vicinity causing short-term displacement. Heavy equipment operation for multiple categories of activities (e.g., culvert replacement or side channel restoration) would create noise, vibration, and potentially water surface disturbance. Heavy equipment will operate either outside of the stream channel or in dewatered stream channels, with the exception of temporary stream crossings. Project Sponsors will minimize the number of temporary stream crossings and the number of trips across.

Popper *et al.* (2003) and Wysocki *et al.* (2007) discussed potential impacts to fish from long-term exposure to anthropogenic sounds, predominantly air blasts and aquaculture equipment, respectively. Popper *et al.* (2003) and Popper and Hastings (2009) reported possible effects to fish include temporary, and potentially permanent hearing loss (via sensory hair cell damage), reduced ability to communicate with conspecifics due to hearing loss, non-auditory tissue damage, and masking of potentially biologically important sounds. Studies referenced by Popper *et al.* (2003) evaluated peak noise levels ranging from 170 to 255 decibels (dB) (re: 1µPa). Wysocki *et al.* (2007) did not identify any adverse impacts to rainbow trout from prolonged exposure to three sound treatments common in aquaculture environments (115, 130, and 150 dB root mean squared) (re: 1µPa). In the studies identified by Popper *et al.* (2003) that caused ear damage in fishes, all evaluated fish were caged and thus incapable of moving away from the disturbance. Popper and Hastings (2009) discuss how differences in how fish use sound (i.e., generalist versus specialists), fish size, development, and possibly genetics can lead to different effects from the same sounds. As a result, they caution that studies on the effects of sound, particularly if they are from different sources, are not readily extrapolated between species, fish sizes, or geographic location.

The Federal Highway Administration (2008) indicates that backhoe and truck noise production ranges between 80 and 89 dB, which is below the sounds levels described above which did not cause adverse impacts to rainbow trout. It is unknown if the expected dB levels will cause fish to temporarily move away from the disturbance or if fish will remain present. Visual stimulus from the nearby activities may also cause temporary behavior modifications. Even if fish move, they are expected to move only short distances to an area where they feel more secure and only for a few hours in any given day (Grant and Noakes 1987; Ries 1995; Olson 1996; SNF 2009). Adult fish would likely simply continue their upstream migration unharmed. NMFS does not anticipate that short-term movements caused by construction equipment will result in effects substantially different than those typically experienced by fish in their natural environment. The expected noise levels and level of disturbance caused by construction equipment will be minimal and are unlikely to result in injury or mortality.

Temporary stream crossings for heavy equipment are not likely to crush fish due to the following conservation measures specified in the proposed action. No stream crossings may occur at sites: (1) Where adults are actively spawning, or immediately upstream (300 feet) of actively spawning adults; (2) where holding adult listed fish are present; or (3) where eggs or alevins are in the gravel. Equipment and vehicles may cross the stream in the wet only where the streambed is bedrock and where the streambed is naturally stable, or where mats or off-site logs are placed in the stream and used as a crossing. Juvenile fish could be present near temporary stream crossings but would likely move short distances out of the way to avoid the machinery.

#### *2.4.3.2 Fish Handling*

Dewatering of stream channels and associated fish-handling procedures to remove fish from these stream reaches will adversely impact individual juvenile fish, including juvenile spring/summer Chinook, juvenile fall Chinook, and juvenile steelhead; and could also adversely impact adult bull trout. The fish work windows set by IDFG would ensure that no adult ESA-listed salmon or steelhead would be present during the construction phase of restoration actions under this program. Sockeye salmon of any life-stage will also not be present during dewatering of stream reaches. Restoration projects adjacent to the lakes in the Sawtooth Valley where sockeye rear (Redfish Lake, Alturas Lake) will not require fish handling, and out-migrating juvenile sockeye will not be present at potential project sites on the Salmon River during fish work windows, which generally run from early July to mid-August.

Any work area within a wetted stream channel will be isolated from the active stream whenever ESA-listed fish are reasonably certain to be present, or if the work area is 300 feet or less upstream from spawning habitats, except for large wood restoration actions. Work area isolation will be necessary for Fish Passage and Channel Reconstruction/Relocation projects and might also apply to other project types, depending on the extent of excavation within the stream channel. Fish trapped within the isolated work area will be captured and released using a trap, seine, hand net, or other methods as prudent to minimize the risk of injury, and then released at a safe release site. Capture and release will be supervised by a fishery biologist experienced with work area isolation and competent to ensure the safe handling of all fish. Electrofishing will be implemented only where other means of fish capture are not feasible or effective, and will follow NMFS (2000b) electrofishing guidelines.

Capturing and handling fish causes them stress, though they typically recover fairly rapidly from the process. Types of stress likely to occur during project implementation include increased plasma levels of cortisol and glucose (Frisch and Anderson 2000; Hemre and Krogdahl 1996). Even short-term, low intensity handling may cause reduced predatory avoidance for up to 24 hours (Olla *et al.* 1995). The primary contributing factors to stress and death from handling with nets and buckets are differences in water temperatures (between the river and wherever the fish are held), dissolved oxygen conditions, the amount of time that fish are held out of the water, and physical trauma. Stress on salmonids increases rapidly from handling if the water temperature exceeds 64.4°F or dissolved oxygen is below saturation. Fish that are transferred to holding tanks can experience trauma if care is not taken in the transfer process. NMFS assumes that all handled fish will be held in 5 gallon buckets filled with stream water for a period only long enough to transport fish to an appropriate release site immediately upstream of the individual project sites. Buckets will likely be placed into the water and slowly inverted to allow captured fish to move into the selected release sites. Handling fish in this manner is likely to minimize the potential stress fish experience.

The effects of electrofishing on juvenile salmonids will consist of the direct and indirect effects of exposure to an electric field, capture by netting (described above), and handling associated with transferring the fish back to the river (also described above). Most of the studies on the effects of electrofishing have been conducted on adult fish greater than 12 inches in length (Dalbey *et al.* 1996). The few studies that have been conducted on juvenile salmonids indicate that spinal injury rates are substantially lower than they are for large fish. Smaller fish intercept a smaller head-to-tail potential than larger fish (Sharber and Carothers 1988) and may therefore be subject to lower injury rates (Dalbey *et al.* 1996; Thompson *et al.* 1997). McMichael *et al.* (1998) found a 5.1% injury rate for juvenile middle Columbia River steelhead captured by electrofishing in the Yakima River subbasin; while Ainslie *et al.* (1998) reported injury rates of 15% for direct current applications on juvenile rainbow trout. The incidence and severity of electrofishing damage is partly related to the type of equipment used and the waveform produced (Sharber and Carothers 1988; Dalbey *et al.* 1996; Dwyer and White 1997). Continuous direct current or low-frequency (equal or less than 30 hertz) pulsed direct current have been recommended for electrofishing because lower spinal injury rates occur with these waveforms (Dalbey *et al.* 1996; Ainslie *et al.* 1998). Only a few recent studies have examined the long-term effects of electrofishing on salmonid survival and growth (Ainslie *et al.* 1998; Dalbey *et al.* 1996). These studies indicate that although some of the fish suffer spinal injury, few die as a result. However, severely injured fish grow at slower rates and sometimes show no growth at all (Dalbey *et al.* 1996).

Electrofishing will be conducted by qualified personnel with appropriate training and experience, who will follow standard guidelines (NMFS 2000b) that will minimize the levels of stress and mortality related to electrofishing. For example, field crews will be trained in observing animals for signs of stress and shown how to adjust electrofishing equipment to minimize that stress. Although McMichael *et al.* (1998) indicated electrofishing injury rates for natural-origin salmonids were only 5%, NMFS notes that as many as 25% (Nielson 1998) of the total number of fish electrofished could be injured to account for variable site conditions and experience levels.

NMFS estimates that the action agencies will collectively implement between 10 and 20 projects per year under this programmatic consultation, based on the number of individual consultations in past years in Idaho on habitat restoration projects. Taking into account that there may be circumstances under which the action agencies might implement a larger number of projects, NMFS therefore assumes that not more than 40 projects would be implemented in any given year (twice the expected yearly number). At most, based on BPA's HIP programmatic consultation, a highly similar action, half of these projects would involve instream construction and work area isolation, under which 20 of 53 habitat restoration projects in Idaho from 2008 to 2012 involved instream work and fish handling (BPA 2012). At these 20 BPA habitat restoration projects in Idaho, biologists removing fish from the work area handled an average of 16 salmonids per project site. Because the proposed action consists of similar projects in activity, size, and scale, and in the same geographic area, as the BPA's HIP, individual projects under the proposed action are likely to remove a similar number of fish during dewatering. Using the average number of fish handled from the BPA project gives an estimate of 320 juvenile salmonids per year captured during work area isolation for the proposed action. These salmonids could include juvenile spring/summer Chinook, juvenile fall Chinook, and juvenile steelhead.

The estimated 320 juvenile salmonids captured during work area isolation each year would experience lethal and non-lethal effects. NMFS makes the following assumptions about injury and death rates for different fish handling methods, which lead to the calculations presented in Table 12.

- A maximum of 20 project sites per year are likely to involve de-watering of stream reaches and handling and removal of individual ESA-listed fish from these stream reaches. An estimated 320 juvenile salmonids will be captured each year.

- Of the fish remaining in the project area, after the stream reach has been partially dewatered to encourage fish the leave the area on their own, 70% of the remaining fish will be captured by nets (based on USFWS 2004); a programmatic opinion with similar actions in Oregon and Washington).

- Of the remaining individuals, 50% will be captured through electrofishing (Peterson *et al.* 2004).

- Electrofishing will injure 25% of fish captured (Nielson 1998) and kill 5% of fish captured (Hudy 1985; McMichael *et al.* 1998).

- Many of the remaining fish will be collected with nets out of pools as the stream reach is completely dewatered, but up to half may be stranded in the dewatered reach and die.

