# United States Department of the Interior

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AUG 14 2006

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Subject: Stream Crossing Structure Replacement and Removal Program—Idaho and Nevada—Biological Opinion and Concurrence
File #s 104.0000, 106.0000, 110.0000, 113.0000, 114.0000, 115.0000, 1002.1000 2006-F-0206

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

This letter transmits the Fish and Wildlife Service's (Service) Biological Opinion (Opinion) and concurrence on the anticipated effects to listed species associated with the programmatic consultation for Stream Crossing Structure Replacement and Removal Activities. This program of work, proposed by Regions 1 and 4 of the Forest Service (Forest) and the Idaho State Office of the Bureau of Land Management (Bureau), will be implemented on the following field units in all or a part of Idaho and Nevada: Boise, Payette, Sawtooth, Salmon-Challis, Nez Perce, and Clearwater National Forests; and Challis, Cottonwood, Coeur d'Alene, Four Rivers, Jarbidge, Salmon, and Upper Snake Field Offices of the Bureau. The program of work is intended to address fish passage problems associated with stream crossings, as well as to improve stream function and watershed health. Work components include inventory and prioritization of culvert stream crossings, creation of naturalized stream crossings, and reconnecting fragmented fish habitats.

In a joint letter dated November 30, 2005, and received by the Service on December 5, 2005, the Forest and the Bureau requested formal consultation for your determination under section 7 of the Endangered Species Act (Act) of 1973, as amended, that the program of work identified in your associated Biological Assessment (Assessment) is likely to adversely affect bull trout (*Salvelinus confluentus*). The Service concurs with this determination and has concluded that bull trout in the coterminous United States are not likely to be jeopardized by the proposed work activities. In addition, the Forest and the Bureau determined that the program of work will not adversely affect the following listed species: bald eagle *(Haliaeetus leucocephalus)*, Canada lynx *(Lynx canadensis)*, Gray wolf *(Canis lupus)*, northern Idaho ground squirrel *(Spermophilus brunneus brunneus)*, Ute ladies'-tresses *(Spiranthes diluvialis)*, Macfarlane's four-o'clock *(Mirabilis macfarlanei)*, Spalding's catchfly *(Silene spaldingii)*, and water howellia *(Howellia aquatilis)*. The Service concurs with these determinations and provides additional information in

the enclosure. Similarly, you determined that proposed work activities would not adversely affect the following candidate species: southern Idaho ground squirrel *(Spermophilus brunneus endemicus)*, yellow-billed cuckoo *(Coccyzus americanus)*, Columbia spotted frog *(Rana luteiventris)*, and slender moonwort *(Botrychium lineare)*. We acknowledge these determinations and appreciate your efforts in conserving these species.

In an email dated July 5, 2006, the Forest and the Bureau provided an addendum to the Assessment proposing a study to evaluate suspended sediment levels associated with stream crossing removal or replacement activities. The amount, severity, and spatial extent of suspended sediment effects on listed fishes, although well studied, have not been adequately tied to the types of activities proposed in the Assessment and Opinion. The study, conceived jointly by members of the interagency team involved in the development of the Assessment, is proposed to confirm that the assumptions described in the associated documents are accurate, and to test the validity of using a less costly surrogate for measuring suspended sediments (turbidity as measured by nepholemetric turbidity units). A study that meets these purposes fosters your ability as action agencies to consider time- and cost-effectiveness when meeting obligations pursuant to section 7 consultation, and would benefit all agencies in improving our state of knowledge regarding effects of these and similar actions on fish.

Although this proposal is not a requirement of the Opinion nor considered a part of the proposed action, its implementation is considered a high priority for the action agencies. The Rocky Mountain Research Station in Moscow, Idaho, has expressed an interest in conducting the research, and the study is currently being considered for funding by the action agencies. The Service is committed to this endeavor and is currently in the process of securing additional funding to help ensure its successful initiation and implementation.

Thank you for your continued interest in the conservation of threatened and endangered species. The Service is pleased to be a part of this interagency effort and commend you for your contributions; we believe this programmatic consultation will provide significant conservation benefit to listed aquatic species in Idaho and the systems in which they reside. Through our Level 1 Team representatives and their contacts, we will provide an electronic copy of the Opinion for dissemination to the appropriate specialists in each field unit. We look forward to working with you throughout implementation of this program of work, and will continue to work with the interagency group to initiate the proposed sediment study. Please contact Kendra Womack (208-685-6951) or Mark Robertson (208-378-5287) if you have questions concerning this Opinion and concurrence.

Sincerely,

for Jeffery L. Foss, Field Supervisor
Snake River Fish and Wildlife Office

Enclosure

cc: Forest Service – Region 1, Missoula (Walker)
Forest Service – Region 4, Ogden (Duffield)
Payette NF, McCall (Faurot)
NOAA, Boise (Fealko)
FWS, Reno (Sada)
Payette NF, McCall (Rainville)
Boise NF, Boise (Smith)
Sawtooth NF, (Monahan)
Clearwater NF, Orofino (Reilly)
Nez Perce NF, Grangeville (Cottrell)
Salmon-Challis NF, Salmon (Wood)
BLM – State Office, Boise (Burton)
BLM – Boise District, Boise (Taylor)
BLM – Twin Falls District, Twin Falls (Hedrick)
BLM – Idaho Falls District, Idaho Falls (Kraayenbrink)
BLM – Coeur d'Alene District, Coeur d'Alene (Brown)

# PROGRAMMATIC CONCURRENCE AND BIOLOGICAL OPINION

**for**

# STREAM CROSSING STRUCTURE REPLACEMENT AND REMOVAL PROGRAM

**in**

Idaho National Forests: Payette, Boise, Sawtooth, Salmon-Challis, Nez Perce and Clearwater
Idaho/Nevada Bureau of Land Management: Challis, Cottonwood, Coeur d'Alene, Four Rivers, Jarbidge, Salmon, and Upper Snake Field Offices

**2006-F-0206**

**AUGUST 2006**
**FISH AND WILDLIFE SERVICE**
**SNAKE RIVER FISH AND WILDLIFE OFFICE**
**BOISE, IDAHO**

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## Introduction

This document transmits the Fish and Wildlife Service's (Service) Biological Opinion (Opinion) for Region's 1 and 4 of the Forest Service (Forest Service) and the Idaho Bureau of Land Management's (Bureau) proposal to implement a program to address fish passage problems associated with stream crossings (Program). Program components include inventory and prioritization of culvert stream crossings, creation of naturalized stream crossings, and reconnecting fragmented fish habitats in portions of Idaho and Nevada. Implementation of the proposed Program will occur on the Payette, Boise, Sawtooth, Salmon-Challis, Nez Perce, and Clearwater National Forests in Idaho, and lands under the jurisdiction of the Challis, Cottonwood, Coeur d'Alene, Four Rivers, Jarbidge, Salmon, and Upper Snake Field Offices (Bureau Lands) in Idaho and Nevada. We received the joint Forest Service and Bureau request for formal consultation dated November 30, 2005, on December 5, 2005.

The Service reviewed the proposed Program and its potential effects on bull trout *(Salvelinus confluentus)* in the coterminous United States, bald eagle *(Haliaeetus leucocephalus)*, Canada lynx *(Lynx Canadensis)*, Gray wolf *(Canis lupus)*, northern Idaho ground squirrel *(Spermophilus brunneus brunneus)*, Ute ladies'-tresses *(Spiranthes diluvialis)*, Macfarlane's four-o'clock *(Mirabilis macfarlanei)*, Spalding's catchfly *(Silene spaldingii)*, and water howellia *(Howellia aquatilis)* in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended. As you requested, we also reviewed potential effects to southern Idaho ground squirrel *(Spermophilus brunneus endemicus)*, yellow-billed cuckoo *(Coccyzus americanus)*, Columbia spotted frog *(Rana luteiventris)*, and slender moonwort *(Botrychium lineare)*, candidate species under the Act. Concurrent with this consultation, the Action Agencies are consulting with NOAA fisheries on effects of the Program on listed anadromous fishes and designated and proposed critical habitat.

You determined, and the Service agrees, that the Program is likely to adversely affect bull trout in the coterminous United States. You determined that the proposed Program is likely to adversely affect bull trout critical habitat. However, there is no designated critical habitat in the action area (Service 2005), therefore critical habitat for bull trout will not be considered further in this Opinion. You concluded and we concur that this programmatic action is not likely to adversely affect any other listed species or critical habitat. Justification for these conclusions is included below.

This Opinion is based primarily on information provided in the Biological Assessment (Assessment) for this consultation. A complete record of this consultation is on file at the Service's Snake River Fish and Wildlife Office.

## Consultation History

The Service has been engaged with the Action Agencies for over two years in the development of materials and information for this consultation. During that time, there was substantial informal consultation among Service, National Marine Fisheries Service

(NOAA Fisheries), Forest Service, and Bureau personnel. Following is a summary list of the most important correspondence or other actions relevant to our consultation with the Action Agencies and the development of this Opinion.

| | |
|---|---|
| January 8, 2004 | An interagency conference call involving the Forest Service, NOAA Fisheries, and the Service resulted in initiation of informal consultation on a programmatic action for stream crossing removal/replacement. |
| July 19, 2004 | A team of personnel from the Forest Service, NOAA Fisheries, and the Service was formed to prepare the Biological Assessment for the programmatic stream crossing consultation. |
| July 22, 2004 | The Bureau officially joined the team and initiated informal consultation with the Service on the joint programmatic action. |
| July 22, 2004 to November 30, 2005 | The Biological Assessment was prepared. Multiple drafts and comments between agencies were shared during this period, including numerous electronic mail messages and telephone calls. In addition, regular team meetings were held to discuss issues relevant to the development of the programmatic stream crossing removal/replacement Biological Assessment. |
| November 30, 2005 | The Forest Service and the Bureau provided a final Biological Assessment and requested initiation of formal consultation with the Service for the programmatic stream crossing removal/replacement action. |
| January 26, 2006 | The Forest Service provided clarification to the Service via email on three items in the Biological Assessment. |
| April 27, 2006 | A draft version of this Opinion was released to the action agencies for review and comment. |
| May 29, 2006 | The Service received action agency comments and incorporated them into the Opinion. |

**Concurrent Sediment Monitoring Research Proposal**

In an electronic transmittal dated July 5, 2006, the action agencies documented a preliminary proposal for a coordinated research effort to examine the relationship between turbidity and suspended sediment across various geologies and vegetation types in the action area. This proposal was developed by the Interagency Fish Passage Consultation Team (Service, Bureau, Forest Service, and NOAA Fisheries personnel) concurrent with the development of this Opinion. The study proposal, as currently described, will monitor turbidity and the release of suspended sediment at stream crossing replacement projects implemented under this Program across a sample set of

streams with various geologies and vegetation types throughout the action area. There is more work needed to develop the final design and scope of the study, as well as with the timing of implementation. For these reasons, and because the study is not necessary to complete section 7 consultation, the study proposal and its potential results are not considered further in this Opinion.

**Concurrence for Threatened and Endangered Species**

The Action Agencies determined that, for all listed species other than bull trout, the Program may affect, but is not likely to adversely affect species listed under the Act. The Service concurs with this determination. Our rationales for concurrence are outlined below for each species that may occur in some or all of the action area.

Bald eagle

Bald eagles are likely to occur throughout the area that may be affected by projects carried out under the Program. The nature of the construction activities will confine effects to areas within existing road structures and previous disturbance. Additionally, most project actions will occur in smaller order streams, where bald eagle use is limited. The program includes measures aimed at preventing construction-related disturbance to any bald eagles that may occur within the action area. These measures are outlined in section II.G1 of the Assessment; the Service supports full implementation of these measures to minimize exposure of bald eagles to Program-related activities. As such, potential effects to bald eagles resulting from implementation of projects carried out under the Program are considered insignificant and would not rise to adverse levels.

Canada lynx

Canada lynx may occur in forested habitats within the action area, although the extent of their distribution is largely unknown. All Program activities will occur either within or near existing roads and trails in the action area, where vegetation has been previously degraded or removed. Mitigation measures required under section II.G3 of the Assessment will ensure protection of suitable lynx habitat and will minimize any potential disturbance to Canada lynx. Impacts of Program implementation are expected to be insignificant, and will not likely adversely affect the species.

Gray wolf

Gray wolves that are likely to occur within areas that may be affected by projects carried out under the Program are considered part of the experimental/non-essential population in Idaho. All Program activities will occur either within or near existing roads and trails, will be of short duration, will not affect wolf prey availability, and will not directly impact individual animals or active den sites. No additional measures to minimize Program effects on gray wolves are proposed (section II.G4). The Service does not expect that any project related activities will adversely affect gray wolves, and implementation of the Program will not jeopardize the continued existence of this population.

