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National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
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Seattle, WA 98115

Refer to NMFS No.:
2005/06396, 2005/07365, 2005/07366

August 8, 2006

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Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Stream Crossing Structure Replacement and Removal Activities**,** Snake and Clearwater River Basins, 170601 & 170603, Idaho.

Dear Mr. Troyer, Ms. Kimbell, and Mr. Bennett:

The enclosed document contains a biological and conference 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 the Stream Crossing Structure Replacement and Removal Activities Programmatic. Forest Service Region One and Four (FS) and the Idaho State Office of Bureau of Land Management (BLM) are proposing the action according to their authority under the Forest and Rangeland Renewable Resources Planning Act (1974), as amended by the National Forest Management Act (1976) and it's implementing regulations.

In this Opinion, NMFS concludes that the proposed action is not likely to jeopardize the continued existence of Snake River (SR) spring/summer Chinook salmon (*Oncorhynchus tshawytscha*); SR steelhead (*O. mykiss*), or result in the destruction or adverse modification of critical habitat designated for SR spring/summer Chinook salmon, SR steelhead and SR sockeye salmon (*O. nerka).*

As required by Section 7 of the ESA, an incidental take statement prepared by NMFS is provided with the Opinion. The incidental take statement describes reasonable and prudent measures NMFS considers necessary or appropriate to minimize incidental take associated with this action. It also sets forth nondiscretionary terms and conditions, including reporting requirements, that the Federal agency and applicant, if any, must comply with to carry out the reasonable and prudent measures. Incidental take from actions by the action agencies and applicants that meet these terms and conditions will be exempt from the ESA take prohibition.

Based on the best available information, successful implementation of conservation measures described in the proposed action, NMFS has determined that the proposed action would have no more than a negligible potential to adversely affect SR fall Chinook salmon (*O. tshawytscha*), their habitat, or SR sockeye salmon (*O. nerka*). Therefore, NMFS concurs with the action agencies finding that the proposed action is "Not Likely to Adversely Affect" SR fall Chinook salmon, SR fall Chinook salmon designated critical habitat, or SR sockeye salmon.

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 or subset of the ESA Terms and Conditions. Section 305(b)(4)(B) of the MSA requires Federal agencies provide a detailed written response to NMFS within 30 days after receiving these recommendations. If the response is inconsistent with the recommendations, the FS and BLM 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 or need to request confirmation of a conference as a biological opinion, please contact Chad Fealko, Idaho State Habitat Office, Boise Idaho, 208/378-5682.

Sincerely,

For Michael R Crouse

D. Robert Lohn
Regional Administrator

Enclosure

cc:

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Endangered Species Act-Section 7 Formal Consultation
Biological and Conference Opinion

&

Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Stream Crossing Structure Replacement and Removal Activities**,** Snake and Clearwater River Basins, 170601 & 170603, Idaho

Lead Action Agency:	U.S. Forest Service, Regions 1 and 4, and Idaho State Bureau of Land Management
Consultation Conducted By:	National Marine Fisheries Service Northwest Region
Date Issued:	August 8, 2006
Issued by:	For Michael R Crouse D. Robert Lohn Regional Administrator

NMFS No.: **2005/06396, 2005/07365, 2005/07366**

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BA	Biological Assessment
BIA	Bureau of Indian Affairs
BLM	Idaho Bureau of Land Management
CDT	Culvert Design Team
DBH	Diameter at Breast Height
DPS	Distinct Population Segment
DQA	Data Quality Act
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FCRPS	Federal Columbia River Power System
FS	U.S. Forest Service
FUR	Functioning at Unacceptable Risk
FR	Functioning at Risk
FWS	U.S. Fish and Wildlife Service
HUC	Hydrologic Unit Codes
ICBEMP	Interior Columbia Basin Ecosystem Management Project
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDWR	Idaho Department of Water Resources
LRMPs	Land and Resource Management Plans
LUPs	Land Use Plans
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NLAA	Not Likely to Adversely Affect
NMFS	National Marine Fisheries Service
NPS	National Park Service
NTU	Nephelometric Turbidity Units
Opinion	Biological Opinion
PCE	Primary Constituent Elements
PFC	Proper Functioning Condition
PFMC	Pacific Fishery Management Council
RPMs	Reasonable and Prudent Measures
Services	U.S. Fish and Wildlife Service and Natioanl Marine Fisheries Service
SPCCP	Spill Prevention Containment and Control Plan
SR	Snake River
SWIEG	Southwest Idaho Ecogroup
TRT	Columbia Basin Technical Recovery Team
VSP	Viable Salmonid Population

1. INTRODUCTION

The biological opinion (Opinion) and incidental take statement portions of this consultation were 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. However, consistent with a decision rendered by the Ninth Circuit Court of Appeals on August 6, 2004,[1] we did not apply the regulatory definition of "destruction or adverse modification of critical habitat" at 50 CFR 402.02 to complete the following analysis with respect to a critical habitat, and instead relied on statutory provisions of the ESA.

The essential fish habitat (EFH) consultation 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 administrative record for this consultation is on file at the Idaho State Habitat Office.

Regions 1 and 4 of the U.S. Forest Service (FS) and Idaho Bureau of Land Management (BLM) propose a five-year program that would implement a maximum of 156 annual stream crossing replacement/removal actions within occupied habitat for ESA-listed fish. The FS and BLM (action agencies) also propose to implement an unknown number of stream crossing replacement/removal actions in intermittent and perennial channels that are not occupied by ESA-listed fish species over the same time period. The proposed action addresses five activity categories that may be addressed under this consultation: (1) Culvert Removal and Associated Channel Rehabilitation; (2) Culvert, Bridge or Ford Replacement with a Culvert or Open-Bottomed Arch; (3) Culvert or Ford Replacement with a Bridge; (4) Culvert Replacement with a Low-water Trail Ford; and (5) Programmatic Project Maintenance. This program, along with the Opinion on the program, will provide FS and BLM administrative units with consistent methodology and criteria for implementing, documenting, evaluating, and monitoring stream crossing and fish passage rehabilitation activities.

The purpose of the action is to remove or replace undersized, poorly designed or obsolete stream crossing structures. These structures generally block upstream fish passage while contributing to elevated sediment levels and poorly functioning watershed processes upstream and downstream of individual sites. Implementation of the proposed action will result in increased fish habitat connectivity, decreased sediment inputs, reduced stream crossing failure potential and improved hydrological processes. The FS and BLM are proposing the action according to their authority under the Forest and Rangeland Renewable Resources Planning Act (1974), as amended by the National Forest Management Act (1976) and it's implementing regulations. The administrative record for this consultation is on file at the Idaho State Habitat Office.

[1] *Gifford Pinchot Task Force et al. v. U.S. Fish and Wildlife Service*, 378 F.3d 1059 (9th Cir. 2004).

1.1. Background and Consultation History

Regions 1 and 4 of the FS were evaluating ways to implement stream crossing rehabilitation/restoration projects. As these projects would require ESA section 7 and EFH consultation with NMFS, the FS in discussion with NMFS, determined that a statewide approach to consultation would most efficiently streamline the process for individual projects. Utilizing a programmatic approach is expected to reduce costs and time spent completing individual consultations, while ensuring statewide consistent design and implementation at individual project sites. Consistency in design and implementation parameters results in increased protections for ESA-listed fish. An interagency conference call on January 8, 2003, initiated informal programmatic consultation for stream crossing replacement/removal.

Following consultation initiation, a Biological Assessment (BA) team was formed including representatives from the FS, NMFS and U.S. Fish and Wildlife Service (FWS). The BLM was completing statewide culvert inventories on lands under their jurisdiction at this time and recognized the benefits of participating in the programmatic effort. The BLM officially joined the team on July 22, 2004. During the first several months of consultation the BA team worked to refine the proposed action which included design criteria intended to avoid or minimize effects to ESA-listed species. The BA authors for similar programmatic consultations in Oregon/Washington (2003) and Montana (2001, bull trout) were contacted to ensure the BA team's approach was consistent with previous efforts and to make sure that any errors made in those earlier efforts could be avoided. Individual FS and BLM units were solicited for input on draft proposed actions, mitigation measures, baseline information and culvert survey data. These experts provided feedback that was incorporated into the draft BA. Additional BA team discussions focused on the extent to which restoration of stream processes, in addition to fish passage, were to be included in the action. These discussions focused on the merits of structure widths greater than bank full width and inclusion of projects outside of occupied habitat intended to reduce sediment delivery to occupied habitats downstream.

As technical aspects of the consultation progressed, discussions shifted to identifying the appropriate number of crossings to consult on and assessing effects of the programmatic action. Identifying the number of crossings would aid FWS and NMFS (together Services) in quantifying any incidental take that may occur. Programmatic actions will occur over a range of locations with varying site conditions. Due to the restorative nature of the proposed action, the expectation of diverse site conditions and potential complexity of design, it was recommended that a Culvert Design Team (CDT) be established for each project by the FS. The CDT (interdisciplinary in nature) is needed to ensure local expertise and knowledge is utilized in project design and implementation. Proper CDT operation is intended to facilitate an adaptable design process while minimizing the need for individual project review by the Services.

The BA team recognized the need to maintain communication between action agency field units and individual Level 1 teams. To ensure the link was maintained the BA team developed a

Pre and Post project checklist (Appendices A and B) that shall be presented to appropriate Level 1 teams for basic review and project tracking purposes as well as to validate take assumptions made in this consultation.

Multiple "draft BAs" were distributed to the BA team for review. These reviews allowed NMFS to ensure adequate design criteria were incorporated into the proposed action to avoid or minimize effects to ESA-listed fish species. Team reviews allowed the development of proposed activities that NMFS could fully support. Reviews enabled team members to ensure the rationale and data in the BA were adequate to support the effects determinations made. The BA described the effects of the programmatic action based on the CDT's ability to adapt to local site conditions, thereby maximizing the restorative nature of each project while avoiding or minimizing adverse effects to ESA-listed fish species. Formal consultation was initiated at this time.

The FS and BLM submitted the final BA to NMFS and FWS with a request for formal consultation in an undated letter received on November 30, 2005. A request for concurrence with the Not Likely to Adversely Affect (NLAA) determination of effects for Snake River (SR) fall Chinook salmon, SR fall Chinook salmon designated critical habitat and SR sockeye salmon was also included.

Additional discussions related to the need for a suspended sediment monitoring program occurred between the action agencies and NMFS following the action agencies' review of the draft Biological Opinion (Opinion). NMFS identified the level of incidental take that would occur from suspended sediment exposure as a result of programmatic action implementation. Because incidental take was exempted, NMFS identified a need to confirm the assumptions of the extent, duration and intensity of suspended sediment exposure and thus a means to monitor the level of incidental take that actually occurred. The BA team worked together to develop a suitable monitoring proposal that would meet the needs of regulatory agencies and would still be reasonable for the action agencies to implement. That monitoring proposal was appended to the Final BA via a July 5, 2006, email and is presented as part of the proposed action in this Opinion.

The program area for this consultation includes administrative units within the range of ESA-listed species and critical habitat including: Payette, Boise, Sawtooth, Salmon-Challis, Nez Perce, and Clearwater National Forests; and Idaho BLM Public Lands in Challis, Cottonwood, Coeur d'Alene, Four Rivers, Jarbidge (including those portions located in Nevada, but managed by Idaho), Salmon, and Upper Snake Field Offices. For the purposes of this consultation, the extent of these administrative units generally represents the action area within which effects to ESA-listed species may occur. This Opinion covers only the actions described in section 1.2.1 of this Opinion. See section 1.2.3 for excluded actions. Excluded actions will require a separate consultation.

Across the six National Forests and seven BLM Field Offices with anadromous fish and bull trout in Idaho (and BLM lands in Nevada), several thousand culverts were inventoried from 2002-2004. Standardized FS and BLM protocols were used for the majority of these inventories. The protocol ("San Dimas protocol") documents or measures the following variables: culvert type, length, width, height, culvert slope, channel alignment, pool depth at culvert outlet, jumping height to culvert outlet, and channel gradient (Clarkin et al. 2003). Using the protocol, 75-90% of the inventoried culverts failed to pass fish at some life stage.

For the purposes of this Opinion, the FS and BLM identified the SR fall Chinook salmon (*Oncorhynchus tshawytscha*) and designated critical habitat; SR spring/summer Chinook salmon and designated critical habitat; SR steelhead (*O. mykiss*) and designated critical habitat; and SR sockeye (*O. nerka*) salmon and designated critical habitat as occurring within the project area and under the jurisdiction of NMFS. Fall Chinook salmon addressed within the BA comprise one Evolutionarily Significant Unit (ESU)[2], consisting of one population as identified by the Interior Columbia Basin Technical Recovery Team (TRT) (2003). Spring/summer Chinook salmon addressed within the BA comprise one ESU consisting of three major population groups with 21 populations as identified by the TRT. Steelhead addressed within the BA comprise one Distinct Population Segment (DPS) consisting of three major population groups with 17 populations identified by the TRT. Sockeye salmon addressed by the BA comprise one ESU consisting of one population as identified by the TRT. Table 1 displays the FS and BLM determinations for individual species, critical habitat and EFH. For consistency throughout this document all future references to affected ESUs or DPSs will be made with the term 'ESA-listed species'.

[2] An "evolutionarily significant unit" (ESU) of Pacific Salmon (Waples 1991) and a "distinct population segment" (DPS) of steelhead (71 FR 834) are considered to be "species," as defined in Section 3 of the ESA.

Table 1. FS and BLM Effects Determinations for the Proposed Action (USFS, 2005).

Species/Critical Habitat/Essential Fish Habitat	Status	Determination
SR fall Chinook salmon	Threatened	NLAA
Critical Habitat - SR fall Chinook salmon	Designated	NLAA
SR spring/summer Chinook salmon	Threatened	LAA
Critical Habitat - SR spring/summer Chinook salmon	Designated	LAA
Essential Fish Habitat - Chinook salmon	Designated	LAA
SR sockeye salmon	Endangered	NLAA
Critical Habitat - SR sockeye salmon	Designated	LAA
SR steelhead	Threatened	LAA
Critical Habitat - SR steelhead	Designated	LAA

NMFS concurs with the action agency's determination that the proposed action is NLAA SR fall Chinook salmon, SR fall Chinook salmon designated critical habitat, and SR sockeye salmon. NMFS concurs with the NLAA determinations because programmatic activities will not occur where SR fall Chinook salmon and SR sockeye salmon are present and because design criteria effectively reduces the potential to impact any individuals that may be found downstream of project sites. Designated critical habitat for SR fall Chinook salmon would not be adversely affected by the proposed action since programmatic activities are not expected to occur within these habitats due to a lack of road crossings in these mainstem habitats.

The action would likely affect tribal trust resources. Because the action is likely to affect tribal trust resources, NMFS has contacted the Nez Perce and Shoshone Bannock pursuant to the Secretarial Order (June 5, 1997).

On January 27, 2006, NMFS sent out an e-mail describing this consultation and requesting input on tribal resources from each Tribe. An additional email was sent to the Nez Perce Tribe on February 13, 2006 following phone conversations concerning the appropriate contact. NMFS left a message for Chad Colter of the Shoshone Bannock Tribe on February 23, 2006 asking for comments on the draft Opinion that was not returned. NMFS has not received a response from the Shoshone Bannock Tribe.

NMFS has coordinated with the Nez Perce Tribe through phone conversations and e-mails, discussing this action along with possible impacts to tribal resources. The Nez Perce Tribe submitted an email to NMFS on March 10, 2006. The Nez Perce Tribe indicated that the draft Opinion did not produce any conflicts to tribal resources. No modifications to the draft Opinion resulted from tribal consultations.

1.2 Proposed Action

For the purposes of this consultation, the proposed Federal action is the action agencies programmatic implementation of stream crossing removal and or replacement activities within the action area. Because the FS and BLM propose to fund actions that may affect listed resources, they must consult under ESA section 7(a)(2) and MSA section 305(b)(2).

This consultation will cover stream crossing replacement and or removal actions initiated within five years of the issuance of this Opinion. This consultation effort is intended to remain flexible and adaptable, pending the collection and evaluation of monitoring data. Action agencies' CDTs and individual Level 1 teams will be responsible for the collection and evaluation of data for these purposes. Reinitiation shall occur if any of the conditions described in section 2.7 of this Opinion are met during the five year life of this consultation.

The FS and BLM have proposed to conduct up to 156 stream crossing replacement and or removal actions in occupied habitat[3] each year within the action area. There are 13 FS and BLM administrative units within the action area. For the purposes of this consultation, there is a cap of 12 projects per administrative unit each year. All stream simulation design criteria and mitigation measures apply to these projects (see Sections 1.2.2.1 & 1.2.5). The proposed action also includes an unknown number of stream crossing replacement and or removal projects in unoccupied habitat each year. See Section 1.2.2 Design Parameters and 1.2.5 Mitigation Measures, for criteria and measures relevant to unoccupied habitats.

The FS and BLM intend to use this programmatic consultation to expedite completion of on-the-ground projects while hastening project development and consultation timeframes. Implementation of the proposed action will improve fish habitat connectivity and reduce anthropogenic sediment yields across the action area. Should any administrative unit plan on exceeding the 12 projects in a given year, Level 1 Teams will be consulted to ensure that effects remain within those anticipated in the BA and ensure all terms and conditions from the Opinion are met. Level 1 Teams will coordinate annual project plans across the action area by annually reviewing submissions made by individual CDTs (pre- and post-project report forms).

The main objective of all actions is to provide for stream simulation at all treated sites. Stream simulation mimics natural stream processes at stream crossings and rehabilitated sites. The proposed action is consistent with the following regional plans and strategies: FWS Draft Bull Trout Recovery Plans (FWS 2002a, 2004a); NMFS Restoration Activities to Restore

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3 "Occupied habitat" for the purposes of this consultation is defined as habitat within perennial or intermittent channels that are occupied by ESA-listed fish species including habitat within 600 feet upstream of known or suspected occupied habitat. Definition is derived from the FWS Opinion for Fish Passage Restoration Activities in Eastern Oregon and Washington, where effects of culvert replacement/removal construction were determined to impact bull trout up to 600 feet downstream of project sites (FWS 2004b).

Anadromous Stocks (Roni et al. 2002); Interior Columbia Basin Strategy Aquatic Framework (USDA and USDI 2004); PACFISH/INFISH (Not applicable to National Forests within the Southwest Idaho Ecogroup [SWIEG]) Roads Management Standard and Guidelines RF-4 and RF-5 (USDA and USDI 1994); Aquatic Conservation Strategy for the SWIEG revised Land and Resource Management Plans (LRMPs) - Roads Objective 11, Facilities and Roads Standard FRST02, and Soil, Water, Riparian, and Aquatic Resources Goal 2 (USDA FS 2003a).

1.2.1. Activity Categories

The proposed action consists of five activity categories. These activities are covered either as stand-alone projects, or as components of larger projects. Coverage of project activities as components of larger projects is warranted only if consultations for the remaining components of larger projects have "Not Likely to Adversely Affect" determinations for listed species and/or critical habitat. Should a larger scope project have a “Likely to Adversely Affect” determination, the culvert replacement component would be addressed in the BA for the larger action.

Section 1.2.2 of this Opinion describes design parameters that are applicable to all the following activity categories.

1.2.1.1. Culvert Removal and Associated Channel Rehabilitation.

This activity will occur to restore physical and biological connectivity, most notably passage for ESA-listed fish, and can be associated with closed, intermittently closed or decommissioned (provided all valley-bottom fill is removed) roads.

Following culvert removal, channels will be rehabilitated to the bankfull width, gradient, substrate composition, and active floodplain dimensions that exist upstream and downstream of the project area.

1.2.1.2. Culvert, Bridge or Ford Replacement with a Bridge.

This activity will occur to reestablish physical and biological connectivity where an existing forest road or trail is required for FS or BLM access or transportation needs, where an existing bridge is adversely affecting channel dynamics, where a bridge has been determined to pose a safety hazard or has outlived its useful life, or if expected 100-year flows and associated debris could not be accommodated with a culvert or open-bottomed arch. Structures and/or fords will be removed and replaced with stream simulation bridges. Bridge footings will be placed beyond bankfull width with possible flood relief culverts or additional spans.

1.2.1.3. Culvert or Ford Replacement with a Culvert or Open-Bottomed Arch.

This activity will occur to reestablish physical and biological connectivity where an existing forest road or trail is required for FS or BLM access or transportation needs and 100-year flows and associated debris can be accommodated by a culvert or open-bottomed arch culvert. Culverts and/or fords will be removed and replaced with stream simulation culverts or open-bottomed arches. Culvert and open-bottomed arch widths will be at least bankfull width. Flood relief culverts on floodplains, embedded box culverts, and structural plate (constructed on site) as well as corrugated metal pipe (pre-assembled) may be used.

1.2.1.4. Culvert Replacement with Low-Water Trail Ford.

This activity will be covered only if the selected alternative reduces overall potential effects to stream channels, assures fish passage, and/or reduces or eliminates adverse effects to ESA-listed fish species by replacing the culvert with a trail ford. This category does not cover road culvert replacement with road fords, even when used on an intermittent basis. This activity will occur to reestablish connectivity only where a road-to-trail conversion project is planned, or on an existing trail where a trail culvert is inadequate for fish passage, and is difficult or impossible to maintain due to inaccessibility. Mitigation will typically include hardening the trail ford so that erosion is minimized, but no ford hardening will occur where suitable spawning habitat is present.

1.2.1.5. Programmatic Project Maintenance.

Maintenance activities will be directed at the aforementioned actions designed and constructed under this proposed action. Maintenance actions include removal of debris (not sediment) that has accumulated at stream crossing structure inlets during flood events, and that has been determined (by the CDT) to obstruct fish passage or pose threats to the integrity of the road crossing. Woody debris removed from the culvert inlet would be placed within the immediate vicinity of the crossing (in-channel, outside the channel, and/or in the downstream floodplain). Maintenance also includes armoring around crossing structure inlets, and revegetation.

1.2.2. Design Parameters.

This section describes general design parameters applicable to all activity categories. Design parameters specific to only occupied habitats and/or perennial streams are indicated where relevant.

1.2.2.1. Stream Simulation.

Stream simulation designs are intended to mimic the natural stream processes at a culvert removal site or at a stream crossing within a culvert, open-bottom arch, ford, or under a bridge. Fish passage, sediment transport, flood and debris conveyance within the structure are intended to imitate the stream conditions upstream and downstream of the crossing as close to natural conditions as the structure type allows. Stream simulation requires a high level of information regarding stream hydrology, geomorphology, and engineering. It is critical that a hydrological/geomorphological evaluation of the project site be completed to determine project design, and potential impacts of the project at the site and along the stream channel.

Stream simulation parameters for programmatic actions are defined by the San Dimas Stream Simulation Design Training Manual (USDA FS San Dimas Technology and Development Center (SDTDC) 2004). Parameters are the same for occupied and unoccupied habitats in intermittent and perennial channels unless otherwise indicated.

For occupied habitat, specific objectives of activities include:

- Simulate bed material and structure, bankfull cross-section, and slope of the natural channel to provide diverse avenues for passage by organisms moving in a natural channel;
- Provide for some of the culvert bed material to be mobile;
- Design project to accommodate valley and floodplain processes, 100-year flows, sediment and debris movement, and stream meander migration;
- Control velocity by designing roughness and slope to accommodate the varying endurance and swimming abilities of specific fish species;
- Minimize delay of movement of listed species;
- Provide for ecological connectivity; and,
- Provide for wildlife passage.

For unoccupied habitat in perennial and intermittent channels, specific objectives include:

- Simulate bankfull cross-section and slope of the natural channel;
- Design project to accommodate valley and floodplain processes;

- For all crossings, design project to accommodate 100-year flows or, alternatively, provide for site-specifically analyzed recurrence flows;

- For crossings determined to pose a substantial risk, design project to accommodate 100-year flows and associated sediment and debris movement; and,

- Provide for ecological connectivity.

1.2.2.2. Grade Control.

Grade control treatment may be included in project design based on site limitations (i.e. channel slope or bed material type), material availability, economics, land use, design competence or familiarity, and/or regulatory restrictions. Treatment alternatives that control grade so that incision is prevented can include large roughness element grade controls, rock and log weir grade controls, constructed step-pool and cascade grade controls, and sizing the culvert to contain the floodplain (Castro 2003).

1.2.2.3. Structure Width.

Widths for all structures replaced under this programmatic BA shall be greater than or equal to the bankfull channel widths. Structures should be wide enough to remove the hydraulic signature of the structure on the stream, and to sustain general bed shape, channel forms, and elevation. Bankfull cross-section shape and dimensions should be similar to natural channel reference reaches and fit with stream reaches adjacent to crossing site (reference reach lengths for perennial streams should be at least twenty times the stream width upstream and downstream of the stream crossing).

Structure widths greater than bankfull widths are suggested by NMFS (NMFS 2004, in draft) and Washington Department of Fish and Wildlife (Bates 2003). Required structure widths in occupied habitats under this BA must be greater than bankfull widths only when the following conditions exist or are desired:

- When required to pass debris;

- When necessary to minimize effects to meander pattern in low-gradient channels; or

- When site-specific conditions dictate additional width (to be described in pre-project review).

1.2.2.4. Culvert Length.

Culverts will be designed to be long enough to avoid fill failures or chronic erosion from fill.

1.2.2.5. Embedment.

Culverts will be embedded 20% or more if desired, which puts the stream bed at the widest part of the culvert. Embedment shall be deep enough to account for scour, grade adjustments, footings, and bed integrity.

1.2.2.6. Bridges.

No abutments shall be placed within the bankfull channel. Exposed riprap shall not be placed within the bankfull channel unless necessary to achieve passage objectives, maintain channel features, and protect structures. Installation of multiple-span bridges is not included.

1.2.2.7. Trail Fords.

The CDT (including a trail building specialist for this category) will design ford and trail approaches during project planning to ensure long-term stability and minimize the potential for sediment entry. Design will prevent creation of a low-water barrier to fish passage, by having similar grade and bankfull width as the channel while maintaining adequate water velocities and depths to allow fish passage. Design will minimize ground disturbance and excessive grade (less than 15 percent) on the approach and exit, and avoid existing or potential spawning locations. Trail fords will be 24 inches (foot and stock use only) to 50 inches (ATV use) in width (USDA FS 2000, Trail Construction and Maintenance Handbook). Trail approaches and fords will typically be hardened with rocks, and may include grade control structures. Adequate drainage on approaches will reduce hydrologic connectivity and minimize trail-generated sediment delivery.