**Table 12. Estimates for the number of salmon and steelhead juveniles per year that will be disturbed, injured, or killed from netting, electrofishing, and de-watering as a result of annual implementation of the proposed action.**

| | |
|---|---|
| Maximum number of projects to capture fish per year | 20 |
| Maximum number of fish captured | 320 |
| Maximum number of fish injured by electrofishing per year | 12 |
| Maximum number of fish potentially killed by electrofishing per year (also included in injury total) | 3 |
| Maximum number of fish killed by stranding per year | 24 |
| **Maximum total number of fish killed per year** | **27** |

As shown in Table 12, NMFS estimates that the proposed action would result in the capture, handling, transport, or stranding of a maximum of 320 juvenile salmonids per year. This individual fish could be spring/summer Chinook salmon, fall Chinook salmon, or steelhead. This handling is likely to result in various levels of harm and stress. The conservation measures in the proposed action should reduce the potential harm to individuals during capture and transport such that the risk of death is minimized. Adequate monitoring of the number of fish handled will be necessary to validate assumptions and to adaptively manage the programmatic consultation to reduce take levels over time. NMFS estimates that the proposed action is likely to directly result in the death of up to 27 juvenile spring/summer Chinook salmon, fall Chinook salmon, or steelhead per year through electrofishing and stranding in de-watered stream reaches. NMFS further estimates that the proposed action would directly injure up to 12 juvenile ESA-listed fish per year through electrofishing.

Most of the estimated 27 juveniles per year killed from fish handling are likely to be spring/summer Chinook and steelhead, since fall Chinook inhabit large mainstem rivers and have much less overlap with stream restoration projects. Given smolt-to-adult return rates of less than 1% for steelhead and for spring/summer Chinook salmon in Idaho (Arthaud and Morrow 2007), the loss of 27 juveniles spread across all Idaho populations would not be great enough to impact population abundance.

*2.4.3.3 Suspended Sediment*

Fish exposed to elevated turbidity levels may be temporarily displaced from preferred habitat or could potentially exhibit sublethal responses such as gill flaring, coughing, avoidance, and increases in blood sugar levels (Bisson and Bilby 1982; Sigler *et al.* 1984; Berg and Northcote

1985; Servizi and Martens 1991), indicating some level of stress (Bisson and Bilby 1982; Berg and Northcote 1985; Servizi and Martens 1987). The magnitude of these stress responses is generally higher when turbidity is increased and particle size decreased (Bisson and Bilby 1982; Servizi and Martens 1987; Gregory and Northcote 1993). The most critical aspects of sediment-related effects are timing, duration, intensity and frequency of exposure (Bash *et al.* 2001). Depending on the level of these parameters, turbidity can cause lethal, sublethal, and behavioral effects in juvenile and adult salmonids (Newcombe and Jensen 1996). Although turbidity may cause stress, Gregory and Northcote (1993) have shown that moderate levels of turbidity (35 to 150 NTUs) accelerate foraging rates among juvenile Chinook salmon, likely because of reduced vulnerability to predators (camouflaging effect). Turbidity and fine sediments can reduce prey detection, alter trophic levels, reduce substrate oxygen, smother redds, and damage gills, among other negative effects (Spence *et al.* 1996).

Conservation measures included in the proposed action are intended to prevent the majority of sediment from being delivered to stream habitat but cannot prevent all sediment due to the nature of the in-channel work necessary for some types of projects. Juvenile spring/summer Chinook salmon, fall Chinook, and steelhead may experience short-term adverse effects as a result. Substrate may inadvertently fall from excavation equipment buckets or accidentally be pushed over streambank edges while working in close proximity to the stream channel during site preparation or during structure repair, replacement, or installation (e.g., culverts). Rain events during and following construction activities may also result in mobilization of disturbed soils resulting in stream delivery, even with sediment control measures in place (Foltz and Yanosek 2005). Rewatering of dewatered stream reaches may mobilize sediment in areas disturbed by project activity, such as channel reconstruction. However, conservation measures included in the proposed action will minimize the risk of sediment entering streams (as described in *1.3.4 General Conservation Measures*). The Project Sponsor will carry out erosion and pollution control measures commensurate with the scope of the action.

The amount of sediment likely to enter the stream depends on whether instream work is necessary. Projects in which heavy equipment works from the bank and does not enter the stream channel (such as placing rock) may not cause any visible turbidity (e.g. Eisenbarth 2013a), or may cause only small, short (minutes) pulses of turbidity. Projects which require dewatering and instream work, on the other hand, are likely to produce short-term sediment plumes when streamflow is reintroduced to the isolated, dewatered reach. Such projects may also produce a brief (less than 2 hours) turbidity pulse upon initial dewatering (Connor 2014). Culvert and bridge replacements, channel reconstruction, and changes to diversion structures are all likely to involve dewatering and instream work. Conservation measures included in the proposed action for rewatering stream channels will reduce the amount of sediment released. Reconstructed stream channels will be "pre-washed" into a reach equipped with sediment capture devices, prior to reintroduction of flow to the stream. Stream channels will be re-watered slowly to minimize a sudden increase in turbidity. When rewatering begins, the Project Sponsor will monitor turbidity every hour 600 feet downstream from the point of discharge. If turbidity levels exceed 50 NTUs over background levels for two consecutive readings (2 hours), the Project Sponsor must cease work immediately and take measures to reduce turbidity before continuing to reintroduce streamflow. Sediment transport from any temporary bypass channels will be minimized due to the provision for lined channels or the use of plastic pipes to convey water around the construction site.

NMFS expects that sediment plumes associated with rewatering stream channels that were isolated during project construction could extend up to 1,000 feet. This assumption is based on turbidity monitoring reports from past projects in the action area which involved reconstruction of stream channels, including culvert, bridge, and diversion replacement projects (Eisenbarth 2013b; Connor 2014). In many cases the turbidity plume upon rewatering will last less than 2 hours, but the plume may last for up to 24 hours (Connor 2014; Jakober 2002; Casselli 2000; Eisenbarth 2013b). Similar turbidity monitoring results have been reported for rewatering reconstructed side channels in the action area (CH2MHill 2012). Juvenile fish will likely respond to a turbidity plume for this distance along the streams edge by avoiding the plume and temporarily seeking refuge nearby. Fish present downstream from program activities are thus expected to be able to avoid or reduce their exposure to turbidity by swimming to adjacent, less turbid habitat (i.e., behavioral response only). However, harm to juveniles is still likely to occur as a result of increased turbidity, as exposure of juveniles to predators will likely increase as they seek alternate rearing habitat.

Based on habitat restoration projects in Idaho in past years requiring section 7 consultations, NMFS expects that half of the projects that will be implemented under this programmatic Opinion each year will require dewatering and instream work, and will result in turbidity plumes as described above. NMFS assumes that no more than 40 projects will be implemented under this Opinion per year, leading to no more than 20 projects per year with turbidity plumes lasting up to 24 hours.

#### *2.4.3.4 Sediment Deposition*

The methods for sediment introduction to the stream channel were described in the suspended sediment discussion above. The same suite of conservation measures proposed to reduce the potential for suspended sediment would likewise minimize the potential for in-channel sediment deposition.

The potential effects of sediment deposition on fish habitat, and subsequently on individual fish, include smothering of redds and spawning gravels, changes to primary and secondary productivity, and reduction of available cover for juveniles. Egg-to-emergence survival and size of alevins is negatively affected by fine sediment intrusion into spawning gravel (Young *et al.* 1991). Fine sediment deposition in spawning gravel reduces the oxygen supply rate to redds (Wu 2000). However, female salmonids displace fine sediment when they dig redds, cleaning out the gravel and increasing permeability and interstitial flow (Kondolf *et al.* 1993).

Fine sediment deposition also has the potential to adversely affect primary and secondary productivity (Spence *et al.* 1996; Suttle *et al.* 2004). Suttle *et al.* (2004) found that increases in fine sediment concentration led to a change from aquatic insects available to salmonids (i.e., surface grazers and predators) to unavailable burrowing species. However, due to the conservation measures included in the action to minimize sediment delivery to streams, NMFS expects that any effects to primary production will be minimal.

Fine sediment delivery to streams can reduce cover for juvenile salmonids (Bjornn and Reiser 1991). Fine sediment can fill pools as well as interstitial spaces in rocks and gravels used by fish for thermal cover and for predator avoidance (Waters 1995). NMFS expects that juvenile cover will be affected in the short term within the affected individual 1,000 foot stream reaches (the expected extent of sediment plumes described above); but that habitat quality will then recover as fine sediments are flushed downstream during high flows after project completion. Because of the expected effectiveness of the proposed sediment control best management practices (BMPs), NMFS does not expect that enough sediment deposition will take place to alter salmonid use of the habitat. Furthermore, NMFS expects that project-related sediments introduced into the stream channel will be a much smaller amount than the annual sediment budget of a watershed, such that sediment impacts from the program will be unmeasurable at the watershed-scale.

Given the small level of sediment likely to be introduced to streams from project activities with proposed sediment control BMPs, the process of digging a redd will likely displace most of this sediment. Furthermore, it is extremely unlikely that redds will be present within any work site during the work period due to the proposed instream work windows. Thus, sedimentation is not expected to directly affect incubating eggs or alevins.

#### *2.4.3.5 Temperature*

The proposed action has the potential to reduce streamside shade through the removal of riparian vegetation. Reductions in shade can increase the amount of solar radiation reaching the stream surface and lead to increases in steam temperatures. Elevated water temperatures may adversely affect salmonid physiology, growth, and development, alter life history patterns, induce disease, and may exacerbate competitive predator-prey interactions (Spence *et al.* 1996). As described in the proposed action, individual projects will be designed to preserve existing vegetation. In instances where riparian shrubs are removed during construction, vegetation will be replanted. Many actions under this consultation will result in long-term increases in shade, and any short-term decreases in shade are likely to be minimal.

#### *2.4.3.6 Chemical Contamination*

Use of construction equipment and heavy machinery adjacent to stream channels poses the risk of an accidental spill of fuel, lubricants, hydraulic fluid, or similar contaminants into the riparian zone, or directly into the water. If these contaminants enter the water, these substances could adversely affect habitat, injure or kill aquatic food organisms, or directly impact ESA-listed species. Petroleum-based contaminants such as fuel, oil, and some hydraulic fluids contain poly-cyclic aromatic hydrocarbons, which can cause chronic sublethal effects to aquatic organisms (Neff 1985). Ethylene glycol, the primary ingredient in antifreeze, has been shown to result in sublethal effects to rainbow trout at concentrations of 20,400 mg/L (Beak Consultants Ltd. 1995, as cited in Staples 2001). Brake fluid is also a mixture of glycols and glycol ethers, and has about the same toxicity as antifreeze.