Wolves in Nevada are not considered part of the experimental/non-essential population. Currently, wolves are not known to inhabit that portion of Nevada considered for this action. If dens or rendezvous sites are identified in proximity to individual projects, the action would fall outside the scope of this Program and would require separate, site-specific consultation.

Northern Idaho ground squirrel

Northern Idaho ground squirrels (NIGS) occur in southwest Idaho on lands managed by the Payette Forest, municipal property, State of Idaho, and private lands. There is also potential habitat for NIGS on the Four Rivers and Cottonwood Field Office areas and the Nez Perce National Forest. The species is not likely to be present in riparian areas that may be impacted by Program activities. Populations of NIGS do exist within meadow habitats that may be used for staging, equipment parking, storage, and camps for construction and/or action agency employees. In areas where NIGS may occur, prior to using any meadow area for Program activities, the Action Agencies propose that a qualified biologist will survey the site to ensure that NIGS are not present. If NIGS are present, the appropriate Streamlining Consultation Level 1 team[1] will be contacted for further recommendations, which may include selecting an alternative site for staging and other activities or initiation of a site-specific consultation. Because of this process, as well as the limited overlap between NIGS habitat and areas where the Program will be carried out, the Service anticipates that the potential for adverse impacts to NIGS associated with is discountable. This is consistent with information in the Assessment (section II.G5), and in supplemental information provided to the Service by the Action Agencies via email on January 26, 2006.

Threatened and Endangered Plants: *Mirabilis macfarlanei, Silene spaldingii, Howellia aquatilis, Spiranthes diluvialis*

The four listed plant species identified above may occur within areas affected by projects carried out under the Program, and some Program activities may have the potential to affect one or more of these species. The proposed action includes procedures outlined in Section II.G7 of the Assessment provide for avoidance of effects to listed plants. Under the these procedures, within the range of these species a qualified botanist will review each project site, and will determine whether a listed plant species occurs within a quarter-mile of the site, and whether project activities have the potential to affect the plant or population of plants. If the botanist determines that a project carried out under the Program has the potential to adversely affect listed plant species the Level 1 team will be notified and a separate section 7 consultation with the Service will be initiated. Any action with potential to adversely affect one of these plant species would be inconsistent with the terms of the proposed action and would not fall within the Program considered in this Opinion.

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[1] Level 1 Teams are composed of representatives of NOAA Fisheries and the Service, and wildlife biologists, fisheries biologists, botanists, hydrologists, and other specialists from a Forest Service or Bureau administrative unit. The groups meet regularly to discuss projects proposed by the administrative units and to provide a forum to expedite the section 7 consultation process. In this Opinion, the "appropriate" Level 1 Team is the team for the administrative unit proposing to implement a given project under this Program.

**Conclusions for Candidate Species**

Although not required to under section 7 of the Act, the Action Agencies have analyzed potential impacts of the Program to species that are candidates for listing under the Act. You concluded that the Program is not likely to adversely affect species that are candidates for listing under the Act. Our comments for candidate species are provided below.

Columbia spotted frog (Great Basin population)
The candidate population of spotted frog is located in southwest Idaho and eastern Oregon. Within the action area, it is known to occur on the Bureau's Boise District, and potential habitat exists in the Jarbidge Field Office. Primary habitat for Columbia spotted frogs is grassy/sedge/rush wetland margins of springs, lakes, ponds, and slow moving streams and marshes; this habitat type is not typical of the areas where Program activities would likely occur. The possible exception is for site preparation activities, which may occur outside the existing road prism and area of previous disturbance, and may result in habitat degradation or direct mortality to individuals. However, the proposed action includes extensive measures to minimize the potential for adverse impacts to Columbia spotted frogs, including pre-construction surveys, implementation of conservation measures (to minimize potential effects to the aquatic environment; see appendix B), and consideration of construction timing. In addition, the spatial and temporal scale of Program activities that may affect Columbia spotted frogs are extremely limited, and significant loss of individuals or habitat is not anticipated for any given population. This is consistent with the Assessment (section II.G6) and additional information provided to the Service via email on January 26, 2006. In considering all factors, the Service agrees with the Forest Service and Bureau's conclusion that any loss of Columbia spotted frogs will be slight and will not adversely affect the species at the population level, with minimal risk of adverse effects to individual frogs.

Yellow-billed cuckoo
Yellow-billed cuckoos may occur throughout the area where the Program will be carried out, although its status and distribution are poorly understood. Yellow-billed cuckoos require large areas of continuous riparian habitat, and removal or disturbance of riparian vegetation is the primary pathway to potential adverse effects associated with the project. Although projects carried out under the Program may require the removal or disturbance of small, localized patches of riparian vegetation, the scale of the habitat impacts will be extremely limited. Conservation measures outlined in section II.F and II.G2 of the Assessment will avoid any significant impacts to yellow-billed cuckoo or their habitats.

Southern Idaho ground squirrel
Southern Idaho ground squirrels (SIGS) occur in the Weiser River basin of southwest Idaho, on private lands and lands managed by the Bureau's Four Rivers Field Office Area, and on state lands managed by the Idaho Department of Lands. The species is not likely to be present in riparian areas that may be impacted by Program activities. Populations of SIGS do exist within meadow habitats in the area covered by this programmatic consultation; meadow areas may be used for staging, equipment parking,

storage, and camps for construction and/or action agency employees. Within the range of the species, prior to using any meadow area for these activities, a qualified biologist will survey the site to ensure that SIGS are not present. If SIGS are present, the appropriate Level 1 team will be contacted for further recommendations, which may include determining an alternative site for staging and other activities or initiation of a site-specific consultation. Based on this process, the Service anticipates that the potential for adverse impacts to SIGS associated with programmatic actions is discountable. This is consistent with information in the Assessment (section II) and in supplemental information provided to the Service by the Action Agencies via email on January 26, 2006.

*Botrychium lineare* (slender moonwort)
*Botrychium lineare* may occur throughout the action area, with the most likely habitats being in meadows, under trees in forested areas, or on cliffs, all at high elevations (Wagner and Wagner 1994 *in* Service 2004). However, a specific habitat description is not possible based on current knowledge of the species. The wide range of potential habitats increases the likelihood that the species will be adversely impacted by Program activities. However, procedures outlined in Section II.G7 of the Assessment limit the analysis under this consultation to those activities that are not likely to adversely affect any candidate plant species.

Under the procedures outlined in section II.G7 of the Assessment, a qualified botanist will review each project site, and will determine whether a listed or candidate plant species occurs within a quarter-mile of the site, and whether project activities have the potential to affect the plant or population of plants. If the botanist determines that a project carried out under the Program has the potential to adversely affect candidate plant species the Level 1 team will be notified and the action agency will initiate separate discussions regarding any potential adverse effects. Adverse effects to candidate plant species associated with the Program are not considered under this programmatic action.

# BIOLOGICAL OPINION

## I. Description of the Proposed Action

### A. Action Area

The action area is defined as all areas to be affected directly or indirectly by the proposed Federal action. Implementation of the proposed Program may occur anywhere listed fish species and proposed or designated critical habitat for fish exist within the Payette, Boise, Sawtooth, Salmon-Challis, Nez Perce, and Clearwater National Forests in Idaho, and lands under the jurisdiction of the Challis, Cottonwood, Coeur d'Alene, Four Rivers, Jarbidge, Salmon, and Upper Snake Field Offices in Idaho and Nevada. Each National Forest or Bureau Field Office is considered an "administrative unit" for purposes of this consultation. Projects carried out under the Program may occur in 32 subbasins (fourth field hydrologic unit codes [HUCs]) in Idaho and Nevada. These HUCs are listed in Tables 3 and 4 of the Assessment, which also list threatened, endangered, and candidate fish, plant, and wildlife species that may occur in each HUC. In this Opinion, Figure 1 shows the action area in Idaho, with land ownership and fourth field HUCs represented. Individual projects under this Program may occur anywhere within the Action Area. The specific location of each action implemented under this Program will be determined later and described in the pre-project documentation materials and agreed upon by the appropriate Level 1 Team.

### B. Proposed Action

The purpose of the Program is to restore physical and biological connectivity, including fish passage, in streams and subbasins within the 13 land management units where listed fish and proposed or designated critical habitat exist. The Program will reduce the impacts of existing road crossing structures or provide means to decommission or close existing roads intermittently or fully. Overall Program goals are consistent with the goals of other regional plans and strategies outlined in section II.A. of the Assessment. The duration of the proposed action is five years following issuance of this Opinion, after which the agencies may consider extension of the Program.

Activities under this Program fall into the six following categories.

- Culvert removal and associated channel rehabilitation;
- Culvert, bridge, or ford replacement with a bridge;
- Culvert or ford replacement with a culvert or open-bottomed arch;
- Culvert replacement with low-water trail ford;
- Short term maintenance in the form of minor modifications or adjustments to structures and associated project components to ensure structural integrity and stream simulation; and
- Post-project monitoring of project implementation.

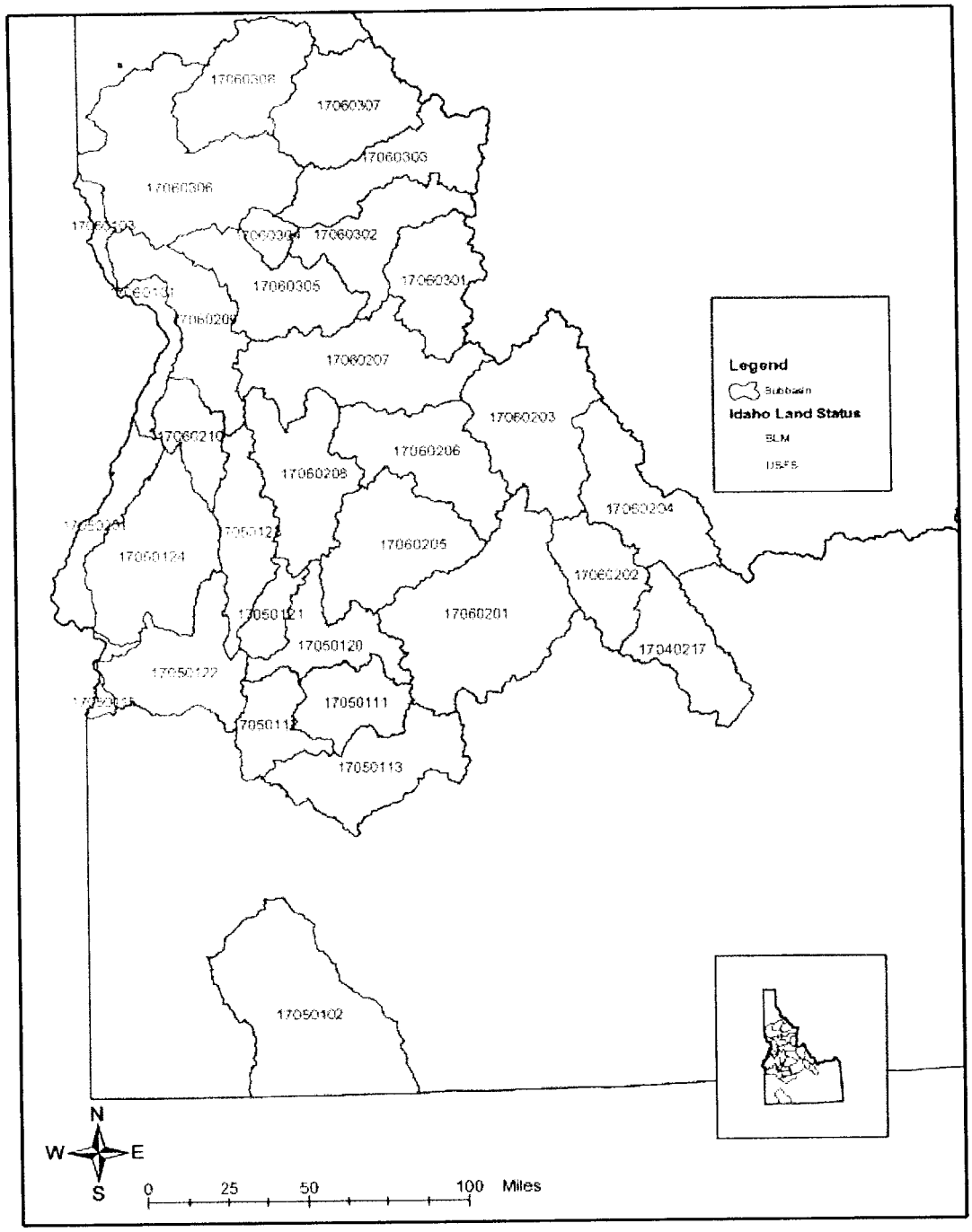


**Figure 1. Subbasins (fourth field HUCs) and land ownership within the portion of the action area that lies in Idaho. This figure does not depict the area of Nevada (Jarbidge River subbasin) that may be affected by the Program.**

On a site-specific basis, the appropriate category of action will be determined by a local culvert design team (Culvert Team), which will be comprised of individuals with expertise in engineering, hydrology, fluvial geomorphology, contract administration, and fisheries and wildlife biology. Each administrative unit that implements actions under the Program will have its own Culvert Team to fulfill the design and implementation requirements of the Program. The degree of involvement of individuals in each area of expertise will vary depending on the specific circumstances associated with each project.