1.2.3. Excluded Projects

The FS and BLM have indicated that the following list of project types would not be included in the proposed programmatic actions, or covered by this programmatic BA:

- Projects in streams currently inhabited by sockeye salmon (inlet and outlet streams of Petit, Alturas, and Redfish Lakes). Projects may occur in streams that were historically inhabited by sockeye and/or streams currently occupied by kokanee;

- Any projects that would facilitate the expansion of brook trout into occupied bull trout habitat (or potentially occupied should passage be restored);

- Projects with structure widths less than bankfull width;

- Maintenance of projects conducted under this BA, outside of that described in Section 1.2.1.5, and reconstruction of projects not meeting objectives of this BA;

- Placement of any kind of baffled culvert;

- Culvert retrofitting (*e.g.*, fish ladders inside culverts);

- Multiple-span bridges (bridges requiring instream piers);

- Projects with spawning ESA-listed fish or their redds within the area that would be directly disturbed or disrupted by project actions;

- Projects not conducted during low flow conditions;

- Actions that are components of larger projects for which a determination of "Likely to Adversely Affect ESA-listed species" has been made; or

- Any newly constructed stream crossing that does not replace or remove an existing stream crossing.

1.2.4. Culvert Design Team

CDT Membership. The design and construction of naturalized stream crossings requires expertise in engineering, hydrology, fluvial geomorphology, contract administration, and fisheries and wildlife biology. The CDTs that undertake projects under this consultation will be comprised of individuals with this expertise. The degree of involvement of individual team members will vary, depending on whether the project is in occupied or unoccupied habitat, within perennial or intermittent channels, and depending on the information required during particular planning phases. In the following sections, the term "CDT" can mean one, several, or all members of the team, depending on the information required.

1.2.4.1. Guidance for Project Prioritization.

Prioritization of projects may tie to partner availability, funding sources, components of other projects, existing recovery plans, LRMPs, Land Use Plans (LUPs), and the Aquatic Framework of the Interior Columbia Basin Strategy. Prioritization factors may include biological and

physical parameters that define the potential for restoring access and function to habitats for ESA-listed species. Increased prioritization may be placed on projects that will implement identified recovery actions from (draft) recovery plans. The CDTs may also consider watershed assessments, transportation analysis, quantity and quality of habitat, number of fish species affected, presence of exotic fish species, risk of headcutting, risk of failure, culvert condition, funding restrictions, and planning status.

1.2.4.2. Project Design.

The CDTs will conduct full field reviews of potential sites in occupied habitats, identifying those biological and physical characteristics that need to be met by the design process. The CDTs will consider existing and desired environmental conditions, and will recommend alternatives that can be feasibly incorporated into project design to rehabilitate natural conditions that support ESA-listed fish.

The CDTs will oversee the collection of project site data essential for the design of a stream simulation structure in occupied habitats and perennial channels, and the design of structures in intermittent channels. This includes information that describes physical watershed and stream processes and provides parameters for designing crossing structures. The information will include potential for landslide and debris flows, flood flows, channel character and stability, floodplain character, and flooding potential. This information will help CDTs consider and develop feasible project alternatives and project-specific plans for the selected alternative.

1.2.4.3. Pre and Post Project Documentation.

Prior to implementation, CDTs will notify Level 1 Streamlining Teams of all proposed actions to be covered under this programmatic Opinion through the Level 1 Team process, conveying that the proposed actions meet conditions outlined in this Opinion and the supporting BA. The CDTs will document project design, review, and implementation of each of the projects in occupied habitat (up to 12 per year per administrative unit). Appendix A provides a template of the information to be reported.

The CDTs will also notify Level 1 Teams of all completed actions in occupied habitat covered under this programmatic Opinion through the Level 1 Team process using the format found in Appendix B. Level 1 Teams will conduct annual field monitoring reviews of randomly selected projects within occupied habitat from previous years and will include personnel from the appropriate BLM or FS action agency (engineers, hydrologists, geomorphologists, and/or fisheries biologists), FWS, and NMFS. Formats for annual field reviews will be developed by individual Level 1 Teams.

NMFS Level 1 Team members will assure that copies of pre and post project checklists as well as any Level 1 Team documentation of field reviews, are submitted to, and housed at the NMFS Idaho Habitat Branch Office.

The action agencies and NMFS (along with FWS) will cooperatively seek to fund a suspended sediment study that has the following objectives:

1. To assess and validate levels of suspended sediment and associated level of adverse effects, if any, resulting from project implementation across the State.

2. To assess relationships between suspended sediment and NTU turbidity, to determine the NTU ranges predicted to result in adverse affects (reach sub-lethal levels) in Idaho, and whether NTU turbidity can be used as a reliable surrogate measure for this purpose.

3. To assess the range of turbidities resulting from implementation of the proposed action, by ecoregion type and activity category.

It is expected that the study will incorporate the following components to achieve study objectives. However this may be modified as the study design is further refined through negotiation and planning with research scientists at the Rocky Mountain Research Station.

1. Measure suspended sediment concentrations at selected project sites implementing the design and mitigation measures contained in the BA.

2. Sites will be representative of multiple Eco-regions across Idaho, where the salmonids subject to the BA are found, to evaluate the variability of suspended sediment responses between core geologies and vegetation types.

3. Samples will be taken, starting one hour prior to channel re-watering, at a reference site above the work site, immediately downstream of the stream crossing, and at approximately 600 feet downstream from the bottom of the subject worksite.

4. The literature concludes that durations of sub-lethal effects were ½ hour or longer. Therefore, samples will be collected at 1/2 hour intervals downstream of the project for a period of 4 hours during and immediately after channel re-watering. After that, samples will be collected at 1 hour intervals at both the upstream reference and downstream site for up to 8 hours or until turbidity levels at the downstream site reduce to less than 50 NTUs above the NTU levels at the upstream site, as required to meet Idaho water quality standards.

5. A standard depth-integrated sample using a DH-48 suspended sediment sampler will be employed to measure suspended sediment. Total suspended solids will be determined following standard procedures for filtering, drying, and weighing sediment residues.

6. Samples will also be analyzed for NTU turbidity using methods in the USGS National Field Manual, section 6.7, or equivalent standard method.

Schedule:

Pending availability of funding, the following summarizes the schedule of planned monitoring actions.

1. Identify and work with the research organization and develop the detailed study plan. **Target completion date: July 2006.**

2. Implement the study design components on selected culvert replacement projects on National Forest System and Public Lands in Idaho. **Start date: Potentially late summer-fall 2006 pending application of designs and mitigations consistent with this BA. Target completion date: Late fall 2008**, prepare interim and final reports. **Interim report dates: January 1, 2007; January 1, 2008. Final report target date: January 1, 2009.**

Pre and post project information is critical to ensure project design and implementation meet stream simulation goals. Monitoring information also ensures that take assumptions made in this Opinion are validated while providing data necessary to evaluate the need for re-initiation over the five year life of the consultation.

1.2.5. Construction Methods, Impacts and Applied Conservation Measures

Each stream crossing replacement/removal action will be implemented by incorporating construction methods and conservation measures to minimize short-term impacts and effects to ESA-listed species. Table 2 summarizes the typical methods and conservation measures that will be applied during each phase of an individual project, and provides the relevant required mitigation measures specific to each construction phase. A complete discussion of conservation measures (including identification of personnel responsible for implementation) is found in the BA and included in Appendix C of this Opinion.

Table 2. Applicable mitigation measures for typical construction phases for programmatic stream crossing structure replacement and removal activities. Mitigation measures are fully detailed in Appendix C. Typical construction phases are described in Section 1.2.5.

	Site Preparation	Excavation of Road Fill and Diversion Channel	Dewatering of Construction Site	Removal of Culvert	Reconstruction of Channel	Construction of Trail Ford	Construction of New Structure	Removal of Diversion	Backfill to Road Surface	Site Rehabilitation	Maintenance
F1. Buffers	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔
F2. Low-water Work Windows		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
F3. Fish Avoidance		✔	✔								
F4. Pollution Control Measures											
a. Clean Water Act	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
b. Spill Prevention, Containment, and Reporting	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
c. Minimize Exposure to Equipment Fuel/Oil Leakage	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
F5. Aquatic Invasive Control Measures	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
F6. Erosion Control Measures											
a. Minimize Site Preparation Impacts	✔										
b. Minimize Earthmoving-related Erosion		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
c. Minimize Temporary Stream Crossing Sedimentation		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
d. Minimize Sedimentation Through Dewatering		✔			✔	✔					
e. Flow Re-introduction								✔			
f. Site Rehabilitation				✔						✔	

These construction phases and mitigation measures represent *typical* actions required for implementation of programmatic activities. Based on site-specific conditions and activity category, the phases, methods, and timing may vary to more effectively meet the goals of stream simulation. To ensure that adverse effects to listed species, channel, and/or watershed integrity

are minimized, construction methods will be coordinated and planned within the CDT, involving fisheries biologists, hydrologists, other aquatic specialists, and engineers. Conservation measures apply to all projects unless specified otherwise in Appendix C.

1.2.5.1. Equipment.

Equipment used for all culvert removal and replacement projects would typically consist of a mix of the following: Back hoe, bulldozer, tractor, grader, dump truck, front-end loader, excavator, crane, concrete pumper truck, paving machine, pile driver, pumps, helicopters, explosives, hydraulic hammers, hydroseeding truck, large and small compactors, hand shovels and rakes.

1.2.5.2. Site Preparation.

Site preparation would include flagging riparian buffers and boundaries of staging areas, stockpile areas, and other locations where impacts are expected. Existing disturbed locations would be used wherever possible (for example, road prisms). Areas of sufficient size would be cleared if sufficient staging or stockpile areas do not exist. Excavated material from clearing would be stored in the stockpile area. Machinery, equipment, and materials would be stored in the staging area. Expected impacts include vegetation removal and exposing disturbed areas to potential erosion. Where needed, sediment barriers or silt fences would be placed around disturbed areas to prevent erosion into the stream channel and road ditches. Table 2 indicates additional conservation measures to be employed.

1.2.5.3. Excavation of Road Fill and Diversion Channel.

Road fill would be excavated around the culvert to just above the wetted perimeter in preparation for dewatering procedures. However, sometimes dewatering would be conducted before any excavation. Excavating equipment would typically work from the road fill without disturbing water flow or sidecasting material into stream channels.

In some cases, project design will call for a pipe or side-channel diversion to carry diverted streamflow from a diversion point around the project site to a location downstream of the project site (See Section 1.2.5.4). Where the project design calls for an excavated, lined channel to dewater the project area (rather than a pipe or side-channel diversion) excavation would be required from the diversion point through the floodplain, and down to a re-entry point below the project site. Excavation would not be conducted in the live channel.

Excavated material from road fills would be stored at a designated stockpile site for use in site rehabilitation, or hauled to a permanent waste area. Excavated material from diversion channels would be stored at the 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. Machinery may cross streams only at designated temporary crossings (as recommended by the CDT).

Aggregate construction impacts to this point would likely include the staging and stockpile areas, road fill around the culvert, excavated diversion channel, designated crossings, and possibly the road prism crossing the floodplain. Table 2 indicates the necessary conservation measures.

1.2.5.4. Dewatering of Construction Site.

The rerouting of stream flows would isolate the project work area from the stream. This process involves removing aquatic organisms from the project site, and includes the construction of water diversion structures. Blocknets would be placed at the upstream end of the diversion channel. Sites that necessitate electrofishing to clear the work area would be dewatered differently than sites not using electrofishing. In addition to blocknets, electrofished sites would have a fish biologist attempt to clear the area of fish before the site is dewatered and the flow is bypassed. This could be accomplished by a variety of methods, including seining, dipping, or electroshocking, depending on specific site conditions. Non-electrofished sites would be cleared of fish by dewatering the site and then using dipnets to salvage remaining fish from isolated pools (Appendix C). Standard fish handling procedures would be used to minimize handling stress.

The dewatering structure would typically be a temporary dam built just upstream of the project site or a structure that diverts flow to one side of the channel. Structures are built with rock or sand bags filled with clean gravel, and covered with plastic sheeting. A portable bladder dam or other diversion technologies constructed of non-erodible material may be used to contain stream flow; however, mining of stream or floodplain rock cannot be used for diversion dam construction. In most cases, a pipe would carry the stream flow from the diversion dam around the project site to a location immediately downstream of the construction zone. Pumping of diverted water may occur to facilitate dewatering, as long as screening, velocity, and water disposal parameters are met. It may be necessary to have temporary equipment access through the riparian area to the site of the dewatering structure.

Aggregate construction impacts include the exposed staging and stockpile areas, road fill at the crossing, dewatered stream channel, constructed diversion channel, designated crossings, and possibly the road prism crossing the floodplain. Table 2 indicates the necessary conservation measures.

1.2.5.5. Removal of Culvert.

Removal of culverts involves removal of road fill immediately associated with existing culverts and is completed entirely within the dewatered work area. Road fill would be removed and stored at a designated stockpile site or hauled to a permanent waste area. At this point, the culvert would be removed, and the remaining material would be excavated down to streambed elevations. Excavation widths and depths would vary depending on whether the culvert would be removed or replaced with a bankfull culvert, open-bottom arch, bridge footings, or trail ford. Excavating equipment would typically work from the road fill and cross the stream within the dewatered area or at a designated stream crossing. Excess groundwater may be removed from the work area by pumping to a settling area before discharging back into any water body. Table 2 indicates the necessary conservation measures.

1.2.5.6. Reconstruction of Channel.

All work under this activity phase would occur within the dewatered work area. The stream channel cross-section and gradient would be reconstructed within the area formerly occupied by the culvert in a manner that mimics natural conditions found upstream and downstream. Grade control structures and barbs upstream and downstream of project sites may be included in this channel reconstruction. The floodplain would be reconstructed to mimic floodplain elevations and dimensions that occur upstream and downstream of the project site. Large wood and/or boulders may be placed in the reconstructed stream channel and floodplain (as recommended by the CDT) where natural conditions possess these attributes. Table 2 indicates the necessary conservation measures.

1.2.5.7. Construction of Trail Ford.

All work under this activity phase would occur within the dewatered work area. Ford locations would be excavated to accommodate any permanent ford structure being installed. Waste material would be staged in designated locations or end hauled to an approved disposal site. The ford structure would then be installed and trail approaches to and from the ford rebuilt to access a suitable graded stream section. Table 2 indicates the necessary conservation measures.

1.2.5.8. Construction of New Structure.

All actions described under this construction phase would occur within the dewatered channel segment. Headwalls may be applied to the culvert, arch, and bridge construction phases, outside of bankfull widths. Riprap placement for structure protection and where needed to achieve passage objectives and maintenance of channel features may occur (as recommended by CDT).

For culvert placement and backfilling over the culvert, bedding material would be placed and shaped, the culvert would be assembled and placed in position, and fill would be placed around it in successive layers to begin the reconstruction of the road prism. Machinery would typically operate from the road fill and cross streams at dewatered areas, temporary bridges, or at designated temporary crossings. If part of the design, flood relief culverts would be installed at this time. Concrete may be poured to provide bedding for squashed culverts in some instances. Culverts would then be embedded with appropriate substrate from offsite locations, or suitable material would be used from a project stockpile. Properly sized and sorted substrate would be placed and compacted in lifts inside the culvert to the designed height.

Likely construction methods for open-bottomed arch placements and backfill would include excavation of footing locations for either poured-in-place or pre-cast footings. Placement of forms or pre-cast footings pouring and curing of concrete would generally occur next. To embed the open-bottomed arch with substrate, infill material would be hauled from an offsite location, or suitable material would be used from a project stockpile. Properly sized substrate would be placed and compacted in thin lifts to the required height within the footings. Assembly of the arch and its attachment to the concrete footings usually would follow. Fill would then be placed in thin lifts or layers around the structure to begin restoration of the road prism. Machinery would typically operate from the road fill and cross streams at dewatered areas, temporary bridges, or at designated temporary crossings.

One of the following three construction methods would likely be used for bridge placements. Each method will occur outside bankfull width: (1) Pile abutments would be constructed by driving piles below stream channel then forming and pouring a concrete cap; (2) Concrete footings or piers would be built below the stream channel through excavation and placement of forms followed by pouring and curing of concrete; or (3) Pre-cast, I-beam, steel, gabion, or cast- in-place footings would be placed, and compacted fill would be protected by riprap if necessary to achieve project objectives. Headwalls may be constructed to protect the road fill prism. Fill would be placed where necessary to help restore the road prism. Machinery would typically operate from the road fill and cross streams at dewatered areas, temporary bridges, or at designated temporary crossings (recommended by the CDT). Other construction actions, depending on design, may include: placement of substrate material and fill-slope riprap, beam placement, grout seam, deck construction, form curbs, place guardrails and approach rails, and paving. Table 2 indicates the necessary conservation measures for this construction phase.

1.2.5.9. Removal of Diversion.

The restoration of stream flow to the work site involves the removal of the in-water diversion structures. The diversion dam and water routing equipment would be removed. Heavy machinery or individuals - operating from the bank or within the channel - may be used to remove diversion structures. Table 2 indicates the necessary conservation measures for this construction phase.

1.2.5.10. Backfill to Road Surface.

Completion of road fill and surfacing may include construction of headwalls (if part of the design), placing fill in thin lifts over the culvert or open-bottomed arch to top of subgrade using backfill material from stockpiling or outside sources, and final construction of road surface. Most, if not all, work will occur on the road prism. Table 2 indicates the necessary conservation measures for this construction phase.

1.2.5.11. Site Rehabilitation.

Site rehabilitation after construction generally includes establishing long-term erosion protection measures using boulder-sized riprap, plantings, erosion control fabric, seed, and mulch. Any stockpiled woody debris would be scattered and placed outside of the stream channel. Woody debris may be placed within the stream in the project vicinity, if recommended by the CDT to be a habitat component of the area. Equipment and excess supplies would then be removed, work storage areas cleaned, and temporary erosion control materials removed. If required to reduce erosion, impacted areas would be seeded and/or planted. All actions are intended to be those necessary for site restoration and would be confined to areas impacted throughout the project. Table 2 indicates the necessary conservation measures for this construction phase.

1.2.5.12. Programmatic Project Maintenance.

Large wood that has accumulated at the inlet of a culvert, open-bottomed arch, or bridge, and is determined to obstruct fish passage or pose threats to the crossing's integrity would be removed and placed immediately downstream of the outlet. When access permits, and where appropriate, large wood would be placed within the bankfull channel. Machinery used to remove and place large wood would normally operate from the road prism. If not possible, a temporary access to the stream channel or within the stream channel may be necessary (Conservation measures prohibit working within live channels in 'occupied' streams). In most cases, maintenance activities would usually be completed in two days or less. Armoring of structures, and revegetation are included within this category. Table 2 indicates the necessary conservation measures for this construction phase.

Summary

Conservation measures summarized above and described in their entirety in Appendix C are proposed as part of the action and are intended to avoid or reduce adverse effects on ESA-listed species and their habitats. NMFS regards these conservation measures as integral components of the proposed action and expects that all proposed project activities will be completed consistent with those measures. We have completed our effects analysis accordingly. Any project activity

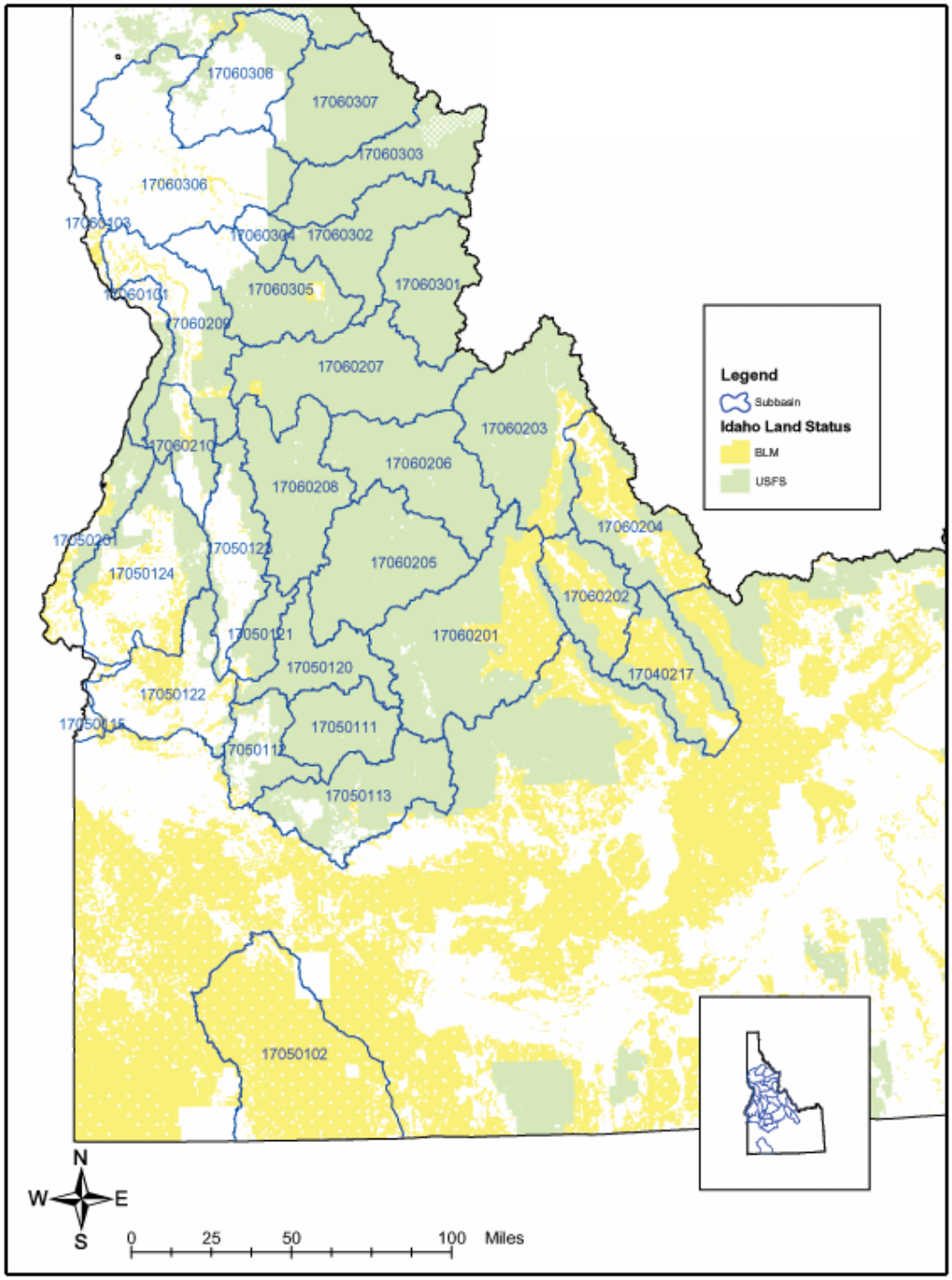
that deviates from these conservation measures will be beyond the scope of this consultation and will not be exempted from the prohibition against take as described in the attached incidental take statement. Further consultation will be required to determine what effect the modified action may have on ESA-listed species or critical habitats.

1.3. 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). For purposes of this consultation, the action area includes 32 subbasins (fourth-level hydrologic units) encompassing all areas potentially affected directly or indirectly by the Federal Action (Figure 1). Because of the potential for downstream and cumulative effects within watersheds, the action area encompasses entire subbasins where the ESA-listed fish and proposed or designated critical habitat occur. The subbasins comprising the action area often extend outside of administrative unit boundaries.

The presence of mainstem dams on the Snake River has limited ESA-listed fish distribution within the action area to just 19 subbasins. This consultation will limit analysis to those 19 subbasins, encompassing all areas potentially affected directly or indirectly by this programmatic stream crossing/replacement action. The fourth field hydrologic unit codes (HUCs) encompassing the action area include: Salmon River Basin:17060201 (Upper Salmon), 17060202 (Pahsimeroi), 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), along with 17060101 (Hells Canyon), and 17060103 (Lower Snake River); Clearwater Basin: 17060301 (Upper Selway), 17060302 (Lower Selway), 17060303 (Lochsa), 17060304 (Middle Fork Clearwater), 17060305 (South Fork Clearwater), 17060308 (Lower North Fork Clearwater) and 17060306 (Clearwater).

Figure 1. Subbasins Included in the Action Area



The action area provides habitat for spawning, rearing, and migrating adult and juvenile individuals for the ESA listed-species noted in Table 3. Due to the large extent of the action area, uncertainty of exact project locations and potential to influence proposed or critical habitat, consultation is being completed for all species listed in Table 3. Sockeye and fall Chinook salmon are not expected to occur in streams where projects will take place (due to excluded projects or species distribution) therefore direct effects to these species are unlikely. Spring/summer Chinook salmon and steelhead are more widely distributed within the action area and incubating, juvenile and adult individuals may be exposed to effects from the proposed action.

The EFH is coincident with designated critical habitat for Chinook salmon within the analysis area. Amendment 14 to the Pacific Coast Salmon Plan designated EFH for Chinook salmon (PFMC 1999). The action area is in an area where environmental effects of the proposed project may adversely affect EFH for Chinook salmon.

Table 3. Federal Register Notices for Final Rules that list species, designate critical habitat, or apply protective regulations to ESA-listed species considered in this consultation. (Listing status: 'T' means listed as threatened under the ESA; 'E' means listed as endangered; and 'P' means proposed for listing, proposed for designation as critical habitat, or proposed as protective regulations. See also, proposed listing determinations for 27 ESUs of West Coast salmonids, at 69 FR 33102, 6/14/04; and proposed designation of critical habitat for 13 ESUs of Pacific salmon and steelhead and proposed protective regulations at 69 FR 74572, 12/14/04.)