Although many projects will require the use of heavy machinery, equipment will not enter flowing water except for during temporary stream crossings, which limits the potential for chemical contamination to occur. Hydraulic fluids used in any vehicle that crosses a stream in live water will be non-toxic to salmonids. Furthermore, the proposed action includes multiple conservation measures aimed at minimizing the risk of fuel or oil leakage into the stream. The Project Sponsor will prepare a spill prevention and contingency plan prior to the start of the project. All staging, fueling, and storage areas would be located away from aquatic areas. NMFS believes that fuel spill and equipment leak contingencies and preventions described in the proposed action should be sufficient to minimize the risk of negative impacts to ESA-listed fish and fish habitat from toxic contamination.

#### *2.4.3.7 Herbicides*

Herbicides may be applied to invasive plant species in or near riparian areas under this program, in order to make space for native plant species that may provide greater riparian function to aquatic habitat, such as shade, LWD recruitment, or bank stability. The conservation measures in the proposed action are designed to minimize the risk of herbicides entering surface water and thereby impacting ESA-listed fish or their prey base. However, due to the possibility of surface water run-off, leaching through ground water, or wind drift, small amounts of herbicide could enter streams or other surface water, negatively impacting ESA-listed species. The analysis of the effects of herbicides on salmonids in this Opinion is based on: (1) Assessing the likelihood that listed fish and other aquatic organisms will be exposed to the herbicides, and estimating the concentrations of herbicides to which fish would be exposed; (2) reviewing the toxicological effects of the herbicides, inert ingredients, and adjuvants on listed fish and other aquatic organisms; and (3) comparing the estimated concentrations of herbicides in surface water from the proposed action to the concentrations known to cause lethal and sublethal effects to salmonids.

Under the proposed action, the risks to salmonids from herbicides are likely to occur primarily through the direct toxicological effects of the herbicides and adjuvants on the fish, rather than through effects on aquatic vegetation or prey species. However, both types of effects may occur and are considered in this Opinion. Unfortunately, the toxicological effects and ecological risks to aquatic species, including ESA-listed fish, are not fully known for all of herbicides, end-use products, and adjuvants in the proposed action.

Due to concerns about the uncertainty of effects of pesticides on ESA-listed fish, the EPA was directed by the 9th District Court (Washington Toxics Coalition v. EPA) to consult with NMFS on the effects of 55 pesticides used in the states of Washington, Oregon, and California. On August 1, 2008, NMFS entered into a settlement agreement to complete consultations on 37 active ingredients by April 30, 2012. To date, NMFS has completed six Opinions, covering 27 active ingredients (http://www.nmfs.noaa.gov/pr/consultation/pesticides.htm). Of those active ingredients, two (2,4-D and triclopyr) are proposed for use in this proposed action. Results of the national consultation on the registration of 2,4-D and triclopyr are incorporated into this proposed action.

Since herbicides could be applied throughout the plant growing season, all life stages of the ESA-listed salmonids in Idaho could potentially be exposed to herbicides, including incubating eggs, rearing juveniles, and adults. Herbicides can enter water through spray drift, surface water runoff, percolation, groundwater contamination, and direct application. The proposed action includes numerous conservation measures intended to minimize or avoid water contamination from herbicides. The conservation measures include stream and riparian buffers where chemical use is restricted or prohibited, limits on the amount of chemicals applied to a given area, and rules governing application methods and timing. The direct application of herbicides to surface water is not allowed. The likelihood of herbicides entering the water depends on the type of treatment and mode of transport.

Wind drift is a significant source of off-site herbicide transport with aerial applications (not allowed under the proposed action), but may also occur during boom or hand spraying. Wind drift is more likely to occur during aerial applications, and less likely to occur to a significant extent during ground-based spraying, unless sprays are directed into the air, or sprays are delivered in a fine mist. Wind drift is largely dependent on droplet size, elevation of the spray nozzle, and wind speed (Rashin and Graber 1993). The smaller a droplet, the longer it stays aloft in the atmosphere, allowing it to travel farther. In still air, a droplet of pesticide the size of 100 microns (mist-size) takes 11 seconds to fall 10 feet. The same size droplet at a height of 10 feet travels 13.4 feet horizontally in a 1 mph wind, and 77 feet at 5 mph wind. Thus the proposed action includes wider stream buffers at wind speeds over 5 mph. During temperature inversions little vertical air mixing occurs and drift can transport long distance. This possibility is addressed through a conservation measure prohibiting spraying when wind speeds are less than 2 mph and there is a potential for temperature inversions. Since aerial application is not part of the proposed action, it is likely that spray drift will reach water only where chemicals are applied in riparian areas. Water contamination through wind drift from ground application of chemicals to riparian areas is likely to be small due to the short distance that a spray droplet is likely to travel as a result of the wind speed restrictions and no-spray buffers.

In the absence of aerial spraying, herbicide transport by surface runoff or percolation are the most likely mechanisms to cause water contamination with the proposed action, but the potential is minimized through timing spray activities to avoid precipitation and the use of no-spray buffers along stream courses. The no-spray buffers reduce the potential for chemicals to reach streams from overland flows by surface flows that might otherwise carry herbicides directly into a stream. The use of riparian buffers for interrupting overland flows is well-established as an effective mitigation technique for reducing sediment delivery to streams and the same mechanism would reduce delivery of herbicides from surface runoff. Overland flows occur when precipitation or snowmelt rates exceed the infiltration capacity of soils, which occurs infrequently in the action area. Overland flows are likely to occur briefly during intense thunder storms in summer, during the spring runoff period (at elevations where there is significant snow accumulation), or extended rainy periods. The proposed action includes provisions to suspend spraying when rain is likely to occur. However, summer thunderstorms are not entirely predictable and there is no practical way to ensure that rainfalls will not occur in herbicide treatment areas shortly after herbicides are applied.

Introduction of herbicides into a stream though percolation occurs when herbicides dissolve in water and through gravity and capillary action, are transported through the soils into an aquifer connected to the stream channel. Water contamination through groundwater is a highly variable process and is not readily predictable. In general, the distance from the point where herbicides reach an aquifer to a stream likely affects the concentration of the herbicides reaching the particular stream. Herbicide concentrations in the aquifer are reduced through dilution with increasing discharge as the aquifer approaches the stream and greater amount of contact with soil particles that may sorb herbicide molecules. The vertical distance to the water table and soil types also affect herbicide transport through ground water. Highly permeable soils with low organic content, such as alluvium and glacial till, provide little filtering or sorption and rapidly deliver pollutants. Soils with high amounts of clays can be virtually impermeable and large amounts of organic matter can bind herbicide molecules for long periods of time. Because the variables affecting transport of herbicides in groundwater are site-specific and highly variable, there is no particular buffer width that works equally well in all settings.

Pesticide movement ratings are derived from soil half-life, sorption in soil, and water solubility, and indicate the propensity for a pesticide to reach a stream through groundwater. As indicated by movement ratings, glyphosate is least likely to reach groundwater or move from the site, while chemicals such as picloram, dicamba, and triclopyr are highly mobile and are likely to be transported by runoff or percolation. All of the herbicides proposed for use are susceptible to transport in groundwater or surface runoff, especially if applications are followed immediately by high rainfall events or if the water table is relatively shallow.

Although no-spray buffers can reduce the likelihood of water contamination from herbicides, there is no general rule to determine appropriate buffer widths. The buffer distances in the proposed action are based on the presumption that herbicides applied near water can more readily reach water than herbicides that are not applied near water, but the specific distances for ground-based spraying are based on practical weed control considerations and are not derived from scientifically-based calculations. The effectiveness of no-spray buffers for preventing water contamination through runoff or percolation is generally unknown, but the buffers provide some increment of additional protection due to filtering and sorption of herbicides that could otherwise reach the stream.

Fish or their prey base are most likely to be exposed to herbicides in occasional circumstances where wind gusts or unexpected precipitation carries chemicals into the water. Chemical contamination of water from the proposed ground-based treatments is unlikely to occur beyond occasional and localized circumstances given the small amounts of chemicals used, precautionary measures that minimize or avoid water contamination, and limited riparian acreage treated within any given subbasin. Water contamination is most likely to occur in situations where spraying occurs in riparian areas with coarse alluvial soils and when a significant unexpected rainfall occurs shortly after weed treatment. Available water quality monitoring for past weed treatments are limited, but suggest that conservation measures similar to those in the proposed action are likely limiting the occurrence of water contamination and the concentrations of chemicals in the water when contamination occurs (Berg 2004).

Although the conservation measures in the proposed action would likely limit exposure of salmonids and their prey base to herbicides, some exposure is nonetheless possible. Site-specific estimates of fish exposure cannot be predicted since the exact treatment locations, the amount of chemicals that will be applied, and weather conditions are not known ahead of time. Instead NMFS has developed estimated environmental concentrations (EECs) of herbicides in surface water based on modeled water contamination rates found in the most recent USFS Risk Assessments prepared by the Syracuse Environmental Research Associates, Inc. (SERA) (http://www.fs.fed.us/foresthealth/pesticide/risk.shtml) and described in the BA in *Appendix E: Toxicological Effects of Herbicides Proposed for Use Under the Idaho Habitat Restoration Program*. The SERA reports predict water contamination rates associated with the application of 1pound of chemical per acre. To establish EECs for each herbicide in the proposed action, NMFS multiplied the SERA water contamination rate by the maximum allowed application rate in Table 13, for a worse-case scenario. Table 13 shows EECs for each chemical, along with some general physical property information.