Projects within any of the five categories listed above may be proposed as stand-alone projects, or as components of larger projects. Activities that are components of larger projects are considered in this Opinion only when no other adverse effects to listed fish species or critical habitat are anticipated from the whole action. If the other components of the larger project may have adverse effects, then the entire action—including stream crossing improvements—must be considered in a separate consultation.

This programmatic action anticipates up to 156 culvert removal and/or replacement projects per year. As proposed in the Assessment, each of the 13 land management units proposes to conduct up to 12 projects per year in occupied habitat. Each individual stream crossing is considered one project under this Program. If any administrative unit wishes to conduct more than 12 projects in occupied habitat in a given year, the appropriate Level 1 team must be consulted during an annual meeting to ensure that the potential aggregate effects are within those anticipated in this Opinion. For this consultation, "occupied habitat" refers to perennial or intermittent channels where listed fish species are likely to be present during project implementation, or if the site is within 600 feet upstream of areas where bull trout are likely to be present during project implementation. Not all projects carried out under this Program will have the potential to affect bull trout; some may occur in streams where bull trout are not known to occur. Projects in areas where spawning listed fish or their redds are present and would be directly disturbed or disrupted by project actions are not part of the proposed Program of work and are not considered in this Opinion. Proposed actions in bull trout spawning habitat require separate consultation.

If bull trout are not detected during pre-project surveys (see section 2 below), and are not likely to be present during project implementation, then we do not expect that Program implementation will adversely affect bull trout at those individual project sites. Program activities are likely to result in elevated sediment-levels in all cases, but adverse effects to bull trout are anticipated to occur only in "occupied habitats" as defined above.

**1. Project Design and Prioritization**

Culvert Teams will conduct field reviews of potential project sites, identifying biological and physical characteristics requiring consideration through the design process. The Culvert Teams will consider existing and desired environmental conditions, and will recommend attributes of project design to rehabilitate stream function and/or provide fish passage by mimicking natural conditions as appropriate through the stream simulation design. The Culvert Teams will oversee the collection of project site data essential for

the design of stream simulation structures in occupied perennial and intermittent streams. Information developed may include physical watershed and stream processes such as potential for landslides and debris flows, flood flows, channel character and stability, floodplain character, and flooding potential. See sections II.C and II.E in the Assessment for further details.

Project prioritization may rely on several factors, including partner availability, funding sources, relationship to other projects, draft or final recovery plans for listed fishes, Land Use Plans, and/or the Aquatic Framework of the Interior Columbia Basin Strategy. Prioritization may be related to biological and physical parameters that define the potential for restoring access and function to habitat for listed species, and higher priority may be placed on those projects that implement identified recovery actions from recovery plans (or drafts). Culvert Teams may also consider watershed assessments, transportation analyses, quantity and quality of habitat, number of fish species affected, presence of exotic fish species, risk of headcutting, risk of failure, culvert condition, funding availability, and planning status. When appropriate, the Service recommends that the Culvert Teams solicit input from the appropriate Level 1 Team regarding project prioritization.

**2. Pre-Project Documentation**

As described in the Assessment, each proposed project or set of projects will be documented and presented to the appropriate Level 1 Team in an annual meeting. Culvert Teams will notify Level 1 Teams of all proposed actions to be covered under this Program, and will provide documentation that the projects meet the conditions described in the Assessment and this Opinion. Level 1 Teams will be consulted to assure projects fit within the Program described in this Opinion. Level 1 Teams will also have the opportunity to recommend changes to proposed project designs to accommodate local conditions and concerns; ultimately the Level 1 Teams will have the responsibility to determine whether each project is within the scope of this Opinion.

The Culvert Team is responsible for project documentation, design, review, implementation, and monitoring. At each administrative unit's annual meeting, the Culvert Team will provide the following information to the Level 1 Team for review and approval.

- A list of all projects proposed to be completed during the upcoming field season, and intended to be covered under this programmatic consultation;
- Maps showing the location of proposed projects;
- A pre-project checklist (see Appendix A) for each project in occupied habitat that includes: the project and stream name(s), project category, date of projected implementation, administrative unit and general location, bull trout core area(s), Culvert Team members and positions, maps with location information (*e.g.*, TRS, latitude/longitude), photos, project design specifications, NEPA documentation (if applicable), contaminant spill plan, listed species checklist, current fish passage conditions, and a checklist of mitigations measures proposed (see Appendix B).

If there is an opportunity for administrative units to add projects after the annual meeting with the Level 1 Teams, they will notify the Level 1 Team, prepare the appropriate documentation, and present it at a regular Level 1 Team meeting for consideration.

### 3. Post-Project Monitoring and Documentation

Culvert Teams will notify Level 1 Teams of projects completed under this Program. For projects in occupied habitat, post-project monitoring will be conducted a minimum of once within a year of project completion, after any subsequent high flow events such as 10-year or 100-year floods, and at time intervals specified within the NEPA documents or during post-project review. The Level 1 Team will conduct annual field monitoring reviews of selected projects from previous years; these reviews will include personnel from the Bureau and the Forest Service, NOAA Fisheries, and the Service.

During the annual Level 1 Team meeting regarding projects implemented under this programmatic consultation, the Culvert Design Teams will provide the following information to the Level 1 Team for review.

- A list of projects in occupied habitat completed during the past field season;
- Maps showing location of projects completed during the past field season;
- A post-project monitoring checklist (see Appendix A) for each project completed within occupied habitat. This checklist will be identical to the pre-project checklist, but with additional information to document construction and post-project conditions.
- Monitoring results for all projects that were monitored during the past field season (those completed more than one field season ago). Monitoring information should include the following.
  - ✓ Photos
  - ✓ Field observations after high flow events
  - ✓ Success of fish passage rehabilitation
  - ✓ Headcutting, erosion, or scour associated with the project
  - ✓ Success of revegetation
  - ✓ Substrate retention, recruitment, and size.

Service Level 1 Team members are responsible for assuring that copies of the pre- and post-project checklists are filed at the Snake River Fish and Wildlife Office.

### 4. Stream Simulation Design

Stream simulation design criteria will be implemented for all activities under this programmatic consultation where a bridge, culvert, or open-bottomed arch will be installed, or where a trail ford will be used. Stream simulation designs are intended to mimic the natural stream processes at a culvert removal site, or at a stream crossing with a culvert, open-bottomed arch, ford, or under a bridge. The objective is that fish passage, sediment transport, and flood and debris conveyance through the structure imitate natural

stream conditions upstream and downstream to the extent that the structure type allows. Stream simulation parameters for programmatic actions are defined by the San Dimas Stream Simulation Design Training Manual (USDA Forest Service San Dimas Technology and Development Center 2004). Design parameters and additional information can be found in section C of the Assessment, and include consideration of structure width, length, and embedment of culverts, and additional factors for bridges and trail fords.

### 5. Activity Categories

The five categories of activities listed below are fully described in section B of the Assessment, and are summarized here. Design parameter requirements associated with all structures and activities are included in section C of the Assessment.

#### a. Culvert Removal and Associated Channel Rehabilitation

Activities in this category will be associated with closed, intermittently closed or decommissioned, or decommissioned roads. Activities will involve culvert removal and channel rehabilitation to bankfull width, and will consider gradient, substrate composition, and active floodplain dimensions that exist upstream and downstream of the project area.

#### b. Culvert, Bridge, or Ford Replacement with a Bridge

Activities in this category will be associated with roads that are necessary for Forest Service or Bureau access or transportation needs, and where an existing bridge or culvert structure is adversely affecting channel dynamics or fish passage. Projects may also be considered if existing structures pose a safety hazard or if 100-year flood events and associated debris flows could not be accommodated with a culvert or open-bottomed arch. The existing bridge, culvert structures, or ford will be removed and replaced with a bridge. Bridge footings will be placed outside of the bankfull width, and will include flood relief culverts if necessary. Multi-span bridges are not covered under this programmatic consultation.

#### c. Culvert or Ford Replacement with a Culvert or Open-Bottomed Arch

Activities in this category will be associated with roads that are necessary for Forest Service or Bureau access or transportation needs, and where 100-year flood events and associated debris flows, and fish passage can be accommodated by a culvert or open-bottomed arch. Culverts or fords will be removed and replaced with stream simulation culverts or open-bottomed arches.

#### d. Culvert Replacement with Low-Water Trail Ford

Activities in this category will be associated with roads that are being converted into trails, or with existing trails where the trail culvert is inadequate for fish passage. All

protocols for removing a culvert will be followed, and the trail ford will be hardened to minimize erosion (except in the area of spawning habitats) while meeting stream simulation characteristics.

### e. Programmatic Project Maintenance

Short-term maintenance activities may be associated with any of the categories of activities during the year construction occurs and in subsequent years until the structure is stabilized. Maintenance activities include minor adjustments to stream crossing structures and associated channel components to ensure structural integrity and stream simulation objectives. Heavy machinery may be necessary to implement maintenance activities. Whenever possible, machinery will operate from the existing road prism. If not possible, a temporary access to the stream channel or within the stream channel may be necessary. Any work requiring temporary stream crossings or equipment in the water in occupied habitat (as defined in this Opinion) will adhere to all conservation measures identified for initial construction actions (see Appendix B). Armoring of structures and revegetation are included within this category. In most cases, maintenance activities will be completed in two days or less.

If monitoring of structures in years following initial construction indicates the need for maintenance actions not currently anticipated, the Culvert Teams will consult with Level 1 Teams to determine appropriate actions and mitigation measures that ensure consistency with the proposed action described in this Opinion. This Program does not include routine road maintenance actions such as removal of woody debris or sediment that has accumulated at stream crossing structures inlets during flood events.

## 6. Conservation and Minimization Measures

The Action Agencies have included in the program conservation activities and measures aimed at avoiding or minimizing any potential adverse effects to listed, proposed, and candidate species and critical habitat. These include measures for fish, wildlife, and plants. The Assessment describes six general categories of measures specific to fish and aquatic conservation. These include: buffers, low-water work windows, fish avoidance, pollution control measures, aquatic invasive control measures, and erosion control measures.

Construction Timing and Duration.
All projects will be conducted during low flow conditions, which typically occur from late summer through fall (specific low flow periods at a given site will be determined by a hydrologist). All projects will be completed within one work season. Stream dewatering associated with project implementation is expected to last between one day (for most projects) and up to one week (for more complex projects). For more details see Appendix B of this Opinion.

Dewatering and Fish Avoidance.
To minimize the potential for direct impacts to bull trout and other listed fish from construction activity, all construction sites in occupied habitats will be dewatered prior to in-stream work. Fish will be removed from the area of stream to be dewatered using passive methods (*i.e.*, slow dewatering from upstream so fish gradually move out of the area), or direct methods such as electroshocking, seining, and dipping, as well as installation of block nets at most projects. If fish are captured they will be relocated to a location deemed appropriate by a fisheries biologist. All fish capture and handling procedures will take place under the direction of a qualified fisheries biologist and under the guidance of NOAA Fisheries and Idaho Department of Fish and Game collection permit requirements.

A full description of all conservation measures designed to avoid or minimize adverse effects to fish is included in Appendix B of this Opinion. Applicable measures will be incorporated into individual projects carried out under this Program. Table 5 in the Assessment presents a matrix of applicable conservation measures for each construction phase under the Program.

**C. Excluded Projects**

The following project types are not considered in this programmatic action.

- 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);
- Any projects that would facilitate the expansion of brook trout into occupied bull trout habitat or areas that would be occupied as a result of passage restoration;
- Projects with structure widths less than bankfull width;
- Maintenance of projects conducted under the Program, outside of that described in section 5e. above, and reconstruction of projects not meeting objectives of Stream Simulation Design (*i.e.*, objectives not being met due to faulty engineering, design, or construction);
- Routine road maintenance actions such as removal of woody debris or sediment that has accumulated at stream crossing structure inlets during flood events;
- Placement of any kind of baffled culvert;
- Culvert retrofitting (*e.g.*, fish ladders inside culverts);
- Multiple-span bridges (bridges requiring instream piers);
- Projects in areas where spawning listed fish or their redds would be disturbed or disrupted by project actions;
- Projects not conducted during low flow conditions;
- Actions that are parts of larger projects that have other components with potential adverse effects on listed fish or designated or proposed critical habitat--these actions require separate consultation that considers project impacts from all action components;
- Any newly proposed stream crossing that does not replace or remove an existing stream crossing; and

- Actions on non-Federal lands where critical habitat for bull trout is designated.