Species ESU	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon (*Oncorhynchus tshawytscha*)			
SR spring/summer run	T 4/22/92; 57 FR 14653	10/25/99; 64 FR 57399	7/10/00; 65 FR 42422
SR fall-run	T 6/3/92; 57 FR 23458	12/28/93; 58 FR 68543	7/10/00; 65 FR 42422
Sockeye salmon (*O. nerka*)			
Snake River	E 11/20/91; 56 FR 58619	12/28/93; 58 FR 68543	ESA Section 9 applies
Steelhead (*O. mykiss*)			
SR Basin	T 8/18/97; 62 FR 43937	9/02/05; 70 FR 52630	7/10/00; 65 FR 42422

2. ENDANGERED SPECIES ACT

The ESA establishes a national program to conserve 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 FWS and NMFS as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their critical habitats. Section 7(b)(4) requires the provision of an incidental take statement that specifies the impact of any incidental taking and includes reasonable and prudent measures (RPMs) to minimize such impacts.

2.1. Biological and Conference Opinion

This Opinion presents NMFS' review of the status of each ESA-listed species considered in this consultation, the condition of designated critical habitat, the environmental baseline for the action area, all the effects of the action as proposed, and cumulative effects (50CFR 402.14(g)). For the jeopardy analysis, NMFS analyzes those combined factors to conclude whether the proposed action is likely to appreciably reduce the likelihood of both the survival and recovery of the affected ESA-listed species.

The critical habitat analysis determines whether the proposed action will destroy or adversely modify a designated or proposed critical habitat for ESA-listed species by examining any change in the conservation value of the essential features of that critical habitat. This Opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

If the action under consultation is likely to jeopardize the continued existence of an ESA-listed species, or destroy or adversely modify a critical habitat, NMFS must identify any reasonable and prudent alternatives for the action that avoid jeopardy or destruction or adverse modification of critical habitat and meet other regulatory requirements (50 CFR 402.02).

2.2. Status of the Species and Critical Habitat

This section defines range-wide biological requirements of each ESA-listed species, and reviews the status of each ESA-listed species and each affected critical habitat relative to those requirements. The present risk of extinction faced by each ESA-listed species informs NMFS' determination of whether additional risk will 'appreciably reduce' the likelihood that an ESA-listed species will survive or recover in the wild. The greater the present risk, the more likely any additional risk resulting from the proposed action's effects on the population size, productivity (growth rate), distribution, or genetic diversity of the ESA-listed species (McElhaney *et al*. 2000), or on the conservation value of critical habitat, will be an appreciable reduction.

2.2.1. Status of the Species.

NMFS reviews the range-wide status of the species affected by the proposed action using criteria that describe a 'viable salmonid population' (VSP) (McElhaney *et al.* 2000). Attributes associated with a VSP include the abundance, productivity, spatial structure, and genetic diversity that enhance its capacity to adapt to various environmental conditions and allow it to

become self-sustaining 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.

To be considered viable, with a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over the long-term, an ESA-listed species should have the following characteristics. It should contain multiple populations so that a single catastrophic event is less likely to cause the ESA-listed species to become extinct, and so that the ESA-listed species may function as "metapopulation" as necessary to sustain population-level extinction/recolonization processes. Multiple populations within an ESA-listed species also increase the likelihood that a diversity of phenotypic and genotypic characteristics will be maintained, thus allowing natural evolutionary processes to operate and increase the ESA-listed species' long-term viability. Some of the ESA-listed species' populations should be relatively large and productive to further reduce the risk of extinction in response to a single catastrophic event that affects all populations. If an ESA-listed species consists of only one population, that population must be as large and productive ("resilient") as possible. Some populations in each ESA-listed species should be geographically widespread to reduce the risk that spatially-correlated environmental catastrophes will drive the species to extinction. Other populations in the same ESA-listed species should be geographically close to each other to increase connectivity between existing populations and encourage metapopulation function. Populations with diverse life-histories and phenotypes should be maintained in each ESA-listed species to further reduce the risk of correlated environmental catastrophes or changes in environmental conditions that occur too rapidly for an evolutionary response, and to maintain genetic diversity that allows natural evolutionary processes to operate within an ESU/DPS. Finally, evaluations of species status should take into account uncertainty about ESA-listed species-level processes. Our understanding of species-level spatial and temporal processes is limited such that the historical number and distribution of populations serve as a useful goal in maintaining viability of ESA-listed species that likely were historically self-sustaining.

2.2.1.1. Snake River spring/summer Chinook salmon

ESU Distribution

Spring and summer Chinook salmon runs returning to the major tributaries of the Snake River were classified as an ESU by NMFS (Matthews and Waples 1991). This ESU includes production areas that are characterized by spring-timed returns, summer-timed returns, and combinations from the two adult timing patterns. Historically, the Salmon River system may have supported more than 40% of the total return of spring and summer Chinook to the Columbia system (e.g., Fulton 1968).

The SR spring/summer Chinook ESU includes current runs to the Tucannon River, the Grand Ronde River system, the Imnaha River and the Salmon River (Matthews and Waples 1991). Some or all of the fish returning to several of the hatchery programs are also listed, including those returning to the Tucannon River, Imnaha River, and Grande Ronde River hatcheries, and to the Sawtooth, Pahsimeroi, and McCall hatcheries on the Salmon River. The Salmon River system contains a range of habitats used by spring/summer Chinook. The South Fork and Middle Fork Salmon Rivers currently support the bulk of natural production in the drainage. Two large tributaries entering above the confluence of the Middle Fork, the Lemhi and Pahsimeroi Rivers, both drain broad alluvial valleys and are believed to have supported substantial, relatively productive anadromous fish runs. Returns into the upper Salmon River tributaries have reestablished following the opening of passage around Sunbeam Dam on the mainstem Salmon River downstream of Stanley, Idaho. The dam was impassable to anadromous fish from 1910 until the 1930s.

Current runs returning to the Clearwater River drainages were specifically not included in the SR spring/summer Chinook ESU. Lewiston Dam in the lower mainstem of the Clearwater River was constructed in 1927 and functioned as an anadromous block until the early 1940s (Matthews and Waples 1991). Spring and summer Chinook runs into the Clearwater system were reintroduced via hatchery outplants beginning in the late 1940s. As a result, Matthews and Waples (1991) concluded that "...the massive outplantings of non-indigenous stocks presumably substantially altered, if not eliminated, the original gene pool."

ESU Population Trends

In the 2005 status review update, NMFS modified previous approaches to ESU risk assessment to incorporate VSP criteria (McElhany et al. 2000): abundance, growth rate/productivity, spatial structure, and diversity. The current condition (Good et al. 2005) of SR spring/summer Chinook is summarized below.

Abundance:

- Marked increase in 2001 returns for many populations although 2002-2004 returns have decreased (Figure 2). Increases primarily hatchery stock.

- Most populations far below their respective interim recovery targets.

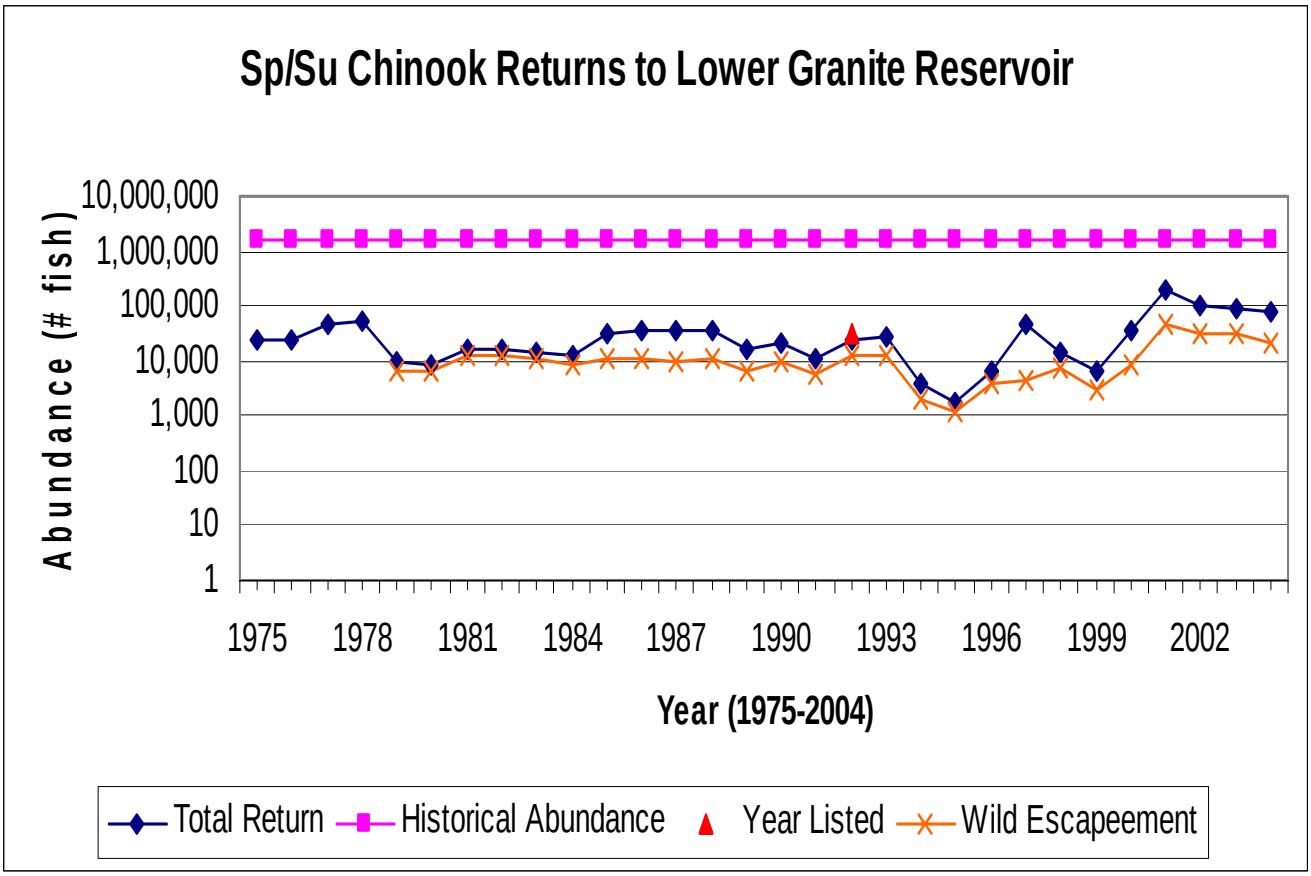
Productivity[4]:

- Long term trends < 1

4 Productivity refers to the population's growth rate. Values less than one indicate a population that is shrinking while values greater than one indicate a growing population.

- Recent trends, buoyed by last five years, are approaching 1

Figure 2. Logarithmic graph of annual spring/summer Chinook salmon returns to Lower Granite Reservoir between 1975 and 2004.



Spatial Structure:

- Widely distributed; much of historic habitat available (~90%)

Diversity:

- Much habitat diversity remains
- No evidence of wide-scale straying by hatchery populations

Recent Events:

- Removal of Grand Ronde (Rapid River) hatchery stock

The total annual production of SR spring and summer Chinook may have been in excess of 1.5 million adults returns per year (Matthews and Waples 1991). Returns to Snake River tributaries had dropped to roughly 100,000 adults per year by the late 1960s (Fulton 1968). Increasing hatchery production contributed to subsequent year's returns, masking a continued decline in natural production.

Aggregate returns of spring-run Chinook (as measured at Lower Granite Dam) showed a large increase over recent year abundances. The 1997-2001 geometric mean return of natural-origin Chinook exceeded 3,700. The increase was largely driven by the 2001 return which was estimated to have exceeded 17,000 naturally produced spring Chinook. However, a large proportion of the run in 2001 was estimated to be of hatchery origin (98.4%). The summer run over Lower Granite Dam has increased as well. The 1997-2001 geometric mean total return was slightly more than 6,000. The geometric mean return for the brood years for the recent returns (1987-96) was 3,076 (Note: does not address hatchery/wild breakdowns of the aggregate run).

Updated analyses of parr density survey results through 1999 by the Idaho Department of Fish and Game (IDFG) conclude that "generational parr density trends, which are analogous to spawner to spawner survivorship, indicate that Idaho spring-summer Chinook and steelhead with and without hatchery influence failed to meet replacement for most generations completed since 1985 (IDFG 2002 as cited in NMFS 2003). These data, however, do not reflect the influence of increased returns from 2001 through 2004.

2.2.1.2. SR Steelhead DPS

The Snake River historically supported more than 55 percent of total natural-origin production of steelhead in the Columbia River Basin. It now has approximately 63 percent of the basin's natural production potential. The SR steelhead DPS is distributed throughout the Snake River drainage system, including tributaries in southwest Washington, eastern Oregon and north/central Idaho (Good 2005). SR steelhead migrate a substantial distance from the ocean (up to 940 miles) and use high elevation tributaries (up to 6,562 feet above sea level) for spawning and juvenile rearing. SR steelhead occupy habitat that is considerably warmer and drier (on an annual basis) than other steelhead DPSs. Snake River basin steelhead are generally classified as summer run, based on their adult run timing pattern. Summer steelhead enter the Columbia River from late June to October. After holding over the winter, summer steelhead spawn during the following spring (March to May). Managers classify up-river summer steelhead runs into two groups based primarily on ocean age and adult size upon return to the Columbia River. A-run steelhead are predominately age-1 ocean fish while B-run steelhead are larger, predominated by age-2-ocean fish.

With one exception (the Tucannon River production area), the tributary habitat used by SR steelhead DPS is above Lower Granite Dam. The ICBTRT (2003) identified six major

population groups in the DPS; (1) the Grande Ronde River system; (2) the Imnaha River drainage; (3) the Clearwater River drainage; (4) the Salmon River; (5) Hells Canyon; and (6) the Lower Snake.

A-run populations are found in the tributaries to the lower Clearwater River, the upper Salmon River and its tributaries, the lower Salmon River and its tributaries, the Grand Ronde River, Imnaha River, and possibly the Snake River's mainstem tributaries below Hells Canyon Dam. B-run steelhead occupy four major subbasins, including two on the Clearwater River (Lochsa and Selway) and two on the Salmon River (Middle Fork and South Fork Salmon); areas that are for the most part not occupied by A-run steelhead. Some natural B-run steelhead are also produced in parts of the mainstem Clearwater and its major tributaries. There are alternative escapement objectives of 10,000 (Columbia River Fisheries Management Plan) and 31,400 (Idaho) for B-run steelhead. B-run steelhead, therefore, represent at least 1/3 and as much as 3/5 of the production capacity of the DPS.

DPS Population Trends

In the 2005 status review update, NMFS modified previous approaches to DPS risk assessment to incorporate VSP criteria (McElhany et al. 2000): abundance, growth rate/productivity, spatial structure, and diversity. The current condition (Good et al. 2005) of SR steelhead is summarized below:

Abundance:

- Uncertainty for wild populations given paucity of data for adult spawners in individual populations
- Dam counts are currently 28% of interim recovery target for the Snake River Basin (52,000 natural spawners) (Figure 3).
- Joseph Creek (outside analysis area) exceeds interim recovery target

Productivity:

- Mixed long- and short-term trends in abundance and productivity

Spatial Structure:

- Well distributed with populations remaining in 6 major geographic areas

Diversity:

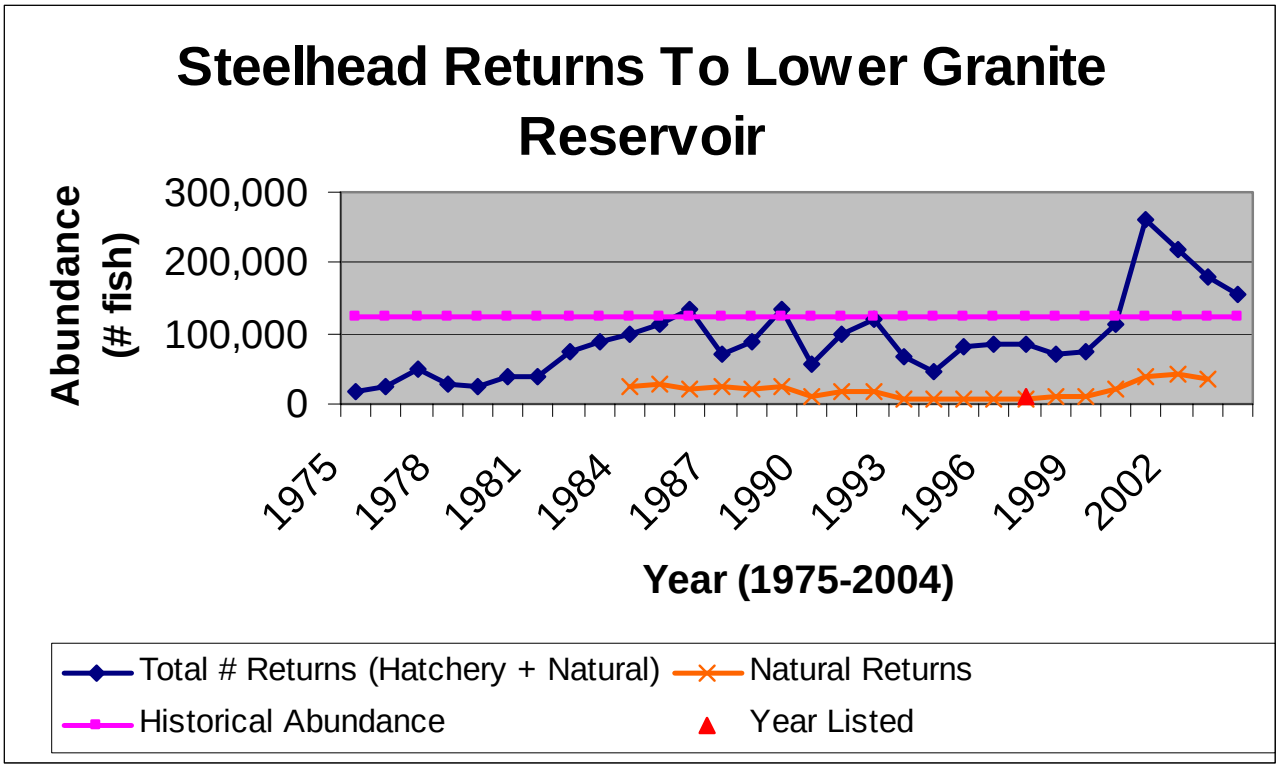
- B-run steelhead particularly depressed

- Displacement of natural fish by hatchery fish (declining proportion of natural-origin spawners)
- Homogenization of hatchery stocks within basins, and some stocks exhibiting high stray rates

Recent Events:

- Hatchery reform with increased use of local broodstock, and hatchery releases away from areas of natural production

Figure 3. Graph of annual SR steelhead returns to Lower Granite Reservoir between 1975 and 2004.



With a few exceptions, more recent annual estimates of steelhead returns to specific production areas within the Snake River are not available. Annual return estimates are limited to counts of the aggregate return over Lower Granite Dam. Returns to Lower Granite remained at relatively low levels through the 1990s. The 2001 run size at Lower Granite Dam was substantially higher relative to the 1990s. The 2002 through 2004 return years have declined annually but continue to remain higher than the 1990s return years.

Updated analyses of parr density survey results through 1999 by the IDFG conclude that "generational parr density trends, which are analogous to spawner to spawner survivorship, indicate that Idaho spring-summer Chinook and steelhead with and without hatchery influence failed to meet replacement for most generations completed since 1985 (IDFG 2002 as cited in NMFS 2003). These data, however, do not reflect the influence of increased returns from 2001 through 2004.

2.3. Status of Critical Habitat.

NMFS reviews the status of critical habitat affected by the proposed action by examining the condition and trends of primary constituent elements (PCEs) throughout the designated area. Within the action area, critical habitat has been designated for SR spring/summer Chinook salmon, SR fall Chinook salmon, SR sockeye salmon, and SR steelhead.

The PCEs consist of the physical and biological elements identified as essential to the conservation of the species in the documents designating critical habitat. The ESA-listed species addressed in this Opinion occupy many of the same geographic areas and have similar life history characteristics and, therefore, many of the same PCEs. These PCEs include sites essential to support one or more life stages of the ESA-listed species (sites for spawning, rearing, migration, and foraging) and contain physical or biological features essential to the conservation of the ESA-listed species, for example, spawning gravels, water quality and quantity, side channels, and forage species (Table 4).

Table 4. Types of sites and essential physical and biological features designated as PCEs, and the species life stage each PCE supports.

Site	Essential Physical and Biological Features	ESA-listed species Life Stage
Freshwater spawning	Water quality, water quantity, and substrate	Spawning, incubation, and larval development
Freshwater rearing	Water quantity and floodplain connectivity to form and maintain physical habitat conditions	Juvenile growth and mobility
	Water quality and forage	Juvenile development
	Natural cover[a]	Juvenile mobility and survival
Freshwater migration	Free of artificial obstructions, water quality and quantity, and natural cover[b]	Juvenile and adult mobility and survival
Estuarine areas	Free of obstruction with water quality and quantity, and salinity	Juvenile and adult physiological transitions between salt and freshwater
	Natural cover[a], forage[b], and water quantity	Growth and maturation
Nearshore marine areas	Free of obstruction with water quality and quantity, natural cover[a], and forage[b]	Growth and maturation, survival
Offshore marine areas	Water quality and forage[b]	Growth and maturation

a Natural cover includes shade, large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
b Forage includes aquatic invertebrate and fish species that support growth and maturation.

At the time that each habitat area was designated as critical habitat, that area contained one or more PCEs within the acceptable range of values required to support the biological processes for which the species use that habitat. Of the six types of sites identified by NMFS and discussed above, the action area for this programmatic consultation provides freshwater spawning, rearing and migration habitat for SR spring/summer Chinook salmon and SR steelhead. The action area also provides adult and juvenile migratory habitat for SR sockeye salmon. Sockeye salmon spawning and rearing habitat in the action area is currently limited to Petit, Alturas, and Redfish Lakes and their inlet and outlet streams. Due to design criteria in the proposed action these habitats are not likely to be influenced by the proposed action. However, projects may occur in streams that were historically inhabited by sockeye and/or streams currently occupied by kokanee within the action area.

The essential features associated with the freshwater spawning, rearing and migratory sites potentially affected by this action are: water quality, substrate, forage, riparian vegetation, access (barriers) and floodplain connectivity.

The present condition of PCEs within designated critical habitat areas and the human activities that affect PCE trends are further described in the environmental baseline (2.3).

2.4. 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). For projects that are ongoing actions, the effects of future actions over which the Federal agency has discretionary involvement or control will be analyzed as 'effects of the action.'

NMFS describes the environmental baseline in terms of the biological requirements for habitat features and processes necessary to support life stages of the subject ESA-listed species within the action area. When the environmental baseline departs from those biological requirements, the adverse effects of a proposed action on the ESA-listed species or its habitat are more likely to jeopardize the ESA-listed species or result in destruction or adverse modification of a critical habitat (NMFS 1999).

The biological requirements of salmon and steelhead in the action area vary depending on the life history stage present and the natural range of variation present within that system (Groot and Margolis 1991, NRC 1996, Spence *et al*. 1996). Generally, during spawning migrations, adult salmon 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. Anadromous fish select spawning areas 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 species considered in this Opinion (Table 3) resides in or migrates through the action area. Thus, for this action area, the biological requirements for salmon and steelhead are

the habitat characteristics that would support successful spawning, rearing and migration of the ESA-listed species considered in this consultation, and the PCEs for freshwater spawning sites, rearing sites and freshwater migration corridors associated with those species.

In general, the environment for ESA-listed species in the Columbia River Basin 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 (approximately 46%) or injures a portion of the smolts passing through the system (NMFS 2004b). Slowed water velocity and increased temperatures in reservoirs delays smolt migration timing and increases predation in the migratory corridor (NMFS 2004b, Independent Scientific Group 1996, National Research Council 1996). Formerly complex mainstem habitats have been reduced to single channels (predominately), with reduced floodplains and off-channel habitats eliminated or disconnected from the main channel (Sedell and Froggatt 2000; Independent Science Group 2000; and Coutant 1999). The amount of large woody debris 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 2004b). In many watersheds, land management and development activities have: (1) reduced connectivity (i.e., the flow of energy, organisms, and materials) between streams, riparian areas, floodplains, and uplands; (2) elevated fine sediment yields, degrading spawning and rearing habitat; (3) reduced large woody material that traps sediment, stabilizes streambanks, and helps form pools; (4) reduced vegetative canopy that minimizes solar heating of streams; (5) caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations; (6) altered peak flow volume and timing, leading to channel changes and potentially altering fish migration behavior; and (7) 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).

The action area covers 19 subbasins (fourth-level HUCs), encompassing all areas potentially affected directly or indirectly by this programmatic consultation. Because of the potential for downstream effects and cumulative effects within watersheds, the action area encompasses entire subbasins where listed species and designated critical habitat occur. A general review of the environmental baseline has been divided up into two basins, the Salmon River basin and the Clearwater River basin. Baseline discussions for matrix pathways that have the greatest

potential of being affected by this action have been presented by 4th field HUC below (Table 5). For more information on the environmental baseline, refer to the 2004 FCRPS Remand biological opinion (NMFS 2004b) at http://www.salmonrecovery.gov/R_biop_final.shtml.

2.4.1. Salmon River Basin

The Salmon River is the largest subbasin (14,000 mi^2) in the Columbia River drainage, excluding the Snake River, and has the most stream miles of habitat available to anadromous fish. Major tributaries include the Little Salmon River, South Fork Salmon River, Middle Fork Salmon River, Panther Creek, Lemhi River, Pahsimeroi River, and East Fork Salmon River (IDFG 1990).

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.

Since the State Stream Channel Protection Act became law in 1971, the Idaho Department of Water Resources (IDWR) has issued a total of 1,763 stream alteration permits within the Salmon River basin (IDWR 2001 as cited in Ecovista 2004a). Examination of the geographic distribution of permitted channel alterations during the past 30 years suggests that the long-term frequency of these activities was relatively consistent across much of the Salmon River basin, but less common in the Upper Middle Fork Salmon, Lower Middle Fork Salmon, Middle Salmon-Chamberlain, and Pahsimeroi watersheds. It is unclear to what degree channel modifying activities completed without permits may have had on the observed pattern. Stream channels in the basin are also altered, albeit on a smaller scale, by recreational dredging activities (Ecovista 2004a).