**Table 13. Physical properties, application rates, and estimated environmental concentrations for herbicides proposed for use.**

| Active Ingredient | Persistence in Soil (days)[1] | Mobile in Soil | Max Label Application Rate (lb a.e./Acre) | Water Contamination Rate (mg a.e./L)[2] | Estimated Environmental Concentration (EEC) (mg a.e./L)[3] |
|---|---|---|---|---|---|
| 2,4-D amine | 10<br>Low | Yes, but degrades quickly | 4.0 | 0.44 | 1.76 |
| Aminopyralid | 5 - 343<br>Low-High | No | 0.11 | 0.056 | 0.0062 |
| Clopyralid | 40<br>Moderate | No | 0.5 | 0.07 | 0.035 |
| Chlorsulfuron | 40 (28-42)<br>Low-Mod | No | 0.12 | 0.2 | 0.024 |
| Dicamba | 7-42<br>Low-Mod | Yes | 2 | 0.01 | 0.02 |
| Glyphosate | 47<br>Moderate | No | 8 | 0.083 | 0.66 |
| Imazapic | 7-150<br>Low-High | No | 0.19 | 0.01 | 0.002 |
| Metsulfuron-methyl | 30 (7-28)<br>Low | No | 0.15 | 0.01 | 0.002 |
| Picloram | 90 (20-300)<br>Mod-High | Yes | 1.0 | 0.18 | 0.18 |
| Sulfometuron-methyl | 20-28<br>Low | No | 0.378 | 0.02 | 0.008 |
| Triclopyr (Garlon 3A) | 30<br>Low | Yes | 9.00 | Acid: 0.24<br>TCP: 0.02 | Acid: 2.16<br>TCP: 0.18 |

[1]Soil half-life values for herbicides are from Herbicide Handbook (Ahrens 1994). Pesticides that are considered non-persistent are those with a half-life of less than 30 days; moderately persistent herbicides are those with a half-life of 30 to 100 days; pesticides with a half-life of more than 100 days are considered persistent.

[2]Water contamination rates for direct spraying of ponds were obtained from the most recent SERA risk assessments (http://www.fs.fed.us/foresthealth/pesticide/risk.shtml). See Appendix E of the BA, "*Toxicological Effects of Herbicides Proposed for Use under the Idaho Habitat Restoration Program for more details and specific citations*."

[3]Estimated environmental concentrations (EECs) were derived by multiplying the maximum label application rate by the SERA water contamination rate for application of 1 pound of chemical per acre.

Herbicides (including the active ingredient, inert ingredients, and adjuvants) can potentially harm fish directly or indirectly. Herbicides can directly affect fish by killing them outright or causing sublethal changes in behavior or physiology. Herbicides can indirectly affect fish by altering their environment (Scholz *et al.* 2005), such as by changing the availability of prey species. Below we first discuss direct effects of herbicides, then indirect effects, and then conclude with a table showing concentrations of each herbicide known to cause lethal and sublethal impacts to salmonids and lethal impacts to salmonid prey species. Appendix E of the BA, *Toxicological Effects of Herbicides Proposed for Use under the Idaho Habitat Restoration Program*, provides more detail on the specific toxicological effects of each herbicide proposed for use under this program.

Herbicide exposure may directly result in one or more of following impacts to the fitness of salmonids and other fish species:

- Direct mortality at any life history stage.
- An increase or decrease in growth.
- Changes in reproductive behavior.
- A reduction in the number of eggs produced, fertilized, or hatched.
- Developmental abnormalities, including behavioral deficits or physical deformities.
- Reduced ability to osmoregulate or adapt to salinity gradients.
- Reduced ability to tolerate shifts in other environmental variables (*e.g*., temperature or increased stress).
- An increased susceptibility to disease.
- An increased susceptibility to predation.
- Changes in migratory behavior.

In addition to effects of direct exposure on listed fish, indirect effects of pesticides can occur through their effects on the aquatic environment and non-target species. The likelihood of adverse indirect effects is dependent on environmental concentrations, bioavailability of the chemical, and persistence of the herbicide in salmonid habitat. For most herbicides, including those in the proposed action, there is little information available on environmental effects such as negative impacts on primary production, nutrient dynamics, or the trophic structure of macroinvertebrate communities. Most available information on potential environmental effects must be inferred from laboratory assays, although a few observations of environmental effects are reported in the literature.

Juvenile salmonids feed on a diverse array of aquatic invertebrates, with terrestrial insects, aquatic insects, and crustaceans comprising the large majority of the diets of fry and parr in all salmonid species (Higgs *et al.* 1995). In general, insects and crustaceans are more acutely sensitive to the toxic effects of environmental contaminants than fish or other vertebrates. However, with a few exceptions (e.g., daphnids), the impacts of pesticides on salmonid prey taxa have not been widely investigated. Factors affecting prey species are likely to affect the growth of salmonids, which is largely determined by the availability of prey in freshwater systems (Mundie 1974). Food supplementation studies (e.g., Mason 1976) have shown a clear relationship between food abundance and the growth rate and biomass yield of juveniles in streams. Therefore, herbicide applications that kill or otherwise reduce the abundance of macroinvertebrates in streams can also reduce the energetic efficiency for growth in salmonids. Less food can also induce density-dependent effects, such as increased competition among foragers as prey resources are reduced (Ricker 1976). These considerations are important because juvenile growth is a critical determinant of freshwater and marine survival (Higgs *et al.* 1995). A study on size-selective mortality in Chinook salmon from the Snake River (Zabel and Williams 2002) found that naturally reared wild fish did not return to spawn if they were below a certain size threshold when they migrated to the ocean. There are two primary reasons mortality is higher among smaller salmonids. First, fish that have a slower rate of growth suffer size-selective predation. Second, salmon that grow more slowly may be more vulnerable to starvation or exhaustion (Sogard 1997).

It is possible that the action may also cause detrimental effects when non-target plants are killed by herbicides. Herbicide spraying in riparian areas can kill non-target plants that provide streambank stability, shade, and cover for fish. Spraying can also increase surface runoff by creating areas of bare soil devoid of any vegetation. This is particularly true for non-selective herbicides that kill all plants, such as glyphosate. However, non-target species killed by herbicides tend to be mostly forbs, grasses, and legumes, which are capable of reestablishing themselves within a few growing seasons. Although shrubs and trees are also susceptible to herbicide effects, the quantity of herbicide applied during spot spraying is not likely to kill mature shrubs or trees that have matured beyond the pole stage.

Available information on the toxicological effects of each of the active ingredients and end-use products proposed for use is summarized in Appendix E of the BA. Table 14 summarizes toxicity information for active ingredients and surfactants, using rainbow trout as a surrogate for ESA-listed salmonids and daphnid as a surrogate for salmonid prey species. Lethal effects for rainbow trout are reported as the lethal concentration required to kill half of the test organisms within 96 hours (“96-hour $LC_{50}$”). Lethal effects for daphnids are reported as the lethal concentration required to kill half of the test organisms within 48 hours (“48-hour $LC_{50}$”). Table 15 reports toxicities separately for herbicide active ingredients and surfactants, but the toxicities of mixtures of the two are largely unknown. Mitchell *et al.* (1987) tested the toxicity of Rodeo with and without a surfactant. Without the surfactant, the 96-hour $LC_{50}$ for rainbow trout was 429 mg a.e./L. With the surfactant X-77 (not proposed for use under this action), the 96-hour $LC_{50}$ ranged from 96.4 mg a.e./L (rainbow trout) to 180.2 mg a.e./L (Chinook salmon). The addition of X-77 thus altered the toxicity of the formulation by up to four times. However, the surfactants proposed for use are not hazardous nor are they categorized by EPA as List 1 (inert ingredients of toxicological concern) or List 2 (potentially toxic other ingredients/high priority for testing inerts) compounds when used as intended and label directions are followed (CH2MHILL 2004).

**Table 14. Toxicity of active ingredients and adjuvants proposed for use under this program.**

| Active Ingredient | Rainbow trout 96-hour $LC_{50}$ (mg a.e./L)[1] | Lowest Sublethal Effect Threshold for Salmonids (mg a.e./L)[1] | Daphnid 48-hour $LC_{50}$ (mg/L) |
|---|---|---|---|
| 2,4-D amine | 162 | 5 | 25 |
| Aminopyralid | 100 | Unknown | 98.6 |
| Clopyralid | 103.5 | NOEC = 68 | 225 |
| Chlorsulfuron | 40 | No Observed Effects Concentration (NOEC) = 32 | >100 |
| Dicamba | 28 | Unknown | 100 |
| Glyphosate | 96.4 | NOEC = 25.7 | 128 |
| Imazapic | 100 | Unknown | >100 |
| Metsulfuron-methyl | 150 | 4.7 | >150 |
| Picloram | 8 | NOEC = 0.55 | 48 |
| Sulfometuron-methyl | 148 | NOEC = 1.17 | >150 |
| Triclopyr: Garlon 3A | Acid: 117<br>Trichloropyridinol (TCP): 1.5 | 32.2<br>TCP: 0.178 | Acid: 132.9<br>TCP: 10.9 |
| **Adjuvant** | | | |
| Activator 90 | 2.0[2] | NA | 2.0[2] |
| LI 700 | 17 – 130[3,4] | NA | 170 – 190[3,4] |
| Methylated Seed Oil (MSO) | 48[5] | NA | >100[5] |
| R11 | 3.8 – 6[2,4] | NA | 5.7 – 19[2,4] |
| Spreader 90 | 3.3[5] | NA | 7.3 (96-hr)[5] |
| Syl-Tac | >5[5] | NA | >5[5] |
| Agridex | >1000[6] | NA | >1000 |
| Valid | 10[7] | NA | NA |
| 41-A | 1000[7] | NA | NA |

[1] Obtained from the most recent SERA risk assessments. See *Appendix E* of the BA for more detail. For triclopyr, the values presented are for the formulated product and a metabolite.
[2] McLaren-Hart Environmental Engineering Corporation 1995
[3] LI 700 Safety Data Sheet
[4] Smith *et al.* 2004
[5] Bakke 2003
[6] McLaren/Hart 1995, as cited in Diamond and Durkin (1997)
[7] as reported in BPA (2012, p.B-25).

To predict the effects of the proposed action on ESA-listed salmonids, we compare estimated concentrations of herbicides in surface water after application to riparian plants to known toxic concentrations of these herbicides to salmonids and their prey species (Table 14). However, there are numerous uncertainties in this analysis:

- Table 14 presents toxicities for the active ingredients in herbicides, but end-use products (e.g. Rodeo) have other inert ingredients besides the active ingredients (e.g. glyphosate) listed above. End-use products containing the same active ingredient may have different toxicities to aquatic organisms. This is because they have different formulations (i.e., different proportion of active ingredient, different inert ingredient composition, or different proportions of each inert ingredient).

- Surfactants are toxic by themselves and have been documented to increase the toxicity of herbicide formulations. The increase in toxicity is not necessarily additive; it depends upon the type of surfactant used as well as the proportion of surfactant in the formulation or tank mixture. As stated above, Table 14 reports toxicities separately for herbicide active ingredients and surfactants, but the toxicities of mixtures of the two are largely unknown.