## II. Status of the Species

### A. Regulatory Status

The coterminous United States population of the bull trout was listed as threatened on November 1, 1999 (64 FR 58910). The threatened bull trout occurs in the Klamath River Basin of south-central Oregon and in the Jarbidge River in Nevada, north to various coastal rivers of Washington to the Puget Sound and east throughout major rivers within the Columbia River Basin to the St. Mary-Belly River, east of the Continental Divide in northwestern Montana (Cavender 1978, Bond 1992, Brewin and Brewin 1997, Leary and Allendorf 1997).

Throughout its range, the bull trout is threatened by the combined effects of habitat degradation, fragmentation and alterations associated with: dewatering, road construction and maintenance, mining, and grazing; the blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment (a process by which aquatic organisms are pulled through a diversion or other device) into diversion channels; and introduced non-native species (64 FR 58910).

The bull trout was initially listed as three separate Distinct Population Units (DPSs) (63 FR 31647, 64 FR 17110). The preamble to the final listing rule for the United States coterminous population of the bull trout discusses the consolidation of these DPSs, plus two other population segments, into one listed taxon and the application of the jeopardy standard under section 7 of the ESA relative to this species (64 FR 58930).

> Although this rule consolidates the five bull trout DPSs into one listed taxon, based on conformance with the DPS policy for purposes of consultation under section 7 of the Act, we intend to retain recognition of each DPS in light of available scientific information relating to their uniqueness and significance. Under this approach, these DPSs will be treated as interim recovery units with respect to application of the jeopardy standard until an approved recovery plan is developed. Formal establishment of bull trout recovery units will occur during the recovery planning process.

In its draft recovery plan for bull trout, the Service (2002) divides the Columbia River distinct population segment into 22 recovery units, each of which is comprised of one or more core areas and further divided into local populations. These divisions were intended to provide a structure that considers both the genetic relationship of local population and management options (recovery units), to reflect metapopulation structure (core areas), and to approximate a panmictic (completely random breeding) group of individuals (Service 2002; Whitesel *et al.* 2004). Whitesel *et al.* (2004) evaluated the appropriateness of these divisions. They found that the definitions and delineations of local populations and core areas hold true to theory in some cases but not all. In general, they indicated that this scale of delineation is appropriate. However, they found that

recovery units, as defined, did not adequately represent biological groupings of bull trout, and they recommended the use of Conservation Units instead, as described below.

Recent literature (Spruell *et al.* 2003) provides updated information on the genetic population structure of bull trout across the northwestern United States. Based on analysis of four microsatellite loci, Spruell *et al.* (2003) suggested that there are three major genetically differentiated groups (lineages) of bull trout represented within the Columbia River distinct population segment. They described these as "Coastal" populations, "Snake River" populations, and "Upper Columbia" populations (including primarily the Lake Pend Oreille and Clark Fork basin populations), with populations further subdivided, primarily at the level of major river basins. Whitesel *et al.* (2004) used this and other information to describe four "Conservation Units" (upper Columbia River, Snake River, Klamath River, and Coastal-Puget Sound) that are thought to represent the best estimate for delineation of areas that are necessary to ensure evolutionary persistence of bull trout.

## B. Description of the Species

Bull trout, a member of the family Salmonidae, is a char native to the Pacific Northwest and western Canada. Girard first described bull trout as *Salmo spectabilis* in 1856 from a specimen collected on the lower Columbia River, and it was subsequently described under a number of names such as *Salmo confluentus* and *Salvelinus malma* (Cavender 1978). Bull trout and Dolly Varden (*Salvelinus malma*) were previously considered a single species (Cavender 1978; Bond 1992). Cavender (1978) presented morphometric (measurement), meristic (geometrical relation), osteological (bone structure), and distributional evidence to document specific distinctions between bull trout and Dolly Varden. The American Fisheries Society formally recognized bull trout and Dolly Varden as separate species in 1980 (Robins *et al.* 1980).

## C. Status and Distribution

As noted above, in recognition of available scientific information relating to their uniqueness and significance, five segments of the coterminous United States population of the bull trout are considered essential to the survival and recovery of this species and are identified as interim recovery units: (1) Jarbidge River; (2) Klamath River; (3) Columbia River; (4) Coastal-Puget Sound; and (5) St. Mary-Belly River. Each of these segments is necessary to maintain the bull trout's distribution, as well as its genetic and phenotypic diversity, all of which are important to ensure the species' resilience to changing environmental conditions.

Jarbidge River

This interim recovery unit currently contains a single core area with six local populations. Less than 500 resident and migratory adult bull trout, representing about 50 to 125 spawners, are estimated to occur within the core area. The current condition of the bull trout in this interim recovery unit is attributed to the effects of livestock grazing, roads, angler harvest, timber harvest, and the introduction of non-native fishes (Service 2004).

The draft bull trout recovery plan (Service 2004a) identifies the following conservation needs for this unit: maintain the current distribution of the bull trout within the core area; maintain stable or increasing trends in abundance of both resident and migratory bull trout in the core area; restore and maintain suitable habitat conditions for all life history stages and forms; and conserve genetic diversity and increase natural opportunities for genetic exchange between resident and migratory forms of the bull trout. An estimated 270 to 1,000 spawning fish per year are needed to provide for the persistence and viability of the core area and to support both resident and migratory adult bull trout (Service 2004a).

Bull trout populations in the Jarbidge River represent the most southern extent of the species' range. Six local populations exist within the Jarbidge and Bruneau River basins, including in East Fork Jarbidge River (including the East Fork headwaters, Cougar Creek, and Fall Creek); West Fork Jarbidge River (including Sawmill Creek); Dave Creek; Jack Creek; Pine Creek; and Slide Creek.

Klamath River

This interim recovery unit currently contains 3 core areas and 12 local populations. The current abundance, distribution, and range of the bull trout in the Klamath River Basin are greatly reduced from historical levels due to habitat loss and degradation caused by reduced water quality, timber harvest, livestock grazing, water diversions, roads, and the introduction of non-native fishes (Service 2002). Bull trout populations in this unit face a high risk of extirpation (Service 2002). The draft bull trout recovery plan (Service 2002) identifies the following conservation needs for this unit: maintain the current distribution of the bull trout and restore distribution in previously occupied areas; maintain stable or increasing trends in bull trout abundance; restore and maintain suitable habitat conditions for all life history stages and strategies; conserve genetic diversity and provide the opportunity for genetic exchange among appropriate core area populations. Eight to 15 new local populations and an increase in population size from about 3,250 adults currently to 8,250 adults are needed to provide for the persistence and viability of the 3 core areas (Service 2002).

Columbia River

This interim recovery unit currently contains about 90 core areas and 500 local populations. About 62 percent of these core areas and local populations occur in central Idaho and northwestern Montana. The condition of the bull trout within these core areas varies from poor to good but generally all have been subject to the combined effects of habitat degradation, fragmentation and alterations associated with one or more of the following activities: dewatering; road construction and maintenance; mining, and grazing; the blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment into diversion channels; and introduced non-native species. The draft bull trout recovery plan (Service 2002) identifies the following conservation needs for this unit: maintain or expand the current distribution of the bull trout within core areas; maintain stable or increasing trends in bull trout abundance; maintain/restore suitable habitat conditions for all bull trout life history

stages and strategies; and conserve genetic diversity and provide opportunities for genetic exchange.

Coastal-Puget Sound

Bull trout in the Coastal-Puget Sound interim recovery unit exhibit anadromous, adfluvial, fluvial, and resident life history patterns. The anadromous life history form is unique to this unit. This interim recovery unit currently contains 14 core areas and 67 local populations (Service 2004b). Bull trout are distributed throughout most of the large rivers and associated tributary systems within this unit. With limited exceptions, bull trout continue to be present in nearly all major watersheds where they likely occurred historically within this unit. Generally, bull trout distribution has contracted and abundance has declined especially in the southeastern part of the unit. The current condition of the bull trout in this interim recovery unit is attributed to the adverse effects of dams, forest management practices (e.g., timber harvest and associated road building activities), agricultural practices (e.g., diking, water control structures, draining of wetlands, channelization, and the removal of riparian vegetation), livestock grazing, roads, mining, urbanization, angler harvest, and the introduction of non-native species. The draft bull trout recovery plan (Service 2004b) identifies the following conservation needs for this unit: maintain or expand the current distribution of bull trout within existing core areas; increase bull trout abundance to about 16,500 adults across all core areas; and maintain or increase connectivity between local populations within each core area.

St. Mary-Belly River

This interim recovery unit currently contains 6 core areas and 9 local populations (Service 2002). Currently, the bull trout is widely distributed in the St. Mary River drainage and occurs in nearly all of the waters that it inhabited historically. Bull trout are found only in a 1.2-mile reach of the North Fork Belly River within the United States. Redd count surveys of the North Fork Belly River documented an increase from 27 redds in 1995 to 119 redds in 1999. This increase was attributed primarily to protection from angler harvest (Service 2002). The current condition of the bull trout in this interim recovery unit is primarily attributed to the effects of dams, water diversions, roads, mining, and the introduction of non-native fishes (Service 2002). The draft bull trout recovery plan (Service 2002) identifies the following conservation needs for this unit: maintain the current distribution of the bull trout and restore distribution in previously occupied areas; maintain stable or increasing trends in bull trout abundance; restore and maintain suitable habitat conditions for all life history stages and forms; conserve genetic diversity and provide the opportunity for genetic exchange; and establish good working relations with Canadian interests because local bull trout populations in this unit are comprised mostly of migratory fish, whose habitat is mostly in Canada.

## D. Life History

Bull trout exhibit resident and migratory life history strategies throughout much of the current range (Rieman and McIntyre 1993). Resident bull trout complete their entire life cycle in or near the streams where they spawn and rear. Migratory bull trout spawn and

rear in streams for 1 to 4 years before migrating downstream to either a lake/reservoir (adfluvial), river (fluvial), or in certain coastal areas, to salt water (anadromous), where they reach maturity (Fraley and Shepard 1989; Goetz 1989). Resident and migratory forms often occur together, and it is suspected that individual bull trout may give rise to offspring exhibiting both resident and migratory behavior (Rieman and McIntyre 1993).

Bull trout have specific habitat requirements that distinguish them from other salmonids (Rieman and McIntyre 1993). Bull trout are found primarily in colder streams, although individual fish are migratory in larger, warmer river systems throughout the Columbia River basin (Fraley and Shepard 1989; Rieman and McIntyre 1993, 1995; Buchanan and Gregory 1997; Rieman *et al.* 1997). Dunham *et al.* (2003) found that the probability of bull trout occurrences is low when mean daily temperatures exceed 14 to 16 °C; Selong *et al.* (2001) reported that maximum growth of bull trout occurred at 13.2 °C. These temperature requirements may partially explain the patchy distribution within a watershed (Fraley and Shepard 1989; Rieman and McIntyre 1995).

Spawning areas are often associated with high elevation, cold-water springs, groundwater infiltration, and the coldest streams in a given watershed (Pratt 1992; Rieman and McIntyre 1993; Rieman *et al.* 1997). Goetz (1989) suggested optimum water temperatures for rearing of about 7 to 8 °C and optimum water temperatures for egg incubation of 2 to 4 °C. In Granite Creek, Idaho, Bonneau and Scarnecchia (1996) observed that juvenile bull trout selected the coldest water available in a plunge pool, 8 to 9 °C within a temperature gradient of 8 to 15 °C. Dunham *et al.* (2003) found that maximum bull trout use during the summer (July 15 to September 30) occurred between 7 and 12 °C.

All bull trout life history stages are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Oliver 1979; Fraley and Shepard 1989; Goetz 1989; Hoelscher and Bjornn 1989; Sedell and Everest 1991; Pratt 1992; Thomas 1992; Rich 1996; Sexauer and James 1997; Watson and Hillman 1997). In general, bull trout prefer relatively stable channel and water flow conditions (Rieman and McIntyre 1993). Jakober (1995) observed bull trout overwintering in deep beaver ponds or pools containing large woody debris in the Bitterroot River drainage, Montana, and suggested that suitable winter habitat may be more restrictive than summer habitat. Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997).