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, 2004a). Eighty-nine water bodies in the Salmon River basin are classified as impaired under the guidelines of Section 303(d) of the Clean Water Act (CWA). The primary parameters of concern are sediments (88 cases), nutrients (17 cases), flow alteration, irregular temperatures, and habitat alteration.

Ten to 25 percent of the waters within the South Fork Salmon and the Lower Salmon River watersheds are listed as impaired by the Environmental Protection Agency (EPA). Five to 10 percent of the waters in the Little Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, and Middle Salmon-Chamberlain watersheds are impaired. In the Upper Salmon, Upper Middle Fork Salmon, and the Lower Middle Fork Salmon, less than 5% are listed as impaired (Ecovista, 2004a).

In the Lemhi, Upper Salmon, Pahsimeroi, and Middle Salmon-Panther watersheds, less than 20% of the larger streams meet all designated uses (i.e., specific uses identified for each water body through State and Tribal cooperation, such as support of salmonid fishes, drinking water supplies, maintenance of aquatic life, consumption of fish, recreational contact with water, and agriculture) (Ecovista, 2004a).

Partial and seasonal barriers have been created on a few of these streams. In addition to the 75-90% of FS and BLM road culverts that are barriers to some life stage (USFS 2005), partial to complete barriers to anadromous fish exist on Panther Creek in the form of acid mine drainage, and on the Lemhi, Pahsimeroi and upper Salmon rivers at water diversions for irrigation. Twenty minor tributaries contain dams that are used for numerous purposes such as irrigation, recreation and fish propagation (IDFG 1990).

Agricultural diversions within the Salmon River basin have a major impact near developed areas, particularly the Lemhi, Pahsimeroi, the mainstem, and several 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 over allocation. 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 2004a).

The Salmon River basin encompasses portions of five FS wilderness areas. The Frank Church River of No Return Wilderness area is the largest wilderness area in the contiguous United States. Specific management guidelines for wilderness areas generally prohibit motorized activities and allow natural processes to function in an undisturbed manner.

Grazing on private lands continues to impact aquatic and riparian habitat. Grazing impacts are particularly noticeable on the mainstem Lemhi River and the lower reaches of most of the tributaries, 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 2000a).

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 alterations 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 of the 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 1990).

The Salmon River basin is somewhat unique, in that large sections of riparian and floodplain habitats have retained their composition, structure and function due to wilderness designations or protective management. Outside of wilderness areas, land management activities such as road construction, timber harvest, grazing, diversions, other riparian development or other conversions within the 50 and 100-year floodplains have altered riparian functions. In the Pahsemeroi River alone, approximately 61% of the riparian areas have been anthropogenically altered. These alterations have resulted in increased rates of erosion sedimentation and increased stream temperatures (Ecovista 2004a). Some restorative work has been completed, including; 146 miles of riparian fencing that protects 39 river miles; and 239 miles of road modifications that reduce riparian encroachment. The Salmon River Basin assessment (Ecovista 2004a) identified riparian protection and restoration as activities most likely to yield the greatest gains for fish with the least cost. In general terms, floodplain access within the basin is functioning at unacceptable risk. However a mining, road encroachment, channelization and agricultural land use have resulted in some watersheds (Yankee Fork, 12 mile section of Main Salmon, Lemhi and Little Salmon) having impaired floodplain access (Ecovista 2004a). Loss of floodplain access alters hydrology by preventing energy dissipation of high flows and reduces organic matter input from riparian interaction affecting primary productivity.

2.4.2. Clearwater River Basin

The Clearwater River basin is located in north central Idaho in a region of mountains, plateaus, and deep canyons. 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 9,645 miles^2. There are four major tributaries that drain into the mainstem Clearwater River: the Lochsa, Selway, South Fork Clearwater, and North Fork Clearwater Rivers. Dworshak Dam, located two 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 (Ecovista 2004b).

More than two-thirds of the total acreage of the Clearwater basin is forested (over four 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 comprised 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 FS (over 3.5 million acres), but the state of Idaho, Potlatch Corporation and Plum Creek Timber Company 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 FS lands in the eastern portion of the basin. Nez Perce Tribal lands are located within the subbasin. 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 (BIA). Other agencies managing relatively small land areas in the Clearwater basin include the National Park Service, BLM, U.S. Army Corps of Engineers, and IDFG (Ecovista 2004b).

The current list of 303(d) listed segments was compiled by the Idaho Department of Environmental Quality (IDEQ) in 1998, and includes 135 defined stream reaches within the Clearwater basin. Individual stream reaches are often listed for multiple (up to 11) parameters, making tabular summary difficult. Streams are most often listed as impaired due to sedimentation and temperature impacts.

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 subbasin is operated by the Lewiston Orchards Irrigation District within the Lower Clearwater.

Seventy dams currently exist within the boundaries of the Clearwater basin. The vast majority of existing dams exist within the Lower Clearwater (56), although dams also currently exist in the Lower North Fork (3), Lolo/Middle Fork (5), and South Fork (6) watersheds (Ecovista 2004b).

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 (Clearwater Basin Bull Trout Technical Advisory Team 1998b). Total cropland and pasture in the subbasin exceeds 760,000 acres. Landscape dynamics, hydrology, and erosion in these areas are primarily determined by agricultural practices (Ecovista 2004b).

Subwatersheds with the highest proportion of grazeable area (> 50%) within the Clearwater basin are typically associated with FS grazing allotments in lower elevation portions of their ownership areas. However, the majority of lands managed by the FS within the Clearwater subbasin are not grazed 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 FS boundary 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 subbasin typically contains a high percentage of agricultural use, with grazeable lands found only in uncultivated areas.

Mines are distributed throughout all eight watersheds in the Clearwater subbasin, with the lowest number of occurrences in the Upper and Lower Selway. Ecological hazard ratings for mines (delineated by the Interior Columbia Basin Ecosystem Management Project [ICBEMP]) 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 (Lolo/Middle Fork) (Ecovista 2004b).

Habitat problems in streams include high soil erosion rates, high bedload movement rates, altered channel morphology and riparian areas, variable streamflows with severely limited late summer flows, and high summer temperatures in lower tributary reaches (Kucera and Johnson 1986; Nez Perce Tribe and IDFG 1990).

Road densities vary from extremely low in wilderness dominated HUCs to very high in heavily managed portions of the basin. Road densities in riparian areas are generally moderate to high, suggesting a large proportion of valley bottom roads in many watersheds. Increased valley bottom road density is likely to reduce floodplain connectivity and function. Ecovista's report (2004b) did not provide any functional rating for floodplain connectivity but it was not listed as a major limiting factor for the basin.

2.4.3. Matrix Indicators Potentially Affected.

Declines in fish numbers can be directly related to the movement of matrix indicators from a predominately "Properly Functioning" rating to a "Functioning-at-Risk" or "Functioning-at-Unacceptable Risk" rating (see, NMFS 1996). The anadromous salmonids on the west coast of the United States have been affected by forestry, agriculture, mining, and urbanization which can simplify, degrade, and fragment habitat. Water diversions for agriculture, flood control, domestic, and hydropower purposes have greatly reduced or eliminated historically accessible habitat.

This Opinion provides an indicator rating only for indicators that may be temporarily degraded by the action as proposed. Those indicators include sediment/turbidity, chemical contamination (sediment-related only) and substrate ("Sediment" is used in Table 5 and the narrative as a collective indicator for these). The physical Barriers indicator may also be temporarily degraded. These indicators are expected to experience temporary to short-term adverse effects during project implementation but result in long-term benefits thereafter.

Table 5. Summary of Sediment and Physical Barrier indicators on federal lands within the analysis area (FS, BLM in parentheses indicates primary land ownership)

Subbasin		Indicators		References[5]
4th HUC	Subbasin Name	Sedi-ment	Bar-riers	
17050111	N, Mid Fork Boise (FS)	FUR	FUR	USFS 2003, NWPCC 2004
17050112	Boise-Mores (FS)	FR	FUR	USFS 2003
17050113	South Fork Boise (FS)	FR	FUR	USFS 2003, NWPCC 2004
17050115	M Snake-Payette (BLM)	FR	FUR	USFS 2003
17050120	South Fork Payette (FS)	FUR	FUR	USFS 2003, NWPCC 2004
17050121	Mid Fork Payette (FS)	FUR	FUR	USFS 2003, NWPCC 2004
17050122	Payette (BLM)	FUR	FUR	USFS 2003, NWPCC 2004
17050123	North Fork Payette (FS)	FUR	FUR	USFS 2003, NWPCC 2004
17050124	Weiser River (FS)	FUR	FUR	NWPCC 2004
17050201	Brownlee (FS)	FR	FR	USFS 2003
17060101	Hells Canyon (FS)	FR	FR	USFS 2003
17060103	L Snake-Asotin (BLM)	FR	FA	BLM 2000b, 2000d
17050102	Bruneau (BLM)	FR	FA	BLM 2003a
17040217	Little Lost (BLM)	FR	FR	BLM 1999a
17060201	Upper Salmon (FS)	FR	FUR	USFS 2003a, BLM 1999a
17060202	Pahsimeroi (BLM)	FR	FUR	USFS 2003a, BLM 1999b
17060203	M Salmon-Panther (FS)	FR	FR	USFS 2003a, BLM 1999a
17060204	Lemhi River (BLM)	FR	FR	USFS 2003a, BLM 2003
17060205	U M Fork Salmon (FS)	FR	FA	USFS 2003a
17060206	L Mid Fork Salmon (FS)	FR	FA	USFS 2003a
17060207	M Salmon-Chamberlain (FS)	FR	FA	USFS 2003a, BLM 2000c
17060208	South Fork Salmon (FS)	FR	FR	USFS 2003a & 2003b, BLM 2000c
17060209	Lower Salmon (FS)	FR	FA	USFS 2003a, BLM 2000f
17060210	Little Salmon (FS)	FUR	FUR	USFS 2003a, BLM 2000a
17060301	Upper Selway (FS)	FA	FA	Ecovista 2003
17060302	Lower Selway (FS)	FR	FA/ FR	Ecovista 2003
17060303	Lochsa (FS)	FUR	FUR	Ecovista 2003, USFS 2003c
17060304	M Fork Clearwater (FS)	FUR	FR	Ecovista 2003, BLM 2000e
17060305	S Fork Clearwater (FS)	FUR	FR	Ecovista 2003
17060306	Mainstem Clearwater (BLM)	FUR	FA	BLM 2000e
17060307	Lower N Fork Clearwater (FS)	FUR	FR	Ecovista 2003, BLM 2000e
17060308	Upper N Fork Clearwater (FS)	FR	FUR	Ecovista 2003, BLM 2000e

FA – Functioning Appropriately; FR – Functioning at Risk; FUR – Functioning at Unacceptable Risk

5 All data and references were incorporated from the project BA (USFS 2005).

2.4.3.1. Sediment.

Overall watershed conditions (which are characterized by various habitat elements, including substrate conditions and sediment delivery) are functioning at risk or unacceptable risk in all subbasins of the SWIEG (Boise, Payette, and Sawtooth National Forests). Continued effects from past land use activities - such as mining, grazing, road construction and locations, and timber harvest - degrade overall watershed conditions. Road densities and locations contribute to degraded conditions because of their effect on sediment delivery and riparian conditions. There are approximately 2,000-2,500 barriers and an undoubtedly greater number of undersized crossings within the project area. Undersized stream crossings have a greater risk of failure. Chronic sediment production and risk of potential sediment delivery due to crossing failures is currently very high. Water quality is functioning at risk in most subbasins within the SWIEG, with most subbasins containing stream segments listed as impaired on the IDEQ 303d list. Sediment is the primary pollutant of concern for many of these subbasins (USFS 2003a; NWPCC 2004).

Eighty eight of eighty nine waterbodies listed for water quality impairments by the State of Idaho are listed for sediment impairments. Sediment is by far the largest factor responsible for water quality impairments on the states 303d list in the Salmon River basin

Primary factors limiting salmonid populations in the Clearwater subbasin relate to the impacts of land management activities on sedimentation and other watershed condition indicators (Ecovista 2004b). Of the subbasins analyzed by Ecovista (2004b), six out of seven (all in the Clearwater Basin) rated FUR or FR for sediment (only the wilderness Upper Selway subbasin rated FA).

Of the fourteen subbasins analyzed in Snake, Salmon, and Clearwater Basin watershed BAs by the BLM, ten rated FR, and four rated FUR for sediment (BLM 1999-2003 as cited in USFS 2005).

2.4.3.2. Habitat Access.

Across the six National Forests in Idaho and Idaho/Nevada BLM Lands with anadromous fish and bull trout, approximately 2,000-2,500 culverts were inventoried from 2002-2004 (USFS 2005). A standardized FS protocol was used for the majority of these inventories. Of the inventoried culverts, 65-85 percent failed to pass fish at some life stage.

The BA identified physical barriers are functioning at risk or unacceptable risk in all subbasins of the SWIE other than wilderness subbasins. Physical Barriers are FUR in the Boise-Payette-Weiser subbasins and are FUR or FR in the Clearwater Basin, with the exception of the wilderness Selway subbasin, which rates FA (USFS 2005).

In combination with barriers to fish passage on federal lands, there are significant numbers of culverts that are barriers to fish passage on non-federal lands throughout Idaho, fragmenting habitats and fish populations even further.

In addition to habitat fragmentation related to culverts, agricultural practices, such as water diversions and dewatering of stream reaches for irrigation, create migration barriers throughout western states. Even more, the larger hydroelectric, flood-control and irrigation dams contribute to the isolation of numerous resident fish populations and block historical habitat to both resident and anadromous salmonids.

2.4.3.3. Summary for Salmon River and Clearwater Basins:

The biological requirements of the ESA-listed species are not being met under the environmental baseline. Conditions in the action area would have to improve, and further degradation of the baseline, or delay in improvement of these conditions would probably further decrease the likelihood of survival and recovery of the listed species under the environmental baseline.

Stochastic events in freshwater (flooding, drought, snow pack conditions, volcanic eruptions, etc.) play an important role in a species' survival and recovery. The survival and recovery of these species partially depends on their ability to persist through periods of low natural survival due to ocean conditions, climatic conditions, and other conditions outside the action area. Freshwater survival is particularly important during these periods because enough smolts must be produced so that a sufficient number of adults can survive to complete their oceanic migration, return to spawn, and perpetuate the species. Therefore it is important to maintain or restore Proper Functioning Condition (PFC) in order to sustain ESA-listed species through these periods.

2.5. Effects of the Action

Effects

Long-term adverse effects to ESA-listed fish and their habitat are generally not expected to occur as a result of the proposed action. Contrarily, the overall impact of this action is expected to be beneficial over the long-term. Replacement or removal of existing fish passage barriers or undersized stream crossings is expected to: (1) restore spatial and temporal connectivity between and within watersheds; (2) reduce existing habitat fragmentation, allowing for full expression of all natural life history forms within current or potentially occupied habitats; (3) provide for maintenance of more natural stream dynamics and geometry including, bedload movement, sediment transport, and passage of moderately-sized woody debris; (4) improve the number, distribution and reproductive potential of ESA-listed fish species; (5) alleviate existing risks of stream crossing failures at undersized crossing locations; (6) reduce fine sediment delivery to the

stream by reducing erosion associated with improper design and maintenance activities; and (7) increase potential productivity of treated watersheds. All projects will not achieve PFC for all matrix pathways/indicators at all sites. Stream channels will remain channelized to some degree wherever a crossing remains. NMFS expects the CDT to consider design options that would allow for beneficial effects to other pathways/indicators and move them towards the PFC that is desired.

NMFS anticipates potential effects to water quality (suspended sediment, temperatures, and chemical contamination), potential effects to habitat (temporary passage blockage, sediment deposition, and streambank alteration [riprap]), potential effects from use of explosives, and direct effects to fish related to handling, relocation, and stranding. The magnitude of these effects will vary as a result of the nature, extent, and duration of the construction activities in the water or riparian areas and whether ESA-listed fish are present at the time of implementation. The FS and BLM determined that implementation of the proposed programmatic action was "Likely to Adversely Affect" SR spring/summer Chinook salmon, SR steelhead, and critical habitat for SR steelhead, Chinook and sockeye salmon within the action area.

Adult spring/summer Chinook and steelhead will not be present during the construction phase of these actions due to conservation measures included in the proposed action (low water work windows and fish avoidance measures). Therefore, only juvenile spring/summer Chinook salmon and steelhead are expected to experience short-term adverse effects from temporary passage blockage, turbidity, and fish handling. Critical habitat for spring/summer Chinook, steelhead, and sockeye salmon may experience short-term adverse effects from habitat sedimentation and temporary passage blockages.

The BA identified five different activity types that may be implemented under the proposed action. Sections 1.2.1.1 through 1.2.1.5 of this Opinion identify and describe the five activity categories. Each activity category has the potential to modify the stream crossing and available habitat in a slightly different manner. Activity category descriptions themselves, along with the design criteria and prohibited projects were developed to minimize or reduce any potential influence on ESA-listed habitats or individuals. As previously discussed, activities of this nature have the potential affect species directly through fish handling, disturbance, and use of explosives. These types of activities also have the potential to affect fish and/or fish habitat through effects to water quality and/or alteration of instream habitat. Considering the design criteria proposed this Opinion will now analyze the likelihood and magnitude of these potential effects.

2.5.1. Fish Handling or Disturbance

Implementation of the proposed action may affect individual fish. Noise from heavy equipment operating adjacent to live channels or within the dewatered worksite may disturb fish residing in the immediate area causing short-term upstream or downstream movements or flee responses.

Such a response is a natural occurrence for the species in question. The duration of work is short and adequate refugia are assumed to be readily available for fish that may be disturbed. Therefore disturbance from noise is not considered to adversely affect individuals. Conservation measures proposed for the site dewatering phase may trap individuals in blocknets, or capture, handle and transport individuals through a variety of methods. Additionally, dewatering is likely to result in stranding of some fish.

Mitigation measures provided in the proposed action are designed to reduce the potential for injury and mortality throughout the dewatering and subsequent fish handling procedures. However, NMFS expects that stream dewatering and the capture, handling, transport and release of ESA-listed fish will strand some fish, disrupt normal behavior, and cause short-term stress, injury and occasional mortality. Conservation measures in the proposed action include the incorporation of NMFS electrofishing guidelines, IDFG collection permit direction, and NMFS steelhead collection permit direction in order to minimize stress, mortality, and competitive effects (Appendix C; NMFS 2000). It will be critical to ensure consistent application of approved electrofishing and fish handling procedures. Any methods that may result in fewer stranded individuals should also be explored.

Due to design criteria and timing of the proposed action, only juvenile fish are expected to be handled or disturbed. Movement of fish is proposed to occur in one of two ways, volitionally or manually. The action proposes a combination of both methods in an effort to reduce manual handling and disturbance to the greatest extent possible. Fish handling and capture methods result in unavoidable adverse impacts to individuals. This section describes the amount and type of fish handling to be expected and what level of harm or take is likely to occur as a result of that handling. Additionally, the number of fish expected to be stranded as a result of the programmatic action is also disclosed. Normally, stream dewatering, fish capture/relocation, stream rerouting, and flow reintroduction to the new crossing will not last more than one day. However, unique, difficult and large sites may take one week or more to complete (K. Grover-Weir, Hydrologist, FS, Personal Comm. 2005). The action agencies recognize that the longer the construction period, the greater the urgency for adequate erosion control measures and this is reflected in the proposed conservation measures.

Within the action area, up to 156 projects are annually proposed in occupied habitats. Based on extrapolation from previous year's work history, the project BA anticipates that 39 projects would likely need to use electrofishing in combination with seining, dip-netting and volitional movement of fish to clear work areas of ESA-listed fish. The remaining 117 projects in occupied habitat would occur in steep habitat with less complex habitat conditions and where partial stream dewatering should facilitate passive movement of fish without electrofishing. However seining, dip-netting and block netting is still likely to occur at these sites and may potentially harm some individuals. Fish stranding is likely to occur at all occupied sites (156), including those where rapid stream dewatering and reliance on volitional movement and dip-netting of fish occurs (117 sites). These various methods of worksite clearing will be referred to as 'electrofishing sites' and 'volitional sites,' throughout the remainder of this document.

Blocknets are likely to be deployed at the upstream end of both electrofishing and volitional sites. Blocknets will prevent additional fish from entering the work area during dewatering or construction activities. There is potential for fish to become entrained in the blocknets and some mortality may occur. This is discussed below.

Following installation of the upper block net at electrofishing sites, fish are likely to be hazed out of the proposed dewatered sections by walking seines downstream from the upstream block net location to the end of the work site in an attempt to 'herd' fish out of the worksite. The downstream block net would then be installed and efforts to capture remaining fish with dip-nets would follow. Electrofishing gear would be used last in an attempt to clear the work area and only where determined necessary. As proposed, dewatering of the site would occur after fish removal efforts. Some fish are likely to remain in the work area and will likely be stranded.

At volitional sites, the block net would be first installed at the upstream end of the work site. Flows would then be reduced to encourage downstream volitional migration of any fish inhabiting the work site. A seine net would then be used to 'herd' fish downstream and out of the partially dewatered channel. The downstream block net would then be installed and any remaining fish in isolated pools would be captured with dip-nets. Similar to electrofishing sites, some fish may be entrained in the blocknets while others are likely to be stranded.

NMFS expects all captured fish will be held in five 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 would likely be placed into the water and slowly inverted to allow captured fish to move into the selected release sites.

2.5.1.1. Blocknets

Blocknets will be used at the upstream and downstream end of all work areas to prevent fish migration into the work site from upstream or downstream habitats. It is assumed that the downstream blocknets will not be deployed until after seining actions at electrofishing sites and after volitional movement occurs at non electrofished sites. Use of blocknets at these sites poses an alternative source of harm and potential for take.

The FWS (2002) conducted a study on sampling efficiency with the use of blocknets that observed five mortalities as a result of block net impingement out of 704 bull trout handled. Although not all fish are thought to have encountered the blocknets this mortality figure represents approximately a 0.7 percent block net mortality rate for fish handled in the study. All mortalities were either fry or juvenile bull trout.

A determination of the number or percent of juvenile fish that may be entrained in the blocknets was not calculated for this Opinion as the risk of mortality is considered discountable

because: (1) the upstream block net will be located above the target barrier and only fish from above the net would be likely to encounter the nets; (2) seining and or flow reductions will reduce the number of fish in the work area prior to the downstream block net being installed minimizing exposure; and (3) personnel will be present to check blocknets and release any impinged fish. Furthermore, all work sites are likely barriers to juvenile fish passage and many are barriers to adult salmonids. This likely results in lower juvenile densities above the barrier than below and presumably fewer juvenile fish that could be exposed to the blocknets. No conservation measures were proposed for the mesh size of blocknets to be used. Common block net mesh sizes are approximately 0.28 inches (7mm) and constructed of nylon materials (Gries and Letcher 2002 and Peterson et al. 2005).

2.5.1.2. Seining

Seines are expected to be used at all sites within the analysis area each year. The use of fish seines is expected to cause some fish to flee downstream out of the proposed dewatered site but it is expected that some fish will simply retreat to hiding cover within the work area and have to be removed with alternative methods (i.e. dip-netting and/or electrofishing). Seining of fish is likely to cause some elevated stress levels from the contact with the seine and personnel. The number of fish that may be directly 'harassed' in this manner is unquantifiable. No conservation measures were proposed for the mesh size of seines to be used. Common seine mesh size for this type of activity is approximately 0.28 inches (7mm) and constructed of nylon materials (Gries and Letcher 2002 and Peterson et al. 2005).

2.5.1.3. Dip-netting

Dip-netting of fish from isolated pool areas is likely to occur at all sites and may cause some stress and harm from handling individuals. 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 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. Table 6 provides an estimate of the number of fish to be handled under the proposed action. NMFS has assumed that all handled fish will be held in five 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 would 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.

2.5.1.4. Electrofishing

The effects of electrofishing on juvenile SR steelhead and SR spring/summer Chinook salmon would be limited to the direct and indirect effects of exposure to an electric field, capture by netting, and the effects of handling associated with transferring the fish back to the river (see above for more detail on capturing and handling effects). 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 relatively few studies that have been conducted on juvenile salmonids indicate that spinal injury rates are substantially lower than they are for large fish. Smaller fish intercept a smaller head-to-tail potential than larger fish (Sharber and Carothers 1988) and may therefore be subject to lower injury rates (e.g., Dalbey et al. 1996, Thompson et al. 1997). McMichael et al. (1998) found a 5.1 percent 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 Hz) pulsed direct current have been recommended for electrofishing (Fredenberg 1992, Dalbey et al. 1996) because lower spinal injury rates, particularly in salmonids, occur with these waveforms (Fredenberg 1992, Dalbey et al. 1996, 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 they show no growth at all (Dalbey et al. 1996). As discussed earlier the conservation measures presented in the proposed action (NMFS electrofishing guidelines [NMFS 2000], IDFG collection permit direction and NMFS steelhead collection permit direction) are expected to adequately minimize the levels of stress, mortality, and competitive effects related to electrofishing.

2.5.1.5. Flow Reduction

The proposed action identified the use of ‘slow dewatering’ to reduce effects to individual fish, although the term was not defined. Discussions with Tom Curet, Fisheries Biologist, IDFG (2005), suggest that initial removal of approximately 80% of the base flow results in the greatest number of fish volitionally moving out of the dewatered work area. This 80% flow reduction is assumed to represent the intention of the conservation measure that required ‘slow dewatering’ of the sites and is applied in this analysis.

The IDFG estimated that approximately 50-75% of the fish at a proposed dewatering site will voluntarily move downstream when this 80% flow reduction recommendation is implemented. The IDFG has had success implementing this type of procedure on multiple project work sites. NMFS is assuming the lower value of 50% volitional movement at electrofished sites (39) due to higher complexity of habitat and presumed lower stream gradients that may reduce volitional movement. NMFS assumes the 75% value for volitional sites due to small stream size, higher stream gradient and less complex habitats that are thought to encourage a greater percentage of fish to voluntarily migrate out of the dewatered area. These conditions are often the reason why sites are not chosen for electrofishing in the first place as the practice is less effective in larger, more complex habitats (Peterson et. al 2004). Applied to the 39 potential electrofishing sites, this conservation measure is expected to result in approximately 50% of the post removal population volitionally migrating out of the work area while the discharge is reduced 80%.