- Table 14 reports the known toxicities from the SERA reports, which synthesize available literature. In some cases, available literature is limited. There is little information available on the sublethal effects (e.g., feeding, spawning, or migration) or ecological effects (e.g., effects on prey species) of the active ingredient, end-use products, and tank mixtures.

- To further complicate the evaluation, many sublethal toxicological effects may harm fish in ways that are not readily apparent. When small changes in the health or performance of individual fish are observed (e.g., a small percentage change in the activity of a certain enzyme, an increase in oxygen consumption, or the formation of pre-neoplastic hepatic lesions), it may not be possible to infer a significant loss of essential behavior patterns of fish in the wild, even in circumstances where a significant loss could occur. Where sublethal tests have been conducted, they are typically reported for individual test animals under laboratory conditions that lack predators, competitors, certain pathogens, and numerous other hazards found in the natural environment that affect the survival and reproductive potential of individual fish.

Table 15 compares estimated environmental concentrations of each active ingredient proposed for use to concentrations causing lethal and sublethal effects. These comparisons provide only a rough estimate of effects, given the caveats listed above. Table 15 suggests that the concentrations of most herbicides proposed for use would occur at concentrations well below (at least one to two orders of magnitude) concentrations where lethal effects are known to occur in salmonids. Estimated environmental concentrations of active ingredients would also be below the lowest threshold of sublethal effects, where known. Furthermore, the estimated EEC is for a worst-case scenario. To develop these “worst-case” scenarios, the EEC was derived from a direct application of the active ingredients to a 1-acre pond (1-foot deep) using the maximum rate specified on the label. The EEC is therefore an extreme level that is unlikely to occur during implementation of this programmatic action.

**Table 15. Comparison of estimated environmental concentrations (EECs) of herbicide active ingredients to known toxicities to salmonids and their prey species.**

| Active Ingredient | Estimated Environmental Concentration (EEC) (mg a.e./L) | Toxicity 96-hour $LC_{50}$ (mg a.e./L)[1] | Lowest Sublethal Effect Threshold (mg a.e./L)[1] | Daphnid 48-hour $LC_{50}$ (mg/L) |
|---|---|---|---|---|
| 2,4-D amine | 1.76 | 162 | 5 | 25 |
| Aminopyralid | 0.0062 | 100 | Unknown | 98.6 |
| Clopyralid | 0.035 | 103.5 | NOEC = 68 | 225 |
| Chlorsulfuron | 0.024 | 40 | NOEC = 32 | >100 |
| Dicamba[8] | 0.02 | 28 | Unknown | 100 |
| Glyphosate | 0.66 | 96.4 | NOEC = 25.7 | 128 |
| Imazapic | 0.002 | 100 | Unknown | >100 |
| Metsulfuron-methyl | 0.002 | 150 | 4.7 | >150 |
| Picloram | 0.18 | 8 | NOEC = 0.55 | 48 |
| Sulfometuron-methyl | 0.008 | 148 | NOEC = 1.17 | >150 |
| Triclopyr: Garlon 3A | Acid: 2.16<br>TCP: 0.18 | Acid: 117<br>TCP: 1.5 | 32.2<br>TCP: 0.178 | Acid: 132.9<br>TCP: 10.9 |

[1] Obtained from the most recent SERA risk assessments. See *Appendix E* of the BA for more detail. For triclopyr, the values presented are for the formulated product and a metabolite.

Estimated environmental concentrations are not available for all adjuvants, so NMFS was not able to compare such levels to known toxicities for salmonids and their prey species. Rather, NMFS characterized the ecological risk of each adjuvant using EPA's classification system for ecotoxicity. The ecological risk characterization ranges from very highly toxic ($LC_{50}$ values <0.1 mg/L) to practically non-toxic ($LC_{50}$ values > 100 mg/L). Table 16 summarizes the ecological risk characterization for each adjuvant proposed for use. Ecotoxicity ratings range from practically non-toxic to moderate. All of the surfactants with moderate ecotoxicity cannot be applied within a 50-foot buffer of open water, which should lessen the possibility of fish being exposed to these chemicals.

**Table 16. Toxicity values for surfactants proposed for use under this program.**

| Active Ingredient | Rainbow Trout 96-hour $LC_{50}$ (mg/L) | Ecotoxicity Category[1] | Daphnid 48-hour $LC_{50}$ (mg/L) | Ecotoxicity Category[1] |
|---|---|---|---|---|
| Activator 90 | 2.0 | Moderate | 2.0 | Moderate |
| LI 700 | 17 – 130 | Moderate – Practically non-toxic | 170 – 190 | Practically non-toxic |
| Methylated Seed Oil (MSO) | 48 | Slight | >100 | Practically non-toxic |
| R11 | 3.8 – 6 | Moderate | 5.7 – 19 | Moderate – Slight |
| Spreader 90 | 3.3 | Moderate | 7.3 (96-hr) | Moderate |
| Syl-Tac | >5 | Moderate | >5 | Moderate |
| Agridex | >1000[6] | Practically non-toxic | >1000 | Practically non-toxic |
| Valid | 10 | Moderate | | |
| 41-A | 1000 | Practically non-toxic | | |

[1]EPA Ecotoxicity categories for aquatic organisms. http://www.epa.gov/oppefed1/ecorisk_ders/toera_analysis_eco.htm

***Summary.*** There are numerous uncertainties that weigh into the effects analysis for herbicides in this Opinion. First, there are significant gaps in our knowledge about toxic effects from: (1) Unspecified inert ingredients contained in the end-use product formulations; and (2) tank mixtures containing multiple active ingredients and/or additives (i.e., surfactants). Second, estimates for lethality are measured for a surrogate species and are for 50% of the test organisms. Even in light of all this uncertainty, NMFS believes that outright lethality from the use of herbicides under this program is unlikely to occur. This is because the estimated environmental concentrations for herbicides represent worse-case scenarios and environmental concentrations are expected to actually be much less than these estimates due to implementation of proposed BMPs. Furthermore, as described in the proposed action, herbicide application within 100 feet of live water would be limited to 200 acres per year for the entire program, with no more than 50 acres per year in any particular subbasin. Thus, only a small proportion of the action area will be treated, thus any potential water contamination will be short in duration, small in magnitude, and infrequent. However, NMFS cannot say with any certainty that ESA-listed fish would not be harmed through sublethal effects or indirectly through toxic effects on other aquatic organisms. Sublethal effects from water contamination by herbicides cannot be discounted based on the available information. Water contamination by herbicides is likely to occur in occasional circumstances, and sublethal effects of herbicides or their adjuvants can occur within the range of concentrations likely to occur under the proposed action. Of the particular herbicides and surfactants proposed for use, little is known about their sublethal effects on salmon and steelhead, their effects on aquatic ecosystems, or threshold concentrations where these effects might occur. Where sublethal assays have been reported for salmonids, harmful effects occur at concentrations as much as several orders of magnitude less than the lethal endpoints used by EPA to assess pesticide risk.

2.4.4 Effects to Salmonid Critical Habitat

NMFS designates critical habitat based on physical and biological features that are essential to the ESA-listed species. For anadromous fish, essential features for designated critical habitat include substrate, water quality, water quantity, water temperature, food, riparian vegetation, access, water velocity, space, and safe passage. The action area provides widespread freshwater spawning, rearing, and migration habitat for Snake River spring/summer Chinook salmon, Snake River fall Chinook, Snake River Basin steelhead, and Snake River sockeye salmon. In general, the proposed action would improve the current condition of critical habitat at every project site. Nonetheless, construction activities would likely have small, temporary adverse impacts on critical habitat at some project sites. The critical habitat essential features associated with freshwater spawning, rearing, and migration that may be adversely affected by the action are water quality, substrate/spawning gravel, forage, and riparian vegetation.

***Water Quality.*** As described in *Short-term adverse effects to salmon, steelhead, and their habitat* (Section 2.4.3), water quality in the action areas may be temporarily degraded due to contamination by herbicides or due to increased turbidity associated with some of the proposed activities. For chemical contamination by herbicides, the proposed weed treatment areas would be scattered in patches of various size across the action area. Potential effects of weed spraying on designated critical habitat would vary at each location depending on the size of the treatment area, the chemicals used, method of application, distance from water, and vegetative characteristics of the treatment areas. If chemicals were to reach the water in an appreciable amount, a variety of biological effects could occur, including harmful effects on listed fish or other aquatic organisms due to direct exposure to the chemicals or indirectly from changes in the biotic community. In general, most instream effects of herbicides are short-lived, discreet events associated with spills, drift, or runoff events. Following the events causing contamination, critical habitat elements are likely to return to normal within a few hours to a few days.

For turbidity, conservation measures included in the action will minimize sediment delivery. For projects requiring operation of machinery within a dewatered stream channel, NMFS expects sediment pulses to occur upon reintroduction of streamflow to the reach. As described in in *Short-term adverse effects to salmon, steelhead, and their habitat* (Section 2.4.3), NMFS expects that sediment plumes associated with rewatering stream channels could be up to 1,000 feet, and in many cases will last less than 2 hours, but could last for up to 24 hours. NMFS expects that half of the projects that will be implemented under this programmatic Opinion each year will require dewatering and instream work, and will result in turbidity plumes as described above. NMFS assumes that no more than 40 projects will be implemented under this Opinion per year, leading to no more than 20 projects per year with turbidity plumes lasting up to 24 hours.

Use of construction equipment and heavy machinery adjacent to stream channels also poses the risk of an accidental spill of fuel, lubricants, hydraulic fluid, or similar contaminants into the riparian zone, or directly into the water, which could degrade water quality. However, NMFS believes that fuel spill and equipment leak preventions and contingencies described in the proposed action will minimize the risk of negative impacts to ESA-listed fish and fish habitat. Therefore, effects to the water quality parameters for streams in the action area will be adverse but temporary.

***Substrate/Spawning Gravel.*** As described in *Short-term adverse effects to salmon, steelhead, and their habitat* (Section 2.4.3), temporary pulses of sediment and turbidity plumes are expected to cause small increases in downstream fine sediment deposition and thus negatively affect some substrates in the short term. However, because the amount of deposited fine sediments generated from an individual project will be small, the next high-flow event is likely to wash these fine sediment downstream. Increased surface fines are not likely to persist beyond 6 months. Due to design criteria to avoid redds and limit the sediment introduced and deposited, NMFS expects these temporary increases to be significant but small, especially in comparison to the annual sediment load during peak discharge.