Fraley and Shepard (1989) found that bull trout select spawning habitat in low gradient stream sections with gravel substrates; Goetz (1989) found preferred spawning water temperatures of 5 to 9 °C. They typically spawn from August to mid-October during periods of decreasing water temperatures. High juvenile densities were observed in Swan River, Montana, and tributaries with diverse cobble substrate and low percentage of fine sediments (Shepard *et al.* 1984). Pratt (1992) indicated that increases in fine sediments reduce egg survival and emergence.

Life history strategy influences bull trout size, with growth of resident fish generally slower than growth of migratory fish, and resident fish tending to be smaller at maturity

and less fecund (Fraley and Shepard 1989; Goetz 1989). Bull trout normally reach sexual maturity in 4 to 7 years and live as long as 12 years. Repeat and alternate-year spawning has been reported, although repeat spawning frequency and post-spawning mortality are not well understood (Leathe and Graham 1982; Fraley and Shepard 1989; Pratt 1992; Rieman and McIntyre 1996). It is possible that four or more age-classes could comprise any spawning population, with each age-class including up to three migration strategies (Rieman and McIntyre 1993).

Migratory bull trout frequently begin upstream migrations as early as April and have been known to move as far as 250 kilometers (155 miles) to spawning grounds (Fraley and Shepard 1989). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992), and after hatching, juveniles remain in the substrate. Time from egg deposition to fry emergence may exceed 200 days. Fry normally emerge from early April through May, depending upon water temperatures and increasing stream flows (Pratt 1992; Ratliff and Howell 1992).

Bull trout are opportunistic feeders with food habits primarily a function of size and life history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macrozooplankton, and small fish (Boag 1987; Goetz 1989; Donald and Alger 1993). Adult migratory bull trout are primarily piscivores (Fraley and Shepard 1989; Donald and Alger 1993).

### E. Population Dynamics

Migratory corridors link seasonal habitats for all bull trout life history forms, and the ability to migrate is important to the persistence of local bull trout populations (Rieman and McIntyre 1993; Rieman *et al.* 1997). Pre- and post-spawning migrations facilitate gene flow among local populations because individuals from different local populations interbreed when some stray and return to non-natal streams. Local populations extirpated by catastrophic events may also become reestablished in this manner.

A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994). Metapopulation concepts of conservation biology theory are applicable to the distribution and characteristics of bull trout (Rieman and McIntyre 1993). Local populations may become extinct, but they may be reestablished by individuals from other nearby local populations. Metapopulations provide a mechanism for reducing the risk of local extinction because the simultaneous loss of all local populations is unlikely, and multiple local populations distributed and interconnected throughout a watershed provide a mechanism for spreading risk from stochastic events (Rieman and McIntyre 1993).

### F. Conservation Needs

Bull trout conservation requires the long-term persistence of self-sustaining, complex, interacting groups of fish distributed throughout the species' native range. Two of the factors identified as necessary for recovery also translate into general factors that address the conservation needs of the species. These two factors include restoring and

maintaining suitable habitat conditions for all bull trout life stages and life history strategies, and conserving genetic diversity and providing opportunity for genetic exchange. The programmatic action considered by this Opinion is consistent with the conservation needs of bull trout throughout the action area.

To achieve these general needs, several specific conservation measures should be addressed. The first involves metapopulation theory. As described above, a functioning metapopulation is comprised of multiple local populations distributed and interconnected throughout a watershed, which provides a mechanism for reducing the risk of extirpation associated with stochastic events.

The second measure involves connectivity between populations. A migratory component in bull trout populations is recognized as important to overall health, long-term persistence, and recovery because it allows for reestablishment of populations in reaches where bull trout have been extirpated (Rieman and McIntyre 1993; Whiteley *et al.* 2003). In addition, migratory bull trout are larger and more fecund than their resident counterparts. The greater reproductive capacity of migratory bull trout is also thought to provide an important contribution to the abundance and long-term persistence of local populations (Rieman and McIntyre 1993). In addition, migrations facilitate gene flow among local populations when individuals from different local populations interbreed or stray to non-natal streams. Dams, irrigation diversions, poorly functioning culverts, and other fish passage barriers have interrupted bull trout migration. At the broad scale, dams need adequate fish passage to maintain populations with migratory life histories that may otherwise switch to resident life histories if appropriate habitat conditions are not available. Similarly, fish passage barriers at the local scale caused by road crossing structures may segregate bull trout populations that would otherwise include a migratory component.

An adequate prey base is another essential component for bull trout conservation. Bull trout are described as having voracious appetites, which makes them vulnerable to angling injury or mortality (Post *et al.* 2003). Fish are considered to be the major item in the diet of large bull trout. They feed primarily along the bottom and mid-water levels, consuming insects and other fish species such as suckers, sculpins, minnows, and trout (Pratt 1992). Mountain whitefish and kokanee salmon are two of the bull trout's preferred prey (Fraley and Shepard 1989; Vidergar 2000).

Appropriate habitat conditions are also essential for bull trout survival. Bull trout have more specific habitat requirements than other native trout species, mainly because they require water that is especially cold with clean cobble or gravel size substrate for spawning and development of embryos and alevins. Available overwintering habitat, bank stability, winter precipitation, drought, substrate type, available cover, cold water temperature, and the presence of migration corridors consistently appear to influence bull trout distribution and abundance (see Allan *et al.* in Batt 1996; Dunham and Rieman 1999; Salow 2001; Salow and Cross 2003). Dams, culverts, and other barriers to fish passage may impede bull trout access to habitat upstream of the structure, reducing total habitat availability and/or quality in a given stream or watershed.

Conservation of bull trout is also dependent on protecting bull trout genetic diversity and phenotypic adaptation within each distinct population segment and spreading or reducing the risk of extinction through the maintenance of multiple populations across the range. Retaining a species' genetic variation is important because this variation allows populations to adapt to changing environmental conditions over short (inter-generational) and long (evolutionary) time frames (Allendorf and Leary 1986) and is the basis for maintaining a species' evolutionary legacy, including its geographical distribution, and morphological, physiological, and life-history variation (Allendorf *et al.* 1997).

Loss of genetic variation negatively affects the development, growth, fertility, and disease resistance of fishes. This loss of variation may also reduce fitness and preclude adaptive change in populations (Frankham 1995) or affect the species' ability to recover from disturbance events (Rieman *et al.* 1997). Genetic variation needs to be preserved in order to increase the likelihood of a species survival (Allendorf and Leary 1986), and maintaining genetic variation within populations should be a primary goal of conservation and management of species (Wang *et al.* 2002), bull trout included. Bull trout populations on the margin of the species' range may be adapted to unique environments and may represent a disproportionate part of the total diversity within the species, although the importance of this in a given population is affected by gene flow, generational time, life history, and ecological conditions (Rieman *et al.* 1997; Lesica and Allendorf 1995). Maintenance of genetic variation is highly related to connectivity between populations of bull trout; fish passage barriers, both structural and habitat-based (e.g., temperature), reduce connectivity and affect the ability of fish to maintain genetic variation.

A preceding section of this Opinion (II.C. Status and Distribution) describes new scientific information indicating that Conservation Units (as described in Whitesel *et al.* 2004) may be the most accurate representation of the evolutionary lineage and genetic structure of populations of bull trout (see Spruell *et al.* 2003; Whitesel *et al.* 2004). Each Conservation Unit across the range of bull trout contains an environmental template that allows the full expression of genotypic, phenotypic, and spatial diversity among bull trout populations. The conservation of this template will help ensure resilience and persistence of the species when environmental changes occur. Conservation of the species within a Conservation Unit is necessary to ensure the evolutionary persistence of the species as a whole (Spruell *et al.* 2003; Whitesel *et al.* 2004). This represents the most recent scientific information available regarding appropriate conservation units for bull trout.

A related conservation need of the species involves the development of conservation assessments and prioritization of populations for management and conservation actions across the range (see Epifanio *et al.* 2003; Allendorf *et al.* 1997). Currently, work has not been completed range-wide to describe the conditions affecting individual populations or metapopulations, the risk of local extinction, or the ecological and evolutionary importance of metapopulations or river basins to the larger Conservation Units. Because bull trout are a wide-ranging species, and scientific, financial, and human resources are

limited, it is likely an unrealistic goal to treat and conserve all populations equally (Epifanio *et al.* 2003). Prioritizing areas or populations for protection should consider the risk of extinction, any potentially unique genetic or phenotypic expressions, including habitat usage and life history, and evolutionary and ecological legacy (Allendorf *et al.* 1997). Epifanio *et al.* (2003) described six strategies that could be used to prioritize bull trout populations based on the factors described above. The prioritization of bull trout populations would help ensure that those populations with disproportionately high conservation value are more strictly managed to ensure their persistence, and that over the long term, the fullest range of ecological and evolutionary characteristics is conserved. These activities would provide a better mechanism for protecting the long-term viability of bull trout populations.

### G. Critical Habitat

The Service issued a final rule designating critical habitat for bull trout range wide on September 26, 2005. The designation includes 4,813 miles of stream or shoreline and 143,218 acres of lake or reservoir. We designated areas as critical habitat that 1) have documented bull trout occupancy within the last 20 years, 2) contain features essential to the conservation of the bull trout, 3) are in need of special management, and 4) were not excluded under section 4(b)(2) of the Act. The Final Rule excluded from designation those federally managed areas covered under PACFISH, INFISH, the Interior Columbia Basin Ecosystem Management Project, and the Northwest Forest Plan Aquatic Conservation Strategy. The Service determined that these strategies provide a level of conservation and adequate protection and special management for the primary constituent elements of critical habitat at least comparable to that achieved by designating critical habitat. Areas managed under these strategies do not meet the statutory definition of critical habitat (*i.e.*, areas requiring special management considerations) and were therefore excluded. The excluded areas include much of the proposed critical habitat in Idaho; the final rule only designates 294 miles of stream/shoreline and 50,627 acres of reservoirs or lakes. There is no critical habitat in the action area.

## III. Environmental Baseline

Regulations implementing the Act (50 CFR §402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area which have already undergone section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultations in progress. Such actions include, but are not limited to, previous timber harvests and other land management activities.

### A. Status of the Species Within the Action Area

Bull trout in the action area occur within the 32 subbasins identified in Figure 1. These 32 subbasins lie within 7 larger basin areas, identified in Table 3 of the Assessment. Major river basins in the action area include the mainstem Snake River (Hells Canyon

area), Weiser, Boise, Payette, Little Lost, Salmon, Clearwater, and Jarbidge/Bruneau. The status of populations within these basins varies widely, and resident, adfluvial, and fluvial migratory populations can all be found within the action area. We do not have reliable abundance information for all of these basins, but we can characterize them in a qualitative way based on number of local populations and some incomplete abundance information. For the purposes of this document, strong populations are those that are well distributed and relatively abundant within the capability of the watersheds in which they exist. The Clearwater and Salmon River basins have bull trout populations in a variety of conditions, including some that are relatively strong (areas with 2,500 to 5,000 adults or more). The Boise, and Payette River basins also have bull trout populations in a variety of conditions, with each basin's abundance best characterized as moderate (*e.g.*, approximately 500 adults). Populations in the Weiser, Jarbidge, and Snake River Hells Canyon (Wildhorse River, Indian Creek) basins are weak, with less than 500 adults in each basin. This is significantly lower than the numbers necessary for recovery or long-term persistence of the species in these areas (Rieman and Allendorf 2001, Service 2002, 2004a). It is not practical or necessary in the context of this programmatic consultation to present detailed information regarding the status of each bull trout population within the action area. Site specific information will be made available to, and will be considered by, the Culvert and Level 1 Teams on a project by project basis.

Table 6 in the Assessment describes the status of sediment and physical barrier Matrix Indicators as defined in the Matrix of Pathways and Indicators for bull trout (Service 1998). The sediment and physical barrier indicators are described as Functioning Appropriately (FA), Functioning at Risk (FR), or Functioning at Unacceptable Risk (FUR) for each of the 32 subbasins in the action area. For the sediment indicator, 1 subbasin within the Program area is rated FA, 19 are rated FR, and 12 are rated FUR. For the barriers indicator 8 subbasins within the
Program area are rated FA, 10 are rated FR, and 14 are rated as FUR. Additional indicators will not be assessed in this Opinion because programmatic actions are not expected to impact them.

Sediment ratings incorporate sediment-related effects stemming from activities such as mining, grazing, road construction, timber harvest, or natural conditions, and may vary substantially depending on overall watershed conditions. Barrier ratings are a function of the numbers and types of man made fish passage obstructions at different flow levels, and may be caused by inappropriate road crossing structures, water diversions, or dams.

During Program implementation, it is possible that resident and migratory adult bull trout and juvenile bull trout may be present in the area where individual actions are implemented. Presence will be evaluated during project design. Migratory adult bull trout may be moving downstream through a particular project site, resident adult bull trout may be present in or moving throughout the project site, and juvenile bull trout may be rearing in the stream near the project site. The life history stage that is present at a particular project site will be determined and documented in the pre-project checklist.