Under the proposed action, partial dewatering at the electrofished sites would not be implemented until fish removal activities have occurred. This results in a greater number of fish being exposed to dip-netting, electrofishing and handling effects than if the site was dewatered first, which would allow fish to move out of the work area, avoiding capture and handling. Non-electrofishing sites propose to employ the dewatering conservation measure prior to any other fish removal activity. Therefore, approximately 75% of the pre-project fish population is expected to migrate out of the area and avoid any handling effects. This conservation measure results in approximately 25% of any volitional site's fish population being exposed to the dip-netting, and handling effects discussed below.

2.5.1.6. Take Calculations

Within the action area there are 14 subbasins occupied by spring/summer Chinook salmon, and 18 subbasins occupied by steelhead. Based on this species distribution, and assuming equal distribution of projects across subbasins (which may not be true, but which will be assumed for this analysis), calculations suggest that annually, roughly 17 projects (44% of 39 total electrofishing sites) may use electrofishing that adversely affect juvenile spring/summer Chinook salmon, and roughly 22 projects (56% of 39 total electrofishing sites) may use electrofishing that adversely affects juvenile steelhead (USFS 2005). Applying the same species distribution percentages to the 117 projects at volitional sites; 52 (44%) are likely to affect juvenile spring/summer Chinook salmon and 66 projects (56%) are likely to affect juvenile steelhead.

The proposed action did not identify how many electrofishing passes would be employed during fish salvage. NMFS assumes that a three pass electrofishing effort will be employed because it is a standard practice. The proposed action stated that NMFS' electrofishing guidelines (NMFS 2000) will be followed in all projects employing electrofishing equipment. The guidelines require that field crews be trained in observing animals for signs of stress and shown how to adjust electrofishing equipment to minimize that stress. Electrofishing is not done in the vicinity of redds or spawning adults. All electrofishing equipment operators are trained by qualified

personnel to be familiar with equipment handling, settings, maintenance, and safety. Only direct current units will be used, and the equipment will be regularly maintained to ensure proper operating condition. Voltage, pulse width, and rate will be kept at minimal levels and water conductivity will be tested at the start of every electrofishing session so those minimal levels can be determined. When such low settings are used, shocked fish normally revive instantaneously. Fish requiring revivification will receive immediate care. Although McMichael et al. (1998) indicated electrofishing injury rates for wild salmonids were only 5%, NMFS has assumed a more conservative injury rate of 25% of the total number of fish electrofished to account for variable site conditions and experience levels.

The BA analysis applied a FWS BO (2004b) stranding rate of 5% for all project sites. The FWS (2004b) consultation was for a similar proposed action in Oregon and Washington. This value appeared to rely on abnormally high electrofishing capture efficiency (~100%) and was considered by NMFS to be an overestimate. NMFS conducted this Opinion's analysis with a more realistic electrofishing capture efficiency of 45% for three pass electrofishing (Peterson et. al 2004). After applying this assumption, NMFS calculated an expected stranding rate of 8% (of total exposed population) for both electrofished and non-electrofished sites. It may be necessary to incorporate additional protective measures in order to meet the 5% stranding rate that was targeted in the BA.

This analysis assumes the same injury and mortality rates per project (for some variables) that were determined by FWS (2004b) for bull trout (for a similar action) apply to juvenile spring/summer Chinook salmon and steelhead. Some changes to the potential exposure assumptions were made in order to be consistent with the action area and NMFS trust species and have been discussed above and further documented in the project record. Assumptions used to determine the annual number of fish injured or killed included: (1) densities of juvenile spring/summer Chinook salmon approximate 7.2 fish per 100 feet^2 (carrying capacity for "good" habitat); (2) densities of parr steelhead approximate 1.3 fish per 100 feet^2 (carrying capacity for "good" habitat) and fry steelhead approximate 2.6 fish per 100 feet^2 (Herb Pollard, Fishery Biologist, NMFS, personal communication, 2005); (3) average barrier pipe length is 46.4 feet); (4) average dewatered stream length of 175 feet and average bankfull width is 8.2 feet; 5) average length of occupied habitat within dewatered reach is 128.6 feet (dewatered length – average barrier pipe length); (5) after manual fish removal at the 39 electrofishing sites, 50% of remaining fish will voluntarily migrate out of work site during dewatering; (6) 75% voluntary migration[6] at sites where electrofishing is not deemed necessary (117 sites annually); (7) 70% capture rate with nets regardless of pre- or post-volitional movement (FWS 2004b); (8) 45% electroshocking capture efficiency (Peterson et. al 2004); (9) 25% electroshocking injury rate; (10) 5% electroshocking mortality rate (additional to the 25% electroshocking injury

6 The 75% value was the upper range of volitional movement suggested by T. Curet (Personal Comm. 05). This value is considered appropriate as the Forest Service generally chooses not to electrofish sites that are of higher gradient, smaller channels or less complex habitat and therefore greater volitional movement is expected.

rate)for all species (NMFS 2004); and (11) 8% “stranded fish” rate at all sites (applied to total exposed fish population). These assumptions are based on the best available commercial and scientific information.

For this analysis, the annual number of Chinook salmon and steelhead injured or killed per project and annually for the entire action area (Table 6), was estimated by first extrapolating the method-specific number of Chinook salmon and steelhead expected to be killed, handled or injured by activity type (as described above) to the assumed densities of Chinook and steelhead. This figure was then multiplied by the number of projects within the action area where electrofishing, handling and stranding of juvenile Chinook salmon (17) and steelhead (22) is anticipated. The table also quantifies take for volitional sites anticipated to rely on volitional movement and dip-netting only. Volitional sites are expected to cause stranding, block net impingement or netting related take to juvenile Chinook salmon at 52 sites and juvenile steelhead at 66 sites.

Estimates presented in Table 6 are expected to represent a worst case scenario, as the fish densities used to calculate the values represent carrying capacities for “good” habitat (Hall-Griswold et al. 1995), and it is not likely that any potential project sites are currently at carrying capacity when the current status of the species is considered (Sec. 2.2.1). Furthermore, not all habitat units are expected to represent “good” habitat conditions when the environmental baseline is considered (Sec. 2.4), so lower fish densities are expected at some work sites. Therefore the estimates presented in Table 6 are likely to be overestimates of actual take but are used in this Opinion to give the species the highest level of deference available.

Table 6. Number of fish per project and across the action area (in parentheses), disturbed, injured, hazed or killed due to seining, netting, block net impingement7, electroshocking, and/or dewatering as a result of the annual implementation of the proposed action. See above text for assumptions[8].

	Electrofishing Sites			Volitional Sites (no electrofishing)		
	Sp/Su Chinook Salmon Parr	Steelhead Parr	Steelhead Fry	Sp/Su Chinook Salmon Parr	Steelhead Parr	Steelhead Fry
# Projects to Handle Fish in Action Area Annually	17	22	22	52	66	66
# Fish Injured, handled or hazed per project *(annual in parenthesis)*						
a) Seined, Dip-netted, Handled or Hazed	53 *(906)*	10 *(210)*	19 *(419)*	13 *(680)*	2 *(157)*	5 *(315)*
b) Electrofished	10 *(175)*	1 *(20)*	2 *(40)*	NA	NA	NA
c) Injured as a result of electrofishing	3 *(44)*	<1 *(5)*	<1 *(10)*	NA	NA	NA
d) Total Fish Harmed	63 *(1,081)*	11 *(230)*	21 *(459)*	13 *(680)*	2 *(157)*	5 *(315)*
Number of Fish Killed						
a) Electrofishing Mortality	0.5 *(9)*	<1 *(1)*	<1 *(2)*	NA	NA	NA
b) Stranding Mortality	6.2 *(107)*	1.6 *(35)*	3.2 *(70)*	5.7 *(291)*	1 *(67)*	2.1 *(135)*
c) Total Mortality	7 *(116)*	2 *(36)*	3 *(72)*	5.7 *(291)*	1 *(67)*	2.1 *(135)*
Total Number Fish Injured Annually (sum of electrofished and non electrofished sites)				1,761	387	774
Total Number Fish Killed Annually (sum of electrofished and non electrofished sites)				407	103	206

7 Actual injury or mortality as a result of block net deployment could not be determined. The value is expected to be insignificant.

8 A detailed description of the assumptions and calculations made to complete Table 4 can be found in the project record.

Due to the low water work window and the need to abide by state water quality permit work periods, NMFS assumes that the vast majority of projects will occur between June 1 and August 15 (within the state recommended instream work window). Spring/summer Chinook salmon in the action area are considered 'stream type' with juvenile's rearing in freshwater for only one year (Taylor 1990). Therefore only one year class of spring/summer Chinook salmon has potential to be affected each year. All juvenile Chinook affected by the proposed action will be referred to as 'parr' in the following analyses. Steelhead exhibit an alternative life history with juveniles rearing in tributary streams up to seven years but with most fish residing in freshwater 1-3 years prior to smoltification (Good 2005; Quinn 2005). Steelhead may emerge from redds within the project area as late as the end of June in major Creeks and rivers and potentially as late as September in smaller tributaries. Due to later emergence by steelhead, it is likely that age 0 fish (termed fry here) as well as parr (age 1+) will be affected by the action and therefore they have a take estimate presented in Table 6.

Evaluation of Table 6 indicates that, under the applied assumptions, per-project lethal take of juvenile salmonids is likely to be 19% higher at electrofished sites than at non-electrofished sites. However, annual mortality is 2.5 times greater for the non-electrofished sites due to the number of projects implemented under the different salvage operations. Stranding rates for juvenile fish at both types of sites contribute the greatest percentage to total project mortality.

The total number of fish harmed, injured or hazed is 4.8 times greater for the electrofished sites than it is for the non-electrofished sites. This is primarily due to the fact that the dewatering conservation measure requires fish to be cleared of the worksite prior to dewatering at electrofishing sites and not at non-electrofished sites. If dewatering were to occur prior to fish salvage efforts, a greater number of fish may volitionally move from the work area prior to being hazed, captured handled, or electrofished. Therefore, dewatering prior to fish salvage at electrofishing sites would likely reduce the level of take. Adequate monitoring of the number of fish killed and handled will be necessary to validate these assumptions and to adaptively manage the programmatic consultation to reduce take levels over time.

In summary, the proposed action is estimated to result in the hazing, capture, handling and subsequent transport of approximately 1,761 juvenile Chinook salmon and 1,161 juvenile steelhead (parr and fry) annually. This handling is likely to result in various levels of harm and stress that may lead to eventual death. Death may occur as a result of actual stress levels and increased cortisol production, physical trauma or increased predation rates on released fish. However, it is impossible to quantify the level of mortality that may occur from handling. Application of design criteria provided in the proposed action should effectively reduce the potential harm to individuals during capture and transport such that the risk of death is minimized.

NMFS has estimated that the proposed action is likely to directly result in the death of up to 407 juvenile spring/summer Chinook salmon and 309 juvenile steelhead (parr and fry) annually. The process of dewatering work sites is designed to reduce direct effects to protected fish that

would otherwise occur if the project were implemented in free flowing water. Although dewatering is a design criterion that results in mortality, it is considered an improvement over the potential harm and mortality that would occur without dewatering the project sites. Further, the long-term increase in available habitat following barrier removal is thought to outweigh any short-term adverse effects to individuals.

2.5.2. Water quality

2.5.2.1. Suspended Sediment

Water quality in the analysis area may be degraded as a result of the proposed action. All ground disturbing activities and the return of flow through the dewatered work site have potential to create increased levels of suspended sediment in the water column. Site preparation, excavation of road fill and diversion channel, dewatering of construction site, diversion removal, backfill to road surface, site rehabilitation and maintenance construction phases all have potential to introduce sediment to the stream system and adversely affect water quality. The majority of sediment introduction is expected to occur during site preparation, excavation of road fill/diversion channel, diversion removal and the maintenance construction phases.

Water quality may also be affected through increases in stream temperatures and/or through chemical contamination. Clearing of riparian vegetation could result in increases in stream temperature. Riparian clearing is most likely to occur during site preparation, excavation of road fill and diversion channel construction phases and perhaps during maintenance activities. Chemical contamination may occur any time construction equipment is working within or adjacent to the stream channel and could potentially occur during any of the proposed construction phases.

Conservation measures presented as part of 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. Juvenile spring/summer Chinook salmon and steelhead may experience short-term adverse effects as a result.

The most critical aspects of a sediment effects analysis 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). For salmonids, elevated suspended sediment (i.e. turbidity) has been linked to a number of behavioral and physiological responses (*i.e.*, gill flaring, coughing, avoidance, and increase in blood sugar levels) which indicate some level of stress (Bisson and Bilby 1982; Sigler *et al.* 1984; Berg and Northcote 1985; Servizi and Martens 1992). 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). Although turbidity may cause stress, Gregory and Northcote (1993) have shown that moderate levels of turbidity (35-150 nephelometric turbidity units) accelerate foraging rates among juvenile Chinook salmon, likely because of reduced vulnerability to predators (camouflaging effect).

Timing of sediment inputs from construction related activities would generally occur during low background sediment levels in the stream system (during low flow season and during a lack of precipitation) while sediment generated during spring rains or runoff would occur when background sediment levels are higher. Bash et. al (2001) reported that protective mucus levels of individual fish are lower during the low sediment background period, therefore, effects to fish may be amplified at this time.

Substrate may inadvertently fall from excavation equipment buckets or accidentally be pushed over road or bank edges while working in close proximity to the live stream channel during site preparation, crossing excavation, diversion channel digging, road backfilling, during rehabilitation efforts, and during any needed maintenance activities. Proper design of site clearing, staging areas, access routes and stockpile areas should minimize the risk of erosion into stream channels. Sediment barriers will be placed around potentially disturbed sites where needed to prevent sediment from entering a stream directly or indirectly. An adequate supply of erosion control materials (e.g. silt fence and straw bales) will be on site to respond to emergencies and unforeseen problems. Heavy machinery is prohibited from working within the live channel in occupied habitats to reduce direct fish impacts and decrease substrate disturbance. Instream sediment retention barriers (sedimat, straw bale retentions and off channel sediment settling ponds) may be installed and maintained throughout construction to minimize sediment delivery as well. The CDTs will delineate construction impact areas to confine work to the minimum area necessary to complete the project. Sediment transport from the temporary bypass channel is minimized due to the provision for lined channels or the use of plastic pipes to convey water around the construction site. Where necessary, pumps will be used to remove water from the work site, pumping it to an approved upland location to further reduce sediment delivery. All in- channel sediment retention structures will be appropriately maintained and removed to ensure captured sediment is removed from the system to minimize potential suspended sediment increases. All of these conservation measures help minimize the potential for sediment introductions and increased suspended sediment resulting from project implementation. The proposed action did not identify site preparation conservation measures as being needed to be applied for 'Maintenance' activities which have potential to elevate sediment levels during these construction phases. However, sedimat and straw bale retentions and off channel settling ponds may be used at these sites and are expected to reduce the potential for sediment delivery.

It is recognized that 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). Any substrate introduced during these stages will increase suspended sediment levels to some degree and potentially affect any exposed fish downstream. These types of disturbance are likely to be of short duration as small amounts of substrate are infrequently and inadvertently introduced to the stream channel. Based on review of the literature, NMFS expects that any resulting sediment plumes should be limited to less than 600 feet and should dissipate within a few hours (Casselli et al. 2000, Jakober 2002, FWS 2004, and USFS 2005). In addition to effects remaining within 600 feet of the disturbance, affected streams are likely to quickly return to background suspended sediment levels considering the expected small volume of substrate likely to be introduced (Jakober 2002, Casselli 2000).

2.5.2.1.1. Unoccupied Habitat

The proposed action includes an undetermined number of crossing removal/replacement actions that may occur in 'unoccupied' habitat. Providing conservation measures described in Appendix C are appropriately implemented and unoccupied habitats are identified correctly, dewatering of the construction site within unoccupied habitats is not expected to have any indirect or direct effects to ESA-listed species or habitat. The stream channel between the diversion inlet and outlet would be dewatered. Conservation measures designed to minimize earth moving related erosion and requirements for site rehabilitation will ensure that soil exposure does not result in increased sediment delivery to the adjacent stream channel. As previously discussed, NMFS expects that with implementation of the proposed conservation measures, any resulting sediment plume should be limited to less than 600 feet and should dissipate within a few hours (Casselli et al. 2000, Jakober 2002, FWS 2004, USFS 2005). Therefore, even short turbidity pulses, if they were to occur, are not likely to affect individual fish due to fish being absent within at least 600 feet downstream of the worksite as described in this Opinion's definition of 'unoccupied sites.'

2.5.2.1.2. Occupied Habitat

Newcombe and Jensen (1996) calculated "severity-of-ill-effect scores" for various durations and intensities of juvenile salmonid exposure to suspended sediment. These values can easily be broken down into four basic classes as it relates to take under the ESA. A severity rating of '0' has no behavioral effect and thus no 'harm.' Severity levels 1-4 represent alarm reactions, abandonment of cover, avoidance response and short-term reduction in feeding rates (<2 hours) and are considered insignificant temporary impacts to individuals. Severity levels 5-9 represent ascending levels of sublethal effects that can be assumed to cause 'harm' to listed salmonids and include physiological stress, habitat degradation, impaired homing, reduced growth rate and delayed hatching. Suspended sediment concentrations resulting in severity levels 10-14 result in lethal effects to the subjected individuals.

Foltz and Yanosek (2005) reported suspended sediment levels exceeding 28,000 mg/l at one culvert replacement project site. These levels would have resulted in mortality to exposed fish. However, the site in Foltz and Yanosek's study did not utilize any mitigation measures and occurred in a first order tributary too steep for fish. The proposed action utilizes many design measures that will limit suspended sediment to much lower levels and therefore potential effects from the proposed action will be far less than those reported in the Foltz and Yanosek study.

Jakober (2002) conducted a study to measure the intensity and duration of suspended sediment levels in a small stream as a result of a culvert replacement project in Idaho. Jakober's study (2002) observed higher suspended sediment levels than are expected for the proposed action (due to increased conservation measures in the proposed action). However, for this analysis, NMFS uses Jakober's suspended sediment values as the worst case scenario to determine the potential

effects of turbidity on ESA-listed species downstream of individual project sites. Using Jakober's findings on duration and intensity of observed suspended sediment values and applying the ratings found in Newcombe and Jensen (1996) allowed NMFS to estimate the duration and "severity-of-ill-effect scores" that may occur for a typical project completed under the proposed action.

Jakober (2002) observed several short suspended sediment pulses ranging from 4.53 to 34 mg/l during the site preparation and through new culvert installation construction phases. When applied to Newcombe and Jensen's (1996) "severity-of-ill-effect scores," these observed suspended sediment levels result in severity levels ranging between 1 and 4. Duration of this disturbance is expected to be temporary (<2 hours) as sediment introductions are infrequent and of small size. Noggle (1978 as cited in Newcombe and Jensen 1996) reported concentrations of 25 mg/l for one hour caused decreased feeding rates, and concentrations of 6000 mg/l for
one hour led to avoidance behavior in juvenile coho salmon. Fish exposed to the projected suspended sediment levels during the site preparation phase through new crossing installation phase are anticipated to exhibit reduced feeding rates, avoidance responses, cover abandonment or an alarm reaction. These effects are considered insignificant due to the temporary nature and an insignificant change in behavior.

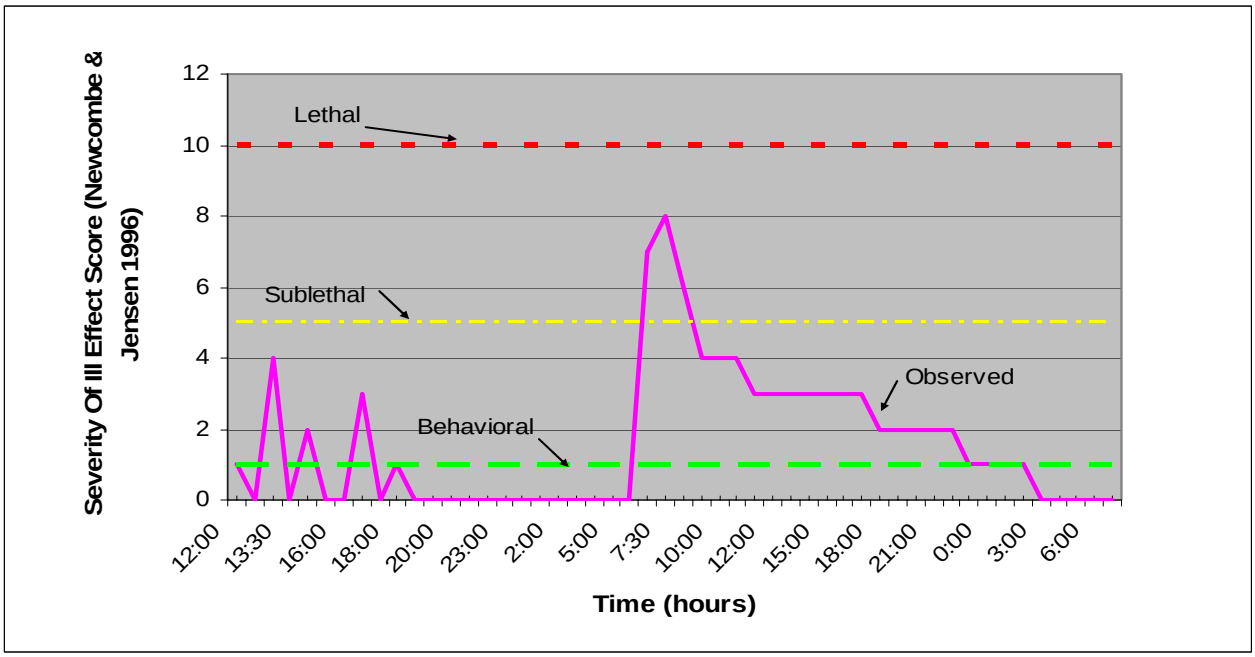
During the slow rewatering of the worksite all freshly disturbed substrates within the dewatered worksite will be highly prone to suspension and mobilization in the water column. The BA cited personal observations of projects similar to the proposed action that observed about 90% of turbidity and sediment increases occur during flow reintroduction to the dewatered channel. Jakober (2002) also found that 95% of construction related sediment was introduced in the first two hours after the diversion was removed and water returned to the new crossing site. Casselli (2000) observed a similar response. In Jakober's study (2002), sediment concentrations instantaneously rose from a background of 1.69 mg of suspended sediment per liter pre-diversion removal, to a high of 15,588 mg/l for 30 minutes during re-watering of the channel. Suspended sediment levels then continuously dropped over time, decreasing to 105-677 mg/l one hour after re-watering, to 17-29 mg/l 2.5 hours after re-watering, to 1.13 mg/l 26 hours after rewatering the site. In a similar monitoring effort, Bakke (2002) recorded sediment concentrations up to 514 – 2,060 mg/l following removal of culverts. These concentrations reportedly lasted less than one hour.

Re-watering of the project site is likely to result in the greatest turbidity/suspended sediment levels achieved during project implementation with values reaching a severity of effects score of up to 8, for approximately one hour. However, intensity levels are expected to be reduced due to conservation measures in the proposed action such as: (1) instream sediment retention structures (Sedimat, straw bales, silt fence, off channel settling ponds); (2) pre-washing work site prior to diversion dam removal, and (3) maintenance and removal of sediment retention structures prior to re-watering.

Considering application of conservation measures, NMFS expects that re-watering the channel could result in suspended sediment levels triggering effects ranging from minor physiological stress and increased rates of coughing and respiration at level 5, to moderate physiological stress at level 6, to moderate habitat degradation and impaired homing at level 7, and to fish demonstrating indicators of major physiological stress at level 8. All these effects can be considered to 'harm' the fish exposed to these conditions and temporarily degrade habitat rearing capacity. Suspended sediment levels are expected to steadily decrease for the next 2 hours, dropping from level 4 to 3 and having similar avoidance and alarm reactions as discussed above. Suspended sediment levels are not anticipated to exceed 22,026 mg/l at any time and therefore severity levels 9-14 will not be reached and no lethal take is expected to occur as a result of sediment exposure. Figure 4 illustrates the level of impacts and duration of exposure for a typical culvert replacement/removal project.

By analyzing Figure 4 it is apparent that even in the worst case scenario, lethal take levels are not expected to be achieved under the proposed action. Fish may experience short, low intensity sediment pulses during diversion installation or site clearing phases. Fish are expected to be exposed to sublethal sediment levels for approximately 2 hours immediately after re-watering the project work site. Sediment conditions then steadily improve with a less intensive plume for up to 20 additional hours resulting in various behavioral modifications that do not constitute harm to the exposed individuals. Fish exposure may be further minimized as fish are likely to seek less turbid conditions downstream of the generated sediment plume (Bisson and Bilby 1982; Noggle 1978; Servizi and Martens 1992).

Figure 4. Illustration of the potential duration, intensity and frequency of sediment exposure under implemented projects. Jakober data (2002) is used to represent the worst case scenario.



Mitigation measures presented as part of the proposed action, such as dewatering the channel, use of Sedimat and other in-channel sediment retention devices, and washing down the new stream channel before re-watering were not reported for the comparitive studies (although Jakober dewatered the channel). Therefore, NMFS believes the suspended sediment concentrations presented are higher than those likely to be observed during any replacement/removal actions authorized by this consultation. Sedimat is able to contain an estimated 600 lbs of direct in-channel sediment delivered from culvert replacements (NYSEGC 1993). Sedimat has been demonstrated to be approximately 95 percent effective in trapping sediment that may be delivered during in-channel activities (NYSEGC 1993). Although local observations have not seen this level of effectiveness, there is wide acceptance of their efficacy (Personal Comm. 2005: D. Newberry, Fisheries Biologist, FS; K. Grover-Weir, Hydrologist, FS).