***Forage.*** Increases in turbidity and sediment deposition and potential herbicide contamination may temporarily reduce macroinvertebrate communities downstream from some project sites. Noise from heavy machinery will temporarily alter the levels of hydro-acoustics, altering juvenile salmonids' ability to utilize forage within the action area. However, the proposed instream work windows, dewatered construction sites, and conservation measures to prevent herbicides from entering surface water are expected to minimize both the magnitude and duration of downstream effects to salmonid food sources. Thus, the proposed action should have no lasting effect on forage levels.

***Riparian Vegetation.*** In instances where riparian shrubs are removed during construction, vegetation will be replanted. Individual projects conducted under this program would increase riparian vegetation over the long term. Because actions completed under this programmatic consultation would occur at sites where habitat is currently degraded, riparian vegetation removal is expected to be minimal. The proposed action will not have significant negative impacts to this PCE.

## 2.5 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Between 2010 and 2013, Idaho's population increased by 2.8%[10]. NMFS assumes that population growth will continue at a similar rate and that therefore future private and state actions within the action area will also increase at a similar rate. Seventy-nine percent of the action area is Federally-owned, which somewhat limits possible cumulative effects from private and state actions within the action area. However, private land is often clustered in valley bottoms, adjacent to occupied habitat for ESA-listed species. NMFS is aware of several potential future state and private actions in the action area that may benefit ESA-listed species. The *Draft Recovery Plan for Idaho Snake River Spring/Summer Chinook and Steelhead,* currently posted online at

[10] http://quickfacts.census.gov/qfd/states/16000.html, accessed April 28, 2014.

http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/snake_river/current_snake_river_recovery_plan_documents.html for informal public comment, recommends habitat restoration projects on private lands throughout the action area.

Due to the large, diverse landscape encompassed by this programmatic action, it is difficult to predict with any certainty the effects of future state and private actions. The effects of ongoing state and private activities in the action area such as road construction, mining, water withdrawals, agriculture, livestock grazing, urbanization, timber harvest, and outdoor recreation will continue to have adverse effects on listed species and their habitat including stream channelization, elimination of wetlands, reductions in streamflow, riparian degradation, reduced connectivity of habitat, elevated fine sediment yields, and reduced large woody material and habitat complexity (Henjum *et al.* 1994; Rhodes *et al.* 1994; National Research Council 1996; Spence *et al.* 1996; Lee *et al.* 1997; NMFS 2004). Habitat restoration projects are expected to continue to occur throughout the action area and will begin to offset the adverse effects of state and private activities to an unquantifiable extent.

## 2.6 Integration and Synthesis

The Integration and Synthesis section is the final step of NMFS' assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.4) to the environmental baseline (Section 2.3) and the cumulative effects (Section 2.5) to formulate the agency's Opinion as to whether the proposed action is likely to: (1) Result in appreciable reductions in the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species. These assessments are made in full consideration of the status of the species and critical habitat (Section 2.2).

NMFS estimates that the action agencies will collectively implement between 10 and 20 projects per year under this programmatic consultation, and projects are likely to occur throughout central Idaho in all populations of ESA-listed salmon and steelhead located outside of designated wilderness area. Taking into account that there may be circumstances under which the action agencies might implement a larger number of projects, NMFS therefore assumes that not more than 40 projects would be implemented in any given year (twice the expected yearly number). The habitat improvement projects in the proposed action will have long-term beneficial effects to salmonids and their habitats. These beneficial effects will improve three salmon and steelhead VSP parameters: abundance, productivity, and spatial structure. These improvements will translate into decreased risk of extinction and increased probability of recovery for all of the species addressed by this consultation. Habitat improvement projects carried out in critical habitat will improve the condition of that habitat at the site and watershed scales. However, the implementation of many activities in the proposed action will have some minor, unavoidable, short-term adverse effects to ESA-listed species and their habitat. Short-term adverse effects of the proposed activities would result from riparian or instream construction, fish handling when isolating inwater work sites, or application of chemical herbicides.

As described above, NMFS recently concluded that all four ESA-listed anadromous fish species in the action area remain threatened with extinction or, in the case of sockeye, are endangered (Ford *et al.* 2011). Degraded spawning, rearing, and migration habitat in Idaho is a limiting factor for each species. The proposed action will kill or harm individual fish and, in the short-term, further impact currently degraded habitat. These effects have the potential to affect the attributes of a viable salmonid population (levels of abundance, productivity, spatial structure, and diversity). However, the number of juvenile fish likely to be killed or harmed will be small, and short-term adverse effects on habitat are also likely to be small, localized, and brief enough that population attributes are not likely to be affected.

Effects on individual fish include handling, exposure to turbidity and sediment, and potential exposure to herbicides. The primary effect on individual fish from the proposed action is the possibility of injury or death from fish handling. Electrofishing and the other fish handling procedures are included in the action specifically in order to reduce the potential for harm, injury, or death to ESA-listed fish, but these protocols will nonetheless kill or injure a small number of individuals. No sockeye salmon will be killed because this species will not be present at electrofishing sites. An estimated 27 juvenile steelhead, spring/summer Chinook, and fall Chinook would be killed per year. Spread across all populations in Idaho, and given smolt-to-adult return rates of less than one percent, this juvenile mortality would not result in a significant reduction in adult abundance at the population scale for any of the three species.

The second effect of the action will be to expose fish to small amounts of turbidity and sediment. At individual project sites, the proposed action will cause water quality degradation in the short term (usually 24 hours or less) through temporary turbidity increases affecting up to 1,000 feet downstream from project sites, generally during rewatering of isolated instream work areas, such as for culvert and bridge replacement, channel reconstruction, or diversion modification. Juveniles within 1,000 feet downstream of a project site are likely to migrate out of the most turbid waters thereby avoiding the highest levels of sublethal effects. Sediment-related impacts are not expected to cause mortality or create long-term reduction of critical habitat value. Instream work windows are designed to avoid impacts on spawning adults or redds. Water quality will not be affected in the long term because construction effects are brief and localized. NMFS expects that sediment and turbidity exposure will not decrease the abundance and productivity of individual populations in the action area, given the small extent of the sediment-related project effects in comparison to total miles of habitat for each population. NMFS anticipates that roughly half of the individual projects will require work area isolation and instream work. Assuming no more than 40 projects will be implemented under this Opinion per year, there will be no more than 20 projects per year with turbidity plumes lasting up to 24 hours.

The third effect of the action will be to potentially expose fish to infrequent, low concentrations of herbicides. NMFS believes that the use of herbicides under this program is unlikely to kill individual fish. Concentrations of most herbicides proposed for use would occur at concentrations well below (at least one to two orders of magnitude) concentrations where lethal effects are known to occur in salmonids, and would also be below the lowest threshold of sublethal effects, where known. Sublethal effects from water contamination by herbicides cannot be discounted based on the available information. However, the areas where herbicides would be applied are widely scattered, the treatment areas would not involve large contiguous spray sites, and a suite of conservation measures would limit the chance of herbicides entering surface water. Consequently, only scattered portions of listed salmon and steelhead populations would be exposed to risks from this action, and NMFS expects that herbicide application would not affect the abundance and productivity of populations in the action area.

In summary, the short-term adverse effects of the action are not likely to affect the attributes of a viable salmonid population and hence not likely to reduce the viability of any MPG, the three salmon ESUs, or the steelhead DPS. Likewise, the short-term adverse effects of the action are not likely to reduce the value of designated critical habitat for the conservation of the four ESA-listed salmon and steelhead species in Idaho.

## 2.7 Conclusion

After reviewing the current status of the listed species and their designated critical habitat, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, it is NMFS' Opinion that the proposed action is not likely to jeopardize the continued existence of Snake River spring/summer Chinook, Snake River fall Chinook, Snake River sockeye, and Snake River Basin steelhead, or to destroy or adversely modify their designated critical habitat.

## 2.8 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 a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by regulation to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. For purposes of this consultation, we interpret "harass" to mean an intentional or negligent action that has the potential to injure an animal or disrupt its normal behaviors to a point where such behaviors are abandoned or significantly altered.[11] Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA, if that action is performed in compliance with the terms and conditions of this ITS.

[11] NMFS has not adopted a regulatory definition of harassment under the ESA. The World English Dictionary defines harass as "to trouble, torment, or confuse by continual persistent attacks, questions, etc." The U.S. Fish and Wildlife Service defines "harass" in its regulations as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.3). The interpretation NMFS adopts in this consultation is consistent with our understanding of the dictionary definition of harass and is consistent with the U.S. Fish and Wildlife interpretation of the term.

2.8.1 Amount or Extent of Take

The proposed action is likely to cause the injury or death of salmon and steelhead species considered in this Opinion as a result of: (1) Short-term increases in suspended sediment; (2) short-term impacts to water quality due to application of herbicides; and (3) juvenile fish handling during work area isolation and dewatering. Juvenile life stages are most likely to be affected, although adults will sometimes also be present during application of herbicides.

**Short-term water quality impacts from turbidity**. Take caused by altered habitat conditions cannot be accurately quantified as a number of fish likely to be harmed. This is because the relationship between habitat-related effects and the distribution and abundance of fish in the action area is imprecisely known. Therefore we cannot predict how many individual fish might be taken by short-term increases in suspended sediment. In such circumstances, we use the causal link established between the activity and a change in habitat conditions affecting the species to describe the extent of take. In this case, the extent of take will be described as the extent of turbidity caused by the proposed action. If turbidity is visible above background levels at 1,000 feet downstream from the project site, the Project Sponsor must cease work immediately and take measures to reduce turbidity before continuing with construction work. If during rewatering of a stream channel turbidity exceeds 50 NTUs at 600 feet downstream of the project site for more than 2 hours, then the Project Sponsor must cease work immediately and take measures to reduce turbidity before continuing to reintroduce streamflow. Exceeding 1,000 feet of visible turbidity for more than 2 hours for more than two projects a year, or exceeding 50 NTUs at 600 feet downstream of a project while rewatering a stream for more than 2 hours for more than two projects a year, will trigger the reinitiation provisions of this Opinion. The occurrence of turbidity plumes lasting 2 to 24 hours and extending up to 1,000 feet at more than 20 projects in 1 year will also trigger the reinitiation provisions of this Opinion.