Some projects under the Program may be implemented in areas where bull trout are not present but where other listed fish or critical habitat exists.

### B. Factors Affecting Species Environment within the Action Area

There are numerous natural and anthropogenic influences on bull trout in the action area. Although some restoration actions and ongoing research efforts have positively affected bull trout, the majority of anthropogenic influences have contributed to the species decline by reducing bull trout numbers, reproduction, and distribution. Factors affecting the species within the action area include migration barriers; diversions; water, forestry, and past sport fisheries management practices; habitat fragmentation and degradation through grazing and road construction; reduced water quality from development, road construction, and mining; and introduction of non-native competitive species (Service 2002, 2004a).

More specifically, individual chapters in the Service's draft bull trout recovery plan for the Columbia River DPS (2002) identified the categories of activities that have had the most significant adverse impacts on bull trout in each Recovery Unit. In the Boise, Payette, and Weiser River basins (Southwest Idaho Recovery Unit) these factors include the following: dams, forest management practices, livestock grazing, agricultural practices, transportation networks, mining, residential development and urbanization, and fisheries management. In the Salmon River basin livestock grazing, logging, roads, mining, introduction and management for exotic species, and irrigation withdrawals were identified; the Clearwater River basin named operation and maintenance of dams and other diversions, forest management practices, livestock grazing, agriculture, road construction and maintenance, mining, and introduction of nonnative species. Effects in the Hells Canyon Recovery Unit were primarily related to large hydroelectric dams, land management activities, water diversions, mining, timber harvest, road construction and crossings, grazing, and presence of brook trout. Elevated stream temperatures, fish passage barriers, competition with brook trout, and possibly the harvest of fish due to poaching were identified in the Little Lost River basin. The draft bull trout Recovery Plan for the Jarbidge DPS (Service 2004a) identifies dams and diversions, increasing water temperatures, forest management practices, livestock grazing, transportation networks, mining, residential development, fisheries management, isolation and habitat fragmentation, recreation, and random naturally-occurring events as major limiting factors in the Jarbidge/Bruneau River basins. More specific information about activities affecting bull trout in these areas can be found in the Service's 2002 and 2004 draft recovery plans.

Overall watershed conditions within the Payette, Sawtooth, and Boise National Forests (including all or portions of the Boise, Payette, Weiser, and Salmon River basins) are functioning at risk or unacceptable risk (Forest Service and BLM 2005, Northwest Power and Conservation Council (NWPCC) 2004a), partly resulting from continued effects of past land use activities including mining, grazing, road construction and location, and timber harvest. Undersized stream crossings, and road densities and locations may adversely affect sediment delivery and riparian conditions. Chronic sediment production

and potential sediment delivery due to crossing failures is currently very high (Forest Service and BLM 2005).Water quality has been adversely affected, and most subbasins have stream segments that are listed as impaired on the Idaho Department of Environmental Quality's (IDEQ) 303d list. Sediment is the primary pollutant of concern for many of these subbasins (Forest Service 2003a; NWPCC 2004a).

Similarly, watershed conditions in the Clearwater River basin (including the Nez Perce and Clearwater Forests, and Cottonwood BLM), are limited by past and present land management activities that affect sedimentation and other watershed indicators (Ecovista 2003). Ecovista (2003) reported that six out of seven subbasins rated FUR or FR for sediment. Of 89 stream segments in the Salmon River subbasin listed on IDEQ's 303d list, 88 are limited for sediment (NWPCC 2004b). Fourteen subbasins in the Snake, Salmon, and Clearwater River basins were analyzed in Bureau watershed Assessments (Bureau 1999-2003); ten subbasins were rated as FR and four were FUR for sediment.

Physical barriers to fish passage and migration within streams and watersheds throughout the action area represent a significant factor affecting bull trout. Culvert passage barriers, water diversions and dewatering, and dams have resulted in isolation of many local populations and have blocked historical habitat. The NWPCC (2004a, 2004b) documented that physical barriers are FUR in the Boise, Payette, and Weiser River subbasins, and FUR or FR in much of the Salmon River subbasin. Ecovista (2003) documented that all subbasins in the Clearwater basin, with the exception of the wilderness Selway subbasin, are FUR
or FR. Of the 2,000-2,500 culverts inventoried across the action area from 2002 to 2004 (see Appendix A in the Assessment), 65 to 85 percent failed to pass fish at some life stage (Forest Service and Bureau 2005).

It is important to note that watershed condition ratings do not necessarily capture the range of conditions within that watershed. For example, an overall watershed rating of FUR does not mean that all of the subwatersheds or individuals stream segments within that watershed are FUR, or that none of them are FA. For the Program considered here it is not possible to accurately characterize watershed conditions at a finer scale than the overall watershed, but we do recognize that there is a range of conditions both across and within watersheds in the action area. Effects associated with the Program will also vary across watersheds, and the risk to bull trout from a given action will be affected by the baseline watershed conditions where a specific action takes place.

Many physical barriers affecting bull trout within the action area do not occur on, or do not result from, Forest Service or Bureau land management activities. The Service's Biological Opinion for Bureau of Reclamation (Reclamation) Operations in the Upper Snake River basin (Service 2005) describes in detail the impacts of Reclamation dam and water operations, which include delivery of irrigation water to private lands. These activities have significant impacts on bull trout in the Boise and Payette River basins in the action area, including subbasins within each. Other large dams that serve as barriers to bull trout movement within the action area include the Army Corps of Engineer's Dworshak Dam and Reservoir in the Clearwater River basin, and Idaho Power

Company's Hells Canyon Complex of Dams on the mainstem Snake River. Flow alterations and the loss of natural hydrographs associated with these dams and other diversion structures and passage barriers also affect bull trout in the action area (Service 2002, 2004a, 2005; NWPCC 2004a, 2004b; Ecovista 2003)

## IV. Effects of the Proposed Action

Effects of the action are defined as "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the actions, that will be added to the environmental baseline" (50 CFR §402.02).

### A. Direct and Indirect Effects

Direct effects are defined as the direct or immediate effects of the action on the species or its habitat. Direct effects result from the agency action, including the effects of interrelated and interdependent actions. Indirect effects are caused by or result from the agency action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside of the immediate footprint of the project area, but would occur within the action area as defined.

Activities that occur as part of this Program have the potential to affect three primary indicators, or habitat conditions, including: 1) sediment/turbidity, 2) chemical contamination/nutrients (sediment-related), and 3) physical barriers. Although the program may affect chemical contamination/nutrients indicators, those effects are expected to be related to sediment as the pollutant of concern. Accordingly, our analysis is focused on sediment-related effects and temporary passage barrier effects. Changes to these habitat conditions are likely to adversely affect bull trout that may be present at project sites in occupied habitats. All potential adverse effects to both habitat conditions and bull trout will be short term in nature, with beneficial or neutral impacts anticipated over the long term.

Throughout this analysis we discuss how suspended sediment may affect bull trout; we may also refer to turbidity. The terms turbidity and suspended sediment are often used interchangeably (Bain and Hynd 1999), but there are important distinctions that should be noted. Turbidity is a measure of the reduction of transmitted light in water, often associated with suspended sediment (Bain and Hynd 1999). However, numerous other factors may affect turbidity in a stream, including organic detritus and pollution, plankton, microscopic organisms, and other factors. In addition, turbidity measurements can be affected by sediment grain size, composition, density, and indices of refraction (Earhart 1984 *in* Bain and Hynd 1999). In contrast, measures of total suspended solids quantify the concentrations of fine particles of suspended sediment that are kept in suspension in the water column by turbulence (Bain and Hynd 1999). Thus, total suspended solids are a direct measurement of suspended sediment, whereas turbidity measurements are only an indicator of suspended sediment (Bash *et al.* 2001). Effects to fish are thought to be related primarily to suspended sediment (*e.g.,* Bash *et al.* 2001,

Newcomb and Jensen 1996). However, studies conducted by Dodds and Whiles (2004) and studies from the Clearwater River basin in Idaho (IDWR Citation) indicate a strong correlation between measures of turbidity and measures of TSS.

The Service does not anticipate that every project carried out under this Program will have adverse effects to bull trout. Even for projects in occupied habitats, there will be a range of effects depending on the size of the stream, the geology of the stream bed and nature of soil types, condition of the adjacent riparian area, the type of crossing project, the nature of bull trout use at the project site, ability of fish to escape to unaffected habitat, and other factors. In some cases, these effects will be insignificant because of their limited extent, or discountable when fish are absent or avoid the project area. In other circumstances, the effects are likely to be adverse. The programmatic nature of this consultation limits our ability to consider the site-specific factors. For the section 7(a)(2) analysis of this Program, it is prudent to anticipate that every project that occurs in occupied habitat has equal potential to affect bull trout, and that effects of similar magnitude and duration will occur at each project in occupied habitat. Accordingly, we have analyzed what we consider to represent the most severe effects expected to occur throughout the Program area.

The Assessment identifies nine construction phases that may occur for any given project implemented under this programmatic consultation. These include 1) site preparation, 2) excavation of road fill and diversion channel, 3) dewatering of the construction site, 4) removal of culvert, 5) reconstruction of channel, construction of trail ford, and/or construction of new structure, 6) removal of diversion, 7) backfill to road surface, 8) site rehabilitation, and 9) maintenance. Each of these construction phases may have a different likelihood of producing conditions that adversely affect bull trout, which will depend on site-specific conditions. In the discussion of potential effects described below, we identify the particular construction phase that is most likely to be associated with that effect, if it is known.

### 1. Beneficial Effects to Bull Trout and Bull Trout Habitat

It is important to note that the explicit purpose of the Program of activities considered in this consultation is to restore fish passage and/or improve aquatic function at specific sites within the action area. All potential adverse impacts are expected to be short term in nature, projects conducted under this programmatic consultation are expected to have long term beneficial effects for bull trout, and all actions conducted under the proposed Program are consistent with the conservation and recovery needs of bull trout. The following table identifies the matrix indicators (Service 1998) that will be maintained or moved toward restoration as a result of programmatic activities.

**Table 1. Matrix indicators that will not be adversely affected by programmatic actions.**

| Matrix Indicator | Effect of Program Actions |
|---|---|
| Water Temperature | Maintain |
| Large Woody Debris | Maintain |
| Pool Frequency/Quality/Depth | Maintain |
| Off-channel Habitat | Maintain |
| Refugia | Restore |
| Floodplain Connectivity | Maintain |
| Width to Depth Ratios | Maintain |
| Streambank Condition | Maintain |
| Change in Peak Base Flows | Maintain |
| Change in Drainage Network | Maintain |
| Road Density and Location | Maintain |
| Disturbance Regime/History | Restore |
| Riparian Reserves or Riparian Conservation Areas | Maintain |
| Bull Trout Population Characteristics | Restore |

The following list identifies the expected beneficial effects to bull trout associated with implementation of the programmatic action.

1. Passage rehabilitation and improved connectivity between habitats upstream and downstream of the existing road crossing structure;
2. Improved potential for genetic exchange;
3. Improved stream functioning, including bedload and woody debris material passage, and physical processes;
4. Increased availability and diversity of habitat for bull trout;
5. Restoration of natural bedload size and quantity capacity in road crossing structure;
6. Decreased habitat disturbance associated with maintenance at the road crossing structure, and decreased sediment delivery associated with the structure; and
7. Decreased potential for roadfill failure and associated sedimentation.

## 2. Sediment-Related Effects

Effects to Bull Trout

Jakober (2002) and Casselli *et al.* (2000) describe the results of sediment monitoring associated with culvert replacement and removal projects on the Bitterroot and Lolo National Forests, respectively. Both projects noted substantial increases in suspended sediment throughout the culvert removal process. The Bitterroot Forest project reported background sediment concentrations of 1.69 milligrams per liter (mg/l), increasing to a project high of 15,588 mg/l for 30 minutes during channel re-watering, with a steady decrease in concentrations to 1.13 mg/l over 26 hours after the start of the work (Jakober 2002). Jakober (2002) reported a total sediment load of 3,480 pounds (1.7 tons or 1.09 cubic yards) mobilized in the stream during the culvert replacement; 90 percent of the sediment was introduced in the first 30 minutes after flow was re-directed from the diversion channel to the new culvert. Ninety-five percent of the total sediment load was introduced in the first 120 minutes following diversion removal. This is consistent with information presented in the Assessment stating that 90 percent of increased turbidity

and/or sediment movement occur during the reintroduction of streamflow into the existing channel (construction phase 6-Diversion Removal). Bakke *et al.* (2002) reported maximum suspended sediment levels of 514 to 2,060 mg/l associated with culvert removals near Olympia, WA. These concentrations did not last for more than one hour. Both Jakober (2002) and Casselli *et al.* (2000) reported that turbidity decreased to pre-project levels within about 24 hours after flow reintroduction. Casselli *et al.* (2000) noted that sediment levels remained at pre-project levels about 1.5 miles downstream of the project site; the Service (2004c) estimated that sediment effects in the stream channel may occur up to 600 feet downstream of the project site.