Projects completed under the action as proposed, especially multiple projects that may be completed within the same stream channel or in the same subwatershed, could result in sediment concentrations similar to those reported by Jakober (2002) and Bakke et. al (2002). Associated adverse, but non-lethal effects to ESA-listed fish and adverse impacts to fish habitat may also occur. Mitigation measures such as complete bypass of project sites by dewatering, use of Sedimat and use of straw bales and silt fences, and washing down the new channel before rewatering will decrease the quantity of suspended sediment generated by project actions, and thus decrease the potential for associated adverse effects on ESA-listed fish and fish habitat below those reported in the literature and displayed in Figure 4.

There is potential for additional sediment inputs beyond the short-term effects from culvert replacement/removal actions. Bakke et al. (2002) monitored Waddell Creek near Olympia Washington and found that channel incision or lateral scour during channel re-adjustments following removal/replacements are likely to produce more sediment delivery than that produced during construction. They also concluded that quantifying sedimentation impacts to threatened fish stocks from culvert removals could be extremely complex (Bakke et al. 2002). Timing of these sediment inputs is likely to occur during large storm events or during spring snow melt and associated peak channel flows. Therefore sediment loading during this period is additive to the peak sediment loads being transported at this time. The FWS determined that sediment inputs from projects similar to those as the proposed action, and at this temporal period, appeared minor relative to the annual sediment budget of the affected watersheds (FWS, 2004b). The amount of sediment introduced via culvert actions is generally recognized as far less than what may be delivered if the same culvert were to fail if the crossing were left unchanged.

2.5.2.1.3. Fish Exposure to suspended sediment

Some of the same assumptions previously used to quantify the impacts of fish handling can also be used to identify the potential number of fish affected by increased suspended sediment levels. As stated in the BA, suspended sediment levels are expected to extend up to 600 feet downstream from the bottom of the dewatered area. Average bankfull stream width was estimated to be 8.2 feet (Personal Comm. 2005: M. Kellett, Fisheries Biologist, FS; J. Chatel, Fisheries Biologist, FS; and C. Zurstadt, Fisheries Biologist, FS). The product of length and width determines the exposure area, approximately 4,930 feet^2 for the average project site. Applying the fish densities previously described in Section 2.5.1.6 of this Opinion and the and exposure area noted above results in approximately 352 spring/summer Chinook salmon, 64 steelhead parr, and 128 steelhead fry potentially exposed to the elevated suspended sediment levels and the above mentioned effects at each project site.

Due to the species distribution across the action area, the maximum number of projects that could affect spring/summer Chinook salmon and steelhead each year is 69 and 87 respectively. Multiplying the number of fish affected at each site by the total number of projects, NMFS estimates that approximately 24,166 spring/summer Chinook salmon, 5,598 steelhead parr, and 11,196 steelhead fry could be affected by the increased suspended sediment levels to some degree each year. As stated previously, densities applied for this analysis are likely an overestimate of the actual number of fish present due to both the current status of the species and the quality of existing habitat. Since sediment will likely settle out as it moves downstream, suspended sediment levels are likely to diminish with increasing distance downstream. Decreasing suspended sediment levels with increasing distance is likely to result in individual fish being less impacted the further downstream individuals are from the project site. Further, fish are expected to temporarily migrate to less turbid waters found downstream, thus lessening the degree of impact elevated suspended sediment levels are likely to have on individuals (Bisson and Bilby 1982; Noggle 1978; Servizi and Martens 1992). These considerations provide another

level of overestimation of the potential effects. This conservative estimate is being used to provide the greatest benefit of doubt to the species by analyzing the worst case scenario. Reviewing Figure 4, it is evident that exposed fish will exhibit behavioral modifications for up to eight hours and sublethal effects for approximately one hour immediately following work site rewatering.

2.5.2.2. Temperature

The proposed action may reduce streamside shade that in turn can result in increased steam temperatures. The greatest potential for riparian disturbance (shade removal) will occur during site preparation, culvert excavation and the digging of the diversion channel. 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 identified in the proposed action, tree removal and riparian disturbance will be minimized to that necessary to facilitate structure installation with no trees greater than eight inches diameter at breast height (DBH) removed during site rehabilitation. Because actions completed under this programmatic consultation will occur at existing stream crossing locations, riparian vegetation removal is expected to be so minimal as to have insignificant effects to stream shade. In certain instances though, installation of a wider structure may also require increasing structure length which could necessitate removal of up to three trees (NMFS assumption based on previous project experience). Conservation measures indicate that riparian disturbance will be limited to that necessary to complete the project and should be minimal due to existing disturbed nature of the sites. Any removed trees will remain on site and be used in-channel rehabilitation efforts (Appendix C, F6.a.2). The removal of up to three trees at a project site has the potential to reduce local stream shading by increasing the amount of solar radiation reaching the stream surface (Spence et al 1996). However, NMFS considers the potential for stream temperature increase to be negligible because the number of removed trees or extent of riparian disturbance will not likely be of a magnitude capable of changing the amount of solar radiation at project sites.

Although generally considered adequate to ensure effects to temperature are adequately minimized and inconsequential, conservation measures outlined in the proposed action do not indicate how the action agencies propose to minimize the potential for stream bank disturbance associated with bypass channel construction adjacent to stream channels. Conservation measures do assure that staging and associated stockpile areas will be located outside of specific buffers and on existing disturbed areas where possible (road prisms or turnouts). Very little site preparation activity is expected to occur in riparian areas and no site preparation activity is expected in the stream channel. Clearing (if needed) will occur outside of the designated buffers. Buffer delineation will be completed by the CDT. Any riparian vegetation removed will

be stockpiled and transplanted back to the riparian area during site rehabilitation. However, conservation measures do not effectively describe how limits to riparian disturbance or tree removal will be effectively managed, only that they will be minimized.

2.5.2.3. Chemical Contamination

Heavy machinery use adjacent to stream channels raises concern for the potential of an accidental spill of fuel, lubricants, hydraulic fluid and 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.

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.

The majority of work is anticipated to occur outside of flowing water which limits the potential for chemical contamination to occur. To further prevent toxic materials from entering live water, the FS and BLM developed specific prevention measures that were presented as part of the proposed action. The action agencies are also requiring a spill prevention, containment and control plan (SPCCP) to be developed for all projects and submitted to Level 1 teams during the pre-project review. Level 1 teams will ensure that all SPCCPs are adequate to sufficiently discount the potential hazards from the chemicals being used during project completion. In addition, it is unlikely that antifreeze, brake or transmission fluid will be present on-site or spilled in volumes or concentrations large enough to harm salmonids in or downstream from project sites. NMFS feels that fuel spill and equipment leak contingencies and preventions described in the proposed action, in combination with individual project SPCCP reviews, should be sufficient to effectively minimize the risk of negative impacts to ESA-listed fish and fish habitat from toxic contamination.

2.5.3. General Habitat Conditions

NMFS expects that implementation of the proposed action may adversely affect habitat conditions within the analysis area. Use of a temporary diversion structure may temporarily block upstream fish passage. Near and in-channel excavations are likely to increase in-channel sediment deposition; and excavation of project sites and installation of riprap may alter stream bank conditions.

2.5.3.1. Temporary Passage Blockage

Diversion channels may temporarily block upstream fish passage. In many cases, the dewatered section will be a continuation of the existing passage barrier being replaced. In these cases, no additional adverse impacts to upstream movements are expected during implementation. Due to project timing and the short duration that sites will be dewatered, temporary blockage of upstream movements will not affect adult ESA-listed fish as none are expected to be present during construction. NMFS anticipates that effects from this temporary blockage of fish passage on juvenile ESA-listed fish will be negligible, particularly when considered in relation to the long-term benefit of restoring year-round fish passage to all age classes in these stream systems.

2.5.3.2. 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, similarly minimize the potential for in-channel sediment deposition.

The potential effects of sediment deposition on fish habitat can be described by evaluating the literature reported effects. Egg-to-emergence survival and size of alevins is negatively effected by fine sediment intrusion into spawning gravel (Cedarholm et al., 1981; Young et al., 1991). Fine sediment deposition in spawning gravel ultimately reduces the oxygen supply rate to the redd (Wu 2000). However, redds should not be present within the work site nor within the expected extent of sediment deposition (~600 feet) and direct effects to incubating eggs or alevins are not anticipated as a result of habitat sedimentation (FWS 2004b, and USFS 2005). Fall fish spawning following project implementation is not likely to inhibited by the expected levels of sedimentation as the initial winnowing of fine sediment by females during redd construction cleans out the gravel and increases permeability and interstitial flow (Kondolf et al. 1993). Fine, redeposited sediments have the potential to adversely affect primary and secondary productivity (Spence *et al.* 1996 and Suttle et al. 2004) and reduce cover for juvenile salmonids (Bjornn and Reiser 1991). Suttle (2004) found that increases in fine sediment concentration led to a change from available aquatic insects (surface grazers and predators) to unavailable burrowing species. It is expected that primary production will be affected in the short term within the individual 600 foot affected stream reaches. Recolonization of affected areas is expected to occur rapidly. Fine sediment can fill pools and interstitial spaces in rocks and gravels used by fish for thermal cover and for predator avoidance (Waters 1995). Any temporary loss of habitat that occurs is likely to be of a temporary nature (< 6 months) within the project area and not have any long term effects to ESA-listed fish. Adequate monitoring of any known redds downstream of 600 feet may be necessary to ensure that this level of protection is maintained.

The construction of stream simulation crossings is expected to reduce annual maintenance levels, reduce risk of crossing failure and reduce channel erosion associated with improperly designed or sized culverts. These sediment reductions will likely benefit the receiving stream systems and habitat over all temporal scales.

In summary, potential effects of increased sediment deposition on fish habitat will likely occur in the immediate work site and up to 600 feet downstream of the dewatered area. Project related sediment that settles on downstream substrates is expected to be flushed out during fall/winter/spring high flows after project completion (USFS 2005). Therefore, NMFS expects that long-term adverse impacts to spawning gravels are not likely to occur. Further, NMFS expects that project-related sediments introduced into the stream channel should be insignificant, relative to the annual sediment budget of a watershed, supporting the BA conclusion that long-term sediment/turbidity impacts will not occur. Introduced sediment levels are expected to be insignificant due to the projected success of the proposed design criteria in limiting sediment introduction to the stream channels.

2.5.3.3. Bank Alteration

Some projects implemented under the proposed action will require the installation of rock riprap and or gradient control structures. Design parameters in the proposed action prohibit exposed riprap within the bankfull channel unless necessary to meet fish passage objectives, maintain channel features or to protect the structures. The placement of riprap is known to cause adverse effects to stream morphology, fish habitat, and fish populations (Schmetterling *et al*. 2001; Garland *et al*. 2002; Quigley, J. T. and Harper, D. J. 2004). Riprap fails to provide the intricate habitat requirements for all age classes or species that are provided by naturally vegetated banks. Stream banks with riprap often have fewer undercut banks, less low-overhead cover and are less likely than natural stream banks to deliver large woody debris to streams (Schmetterling et al. 2001, Quigley, J. T. and Harper, D. J. 2004). All these effects can be considered to simplify habitat and render it less productive to aquatic organisms. Excessive riprap may also reduce sinuosity thereby increasing gradient and potentially resulting in-channel incision and related floodplain abandonment where finer substrates are present. Peters et al. (1998 as cited in Schmetterling et al. 2001) and Quigley and Harper (2004) reported that salmonid abundance was lower at locations where banks had riprap modifications compared to natural banks. The biological community generally regards the presence of riprap along a streambank as an adverse affect to salmonids.

Riprap use in this programmatic is designed to maintain the beneficial channel modifications created by constructing stream simulation crossings. The use of riprap for project completion will likely have small, localized effects on fish distribution and rearing success for as long as the stream crossing and riprap structures are in place. Riprap use is expected to be limited to the length of the average stream crossing in the action area (less than 38 feet). The proposed action

is not likely to use extensive riprap and its extent will likely be less than the 38 foot maximum, further minimizing the potential for adverse affects. The amount of habitat affected by riprap will be very small across the action area and effects will be insignificant.

2.5.3.4. Available Habitat

Dewatering of sites may temporarily (1 day to 1 week) reduce the amount of available fish habitat (approximately 129 feet/site [average barrier length – average dewatered length]). The temporary loss of this amount of habitat is not considered a threat to the ESA-listed species because the loss is temporary and fish utilizing the habitat will be effectively captured and transported from the worksite to an appropriate location prior to dewatering.

Riparian vegetation removal resulting from project implementation may adversely affect fish habitat. Loss of riparian vegetation may reduce allochthonous inputs to the stream, potentially reducing primary productivity in affected reaches. Loss of up to three trees from individual project sites may affect long term pool quantity and quality as woody debris provides essential functions in streams including the formation of habitats. Additionally, the removal of vegetation decreases streambank stability and it's resistance to erosion. The proposed action requires that all trees felled to accommodate project completion will be incorporated into the rehabilitation of the site; thus, current levels of large woody debris should not be adversely affected. Removal of up to three trees per project is also not expected to result in more than a negligible effect on future large woody debris recruitment potential. Any riparian vegetation removed will be stockpiled and transplanted back to the riparian area during site rehabilitation to hasten recovery processes. Since riparian vegetation is expected to recover quickly at most project sites, and vegetation removal is expected to be minimal, any reductions in allochthonous material input is expected to be inconsequential immediately following project completion. Although conservation measures attempt to minimize stream side disturbance resulting from diversion ditch construction, additional safeguards may be necessary to maintain bank stability adjacent to temporary diversion channels.

The intended purpose of the programmatic action is to remove fish passage barriers, resulting in long-term restoration of the project location. By completely removing stream crossings and restoring stream channels or by replacing stream crossings with stream simulation crossings there will be a substantial increase in available habitat that is currently unavailable or under utilized. The stream simulation design method is intended to mimic natural stream processes and features evident at each crossing location. The stream simulation methods provide for fish passage by simulating natural stream conditions, substrate, instream structure, and flows. The stream simulation methods also allow for the movement of stream sediments and large wood downstream, providing the necessary materials to maintain habitat features and ecosystem processes above and below the treated crossings. Thus, stream simulation is expected to improve or restore riparian and floodplain function and physical stream processes at treated sites.

Maintenance actions are believed to provide long-term benefits to species and habitats by removing an imminent threat of crossing failure (catastrophic and incremental) and their associated habitat related adverse impacts.

The extent to which each crossing removal, replacement or maintenance activity will benefit ESA-listed fish will depend on the current state of impairment, CDT's ability to implement the design criteria and objectives on the ground, and the capacity of the populations in question to exploit newly accessible habitats.

Although some temporary and short term negative effects to the amount of available habitat are likely to occur as a result of this action, NMFS believes that the proposed design criteria adequately avoids or minimizes the potential extent, severity and duration of effects. Further, any temporary and short-term effects are expected to result in a long-term beneficial effect by increasing the quantity of available habitat within the action area

2.5.3.5. Explosive Related Disturbance

During the site excavation phase it may be necessary to remove large rock or excavate bedrock in order to achieve the desired depth for the new crossing. Betonamit is a noiseless, shock-free, non-toxic substance that may be used to break rocks via expansive pressure within the dewatered stream channel. This is the material of choice and is likely to be used as a first choice for rock excavation. Its use is not anticipated to have any adverse effects to ESA-listed fish.

Where betonamit is not effective, explosive blasting within the dewatered area is proposed for this consultation. Explosive blasting has the potential to harm or kill rearing or spawning fish and incubating eggs. This activity will occur within the dewatered channel where ESA-listed fish exposure to chemicals, noise, vibrations or debris from blasting or betonamit use is not expected due to design criteria. Conducting all blasting within the dewatered channel and allowing for an adequate buffer width as adapted from Wright and Hopky 1998 (Appendix C) should adequately prevent pressure, toxicity and vibration effects that may harm ESA-listed fish near the project area. Extension of the dewatered channel solely to accommodate larger charge weights is not proposed by this consultation in order to assure dewatering effects remain consistent with those described previously.

2.5.4. Synthesis of Effects

To effectively complete a jeopardy analysis, NMFS converted the number of juvenile fish impacted to the number of adult equivalents that may be lost from each population under the proposed action. The following assumptions were used to convert the juvenile numbers presented in Table 6 to a conservative number of adults that may be lost from the population each year during the life of the programmatic consultation (5 years). NMFS has assumed a reasonably

conservative estimate of 50% parr-to-smolt survival for spring/summer Chinook salmon (Keifer and Lockhart 94). Applying Table 6 values for the number of spring/summer Chinook salmon parr that are likely to be killed annually (407), the programmatic action is estimated to result in approximately 203 fewer spring/summer Chinook salmon smolts being produced from the ESU each year. Smolt-to-adult returns are estimated as 0.87% for spring/summer Chinook salmon. Applying this percentage to the calculated number of lost smolts, it is reasonable to assume that the programmatic action would be expected to result in 1.8 fewer adult spring/summer Chinook salmon returning to the action area on an annual basis. For steelhead, fry-to-parr survival is conservatively estimated at 50% (Herb Pollard, Fishery Biologist, NMFS, Pers. Comm. 2005), and parr-to-smolt survival is assumed to be 50% (Keifer and Lockhart 94), resulting in 103 fewer steelhead smolts annually. To calculate the adult reduction to the population, NMFS applied a 0.8 percent smolt-to-adult survival rate (FWS 1998) that results in less than one (0.83) fewer adult steelhead returning to the action area each year the project is in place.

Increased suspended sediment from project construction activities could cause indirect effects to all juvenile fish within 600 feet downstream of the dewatered area. As previously discussed, approximately 24,166 spring/summer Chinook salmon, 5,598 steelhead parr, and 11,196 steelhead fry may be affected by the increased turbidity levels to some degree. These individuals are likely to experience a temporary (<2 hour) reduction in feeding rates, and increased occurrences of avoidance responses, abandonment of cover, or alarm reactions. Immediately following channel rewatering and lasting for approximately 1.5 hours, sediment levels will peak nearly instantaneously and steadily improve. The highest sediment intensities may result in major physiological stress and moderate habitat degradation and impaired homing ability. These effects may be overstated as fish are expected to migrate away from the highest turbidity levels, seeking more favorable conditions downstream. As sediment levels improve the effects decrease from moderate physiological stress to increased rates of coughing and respiration rates to minor physiological stress. All these effects can be considered to 'harm' fish exposed to these conditions and temporarily degrade fish habitat rearing capacity for the 1.5 hours of exposure. Fish will then be exposed to sediment levels that elicit an insignificant behavioral response for up to 22 additional hours. No lethal take would be expected to occur as a result of sediment exposure. Conservative estimates of fish densities and implementation of effective conservation measures is expected to result in both fewer fish actually harmed and lower levels of actual harm.

Even though the estimated loss of two spring/summer Chinook salmon and one steelhead per year is measurable, NMFS does not believe it is likely to appreciably reduce the likelihood of survival or recovery of the SR spring/summer Chinook ESU or the SR steelhead DPS because the projected loss is small in comparison to the total population and ESA-listed species numbers. The projected number of lost adults will not jeopardize any of the 21 SR spring/summer Chinook salmon populations or the 17 steelhead populations in the Snake River. Since the projects are anticipated to be well distributed across the action area, no one population will be exposed to the loss of more than one individual adult spring/summer Chinook salmon or adult

steelhead and most will not result in the loss of any adult fish. Additionally, habitat improvements and the increased availability of fish habitat within the action area are expected to benefit the affected populations over the long-term.

At the population level, the effects of the environment are understood to be the integrated response of individual organisms to environmental change. Thus, instantaneous measures of population characteristics, such as population abundance, population spatial structure and population diversity, are the sum of individual characteristics within a particular area, while measures of population change, such as population growth rate, are measured as the productivity of individuals over the entire life cycle (McElhany *et al.* 2000). Lethal take associated with work area isolation is expected to amount to no more than a few individual juveniles (see Table 6). NMFS believes these numbers are too low to influence population abundance (especially when adult equivalents under baseline conditions are considered). Similarly, small to intermediate reductions in juvenile population density in the action areas, caused by individuals moving out of the construction area to avoid short-term physical effects of the proposed action, are expected to be transitory and are not expected to alter long-term juvenile survival rates. Because adult salmon and steelhead are larger and more mobile than juveniles, and conservation measures reduce their exposure, it is unlikely that any will be killed or injured during work area isolation. With due diligence for the full range of conservation measures outlined above, it is unlikely that physical habitat changes caused by construction events at any single construction site associated with the proposed activity, or even any likely combination of such construction sites in proximity, will cause delays severe enough to reduce spawning success and alter population growth rate, or cause straying that might otherwise alter the spatial structure or genetic diversity of populations. Thus, it is unlikely that the direct biological effects of construction associated with the proposed action will affect the characteristics of salmon or steelhead populations.

At the ESA-listed species level, direct biological effects are synonymous with those at the population level or, more likely, are the integrated demographic response of one or more subpopulations (McElhany *et al.* 2000). As described above, it is unlikely that the direct biological effects of construction associated with the proposed action will affect the characteristics of salmon or steelhead populations; therefore it is also unlikely that salmon or steelhead will be affected at the ESA-listed species level.

An incremental change in the likelihood of survival and recovery for the ESA-listed species considered in this consultation due to the proposed action cannot be quantified. However, based on the effects described above, it is reasonably likely that the proposed action will have a large, widespread and long-term net benefit of increasing the potential for survival and recovery of the ESA-listed species discussed in this Opinion.

2.5.5. Effects on Critical Habitat

NMFS designates critical habitat based on physical and biological features that are essential to the listed species. Essential features for designated critical habitat include substrate, water quality, water quantity, water temperature, food, riparian vegetation, access, water velocity, space and safe passage. Critical habitat is widespread throughout the action area. The action area provides freshwater spawning, rearing and migration habitat for SR spring/summer Chinook salmon, SR steelhead, and SR sockeye salmon.

The critical habitat essential features associated with the freshwater spawning, rearing and migratory PCEs potentially affected by this action are: water quality, substrate, forage, riparian vegetation, access (barriers) and floodplain connectivity.

1. **Water Quality.** Water quality in the action areas may be temporarily degraded due to increased turbidity from construction activities. This could negatively affect juvenile feeding until the channel and structures are fully stabilized. Removal/replacement of undersized crossings will likely reduce chronic sediment delivery and channel scouring thus reducing sediment levels and improving water quality over the long-term. Operation of heavy equipment in or near the stream channel elevates the risk for accidental fuel and oil contamination of the aquatic environment within the action area although design criteria in the proposed action will reduce the risk to discountable levels. In the long-term, the action area's water temperature may also improve, as problematic sediment sources are stabilized, and riparian structure and function improve.

2. **Substrate.** Temporary pulses of sediment and turbidity plumes are expected to cause small increases in downstream sediment deposition (increased surface fines), negatively affecting substrate in the short-term. However, any deposited sediments liberated during project activities are expected to be entrained during the next channel-adjusting discharge. Increased surface fines are not likely to persist beyond 6 months. Due to design criteria to avoid redds and limit the sediment introduced and thus deposited, this temporary increase is not expected to be significant (see section 2.5). Further, these sediment levels are considered to be negligible in relation to the annual sediment load during peak discharge. Removal/replacement of undersized culverts should reduce chronic sediment delivery and eliminate adverse channel adjustments associated with undersized crossings (downcutting or deposition). Additionally, the long-term risk of culvert failures and associated channel scouring events will be decreased with project implementation.

3. **Cover/Shelter.** Cover/shelter may be slightly and temporarily negatively affected due to increases in turbidity and sediment during project construction activities. Overhead cover provided by riparian vegetation is not expected to change in the short-term since the amount of riparian vegetation that could be removed is considered insignificant in the context of subwatersheds. Use of riprap within project sites may incrementally reduce

the rearing quality of habitat at the sites for an approximate distance of 38 feet per project. Site rehabilitation efforts will encourage riparian recovery over the long-term. Pool habitat quality is not expected to be impaired by project activities.

4. **Food.** Increases in turbidity and sediment deposition may temporarily reduce macroinvertebrate communities within the turbidity plume downstream of (<600 feet) individual project sites. However, working during the low water work period and dewatering the work site prior to conducting the majority of ground disturbing activities is expected to minimize both the magnitude and duration of effects on salmonid food sources. Also, increased stability of the stream channel due to stream simulation designs and reduced chronic sediment loads may positively affect macroinvertebrate communities in the affected watersheds over the long-term.

5. **Riparian Vegetation**. Removal of stream crossings should increase the potential riparian vegetation and improve riparian function. Although stream simulation replacement culverts will continue to restrict riparian function at crossing locations, improved channel stability is likely to improve riparian function downstream of sites. Clearing of vegetation within individual project work sites is expected to have a short-term localized reduction in subwatershed riparian composition and function. Rehabilitation efforts conducted as part of the proposed action should ensure that riparian function is restored or improved in the long-term.

6. **Access.** Upstream passage at project sites will continue to be impaired at project sites during construction activities. However, following completion of individual projects, passage will be restored at treated sites. This is an overall improvement to this PCE.

7. **Floodplain Connectivity.** Floodplain connectivity will be improved at stream crossing removal sites but may continue to be impaired at sites were crossing replacement occurs. Stream simulation design is likely to improve channel function at replacement and removal sites and floodplain connectivity may be improved where drastically undersized culverts previously existed.

In summary, implementation of the proposed action is expected to cause some short-term impairment to PCEs in the action area due to temporary sediment impacts to substrate and salmonid food sources. However the proposed action should also provide long-term improvements to some critical habitat PCEs within the action area. Specifically, the essential features of water quality, substrate, forage, riparian vegetation, access (barriers) and floodplain connectivity should all experience some beneficial effects of programmatic implementation. Decreased maintenance levels, reduced risk of crossing failures and improved hydrologic function at individual sites will reduce sediment inputs, and improve water quality and substrate condition within rearing and spawning habitats. Removing barriers will increase access to fish habitat and provide additional productivity that benefits forage species as well as ESA-listed fish.

Removal of some stream crossings should improve local riparian and floodplain processes. The conservation value of existing and proposed critical habitat is likely to improve as a result of programmatic stream crossing replacement and removal activities.