**Short-term water quality impacts from chemical herbicide application**. Application of chemical herbicides will result in short-term degradation of water quality which will cause injury to fish in the form of sublethal adverse physiological effects. This is particularly true for herbicide applications in riparian areas or in ditches that may deliver herbicides to streams occupied by listed salmonids. These sublethal effects, described fully in the effects analysis for this Opinion, will include increased respiration, reduced feeding success, and subtle behavioral changes that can result in increased susceptibility to predation. Because we do not know exactly where herbicide application will occur in the action area, or the concentrations to which fish will be exposed, we cannot predict how many individual fish might experience sublethal effects from exposure to herbicides. Because there are no other practical methods to estimate take for herbicide application, the extent of take is best identified by the total number of riparian acres treated each year. The action agencies shall reinitiate consultation if more than 200 total riparian acres are treated in a calendar year under this programmatic consultation.

**Fish handling.** We can, however, quantify the number of fish that may be taken during fish salvage activities. Fish salvage will occur at an estimated maximum of 20 sites per year, and we expect that no more than 320 juvenile salmonids (steelhead, spring/summer Chinook, and fall Chinook) will be captured, handled, or stranded per year during salvage activities. Based on available scientific literature, NMFS expects that up to 27 of these juveniles will be killed each year.  The extent of take will be exceeded if take is greater than any of these figures.  We do not anticipate that the activities would take any adult Chinook salmon and steelhead or their incubating eggs.  Nor do we anticipate that any sockeye salmon would be taken at all.

### 2.8.2 Effect of the Take

In the accompanying Opinion, NMFS determined that this level of anticipated take is not likely to result in jeopardy to the species.

### 2.8.3 Reasonable and Prudent Measures and Terms and Conditions

"Reasonable and prudent measures" are nondiscretionary measures to minimize the amount or extent of incidental take (50 CFR 402.02).  "Terms and conditions" implement the RPMs (50 CFR 402.14).  These must be carried out for the exemption in section 7(o)(2) to apply.

#### *Reasonable and Prudent Measures*

The following measures are necessary and appropriate to minimize the impact of incidental take of listed species from the proposed action.

The action agencies shall:

1. Minimize incidental take by ensuring that all projects implement the conservation measures described in the proposed action for project design and implementation, as appropriate.

2. Ensure completion of a monitoring and reporting program to confirm that the take exemption for the proposed action is not exceeded.

#### *Terms and Conditions*

1. To implement RPM 1 (proposed conservation measures for project design and implementation), each action agency shall ensure that every action which that agency funds, permits, or completes under this Opinion will comply with the appropriate conservation measures described in Sections 1.3.4 and 1.3.5.

2. To implement RPM 2 (monitoring and reporting):

    a. Each action agency will provide an annual monitoring report to NMFS by April 1 each year that will include:

        (1) An assessment of overall program activity.

(2) A list of any actions which the action agency funded, permitted, or carried out using this Opinion.

(3) A summary of all fish handling undertaken that year, including totals by species and life-stage for ESA-listed fish handled, injured.

(4) A list of all herbicides used, including amount and acreage.

(5) A summary of turbidity monitoring results reported in the Project Completion Forms for each individual project.

b. NMFS will host an annual meeting for all of the action agencies by April 15 of each year to discuss the annual monitoring report and any actions that will improve conservation under this Opinion, or make the program more efficient or more accountable.

## 2.9 Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02). No conservation measures were identified at this time

## 2.10 Reinitiation of Consultation

As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) The amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action on listed species or designated critical habitat in a manner or to an extent not considered in this Opinion; (3) the proposed action is subsequently modified in a manner that causes an effect on the listed species or critical habitat not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

NMFS recognizes that the action agencies may need to make minor modifications to the project criteria and conservation measures in the proposed action to address circumstances that arise during implementation. Where such modifications would not result in any effect on the listed species or critical habitat not considered in this Opinion, they may be made without reinitiation of consultation. To determine if this is the case, the relevant action agency(ies) should describe the modification to NMFS in writing (by email or letter), and provide a written assessment of whether the modification will have effects not considered in this Opinion. NMFS will respond to the action agency(ies) in writing (by email or letter) as to its determination of whether reinitiation of consultation is required to address the modification.

## 3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT CONSULTATION

The consultation requirement of section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH.

This analysis is based, in part, on the EFH assessment provided by the Federal action agencies and descriptions of EFH for Pacific coast salmon (PFMC 1999) contained in the fishery management plans developed by the Pacific Fishery Management Council (PFMC) and approved by the Secretary of Commerce.

### 3.1 Essential Fish Habitat Affected by the Project

The proposed action will affect EFH for spawning, rearing, and migration life-history stages of Chinook salmon and coho salmon.

### 3.2 Adverse Effects on Essential Fish Habitat

While the proposed action may result in various short-term adverse effects to essential fish habitat in the action area, the net effect is expected to be a long-term improvement to habitat across the landscape as a result of local actions to improve ecological function. The short-term adverse effects identified in the biological opinion include the following:

- Water quality may be affected by a short-term increase in turbidity due to riparian and channel disturbance; and by application of herbicides to riparian areas, through which herbicides may reach surface water.

- Substrate may be affected by a short-term increased fine sediment due to riparian and channel disturbance.

### 3.3 Essential Fish Habitat Conservation Recommendations

NMFS believes that the following conservation measures are necessary to avoid, mitigate, or offset the impact of the proposed action on EFH. These Conservation Recommendations are identical to the ESA terms and conditions. NMFS believes that the implementation of the terms and conditions provided in the ESA consultation above are adequate to ensure conservation of EFH within the action area.

1. Each action agency shall ensure that every action which that agency funds, permits, or completes under this Opinion will comply with the appropriate conservation measures described in Sections 1.3.4 and 1.3.5.

2. Each action agency will provide an annual monitoring report to NMFS by April 1 each year that will include an assessment of overall program activity and a list of any actions which the action agency funded, permitted, or carried out using this Opinion.

3. NMFS will host an annual meeting for all of the action agencies by April 15 of each year to discuss the annual monitoring report and any actions that will improve conservation under this Opinion, or make the program more efficient or more accountable.

### 3.4 Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, the Federal agency must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation from NMFS. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations, unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NMFS Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects [50 CFR 600.920(k)(1)].

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many Conservation Recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of Conservation Recommendations accepted.

### 3.5 Supplemental Consultation

The action agencies must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations [50 CFR 600.920(l)].

## 4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

Section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-554) (Data Quality Act [DQA]) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the Opinion addresses these DQA components, documents compliance with the DQA, and certifies that this Opinion has undergone pre-dissemination review.

### 4.1 Utility

"Utility" principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users.

This ESA consultation concludes that the proposed programmatic action will not jeopardize the affected listed species and will not destroy or adversely modify designated critical habitat for the listed species. Therefore, NMFS, COE, USFS, BLM, NRCS, and BOR can fund, permit, and implement the proposed action. The intended users of this Opinion are NMFS, COE, USFS, BLM, NRCS, and BOR, and any of their cooperators, contractors, or permittees, including Project Sponsors. Individual copies of this Opinion were provided to each of the action agencies. This consultation will be posted on NMFS West Coast Region website (http://www.westcoast.fisheries.noaa.gov). The format and naming adheres to conventional standards for style.

### 4.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, "Security of Automated Information Resources," Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

## 4.3 Objectivity

Information Product Category: Natural Resource Plan

***Standards:*** This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01, *et seq*., and the MSA implementing regulations regarding EFH, 50 CFR 600.

***Best Available Information:*** This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this Opinion/EFH consultation contain more background on information sources and quality.

***Referencing:*** All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

***Review Process:*** This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with Northwest Region ESA quality control and assurance processes.

## 5. REFERENCES

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## APPENDIX A

## Programmatic Consultation for
## Habitat Restoration Projects in Idaho
## Project Information Form

### I. GENERAL INFORMATION

**Date**:

**Project Sponsor**:

Phone/email:
Address:

**Lead Action Agency Contact:**

Phone/email:
Address:

**Other Participating Action Agency Contact:**

Phone/email:
Address:

**Other Participating Action Agency Contact:**

Phone/email:
Address:

**Describe any coordination with NMFS and USFWS (including any correspondence). Specify contact personnel and dates:**

**Location(s) of activity:**

Coordinates (e.g. Lat/Long or UTM):

County:

Watershed and Stream Names:

**ESA-listed species present at the project site:**

| Species | Present? | Species | Present? |
|---|---|---|---|
| Spring/Summer Chinook | | Canada Lynx | |
| Fall Chinook | | Northern Idaho Ground Squirrel | |
| Sockeye | | Spalding's Catchfly | |
| Steelhead | | MacFarlane's Four O'clock | |
| Bull Trout | | Water Howelia | |
| | | Yellow-billed Cuckoo (Candidate) | |
| | | Wolverine (Proposed Threatened) | |

**In the table below, identify the specific action(s).**

| Action Category | Specific actions included in this BA | Check all that apply |
|---|---|---|
| **Fish Screening** | Install, upgrade, or maintain fish screens *(NMFS must review engineering plans for installation or upgrading of screens)* | |
| **Fish Passage** | Install or improve fish passage facilities (e.g. fish ladders or other fishways) at diversion structures and other passage barriers *(NMFS must review engineering plans)*<br><br>Remove or modify water control structures (e.g., irrigation diversion structures)<br><br>Replace culverts and bridges to provide fish passage and/or to reduce risk of culvert failure and chronic sedimentation, using the stream simulation methods from NMFS (2011b). | |
| **Instream Flow** | Lease or purchase water rights to improve instream flows<br><br>Change or consolidate points of diversion *(NMFS must review engineering plans)*<br><br>Increase efficiency of irrigation practices (e.g. convert open ditches to pipes, or convert surface water diversion to ground water well) | |

| Action Category | Specific actions included in this BA | Check all that apply |
|---|---|---|
| **Instream Structures** | Install instream habitat structures including<br>• Rootwads, large woody debris (LWD), and log jams<br>• Boulders<br>• Spawning gravels<br><br>Provide grade control with boulder weirs or roughened channels *(NMFS must review engineering plans for installation of structures with greater than 3 feet height)* | |
| **Side Channels and Floodplain Function** | Reconnect and restore historic side channels<br><br>Modify or remove levees, dikes, berms, and fill | |
| **Channel Reconstruction** | Reconstruction of existing stream channels into historic or newly constructed channels *(NMFS must review engineering plans).* | |
| **Riparian Habitat** | Plant riparian vegetation<br><br>Reduce riparian impacts from livestock:<br>• Install fencing<br>• Develop livestock watering facilities away from streams<br>• Install livestock stream crossings (culverts, bridges, or hardened fords)<br><br>Control invasive weeds through physical removal or with herbicides<br><br>Stabilize stream banks through bioengineering | |

| Action Category | Specific actions included in this BA | Check all that apply |
|---|---|---|
| **Road and Trail Erosion Control, Maintenance, and Decommissioning** | Decommission or obliterate unneeded roads<br><br>Relocate portions of roads and trails away from riparian buffer areas<br><br>When part of a larger restoration project, reduce sediment from existing roads:<br>• Improve and maintain road drainage features<br>• Reduce road access and usage through gates, fences, boulders, logs, tank traps, and signs<br>• Remove or stabilize pre-existing cut and fill or slide material<br><br>Reduce sediment delivery to streams from other man-made sources | |
| **Surveying and Monitoring** | Survey project sites:<br>• Take physical measurements<br>• Install recording devices<br>• Determine fish presence (*electroshocking for research purposes is not included under this consultation*)<br><br>Monitor project site and stream habitat after project completion<br><br>Installation of PIT tag detection arrays | |