The potential impacts of increased suspended sediment on bull trout and other salmonids have been well documented (*e.g.*, Bakke *et al.* 2002, Newcomb and MacDonald 1991, Newcomb and Jensen 1996, Bash *et al.* 2001). Newcomb and Jensen (1996) and Bash *et al.* (2001) provide syntheses of the research that has been conducted on the effects of suspended sediment on salmonids. Newcomb and Jensen (1996) describe 14 severity levels of effects, ranging from "no behavioral effects" (0) to greater than 80 to 100 percent mortality (14). This range is divided into four major categories, including "nil effect," "behavioral effects," "sublethal effects," and "lethal and paralethal effects." Bash *et al.* (2001) help us further refine the categories by describing whether the effect is behavioral, physiological, or habitat-based.

It is possible that stream crossing structure removal and replacement projects carried out under this Program will result in increased sediment levels similar to those reported in Jakober (2002), Casselli *et al.* (2000), and Bakke *et al.* (2002). Minimization measures proposed for this consultation such as the use of Sedimat downstream of the project site and pre-washing the channel before re-watering occurs were not reported in any of the previously discussed projects. These measures have the potential to significantly reduce the suspended sediment concentrations that may occur during project implementation. For example, the Oregon Department of Environmental Quality (2004) reported that a single 4 foot by 10 foot piece of Sedimat had collected 1,000 pounds of sediment at a project site. This represents almost a third of the total suspended sediment that was reported to have been mobilized in Jakober (2002). However, for this analysis the Service is assuming that it is likely that suspended sediment levels may reach those observed in Jakober, Casselli *et al.*, and Bakke *et al.* because the effectiveness of the conservation measures proposed by this Program have not been quantified through on the ground project implementation.

Information reported in Newcomb and Jensen (1996) indicates that suspended sediment concentrations of 500 mg/l for 3 hours caused signs of sublethal stress in adult steelhead, which we would also expect for bull trout. We expect that projects conducted under this action may result in sediment concentrations greater than 500 mg/l, although we do not expect that they will remain at those levels for 3 hours. There is potential that increased sediment concentrations during and immediately following channel re-watering may have short term adverse effects to bull trout. This is particularly true if multiple projects are completed within the same stream or subwatershed. We expect, with one exception (channel re-watering), that increased suspended sediment concentrations resulting from

any work component of the stream crossing removal/replacement projects will result in behavioral effects that do not significantly affect bull trout that may be present downstream of the project area. These may include mild to moderate alarm reactions, short-term abandonment of cover, and/or avoidance responses. Activities that may mobilize sediment but are not expected to result in significant effects to bull trout include site preparation, backfill to the road surface, and maintenance activities; conservation measures that will be employed during these activities are expected to minimize sediment delivery and mobilization into the stream to levels that are insignificant to bull trout that may be present.

During and immediately following channel re-watering, we expect that suspended sediment concentrations may increase to levels that could result in adverse effects to bull trout. The maximum "severity-of-ill-effect" score that we expect for any project conducted under this programmatic consultation is six, which may occur if suspended sediment concentrations reach 3,000 mg/l for up to an hour (Newcomb and Jensen 1996). This level of effect may cause moderate physiological stress (Newcomb and Jensen 1996), and could result in gill trauma and/or temporary adverse changes in blood physiology such as elevated blood sugars, plasma glucose, or plasma cortisol (Servizi and Martens 1987 *in* Bash *et al.* 2002, Servizi and Martens 1992, Bash *et al.* 2001). The Service does not anticipate suspended sediment to reach concentrations that are likely to result in lethal effects to bull trout (*i.e.*, 22,026 mg/l for any time), or to remain at concentrations over time that are likely to result in lethal effects (*i.e.*, 3,000 mg/l for 3 hours) (Newcomb and Jensen 1996).

Based on the analysis provided by the Service (2004c), we anticipate that suspended sediment levels will return to pre-project levels within 600 feet of the crossing site. However, in some cases the downstream extent of sediment effects may be less than 600 feet. Given the large spatial extent of the action area for the Program and the variable conditions found throughout it is not possible to accurately characterize a precise range of potential sediment travel. Therefore, the Service anticipates that all projects have the potential to cause sediment-related effects up to 600 feet downstream of a crossing site.

Based on the observations of Jakober (2002) we expect that levels of suspended sediment high enough to cause sublethal physiological effects (from Newcomb and Jensen 1996) would occur within 1.5 hours of flow reintroduction. We expect suspended sediment levels to continuously decrease after flow is re-introduced into the main channel, and for suspended sediment to return to background levels within 24 hours of flow reintroduction. Most effects to bull trout during the period between maximum observed turbidity and the return to pre-project levels will be behavioral, including avoidance and potential effects to feeding rates. The intensity and severity of any sediment-related effect response will be related to the site-specific conditions and the nature of bull trout use in the area at the time of project implementation.

All projects will occur during low-flow periods, when background levels of sediment in the stream system are generally very low or absent. Bash *et al.* (2001) reported that background mucus levels of fish are decreased during this time period, which may result

in amplified effects to fish associated with the increased sediment inputs. This is in contrast to project-related sediments that may be mobilized during the first high flow events following construction, where background sediment levels are higher. Suspended sediment associated with project implementation is expected to move through the water column, becoming deposited on the substrate in areas of lower velocity, including pools or slackwaters. Higher flows within the year following project implementation are expected to re-mobilize sediments, carrying them further downstream to be deposited. Eventually most sediments mobilized during project implementation will be carried downstream to larger streams, rivers, or water bodies within the watershed. Because high flows that re-mobilize project related sediments are expected to occur when background sediment levels are naturally elevated, any potential impacts to resident bull trout are expected to be insignificant. These high flow events at project sites are likely to occur when fluvial migratory bull trout are far enough downstream of the sediment mobilization event to avoid all potential associated effects. Thus, adverse effects to migratory bull trout resulting from freshet or high flow sediment mobilization are discountable.

The Service stresses that all impacts associated with increased turbidity and suspended sediment will be short-term in nature, with the majority of all effects occurring in a one to two hour period. Prolonged exposure to increased suspended sediment levels is not expected to result from projects implement under this Program. Additionally, all potential effects to bull trout are expected to be sublethal; we do not anticipate any mortality associated with increased suspended sediment levels. In many cases, the minimization measures proposed by the Action Agencies will reduce sediment-related impacts to insignificant levels. In a small but unknown number of projects, we expect sediment-related effects to bull trout may rise to the level of adverse. As stated in the Environmental Baseline section above, migratory and resident adults, as well as juvenile bull trout could be present and affected at any particular project site. However, we anticipate that sediment will primarily impact juvenile and resident adult bull trout downstream of the project area, while migratory adult bull trout are expected to move downstream through the project area with relatively little or no effect response.

Bull trout responses to sediment will vary depending on the nature of the habitat, habitat use by bull trout, and the number of fish present in a particular project area. Adult resident bull trout may be able to more effectively avoid a large sediment pulse by using stream margins or other refuges within or outside the impact area. In contrast, juvenile bull trout may experience more severe effects because they cannot move as quickly or efficiently to evade the sediment plume. Similarly, if high numbers of bull trout are present downstream of a project area when the channel is re-watered, we would anticipate increased severity of effects to some fish present associated with inter- and intra-specific competition for protected space and cover.

Effects to Bull Trout Habitat

Bull trout are particularly susceptible to the effects of sediment on various habitat components (Bash *et al.* 2001, Pratt 1992). Increased suspended sediment levels resulting from project implementation may result in increased substrate embeddedness,

which may affect juvenile bull trout. Juvenile bull trout are known to use interstitial spaces in the gravel substrate for rearing and cover (Bash *et al.* 2001), and during the summer they are known to use habitats close to the stream bottom (Service 2004). The existing conditions and levels of substrate embeddedness will be site specific, and should be taken into consideration through the pre-project documentation process. We anticipate that project actions may increase substrate embeddedness in areas where juvenile bull trout exist, which may result in displacement. This is considered a significant short term disruption in the normal behavior of juvenile bull trout, which are typically less mobile than adults. However, increased levels of substrate embeddedness are expected to be temporary in nature, as we expect either fall/winter storm events or natural high spring flows to mobilize any sediment that was deposited due to project activities within one year of project implementation. Following high flows, the stream simulation technique implemented for this project should result in decreased sediment, and potentially reduced substrate embeddedness over the longer-term because the projects are expected to remove or minimize chronic sources of sediment.

Another potential habitat effect is related to hyporheic inputs, or groundwater/surface water connections (Bash *et al.* 2001). Numerous authors (e.g., Poole and Berman 2001, Baxter and Hauer 2000) have noted the importance of these inputs for salmonids, including bull trout. Bash *et al.* (2001) report that increased sediment can clog the streambed material, thereby reducing conductivity and affecting groundwater/surfacewater interactions. Significantly, Baxter and Hauer (2000) reported that bull trout may select redd sites that correlate to areas with hyporheic exchange. Because this Program cannot be carried out where bull trout are spawning, or where redds are observed, the Service does not anticipate that changes to hyporheic exchange will result in significant effects to bull trout. Any impacts to the process will be temporary, and are not expected to uniformly affect all exchange areas.

Any project sites where bull trout are observed or expected to be spawning, or where bull trout redds are present, are not covered by this Opinion. Therefore, we do not anticipate any affect associated with increased sediment levels will cover redds or interfere with bull trout spawning activity.

**3. Temporary Passage Obstruction**

Construction phases three, four, five, and nine could create a temporary passage barrier for bull trout at the project site. Although there will be a diversion channel that contains flow beginning during construction phase four, the diversion channel will not be designed to provide upstream passage through the project area. The Service assumes that all diversion channels will allow downstream passage of bull trout that may try to move through the area. The diversion channel may act as a barrier to upstream movement of bull trout for the period of time flows are diverted, ranging from one day (average project) up to one week (for more complex projects). Projects that require diverting flows for more than one week are not included in the proposed action.

Project implementation will occur during low flow periods in any given stream or subwatershed. In general, throughout the action area this will correspond to periods between late June and October. Migratory adult bull trout are not likely to encounter barriers to upstream movement to spawning grounds associated with programmatic actions, as the majority of upstream movement normally occurs during the descending hydrograph following spring runoff prior to increases in water temperature. However, downstream migration following tributary spawning may require movements through a given project area via the constructed diversion channel. The Service does not anticipate that the implementation of programmatic actions in any area should result in delayed migration of bull trout to or from spawning and over-wintering areas.

Resident adult bull trout and juveniles that may be rearing or feeding locally may be temporarily restricted from upstream movement through a project site when flows are diverted. It should be noted that in many cases the existing stream crossing structure may already have served as a barrier to upstream movement of bull trout. In those cases, project activities would not result in any additional adverse impacts associated with restricting upstream movement. If the existing structure did not serve as an upstream passage barrier, then it is possible that project implementation may result in temporarily precluding bull trout from moving upstream for up to one week (although typically only one day). This can be considered a disruption to the normal feeding and movement patterns. However, this short-term blockage is not expected to interfere with major life history processes such as spawning, or to occur during the most sensitive periods for bull trout (*e.g.*, winter rearing habitat availability for juvenile bull trout). If juvenile bull trout are present at a project site, and movement of adults is restricted by project passage barriers, then increased predation of juvenile bull trout by adults could occur where adult bull trout become congregated in a limited area. Restricted access to upstream habitats may also result in resident fish being impeded from movement to areas with more suitable water temperatures upstream, which may be particularly important during low water summer flows when projects are likely to occur.

There is a broad range of potential implications associated with temporary passage blockage at project sites. The Service does not anticipate that potential impacts will affect bull trout at every project site, or that every bull trout present would be adversely affected. In most cases the temporary passage obstruction will not cause significant disruptions to bull trout feeding and movements, or nor will they always increase the likelihood of injury to fish present. In a small proportion of cases the Service anticipates the potential for increased predation of juveniles or restriction from more suitable upstream habitats may result in injury to individual bull trout.