An incremental change in the conservation value of designated critical habitats within the action area due to the proposed action cannot be quantified. Based on the effects described above, it is reasonably likely that the proposed action will have small, local, negative impacts on the conservation value of critical habitats from the time of project completion until the next peak discharge (<6 months). Immediately following project completion and into the long-term, the conservation value of affected critical habitats should be improved with improved passage conditions, increased floodplain function, reduced channel instability (downcutting) and improved riparian condition.

2.5.6. 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). Cumulative effects that reduce the ability of an ESA-listed species to meet their biological requirements in the action area may increase the likelihood that the effects of the proposed action on the ESA-listed species or its habitat will result in jeopardy to that listed species or in destruction or adverse modification of designated critical habitat.

Between 1990 and 2000, the population of the State of Idaho increased by 28.5%[9]. Between 2000 and 2004 Idaho's population growth rate had slowed to 7.7%. While the proposed action does not include all counties in Idaho, the statistics are thought to reasonably portray growth expectations within the action area. Thus, NMFS assumes that future private and state actions will continue within the action area, increasing as population density rises. As the human population in the action area continues to grow, demand for agricultural, commercial, or residential development is also likely to grow. The effects of new development caused by that demand are likely to further reduce the conservation value of the habitat within the action area.

Although quantifying an incremental change in survival for the ESA-listed species and in the conservation role of critical habitat considered in this consultation due to cumulative effects is not possible, it is reasonably likely that those effects within the action area will have a moderate, long-term adverse effect on the likelihood that these ESA-listed species will survive and recover, and a moderate, long-term; negative effect on the conservation role of critical habitat units.

[9] U.S. Census Bureau, State and County Quickfacts, State of Idaho. http://quickfacts.census.gov/qfd/

2.5.7. Conclusion

After reviewing the best available scientific and commercial information regarding the biological requirements and the status of the SR spring/summer Chinook salmon ESU and steelhead DPS considered in this Opinion, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, NMFS concludes that the action, as proposed, is not likely to jeopardize the continued existence of these species. Similarly, based on a review of the best available scientific and commercial information regarding the status of the designated or proposed critical habitat for spring/summer Chinook salmon, sockeye salmon and steelhead considered in this Opinion, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, NMFS concludes that the action, as proposed, is not likely to result in the destruction or adverse modification of designated critical habitat.

This conclusion is based on the following considerations:

1. The overall impact of annual removal/replacement of up to 156 action area stream crossings on ESA-listed fish, designated and proposed critical habitats is expected to be a long-term benefit. By completely removing stream crossings and restoring stream channels or by replacing stream crossings with stream simulation crossings there should be a substantial increase in available habitat that is currently unavailable or under-utilized.

2. The conservation value of existing and proposed critical habitat is likely to improve as a result of programmatic stream crossing replacement and removal activities. Specifically, the essential features of water quality, substrate, forage, riparian vegetation, access (barriers) and floodplain connectivity should all experience some beneficial effects due to programmatic implementation.

3. Removal of undersized crossings should reduce chronic sediment delivery at project sites while also removing the risk of catastrophic sediment inputs associated with road crossing failures. Stream channel condition or critical habitat stability should also benefit from installation of stream simulation crossings throughout the action area.

4. The adverse effects resulting from the proposed project are expected to be of limited extent (<600 feet) and temporary (less than two weeks annually for individuals and less than 6 months for critical habitat). The direct construction impacts are limited to the construction area. Adverse impacts would result from capture, handling, transport and stranding of fish during worksite isolation. In the mid-to-long-term, the annual adverse effects on spring/summer Chinook and steelhead should be outweighed by the benefits of the proposed project. The annual loss of less than two returning adult spring/summer Chinook and less than one adult steelhead would be outweighed by the expected increase in production resulting from increased habitat access and improved species distribution within the action area. Construction related short-term increases of sediment within

600 feet of the downstream portion of individual work areas will temporarily adversely affect juvenile spring/summer Chinook salmon and steelhead (<2 hours sublethal, and <8 hours insignificant behavioral modifications) and designated critical habitat for spring/summer Chinook salmon, sockeye salmon and steelhead. Juveniles within 600 feet are likely to migrate out of the most turbid waters thereby avoiding the highest levels of sub-lethal effects. Sediment-related impacts are not expected to cause mortality or create long-term reduction of critical habitat value. Project timing designed to avoid times when adults will be present instream should prevent any negative effects of the action on spawning activities. Conservation measures designed to avoid impacts to downstream redds should preclude any adverse effects to egg development success.

2.6. 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 threatened and endangered species. The following recommendations are discretionary measures that NMFS believes are consistent with this obligation and therefore should be carried out by the FS and BLM:

1. The CDTs should critically review the use of riprap on new structures, minimizing its use to the smallest extent reasonable to provide stability of the structure and insure fish habitat is maintained or improved.

2. The FS and BLM should work closely with the Level 1 teams and incorporate results of completed watershed level consultation and work plans consistent with the LRMP and LUP within each Forest or BLM unit when selecting and prioritizing stream crossing removal or replacement projects.

3. The CDT should consider design options that would allow for beneficial effects to all matrix pathways and indicators, and move them towards the desired PFC.

4. The FS and BLM are encouraged to replace trees that are removed from the riparian area on a 2:1 ratio with appropriate native species for the site to hasten riparian recovery.

5. The FS and BLM should monitor and assess the effectiveness of each project for expanding habitat access and utilization by ESA-listed fish.

Please notify NMFS if the FS or BLM carries out any of these recommendations so that we will be kept informed of actions that minimize or avoid adverse effects, and those that benefit species or their habitats.

2.7. Reinitiation of Consultation

Reinitiation of formal consultation is required and shall be requested by the Federal agency or by NMFS, where discretionary Federal involvement or control over the action has been retained or is authorized by law, and: (a) If the amount or extent of taking specified in the incidental take statement is exceeded; (b) if new information reveals effects of the action that may affect ESA-listed species or critical habitat in a manner or to an extent not previously considered; (c) if the identified action is subsequently modified in a manner that has an effect to the ESA-listed species or critical habitat that was not considered in the Opinion; or (d) if a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16).

If the FS or BLM fail to submit the specified monitoring information within four weeks of the completion of any project site completion in 'occupied habitat,' NMFS will consider that a modification of the action has occurred which will require reinitiation of consultation. The FS and BLM shall reinitiate consultation if annual take reporting indicates that the level of take authorized under this Opinion has been exceeded. Although the turbidity related risks to ESA-listed species is limited to sub-lethal effects, additional information on the efficacy of the proposed design criteria in limiting those effects is needed. The FS and BLM monitoring proposal described in the July 5, 2006 email is anticipated to fill this void and help validate assumptions made in this Opinion and the BA (intensity, duration and distance of turbidity pulse). Results of that monitoring may provide new information pertinent to this reinitiation clause and shall be considered accordingly. To reinitiate consultation, contact the Habitat Conservation Division (Idaho Habitat Branch) of NMFS, and reference 2005/06396.

2.8 Incidental Take Statement

Section 9(a)(1) of the ESA prohibits the taking of listed species without a specific permit or exemption. Protective regulations adopted pursuant to Section 4(d) extend the prohibition to threatened species. Among other things, an action that harasses, wounds, or kills an individual of an ESA-listed species or harms a species by altering habitat in a way that significantly impairs its essential behavioral patterns is a taking (50 CFR 222.102). Incidental take refers to takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(o)(2) exempts any taking that meets the terms and conditions of a written incidental take statement from the taking prohibition.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides RPMs that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply to implement the RPMs.

2.8.1. Amount or Extent of Take

NMFS anticipates that the proposed action considered in this Opinion is reasonably certain to result in the incidental take of some ESA-listed species through habitat-related harm. NMFS also expects those actions that require isolation of the in-water work area within occupied habitat (as defined in the Opinion) would result in an additional amount of harm and death. The proposed action is designed to avoid locations where ESA-listed adult fish are actively spawning, where spawning is eminent, where adults are currently present or where spawning redds are active. Due to the life history of the ESA-listed species considered in this Opinion and complications in otherwise limiting take by managing project timing, take of adult spring/summer Chinook salmon, steelhead, or take of any of their embryos are not authorized in this Opinion.

Take associated with the habitat-related harm caused by programmatic actions are not expected to be measurable as long-term effects on populations. However, increased levels of suspended and deposited sediment from project construction activities are expected to cause both direct and indirect effects to juvenile fish up to 600 feet downstream of the dewatered area, at individual project sites within 'occupied habitats'. NMFS estimated that annually, approximately 24,166 spring/summer Chinook salmon and 16,794 juvenile steelhead could be affected by increased suspended sediment levels to some degree. These individuals are likely to experience a range of effects including the following:

1. Short-term (<2 hour) reduction in feeding rates, avoidance response, abandonment of cover or an alarm reaction. These responses will be present due to expected suspended sediment levels ranging between normal background levels and approximately 35 mg/l. These effects constitute insignificant behavioral modifications and are not considered to have resulted in 'take' to the exposed individuals.

2. Within 600 feet downstream of the work site and for approximately 1.5 hours (following stream rewatering), sediment levels are expected to rapidly peak and then steadily decrease in intensity. Effects are expected to decrease with the decreasing sediment intensity. Effects will range from indicators of major physiological stress to moderate habitat degradation and impaired homing to minor physiological stress and increased rates of coughing and respiration. During this time (1.5 hours) the expected maximum suspended sediment levels are 15,588 mg/l immediately after diversion removal and approximately 100 mg/l 1.5 hours later. Effects associated with these levels are considered 'sub-lethal' to exposed individuals but are still considered 'take' under the ESA. Suspended sediment levels during this time period and within the 600 feet of affected habitat will temporarily degrade critical habitat rearing capacity. The incidental take from suspended sediment related effects authorized by this Opinion is limited to sub-lethal effects lasting no longer than 1.5 hours after rewatering of the construction site and effects not extending greater than 600 feet downstream of any individual worksite.

3. For up to 22 hours after effects described in number two above, the fish are likely to be exposed to sediment levels that elicit a behavioral response similar to number one above. Suspended sediment levels are expected to steadily decrease from an approximate maximum of 100 mg/l to background levels. These effects will be present within the same 600 feet of channel but are not considered 'take' under the ESA as the behavioral response is considered to be insignificant.

4. No lethal take is expected to occur as a result of habitat related effects as suspended sediment levels are not expected to exceed 22,026 mg/l at any time.

It is clear that turbidity measurements are not appropriate surrogates for total suspended solids in all cases, and that many other factors can affect turbidity measurements other than suspended sediment levels. We also know that the relationship between turbidity and suspended sediment varies between watersheds and even between different locations within the same watershed (Henley et al. 2000). However, turbidity is less difficult and more economical to measure than suspended sediment when NTUs are not exceptionally high, and some studies (Dodds and Whiles 2004) show high statistical correlations between the two parameters. Most of the time turbidity measurements take 30 seconds, can be done on site, and therefore allow for rapid adjustments in project activities if turbidity approaches unacceptable levels. Given the low relative risk (sub-lethal only) of the anticipated sediment levels to SR Chinook salmon and steelhead, and the fact that turbidity levels and thus effects to fish will steadily decrease with time, NTU levels will be used to guage the extent of take for projects implemented prior to adoption of the proposed monitoring study (Section 1.2.4.3.). Monitoring shall verify NTU values meet Idaho state water quality standards for NTUs (50 NTU instantaneous over background levels [Idaho DEQ n.d.a]) 600 feet downstream of the project within 1.5 hours of site re-watering. Literature reviewed in Lloyd (1987) and Rowe et al. (2003) indicated that NTU levels below 50 generally elicit only behavioral responses from salmonids thereby making this a suitable interim surrogate for sub-lethal incidental take monitoring.

Projects occurring in habitat occupied by ESA-listed species are required to dewater the project work area during stream crossing or replacement/removal activities. The dewatering of these sites requires that any ESA-listed fish be removed from the work site. The proposed action results in various levels of take ranging from harassment, handling, stress, injury and mortality. Adults of the ESA-listed species considered in this Opinion will not be affected by dewatering activities.

NMFS estimated the total number of fish that may be handled, hazed, injured, killed or otherwise harmed during the dewatering of individual project work sites in section 2.5.3, Table 6. Results of that analysis are reported below. Implementation of the proposed action may result in up to 1,761 spring/summer Chinook salmon parr, 387 steelhead parr and 774 steelhead fry being hazed, dip-netted, handled and electrofished annually. All of this handling is considered to be non-lethal 'take' under the ESA and any exceedance of these values is not authorized under this incidental take statement.

Use of electrofishing to salvage fish from proposed work areas is likely to cause annual incidental mortality of up to nine spring/summer Chinook salmon parr, one steelhead parr and two steelhead fry across the analysis area. Stranding of individual fish during dewatering of construction sites is likely to cause the largest proportion of fish mortality under the proposed action. NMFS calculated that approximately 398 spring/summer Chinook salmon, 103 steelhead parr and 207 steelhead fry may be stranded and killed each year the programmatic consultation is in place. Therefore, the total lethal take associated with implementation of the proposed action is limited to 407 spring/summer Chinook salmon, 104 steelhead parr and 209 steelhead fry. The total expected take is based on the maximum number of projects that may be implemented in any year this programmatic consultation is in place as well as the distribution of ESA-listed anadromous fish within the action area. The provided estimate is considered to be a worst case scenario as all assumptions NMFS applied in the calculations were believed to be conservative and thus have a tendency to overestimate the actual take that may occur.

Monitoring of annual take is critical to ensure that all assumptions used to develop this take statement are accurate and that the action agencies do not exceed the amount of take authorized. Post project monitoring reports (Appendix B) for all projects completed in "occupied" habitat shall be completed and submitted to NMFS, Idaho State Habitat Office, within four weeks of individual project completions. If at any time the level or method of take exempted from take prohibitions and quantified in this Opinion is exceeded, reinitiation of consultation is required.

2.8.2. Reasonable and Prudent Measures

The RPMs are non-discretionary measures to avoid or minimize take that must be carried out by cooperators for the exemption in Section 7(o)(2) to apply. The FS and BLM have the continuing duty to regulate the activities covered in this incidental take statement where discretionary Federal involvement or control over the action has been retained or is authorized by law. The protective coverage of Section 7(o)(2) may lapse if the FS or BLM fails to exercise their discretion to require adherence to terms and conditions of the incidental take statement, or to exercise that discretion as necessary to retain the oversight to ensure compliance with these terms and conditions. Similarly, if any applicant fails to act in accordance with the terms and conditions of the incidental take statement, protective coverage may lapse.

NMFS believes that full application of conservation measures included as part of the proposed action, together with use of the RPMs and terms and conditions described below, are necessary and appropriate to minimize the likelihood of incidental take of ESA-listed species due to completion of the proposed action.

The FS and BLM shall:

1. Minimize incidental take by appropriate consideration of alternative project designs and implementation methods.

2. Minimize incidental take that occurs as a result of programmatic project implementation.

3. Ensure completion of appropriate monitoring and timely reporting to confirm that projects implemented under this Opinion are meeting objectives of the programmatic consultation and are also not exceeding the amount and/or extent of take from permitted activities.

2.8.3. Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the FS, BLM and their cooperators, including the applicant, if any, must fully comply with conservation measures described as part of the proposed action and the following terms and conditions that implement the RPMs described above. Incomplete compliance with these terms and conditions would invalidate this take exemption.

1. To implement RPM #1 (project design and implementation), the FS and BLM shall ensure that:

    a. Stream Channel Simulation Design skills are readily accessible to CDTs and Level 1 teams and are implemented consistently across the action area.

    b. The CDTs seek input from Level 1 teams during design process and during pre-project reviews and remain flexible in the design process in order to adapt to various and unique site conditions and ensure the likelihood that completed projects meet programmatic objectives.

    c. New crossing structures are greater than bankfull width where the CDT or Level 1 consensus determines that; (1) it may be necessary to pass debris; (2) it may be necessary to minimize effects to meander pattern in low gradient channels; or (3) other site specific conditions dictate an increased width.

2. To implement RPM#2 (Minimization of take as a result of programmatic project implementation), the FS and BLM shall ensure that they:

    a. Implement the following best management practices in addition to implementing all programmatic activities consistent with the design criteria, activity types, prohibited projects and mitigation measures presented in the proposed action:

        (1) Minimize extent of riparian clearing activities (especially during site preparation, excavation and diversion channel construction). Disturbance levels shall be minimized to the extent possible but will not exceed removal of more than

three trees greater than eight inches DBH without prior approval from appropriate Level 1 team. Replacement trees of the desired species will be planted as part of site rehabilitation.

(2) Implement the design criteria F6a described in Appendix C, 'Minimize Site Preparation Impacts', where maintenance activities are implemented.

(3) Limit potential take and channel disturbance from live channel stream crossings during site excavation and maintenance construction phases. Ensure that fish are cleared from the area and the site is dewatered prior to any mechanical stream crossing in 'occupied' habitat.

(4) Reduce the potential number of fish hazed, captured, handled or electrofished during fish salvage operations by reducing streamflow *prior* to fish salvage operations at all sites (including electrofishing sites).

(5) When reducing flow during the dewatering phase, approximately 80% of streamflow should be rapidly removed to encourage the greatest degree of volitional movement from the project site. Any alternative dewatering approach must receive approval from the appropriate Level 1 team. Team approval shall determine that the alternative method is consistent with the intent of this Opinion and the anticipated level of take will not be exceeded.

(6) Fish salvage shall proceed from the least invasive method to most invasive. Seine nets will first be walked down the proposed dewatered area to 'herd' fish out of all project sites after initial dewatering. Dip-netting of stranded fish in isolated pools will occur next and electrofishing efforts (where determined necessary by the CDTs) will proceed last.

(7) Electrofishing (where utilized) will be conducted with a three pass method to ensure the greatest level of fish salvage except where previous approval from the appropriate Level 1 team is received to perform more or less passes.

(8) Ensure that holding conditions for any transported fish provide the lowest level of stress to captured individuals by maintaining local stream conditions (temperature, dissolved oxygen etc.) in holding tanks, minimizing holding time and avoiding any predation in holding vessels.

(9) Release all transported fish to a safe location as quickly as possible. Fish release upstream of the project site is preferred as sediment impacts would not likely affect individuals upstream of the crossing.

(10) Cease project operations under high flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.

b. Survey all proposed ford sites prior to design and implementation to ensure no potential spawning habitat for ESA-listed species is present.

c. Provide Level 1 teams with a written rationale statement (attached to pre-project checklist) supporting any determination that overall impacts to stream channels will be reduced at crossing sites proposed for conversion to a ford.

3. To implement RPMs #3 (monitoring and reporting), the FS and BLM shall ensure that:

a. All captured, handled and killed ESA-listed fish shall be identified, counted and reported on the 'post-project checklist' (Appendix B).

b. The Action Agencies shall seek to implement the proposed suspended sediment monitoring as described in the proposed action (Section 1.2.4.3). Since it is unlikely that the coordinated monitoring plan will be implemented immediately, the action agencies shall implement an interim monitoring effort utilizing NTU measurements until the proposed monitoring program is implemented. A reasonable sample of projects (at least one per administrative unit per year) implemented under this consultation will be assessed to assure that the incidental take associated with suspended sediment and exempted in this Opinion has not been exceeded. Monitoring will assess the duration and intensity of turbidity to verify the extent of take exempted in this incidental take statement (Section 2.8.1). The NTU values shall not exceed the Idaho water quality turbidity standard (50 NTUs instantaneous over background [ID DEQ n.d.a]) 1.5 hours after site rewatering. The interim monitoring effort will be necessary until the action agencies' suspended sediment monitoring proposal becomes operational.

(1) NTUs will be recorded at the following locations: (a) Above the project work site; (b) immediately downstream of the project worksite; and (c) approximately 600 feet downstream of the project worksite.

(2) NTU measurements shall be recorded at the following times: a) prior to rewatering of the worksite; b) at 30 minute intervals.

(3) Monitoring of NTUs shall continue until values have decreased below the state NTU standard (ID DEQ n.d.a) or for 4 hours, whichever is achieved first.

If the results of any monitoring effort indicate that the extent of take may have been exceeded, then the action agencies shall coordinate with the Interagency Fish Passage Consultation Team to determine if further action or additional monitoring efforts may be necessary.

c. All monitoring results are submitted with that projects 'post-project' checklist (Appendix B) is submitted within four (4) weeks of project completion for all projects completed under this programmatic consultation.

d. 'Pre-and-post-project checklists' and results of suspended sediment monitoring are reported via the NMFS Public Consultation Tracking System (PCTS) IV online forum when it becomes available.

If the PCTS IV system is not available at the time reports are due submit the 'post-project checklist' to:

Idaho State Director
Habitat Conservation Division
National Marine Fisheries Service
10095 W Emerald St.
Boise, ID 83704

e. NOTICE: If a sick, injured or dead specimen of a threatened or endangered species is found in the project area, the finder must notify NMFS through the contact person identified in the transmittal letter for this Opinion, or through Idaho State Habitat Office of NMFS Law Enforcement at (208) 321-2956, and follow any instructions. If the proposed action may worsen the fish's condition before NMFS can be contacted, the finder should attempt to move the fish to a suitable location near the capture site while keeping the fish in the water and reducing its stress as much as possible. Do not disturb the fish after it has been moved. If the fish is dead, or dies while being captured or moved, report the following information: (1) NMFS consultation number; (2) the date, time, and location of discovery; (3) a brief description of circumstances and any information that may show the cause of death; and (4) photographs of the fish and where it was found. NMFS also suggests that the finder coordinate with local biologists to recover any tags or other relevant research information. If the specimen is not needed by local biologists for tag recovery or by NMFS for analysis, the specimen should be returned to the water in which it was found, or otherwise discarded.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

The consultation requirement of Section 305(b) MSA directs Federal agencies to consult with NMFS on all actions, or proposed actions that may adversely affect EFH. 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 to EFH may result from actions occurring within EFH or outside EFH, and may include

Site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) also requires NMFS to recommend measures that may be taken by the action agency to conserve EFH.

The Pacific Fishery Management Council (PFMC) designated EFH for Chinook salmon (PFMC 1999). The proposed action and action area for this consultation were previously described in the Introduction to this document. The action area includes areas designated as EFH for various life-history stages of SR spring/summer Chinook salmon (PFMC 1999). The effects of the proposed action on EFH are as follows:

The effects on SR Chinook salmon EFH are the same as those for SR spring/summer Chinook critical habitat and are described in detail in the Effects of the Action sections of this Opinion. The proposed action may result in short-term adverse effects on a variety of habitat parameters as well as immediate and long-term benefits to others. These effects are:

1. **Water Quality.** Water quality in the action areas may be temporarily reduced due to increased turbidity from construction activities. This could negatively affect juvenile feeding until the channel and structures are fully stabilized. Removal/replacement of undersized crossings may reduce ongoing sedimentation and channel scouring thus reducing sediment levels and improving water quality over the long-term. Operation of heavy equipment in or near the stream channel elevates the risk for accidental fuel and oil contamination of the aquatic environment within the action area although design criteria in the proposed action are expected to reduce the risk to discountable levels. In the long-term, the action area's water temperature quality may improve, as problematic sediment sources stabilize and riparian structure and function improve.

2. **Substrate.** Temporary pulses of sediment and turbidity plumes are expected to cause small increases in downstream sediment deposition (increased surface fines), negatively affecting substrate in the short-term. However, any deposited sediments liberated during project activities are expected to be entrained during the next channel adjusting discharge. Increased surface fines are not expected to persist beyond 6 months. Due to design criteria to avoid redds and limit the sediment introduced and thus deposited, this temporary increase is not expected to be significant. Further, these sediment levels are considered to be negligible in relation to the annual sediment load during peak discharge. Removal/replacement of undersized culverts should reduce chronic sedimentation and eliminate adverse channel adjustments associated with undersized crossings (downcutting). Additionally, the long-term risk of culvert failures and associated channel scouring events should be decreased with project implementation.

3. **Cover/Shelter.** Cover/shelter may be slightly and temporarily negatively affected due to increases in turbidity and sediment deposition during project construction activities. Overhead cover provided by riparian vegetation is not expected to change in the short-term since the amount of riparian vegetation that could be removed is considered

insignificant in the context of subwatersheds. Use of riprap within project sites may incrementally reduce the rearing quality of habitat at the sites for a distance up to 38 feet per site. Site rehabilitation efforts will encourage riparian recovery over the long-term. Pool habitat quality is not expected to be impaired by project activities.

4. **Food.** Increases in turbidity and sedimentation may temporarily reduce macroinvertebrate communities within the turbidity plume downstream of (<600 feet) individual project sites. However, increased stability of the stream channel due to stream simulation designs and reduced chronic sediment loads may positively affect macroinvertebrate communities in the affected watersheds over the long-term.

5. **Riparian Vegetation.** Removal of stream crossings should increase the potential riparian vegetation and improve riparian function. Although stream simulation replacement culverts will continue to restrict riparian function at crossing locations, decreased channel instability is likely to improve riparian function downstream of sites. Clearing of vegetation within individual project work sites is expected to have a short-term reduction in riparian presence. Rehabilitation efforts will ensure that riparian function is restored or improved in the long-term.

6. **Access.** Passage at project sites will continue to be impaired at project sites during construction activities. Following completion of individual projects, passage should be restored at treated sites. This is an overall improvement to fish passage.

7. **Floodplain Connectivity.** Floodplain connectivity will be improved at stream crossing removal sites but will continue to be impaired at replacement sites. Stream simulation design is likely to improve channel function at these sites though and floodplain connectivity may be improved where drastically undersized culverts previously existed.

3.1. EFH Conservation Recommendations

NMFS believes that the implementation of the five conservation recommendations, the three RPMs and associated Terms and Conditions provided in sections 2.6, 2.8.2 and 2.8.3 of the above Opinion are adequate to ensure conservation of EFH within the action area. These recommendations are necessary to avoid, mitigate, or offset the impact of the proposed action on EFH. These Conservation Recommendations are an identical set of the ESA Conservation recommendations, and RPMs.