## II. Description of the proposed work

Describe your project by filling in the following list. You may expand the space below to provide this information or attach additional pages. Attach maps or drawings to clearly illustrate the location, nature, and extent of the proposed work. **Some categories of projects require additional information (e.g., Channel Reconstruction), as noted in the Opinion, Section 1.3.5 Action Categories and Specific Conservation Measures. Please attach additional required information to this form.**

1. Project purpose:
2. Project Timing
    a. Start Date:
    b. Start Date (inwater work):
    c. End Date:
    d. End date (inwater work):

3. Number and type of structures to be installed or constructed (if rock structure, estimated amount of rock, including size; if wood, estimated number of pieces and size):

4. Proposed construction machinery to be used:

5. Anticipated construction techniques proposed (please include best management practices (BMPs):

6. Describe all temporary and permanent erosion and sediment control measures to be used during the project:

7. Anticipated streamflow at time of construction (cubic ft/sec):

8. How many temporary stream crossings do you propose?  List all BMPs proposed to avoid and minimize impacts from stream crossings.

9. Attach maps and design drawings.

10. **Send engineering plans to NMFS if required (see table above).**

## APPENDIX B

**Programmatic Consultation for
Habitat Restoration Projects in Idaho
Project Completion Form**

Project Sponsor: Date:

Name of Project:

Date Project Completed:

Location of Project:

Objective of Project:

Was project completed as designed (including reclamation of work areas)? (Yes/No):

If No, please explain:

Were the objectives of the project met? Explain:

What indicators were used to determine success of the project (e.g., visual inspection, photo points, amount of area rehabilitated, etc.) Attach photos which document compliance with project implementation measures:

How long will information on indicators be collected (e.g., if the objective of the project was to reestablish a riparian area, how long will plants be monitored for viability?):

Explain any "lessons learned" from implementing this project that could assist in similar projects:

Document all fish handling undertaken during the project (record here or attach a survey sheet):

| Methods of fish collection during project implementation | | | Date |
|---|---|---|---|
| **Electrofishing** | ESA-listed species present | Number of fish by species | Life stages |
| Handled | | | |
| Injured | | | |
| Killed | | | |
| | | | |
| **Seining/Netting** | ESA-listed species present | Number of fish by species | Life stages |
| Handled | | | |
| Injured | | | |
| Killed | | | |

List all herbicides used, including amount and acreage:

If project included turbidity monitoring, report results:

**APPENDIX C**

**Instream Work Windows**

Instream work windows for streams in the Salmon River basin, upstream from the Middle Fork Salmon River.

## Recommended Work Windows

The abbreviation "q" will be used in the following summary of work windows to indicate "quarter." For example, "q2" will be used for "quarter 2." Quarters roughly coincide with weeks.

| River Reach or Tributary | Preferred Work Window |
|---|---|
| Main Salmon River tributaries - Middle Fork to North Fork | July q2 - August q2 |
| Camas Creek | July q3 |
| Panther Creek | July q3 – August q2 |
| North Fork Salmon River | July q2 – August q2 |
| Main Salmon River - Horse Creek to the Pahsimeroi River | July q2 – March q2 |
| Main Salmon River Tributaries-Horse Cr. to Pahsimeroi R. | July q1 – August q2 |
| Lemhi River – Mouth to Agency Creek | July q2 – March q2 |
| Lemhi River – Agency Creek to Hayden Creek | July q2 – August q3 |
| Hayden Creek (Lemhi River drainage) | July q1 – August q2 |
| Lemhi River – Hayden Creek to Leadore | July q1 – August q3 |
| Big Springs Creek (Lemhi River drainage) | July q1 – August q4 |
| Main Salmon River - Pahsimeroi River to Valley Creek | July q2 – August q3 |
| Main Salmon River Tributaries - Pahsimeroi R. to Valley Cr. | July q2 – August q2 |
| Pahsimeroi River – mouth to Hooper Lane | July q1 – August q3 |
| Big Springs Creek (Pahsimeroi River drainage) | July q2 – August q3 |
| Challis Creek (mouth to public land boundary) | July q2 – March q2 |
| East Fork Salmon River – Mouth to Herd Creek | July q2 – August q3 |
| Herd Creek (East Fork Salmon River drainage) | July q2 – August q2 |
| East Fork Salmon River – Herd Creek to Germania Creek | July q2 – August q2 |
| East Fork Salmon River – Germania Creek to Headwaters | July q2 – July q3 |
| Yankee Fork River | July q2 – August q2 |
| Main Salmon River - Valley Creek to Headwaters | July q2 – August q2 |
| Valley Creek | July q2 – August q2 |

From: USBWP (Upper Salmon Basin Watershed Project Technical Team). 2005. Upper Salmon River Recommended Instream Work Windows and Fish Periodicity. For River Reaches and Tributaries Above the Middle Fork Salmon River Including the Middle Fork Salmon River Drainage. Revised November 30, 2005.

Instream work windows for all other streams in the project area (Lower Salmon River, Lower Snake River, and Clearwater River Basins).

| Stream type | Instream work window |
|---|---|
| Perennial, no listed fish | Base the timing on the nearest listed fish found downstream from the project area |
| Perennial, listed steelhead only | Preferred window is August 1 through October 30; exceptions may be made on a project-specific basis to begin work as early as July 15. |
| Perennial, listed steelhead and unlisted salmon | August 1 through October 30 when Chinook and coho spawning habitats are not present in the action area;<br>July 15 through August 15 when Chinook spawning habitat is present in action area;<br>August 1 through September 15 when coho spawning habitat is present in the action area. |
| Perennial, listed steelhead as well as listed salmon or bull trout | July 15 through August 15 |
| Intermittent | August 1 to October 30, or any time work can be completed while the stream is not flowing |

# APPENDIX D

## Fish Screen Design Plans Checklist

**Checklist for NMFS Review of Fish Screen Projects** 

**To be completed by Fish Screen Design Engineer**

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### Juvenile Fish Screen Design Summary

Provided by: Date:
Contact information:

**I.** Description of site including name of diverted stream, HUC 5, type of diversion, type of headgate, metering device, site name.

**II.** Water Surface Elevation (WSE) Data. Generally indicate method used to determine and estimate flows and elevations. Elevations can be relative to local benchmark, and period of record should be limited to the downstream juvenile migration season when flow is being actively diverted.

1. River WSE and streamflow near site of bypass return (open channel diversions only)

   a. 5% exceedance flow = CFS, WSE =

   b. 95% exceedance flow = CFS, WSE =

2. River WSE and streamflow at point of diversion

   a. 5% exceedance flow = CFS, WSE =

   b. 95% exceedance flow = CFS, WSE =

3. Diverted flow and associated canal WSE at screen site

   a. Maximum diversion = CFS, WSE =

   b. Normal diversion = CFS, WSE =

   c. Minimum diversion = CFS, WSE =

**To be completed by Fish Screen Design Engineer**

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**III.** Screen structure

1. Type of screen (rotary drum, fixed vertical, etc.):
2. Angle of screen relative to ditch flow:
3. Screen cleaning mechanism (drum rotation, backspray, brushes, etc.):
4. Screen cleaner powered by (electric motor, paddlewheel, hydraulic motor, etc.):
5. Minimum submerged screen area:
6. Length of screen:
7. Bottom and top elevation of screen (canal screens):
8. Screen diameter (drum or cylindrical screens):
9. For pump intake screens, list brand, model, cleaning mechanism:
10. Describe inspection, operations, and maintenance program.

**To be completed by Fish Screen Design Engineer**

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**IV.** Recommended bypass return pipe (if applicable)

1. Pipe diameter =

2. Length required (to preferred outfall site) =

3. Pipe slope (rise/run) =

4. Bypass flow and flow control device (weir length or orifice size):

5. Outfall type (submerged, free-fall, open channel):

6. Approximate river velocity at outfall =

7. Minimum outfall depth =

8. Pipe invert elevation at ditch =

**To be completed by Fish Screen Design Engineer**

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**V.** Other site constraints (examples: access problems, stream characteristics at bypass outfall site, construction site problems, excessive cut/fill, land owner constraints (e.g., access route, livestock, crop harvests, etc.), irrigation season, river flow, construction window, ice jam problems, sedimentation potential, winter operation required (stock water, hydropower, etc.), consolidation potential, irrigation methods that impact indicated water surface elevations, screen location constraints, road/bridge construction required, excessive debris load, etc.). Indicate method of coping with constraints.

**To be completed by Fish Screen Design Engineer**

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**VI.** Site sketch. Include screen/bypass layout, river near screen site, and construction constraints.

**To be completed by Fish Screen Design Engineer**

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**VII.** Ditch cross sections (if applicable). Include invert elevations relative to benchmark, distance between cross-sections, and water surface elevation.

**To be completed by Fish Screen Design Engineer**

**--------------------------------------------------------------------------------------------------------**

**VIII.** Flow measurement data, water surface elevations and other available flow information. Indicate river and/or canal water surface elevations pertinent to screen installation relative to local benchmark used in the site survey.