NMFS believes that full application of conservation measures included as part of the proposed action, together with implementation of conservation recommendations, RPMs and terms and conditions described in sections 2.6, 2.8.2 and 2.8.3, are necessary and appropriate to minimize the likelihood of adverse impacts to SR Chinook EFH due to completion of the proposed action

3.2. Statutory Response Requirement

Federal agencies are required to provide a detailed written response to NMFS' EFH conservation recommendations within 30 days of receipt of these recommendations [50 CFR 600.920(j)(1)]. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse affects that the activity has on EFH. If the response is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

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.

3.3. Supplemental Consultation

The FS and BLM 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(k)].

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.

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

This ESA and EFH consultation concludes that the Stream Crossing Structure Replacement and Removal Activities Programmatic action will not jeopardize the affected ESA-listed species. Therefore, the FS and BLM can authorize, fund and carry out this action in accordance with their authority under the Forest and Rangeland Renewable Resources Planning Act (1974), as

amended by the National Forest Management Act (1976) and it's implementing regulations. The intended users are Regions 1 and 4 of the FS, the Idaho State office of the BLM and the agencies cooperators.

Individual copies were provided to the above-listed entities. This consultation will be posted on the NMFS Northwest Region website (http://www.nwr.noaa.gov). The format and naming adheres to conventional standards for style.

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.

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 600.920(j).

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the Literature Cited 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.

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Appendix A
Pre Project Documentation List
Stream Crossing Removal and or Replacement Programmatic Consultation

The Culvert Design Teams will provide the information found in this document to Level 1 Teams in an annual Level 1 Team meeting or prior to individual project implementation:

- List of all projects proposed to be completed during the upcoming field season under this programmatic biological assessment (BA) (occupied and unoccupied habitats, perennial and intermittent channels)
- Maps showing location of proposed projects
- A pre-project checklist (attached) for each project within occupied habitat (or group of projects) documenting:
    - Project(s) name, stream name(s)
    - Category of project (from this BA)
    - Date, and projected date of implementation
    - Administrative unit office(s) and general location of project(s)
    - Relevant bull trout core areas; relevant steelhead and/or Chinook salmon Technical Recovery Team (TRT) populations (see Appendix B)
    - Culvert Design Team members and positions, including Line Officer
    - Map with UTMs, latitude/longitude, or range/township/section(s)
    - Project site photos
    - Project design specifications, including:
        - Width and slope of existing structure
        - Bankfull width and natural slope of stream channel
        - Proposed structure type
        - Width and slope of proposed structure
    - NEPA document (if applicable)
    - Plan for spill prevention, containment, control, and prevention
    - Checklist of ESA-listed species and critical habitat within project area
    - Fish passage (coarse screen filter value from San Dimas protocol - red, gray, green[Clarkin et al. 2003])
    - Checklist of required mitigations (see Table 5)

NMFS Level 1 Team members will assure that copies of pre-project checklists are submitted to and housed at the NMFS Idaho Habitat Branch Office.

NMFS Tracking # _____**USFWS Tracking #** _____

PRE PROJECT CHECKLIST FOR
ACTIONS IMPLEMENTED UNDER THE FS & BLM PROGRAMMATIC STREAM CROSSING AND REPLACEMENT BIOLOGICAL ASSESSMENT

This checklist is to be completed before project implementation.

This checklist is for projects within occupied habitat and/or perennial channels.

This checklist is to be submitted to NMFS and FWS at an annual Level 1 Meeting.

Project (or group of projects): _____

Stream Name(s): _____

Anticipated date of implementation: _____

Number of proposed sites in 'unoccupied habitat':_____

Project category (from BA): _____

Pre-project fish passage (from San Dimas protocol) (red, green, gray): _____

Administrative unit office: _____

Bull trout core area (from BA App. B): _____

Chinook, steelhead populations (from BA App. B): _____

Culvert Design Team

Fish Biologist _____Engineer _____

Hydrologist _____ Other _____

Deciding Official (Line Officer) _____

Relevant Attachments (check those that apply):

Map (required) ____ Project design specifications (required) _____

NEPA document _____ Checklist of applicable mitigations (from BA) _____

Photos _____ Spill plan _____

NMFS Tracking # _____**USFWS Tracking #** _____

ESA-listed Species within Project Area (check those that apply):

Species	**√**	**Species/Critical Habitat**	**√**
McFarlane's four-o'clock		Bull trout – Columbia DPS	
Ute ladies'-tresses		Critical habitat	
Spalding's catchfly		Bull trout – Jarbidge DPS	
Water howellia		Critical habitat (proposed)	
Slender moonwort (candidate)		Steelhead (anadromous)	
		Critical habitat (proposed)	
Bald eagle		Steelhead (resident)	
Yellow-billed cuckoo (candidate)		Critical habitat (proposed)	
		Sockeye salmon	
Gray wolf - experimental		Critical habitat	
Gray wolf - endangered		Spring/summer Chinook salmon	
Northern Idaho ground squirrel		Critical habitat	
Southern Idaho ground squirrel (candidate)		Fall Chinook salmon	
Canada lynx		Critical habitat	
Columbia spotted frog (candidate)			

Appendix B

Post Project Documentation and Monitoring

The Culvert Design Teams will provide the information described in this document to Level 1 Teams in an annual Level 1 Team meeting.

- List of projects in occupied habitat completed during the past field season under this programmatic BA.
- Maps showing location of projects completed during the past field season.
- A post-project monitoring checklist (see Appendix C) for each project completed within occupied habitat (or group of projects) during the past field season. This checklist will be identical to the pre-project checklist, and will also include:

    - Width and slope of new structure;
    - Bankfull width and natural slope of stream channel;
    - Miles of stream opened up to fish passage;
    - Species, number, and life stage of ESA-listed fish handled, injured or killed; area dewatered, methods of fish collection;
    - Documentation of any headcutting occurring above and below project area;
    - Substrate retention, recruitment, and size;
    - Erosion from sites associated with project;
    - Success of fish passage rehabilitation (coarse screen filter value from San Dimas protocol - red, gray, green[Clarkin 2003]); and
    - Checklist of mitigations implemented (See Opinion's Table 2)

- List of projects and monitoring information for projects that were monitored during the past field season, that were completed previous to the past field season. Monitoring information should include:

    - Photos;
    - Field observations after high flow events;
    - Success of fish passage rehabilitation;
    - Headcutting, erosion, or scour associated with project;
    - Success of revegetation; and
    - Substrate retention, recruitment, size.

NMFS Level 1 Team members will assure that copies of post-project checklists are submitted to and housed at the NMFS Idaho Habitat Branch Office.

NMFS TRACKING # _____ **USFWS TRACKING #** _____

STREAM CROSSING REPLACEMENT/REMOVAL PROGRAMMATIC SECTION 7 POST-PROJECT CHECKLIST

This checklist is to be completed immediately following project implementation.

This checklist is for projects within occupied habitat and/or perennial channels.

This checklist is to be submitted to NMFS and FWS within four weeks of project implementation.

Project and stream names: _____Forest/District: _____
Date of implementation start: _____ Date of Completion:_____

Post-project fish passage: (red, green, gray): _____

Attach copy of Pre-Project Checklist: _____

Attach copy of Mitigation Implemented Checklist: _____

Electrofishing site (Y/N): ____ Attach photos: _____

Monitoring Information:

Width and slope of new structure _____

Bankfull width and natural slope of stream channel _____
Miles of stream opened up to fish passage _____

Pre-project fish density (#/100 m^2) by species (present data if available)_____

Species, number, and life stage of ESA-listed fish handled, injured or killed during project:

Electrofishing:

Handled: _____
Injured: _____
Killed: _____

Seining/dipnetting:

Handled: _____
Injured: _____
Killed: _____

NMFS TRACKING # _____ **USFWS TRACKING #** _____

Area dewatered during project:_____

Method(s) of fish collection during project:_____

If applicable to site, NTU units (measured at a minimum of 1 administrative site per year recorded at 30 minute intervals starting before rewatering and until levels meet Idaho water quality standards (ID DEQ n.d.a.). (Include: time, distance from crossing, and intensity NTU value or suspended sediment information):_____
_____

Headcutting above and below project area: _____
_____

Substrate retention, recruitment, and size: _____
_____

Erosion from sites associated with project: _____
_____

Appendix C
Stream Crossing Replacement and or Removal Programmatic Consultation
Conservation Measures Applicable to Programmatic Activities

This summary list of conservation measures is a direct copy of ‘mitigation measures’ presented in the BA.

F1. Buffers

F2. Low-water Work Windows

F3. Fish Avoidance

F4. Pollution Control Measures

a. Clean Water Act

b. Spill Prevention, Containment, and Reporting

c. Minimize Exposure to Heavy Equipment Fuel/Oil Leakage

F5. Aquatic Invasive Control Measures

F6. Erosion Control Measures

a. Minimize Site Preparation Impacts

b. Minimize Earthmoving-related Erosion

c. Minimize Temporary Stream Crossing Sedimentation

d. Minimize Sedimentation through Dewatering

e. Flow Re-introduction

f. Site Rehabilitation

F1. Buffers. The Culvert Design Team (CDT) will recommend site-specific riparian buffers for specific activities to avoid delivery of sediment or contaminants to streams (see F4, F5, and F6). The CDT may designate buffers of different widths for different activities such as site preparation, equipment work areas, equipment staging areas, equipment fueling and maintenance areas, earthmoving, and stockpile areas. These widths may vary due to presence of occupied or unoccupied habitat, perennial or intermittent channels, floodplain width, riparian characteristics, size of stream, depth of stream valley, and other site-specific characteristics. For administrative units still within PACFISH/INFISH direction, all equipment fueling, maintenance, and staging areas will be outside of riparian habitat conservation areas (RHCAs) unless no other option is available. When no option is available, the CDT will consult with Level 1 Teams to identify adequate avoidance and minimization measures for the site.

F2. Low-water Work Windows. All projects will be conducted during low flow conditions, which typically occur from late summer through fall (specific low flow periods will be determined by a hydrologist). The State of Idaho stream alteration permit will provide in-channel work window suggestions to avoid adverse effects to ESA-listed fish species for specific locations. All projects will be completed within one work season.

F3. Fish Avoidance. A fish biologist or designee will conduct all of the following fish survey evaluations and work area clearing operations. Once those evaluations are completed it is not necessary for a fish biologist to be on site during all project actions. A fish biologist will direct or conduct a planning survey of the project stream during project planning to determine if ESA-listed fish species inhabit the project area. If the stream is intermittent, the planning survey will be conducted when water is in the channel. If the project stream in the general vicinity of the project site is found to be occupied by ESA-listed fish species or is within 600 feet upstream of occupied habitat, instream work should be conducted only during low flows and/or within the recommended in-channel work windows identified in stream alteration permits, using all fish avoidance and other mitigation measures listed below.

If the stream in the general vicinity of the project site is found to be occupied by ESA-listed fish species, a fish biologist or designee will conduct a pre-work survey of the project site again, immediately prior to any instream work. Should migrating adults, spawning listed fish, or their redds be observed within the area that would be directly mechanically disturbed or disrupted by project actions or 600 feet downstream, the project does not fit within these programmatic BA guidelines (see section II.D: Excluded Projects). The CDT will coordinate with the Level 1 Team on a recommended course of action, which could include initiation of site-specific consultation. This potential delay will be built into contract language for instream project activities.

During the pre-work survey, should non-spawning, non-migrating listed fish be observed within the area (or 600 feet downstream) that would be directly mechanically disturbed or disrupted by project actions, the CDT will determine whether passive movement of fish can be achieved by slow dewatering, or whether less passive methods to clear the project site of fish should be used. Passive movement of fish can usually be achieved by slow dewatering in steeper channels, and less passive methods are rarely used in culvert projects on the Payette National Forest (Dave

Burns, Payette National Forest fisheries Biologist, McCall, Idaho, personal communication). Should less passive methods be warranted, a fish biologist will attempt to clear the area of fish before the site is dewatered and the flow is bypassed. This could be accomplished by a variety of methods, including seining, dipping, or electroshocking, depending on specific site conditions. Under normal conditions, block nets will be installed, fish will be captured and relocated, streamflow will be diverted around the project area, and block nets will be removed all in the same day. On very rare occasions, block nets may remain in the stream overnight when the fish capture and diversion activities require additional time to complete. All handling of fish, using any method, will be conducted by or under the direction of a fisheries biologist, using methods directed by the following:

- National Marine Fisheries Service (NMFS) Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act (NMFS 2000, see Appendix F)

- NMFS steelhead collection permits (if applicable)

- Idaho Department of Fish and Game Scientific Collection Permit (or Nevada equivalent)

F4. Pollution Control Measures

a. Follow State Water Quality Guidelines (Clean Water Act). Project actions will follow all provisions of the Clean Water Act (CWA) and provisions for maintenance of water quality standards as described by Idaho Department of Environmental Quality (IDEQ) (or its Nevada equivalent). Programmatic projects will be in compliance with all applicable state and Federal laws and processes (*e.g.*, Section 404 permits). The CDT engineers and/or hydrologists will summarize specific pertinent guidelines for each project.

The CWA requires States to set water quality standards sufficient to protect designated and existing beneficial uses. In Idaho, "Sediment shall not exceed quantities.....which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Section 350" (Idaho Administrative Procedures Act (IDAPA) 58.01.02 .200.08). In Idaho State Water Quality Standards for Aquatic Life (Section 250), “Turbidity shall not exceed background turbidity by more than 50 nephelometric turbidity units (NTUs) instantaneously (at any point in time) (IDAPA Idaho Code 58.01.02.350.01.a). In Section 350 (Rules Governing Nonpoint Source Activities), "Best management practices should be designed, implemented, and maintained to provide full protection or maintenance of beneficial uses. Violations of water quality standards which occur in spite of implementation of best management practices will not be subject to enforcement action. However, if subsequent water quality monitoring and surveillance indicate water quality standards are not met due to nonpoint source impacts , even with the use of current best management practices, the practices will be evaluated and modified as necessary by the appropriate agencies in accordance with the provisions of the Administrative Procedures Act" (IDAPA 58.01.02.350.01.a).

b. Spill Prevention, Containment, and Reporting. All vehicles carrying fuel will have specific equipment and materials needed to contain or clean up any incidental spills at the project site. Equipment and materials will be specific to each project site, and can include spill kits appropriately sized for specific quantities of fuel, shovels, absorbent pads, straw bales, containment structures and liners, and/or booms. Storing and refueling areas will be located in staging areas away from streams in areas where a spill would not have the potential to reach live water. Containment structures may be necessary if prevention of spilled material from reaching live water cannot be assured. All pumps and generators used within PACFISH/INFISH RHCAs (for administrative units operating within PACFISH/INFISH direction), or riparian conservation area equivalents (for administrative units within the SWIEG), will have appropriate spill containment structures and/or absorbent pads in place during use.

Should quantities of stored fuel for a project exceed 660 gallons in a single tank; or exceed 1,320 gallons for all storage combined; contractors and agency operators will be required to have a standard Environmental Protection Agency (EPA) written Spill Prevention Control and Containment (SPCC) Plan onsite, which describes measures to prevent or reduce impacts from potential spills (from fuel, hydraulic fluid, etc.) (40 CFR 112, Oil Pollution Act relating to SPCC Plans).

For all culvert projects which involve fuel storage and refueling actions conducted under this BA, a written spill plan is required. This spill plan shall be developed, recommended and/or approved by the CDT (or members thereof). The plan will contain a description of the specific hazardous materials, procedures, and spill containment that will be used, including inventory, storage, and handling.

Federal and Idaho state regulations regarding spills will be followed: Any spills resulting in a detectable sheen on water shall be reported to the EPA National Response Center (1-800-424-8802). Any spills over 25 gallons will be reported to the IDEQ (1-800-632-800) (or Nevada equivalent), and cleanup will be initiated within 24 hours of the spill.

c. Minimize Exposure to Heavy Equipment Fuel/Oil Leakage. Methods to minimize fuel/oil leakage from construction equipment into the stream channel include the following:

> ***i.*** All equipment used for instream work will be cleaned of external oil, grease, dirt and mud; and leaks repaired; prior to arriving at the project site. All equipment will be inspected by the Contracting Officer's Representative before unloading at site. Any leaks or accumulations of grease will be corrected before entering streams or areas that drain directly to streams or wetlands.
>
> ***ii***. Equipment used for in-stream or riparian work (including chainsaws and other hand power tools) will be fueled and serviced in an established staging area (site-

specifically recommended by CDT). When not in use, vehicles will be stored in the designated staging area. The staging area should be in an area that will not deliver fuel, oil, etc. to streams.

iii. Oil-absorbing floating booms, and other equipment such as pads and absorbent "peanuts" appropriate for the size of the stream, will be available on-site during all phases of construction. For very small streams with few pools or slack water, booms may not be effective. More pads and straw bales to anchor booms may be necessary. Booms will be placed in a location that facilitates an immediate response to potential petroleum leakage.

F5. Aquatic Invasive Control Measures. Many streams have invasive aquatic species such as the New Zealand Mudsnail and Whirling Disease. Many of these species are practically invisible to the naked eye and impossible to detect if attached to heavy equipment. To ensure that equipment is not contaminated, any visible plants, mud and dirt will be removed by washing any equipment likely to come into contact with water offsite, well away from streams. Equipment will be dried thoroughly after decontamination.

Programmatic projects that would facilitate brook trout expansion into occupied bull trout habitat will not be included under this BA. Projects in streams known or suspected to contain non-native, invasive, competitive fish species (*e.g.*, brook trout) that would not facilitate brook trout expansion into occupied bull trout habitat, will require evaluation by the CDT during project planning. CDTs will discuss individual situations with Level 1 Teams. Discussions between the two teams will evaluate the applicability of individual projects in conforming to this BA at that time.

F6. Erosion Control Measures

a. Minimize Site Preparation Impacts

i. Site clearing, staging areas, access routes, and stockpile areas will be recommended by the CDT in a manner that minimizes overall disturbance, minimizes disturbance to riparian vegetation, and that precludes erosion into stream channels.

ii. If trees need to be removed to facilitate culvert or bridge placement, they will be stockpiled for use in-channel rehabilitation.

iii. When the CDT recommends that sediment barriers are necessary, barriers will be placed around potentially disturbed sites to prevent sediment from entering a stream directly or indirectly, including by way of roads and ditches.

iv. A supply of erosion control materials (*e.g.* silt fence and straw bales) will be kept on hand to respond to sediment emergencies. Sterile straw or certified "weed free" straw will be used to prevent introduction of noxious weeds.

b. Minimize Earthmoving-Related Erosion

i. Additional sediment or erosion control barriers (additional to those recommended above, in Section F6.a.iii.) may be recommended by the CDT once construction commences. These could include Sedimat, straw bale retentions, and off-channel sediment settling ponds. In-channel sediment abatement barriers will capture sediment that is liberated during rewatering of dewatered channels, barriers will be removed, and captured sediment will be disposed of so it is not reintroduced into stream channels. Such barriers will be maintained throughout the related construction and removed only when construction is complete and erosion control is assured.

ii. Instream rocks or bedrock within occupied habitat should be broken without blasting, using non-explosive alternatives such as Betonamit (www.betonamit.co.za/). This noiseless, shock-free, non-toxic product is poured into pre-drilled holes and after a few hours exerts tremendous expansive pressure such that even the hardest rock will be broken into smaller more manageable pieces. This alternative has been analyzed and approved in other programmatic consultations within the analysis area (USDA FS and USDI BLM 2003).

However, it may be impossible in advance to determine if impenetrable rock, resistant to non-explosive alternatives, will be encountered within necessary excavation depths in occupied habitat. Impenetrable rock may only be discovered after onsite excavation actually begins, and may be resistant to non-explosive alternatives. Should this be the case, instream explosive blasting within occupied (but dewatered) habitat is covered by the proposed action, with the following mitigations. Blasting will occur in dewatered or dry channels only, and only outside of the following buffer restrictions, which are based on the weight of explosive charge. The following buffer restrictions, which apply to single shots of a given weight of explosive or single shots in a multiple charge if each shot is separated by an eight millisecond or longer delay, have been analyzed (Wright and Hopky 1998) and determined to protect fish from both swimbladder effects and egg disturbances, and have been approved in other programmatic consultations within the analysis area (see BA Effects Section VI.B.) (USDA FS and USDI BLM 2003). Buffer widths apply to the distance between the blasting activity and the nearest occupied stream bypass entrance or exit.

According to the buffers, a charge of 2.0 pounds requires an 80 foot buffer, which would ensure that effects do not extend outside of the dewatered section of channel (average 175 feet). Assuming the charge would be located in the middle of the dewatered area, effects would not be anticipated beyond 80 feet on either side of the charge, therefore effects would remain within the dewatered area. This BA does not cover the extension of the dewatered area for the sole purpose of increasing the available buffer in order to accommodate larger charge weights. If a larger charge and therefore longer dewatered area is needed to complete the action, or if explosives are necessary within the buffers, the Level 1 Team will be consulted on a recommended course of action.

Buffers for use of explosives in unoccupied habitats in perennial and intermittent channels in occupied watersheds. From USDA FS and USDI BLM 2003.

Explosive Charge Weight (pounds)	Distance from stream necessary to protect fish from swimbladder effects and egg disturbances (feet)
0.5	30
1.0	50
2.0	80
5.0	120
10.0	170
25.0	270
100.0	530
500.0	1180

iii. The CDT will delineate construction impact areas on project plans. Work will be confined to the minimum area necessary to complete the project.

iv. A supply of erosion control materials (*e.g.*, silt fence and straw bales) will be used to respond to sediment emergencies. Sterile straw or "weed free" certified straw bales will be used to prevent introduction of noxious weeds.

v. All project operations will cease, except efforts to minimize storm or high flow erosion, under precipitation and high flow conditions that result in uncontrollable erosion in the construction area.

vi. Native streambed materials may be conserved and stockpiled above the bankfull elevation for later use in-channel rehabilitation and filling culverts. To prevent contamination from fine soils, these materials will be kept separate from other stockpiled material which is not native to the streambed. If a bridge or arch is being constructed, there may be no need to newly disturb native materials.

c. Minimize Temporary Stream Crossing Sedimentation

i. Stream channels in occupied habitat will be dewatered prior to heavy equipment operating within project sites.

ii. Existing roadways or travel paths will be used to access or cross streams whenever reasonable.

iii. In unoccupied habitats only, equipment will only enter the flowing water portion of the stream channel at designated temporary stream crossings (recommended by an aquatic specialist from the CDT).

iv. Temporary crossings will not increase risks of channel re-routing due to high water conditions (unoccupied habitats only).

v. Temporary crossings shall be minimized and conducted at right angles to the main channel where possible (unoccupied habitats only).

vi. Should the CDT determine during planning that the stream bottom needs further protection from channel disturbance and subsequent temporary sediment, temporary stream crossing structures such as rubber mats or temporary bridges may be implemented.

d. Minimize Sedimentation through Dewatering

i. In-channel project sites will be dewatered and completely bypassed prior to excavation.

ii. Any water intake structure (pump) authorized under this proposed action will have a fish screen installed, operated and maintained in accordance with NMFS fish screen criteria (NMFS 1995, and Appendix F)

iii. Flow will be diverted with pumps or structures such as cofferdams, constructed of non-erodible material, such as sandbags, bladder bags, or other means that divert water. Diversion dams will not be constructed with material mined from the stream or floodplain.

iv. The temporary bypass system may be constructed with non-erodible material, such as a pipe or a plastic-lined channel, both of which will be sized to accommodate the predicted peak flow rate (including possible storm intensities) during construction. In cases of channel rerouting, water may be diverted to one side of the existing channel.

v. Flow will be dissipated at the outfall of the bypass system to diffuse erosive energy. The outflow will be placed in an area that minimizes or prevents damage to riparian vegetation. If the diversion inlet is not screened (to allow for downstream passage of fish), the diversion outlet will be placed in a location that facilitates safe reentry of fish into the stream channel (a fish biologist will oversee these measures).

vi. When necessary, water from the de-watered work area will either be pumped to a temporary storage and treatment site, or into upland areas, to allow subsequent filtration through vegetation prior to water reentering the stream channel.

e. Flow Reintroduction

i. In perennial channels, the reconstructed stream channel will be “pre-washed” into a reach equipped with sediment capture devices such as Sedimat, prior to reintroduction of flow to the stream.

ii. In perennial streams, the construction site will be rewatered slowly to prevent loss of surface water downstream as the construction site streambed absorbs water and to minimize a sudden increase in turbidity.

iii. In-channel sediment abatement barriers such as Sedimat will capture sediment that is liberated during rewatering of dewatered channels, barriers will be appropriately cleaned out and removed, and captured sediment will be disposed of so it is not reintroduced into stream channels. Such barriers shall be maintained throughout the related construction and removed only when construction is complete and erosion control is assured.

f. Site Rehabilitation

i. Upon project completion, project-related waste will be removed. Rehabilitation of all disturbed areas will be conducted in a manner that results in conditions similar to pre-work conditions through spreading of stockpiled materials (large woody debris), seeding, and/or planting with native seed mixes or plants. If native stock is not available, soil-stabilizing vegetation (seed or plants) will be used that does not lead to propagation of exotic species.

ii. For culvert removal or bridge projects, the stream channel cross-section and gradient will be reconstructed within the area formerly occupied by a culvert in a manner that reflects more natural conditions found upstream and downstream. Large wood and/or boulders may be placed in the reconstructed stream channel and floodplain (with approval by the CDT) (See Opinion Section 1.2.2, Design Parameters).

iii. No herbicide application will occur as part of the permitted action.

iv. When deemed necessary by the CDT or aquatic specialist, compacted access roads, staging areas, and stockpile areas will be mechanically loosened

v. Trees will be retained at project sites wherever possible. In-stream or floodplain rehabilitation materials such as large wood and boulders will mimic as much as possible those found in the project vicinity. Such materials may be salvaged from the project site or hauled in from offsite but cannot be taken from streams, wetlands, or other sensitive areas (See Opinion Section 1.2.2, Design Parameters).

vi. Trees (greater than 8 inches diameter at breast height) will not be felled in the riparian area for site rehabilitation purposes unless necessary for safety. If necessary for safety, trees may be felled toward the stream and left in place or placed in the stream channel or floodplain when recommended by the CDT.

vii. Site rehabilitation activities (with the exception of further years' seeding and revegetation) will be completed prior to the end of the current field season.