**4. Effects Associated with Fish Handling**

The Assessment describes a variety of likely effects on bull trout that may result in displacement, death, or injury to individuals. These include stranding effects associated with dewatering the channel at a particular project to facilitate construction of structures in the dry channel, and trapping and moving bull trout out of the project area with direct handling techniques. Additionally, impingement on block nets, injury or death from

electroshocking activities, and other injury and/or mortality associated with handling may occur during the implementation of projects covered under this programmatic consultation. Injury or mortality that may occur as a result of the electroshocking, handling through capture and/or relocation with seines or nets, or any other direct fish handling that may occur are regulated by the Idaho Department of Fish and Game via collection permit requirements. The Service analyzed the effects of the Department's program in our February 14, 2000, Biological Opinion and will not address them further here.

**5. Other Effects**

There are several categories of potential effects associated with the proposed action that the Service has considered, but are either extremely unlikely to occur, or will not result in measurable impacts to bull trout. These categories of potential pathways to effects are generally described below.

Chemical Contamination

During project implementation, heavy machinery will be used adjacent to stream channels. There is some risk to bull trout associated with potential release of fuel, oil, and other lubricants from equipment and machinery used during project activities. Fish could be adversely affected if these chemicals or contaminants were discharged into the stream. Effects from such releases could range from death to fish abandoning the area of contamination.

The Action Agencies have proposed several measures to eliminate or minimize the potential for contaminant release into streams throughout the action area. The majority of work is anticipated to occur outside of flowing water, which limits the potential for chemical contamination. The Action Agencies have also proposed the development of a spill prevention, containment, and control plan (SPCCP) for all projects to be implemented under this consultation. The SPCCP will be submitted to Level 1 teams, which will ensure that they adequately reduce the potential hazards of chemical contamination to discountable levels. The Service does not anticipate any adverse effects to bull trout associated with chemical contamination.

In the event of a catastrophic spill associated with fuel-carrying vehicle accidents, the Action Agency should contact the Service immediately to initiate a site-specific consultation under the provisions for emergency consultation in regulations implementing section 7 (50 CFR §402.05).

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). 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). All these effects may result in the simplification of habitat, which may render it less productive/suitable to aquatic organisms, including bull trout.

Use of riprap in this Program would be confined to applications that maintain the beneficial channel modifications created by constructing stream simulation crossings. The use of riprap for project completion, if it occurs at all, will likely be minimal, and will only have small, localized effects on habitat, fish distribution, and rearing success. The proposed action limits the length of riprap use to less than 38 feet (structure length), which further minimizes the potential for adverse affects. The Service expects that placement of riprap for this limited distance, when approved by the Culvert Team as part of a beneficial action, will result in insignificant impacts to bull trout and its habitat.

Use of Explosives

Site excavation activities may require the removal of large rock or excavation of bedrock to achieve the desired depth for a new crossing structure. If possible, the Action Agencies will use betonamit, which is a noiseless, shock-free, non-toxic substance that breaks rock through expansive pressure.

If it is not possible to use betonamit for excavation activities, explosive blasting within dewatered areas may be used. The Action Agencies have proposed several measures and design criteria which reduce potential effects of explosive blasting, such as fish exposure to chemicals, noise, vibrations, and debris, to insignificant levels. The proposed action also includes buffer distance for explosive use adapted from Wright and Hopky (1998), which we expect will adequately reduce effects to bull trout associated with pressure, toxicity, or vibration. The Service does not anticipate any adverse effects to bull trout associated with potential explosive blasting activities under the proposed action.

Loss of Available Habitat for Bull Trout

Dewatering at project sites may temporarily reduce the amount of available fish habitat. The temporary (one day to one week) and relatively small (less than 200 feet in most cases) nature of this habitat loss is not expected to be significant for bull trout.

The Service does not expect that riparian vegetation removal resulting from project implementation will result in significant adverse effects to bull trout habitat or bull trout. Project design criteria and minimization measures, and site rehabilitation activities should ensure that there is not significant loss of riparian vegetation, or loss of habitat complexity associated with project implementation.

Additionally, project activities are expected to improve habitat conditions for bull trout in the long-term. Culvert removal or stream simulation design will facilitate natural stream processes and features, which may include providing access to habitat upstream of an existing crossing structure and increased movement of sediment and large wood, all of

which contribute to improved and/or increased habitat conditions and availability for fish, including bull trout.

Noise and Disturbance Effects

The presence of large machinery in dewatered areas and adjacent to streams where bull trout are present will result in increased noise levels, vibration, and other disturbances associated with increased human presence at a given site. However, these effects are expected to result in only minor disturbances to fish overall, with potential avoidance behaviors initially. Bull trout are typically most active at night, so daytime activities could result in bull trout moving from cover to avoid perceived threats associated with human and equipment presence. We expect that avoidance or alarm responses will be minimal, resulting in movement to other available cover in the immediate area or movement downstream. These effects are measurable, but are not considered a significant disruption in normal feeding, breeding, or sheltering behavior.

Maintenance Effects

Following the initial construction activities, maintenance activities may be necessary to protect the integrity of stream crossing structures and to achieve stream simulation objectives. The need for maintenance activities is expected to be minimal, and machinery will work from the existing road prism whenever possible. In occupied habitats, all conservation measures identified for the structure construction phase will also be implemented during maintenance activities. We anticipate that maintenance activities will be much shorter in duration, with necessary activities not expected to exceed two days. The Service expects the nature of effects to bull trout associated with maintenance, including both sediment and passage effects, to be similar to those anticipated for initial project implementation described in sections A.1. and A.2. above. However, effects associated with maintenance activities are expected to be of even shorter duration, given the temporal extent of maintenance actions.

**6. Summary of Program Effects**

In sum, the proposed Program is expected to adversely affect bull trout through short-term increases in suspended sediment, temporary passage obstruction, and direct fish handling activities. Increased sediment levels are expected to result in both behavioral and physiological adverse effects to bull trout, neither of which are expected to last for more than 24 hours following channel rewatering. Temporary passage obstruction may occur for upstream movement and may range from one day to one week in duration. Although the sediment and barriers matrix indicators may be adversely affected in the short term, Program activities will move them both toward a restored condition in the longer term.

All adverse effects will be short term in duration, and are only expected to occur during initial project implementation at a given site. The magnitude and severity of adverse effects to bull trout among project sites will vary substantially, and in some cases actions are not expected to significantly affect bull trout behavior, habitat, or physiology. It is important to note again that the purpose of the proposed Program is to improve habitat

conditions for bull trout and other native fish species and to improve overall watershed and stream function. The long term benefits associated with removing and/or replacing poorly functioning stream crossing structures are expected to far outweigh the anticipated short term adverse effects associated with project implementation.

### B. Effects of Interrelated or Interdependent Actions

Interrelated actions are those that are a part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Because future maintenance activities are include in the proposed action, the Service has not identified any interrelated or interdependent actions associated with this programmatic action.

## V. Cumulative Effects

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area. This section does not consider future Federal actions that are unrelated to the proposed action because they require separate consultation pursuant to section 7 of the Act.

To a large extent bull trout in the action area are distributed on Federal lands or at Bureau of Reclamation facilities. However, private and state activities and management programs may affect bull trout or their habitat in some parts of the action area. These may be continuation of effects associated with ongoing activities that include timber harvest, grazing and management of domestic livestock, road construction, hay field and pasture cultivation and irrigation, water diversions and water-right allocations, and residential development. Population growth and associated demands for agricultural, commercial, or residential development are expected to effect available habitat quality and quantity for bull trout, with the potential for reduced conservation value over time.

The Service's draft recovery plan for bull trout (2002, 2004a) identified in detail those activities that occur in the action area that would be considered cumulative effects for purposes of this consultation. We have fully considered those activities and their continued influence on bull trout in the action area.

## VI. Conclusion

After reviewing the current status of bull trout, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that implementation of the Action Agencies' stream crossing replacement and removal program, as proposed, is not likely to jeopardize the continued existence of bull trout in the coterminous United States. Although the proposed action may result in short term adverse effects to individual bull trout, we do not anticipate that they will impact bull trout at the local population, core area, recovery unit, or DPS scale.

The effects of the proposed action considered in this Opinion are not expected to result in the death of any bull trout except for death or injury to bull trout related to their capture

and removal from the project footprint. These activities are regulated by the Idaho Department of Fish and Game and the Action Agencies must obtain collection permits from the Department and comply with its requirements. The Service has already analyzed effects of the Department's program and determined that it is not likely to jeopardize bull trout (Service 2000).

Individual actions implemented through this Program may have temporary and localized adverse effects to individual resident adult and juvenile bull trout. Most effects will be associated with behavioral changes such as avoidance or alarm responses, with the potential for sublethal physiological effects in some cases. The significance and severity of effects is expected to vary for projects carried out under the Program. In some cases the maximum extent and severity of effects may occur, with the probability that multiple life history stages and numerous fish will be adversely affected. While our analysis presumes adverse effects from each action undertaken, it is likely that there will be individual projects whose effects on bull trout are insignificant or discountable, and, as such, not adverse. Also, numbers and distribution of bull trout vary throughout the action area, and at some locations only one or two fish may be present and affected by the action.

The nature of Program actions (*i.e.*, one-time construction events), and the extensive conservation measures that will be implemented preclude any population or subpopulation level effects. Additionally, restrictions on the use of this programmatic consultation will preclude actions from having direct impacts on spawning bull trout, bull trout redds, or bull trout eggs and alevins, further reducing the impact of any effects.

Up to 156 projects may be implemented in 29 core areas and 32 subbasins across the action area per year. No more than 12 projects will occur in occupied habitat on any administrative unit in a given year, reducing the potential for aggregate effects to bull trout. Level 1 team oversight of project implementation and necessary conservation measures is an important project component that ensures consideration of the local conditions and the significance of effects to bull trout at a more site-specific level from actions implemented under this Program.

The purpose of the proposed action is to improve habitat and fish passage conditions throughout the action area, thus increasing the likelihood of bull trout recovery. All adverse effects that are anticipated under this action will be short term and temporary in nature. Longer term effects are anticipated to be wholly beneficial, including increased movement and potential for genetic exchange, improved stream and floodplain function, decreased sediment inputs and potential for catastrophic crossing structure failures, and overall improved habitat conditions and function. The proposed action is expected to improve the conservation value of habitat within the action area for bull trout and to improve overall conditions for bull trout in the coterminous United States. The proposed action is not likely to appreciably reduce numbers, distribution, or reproduction of bull trout over the long-term, and will not appreciably reduce the likelihood of bull trout survival and recovery.

## VII. Incidental Take Statement

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary and must be undertaken by the Forest Service and Bureau so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service and Bureau have a continuing duty to regulate the activity covered by the incidental take statement. If the Forest Service or Bureau fails to assume and implement the terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service and Bureau must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement (50 CFR §402.14(i)(3)).

### A. Amount or Extent of Take Anticipated

The Service anticipates that take in the form of harassment of individual fish, adverse effects to their habitat that result in harm to individual fish, and death are reasonably certain to occur as a result of the proposed action. The following level of take of this species can be anticipated by using existing information documenting effects to bull trout and other salmonids, and best professional judgment and visual observations of fisheries managers and biologists in the action area.

The proposed action allows the implementation of up to 156 projects per year in occupied habitats. For each of these projects, the Service anticipates that any bull trout present may experience sediment levels that result in behavioral changes and sublethal injury in the form of moderate physiological stress (Newcomb and Jensen 1996). Harassment may occur when injury to individual bull trout results from behavioral and avoidance responses causing increased energy expenditures, decreased feeding rates, and abandonment of cover. Physiological stress responses could result in gill trauma and/or temporary adverse changes in blood physiology such as elevated blood sugars, plasma glucose, or plasma cortisol. These physiological effects constitute injury to individual fish. The number of bull trout that may be present at any given project site is expected to

be highly variable, and the Service cannot determine the number of bull trout that may experience a more than insignificant harassment or harm effect associated with the Program. Thus, the Service anticipates that there is a possibility that all bull trout that are present within 600 feet downstream of the road crossing structure may be injured or harassed. The temporal extent of anticipated take is as follows.

- Direct injury from sediment will be restricted to the 90 minute period during and immediately following the reintroduction of flow through the new crossing structure or back to the existing channel. This is the period when turbidity levels are expected to be highest, and may result in minor to moderate physiological responses such as changes in blood chemistry, coughing and other respiratory issues, and gill trauma.

- Elevated sediment levels will occur as a result of each project in occupied habitat, with levels that result in behavioral effects restricted to the 24 hour period following channel rewatering. During this period we anticipate behavioral and avoidance responses that may cause increased energy expenditures, decreased feeding rates, and/or abandonment of cover. Behavioral effects and injury may occur simultaneously during the initial large sediment pulse mentioned above.

Increased sediment production may also adversely affect habitat conditions for bull trout, particularly for juveniles. Increased substrate embeddedness may adversely affect habitat conditions for juvenile bull trout to the point that habitat becomes unsuitable. All juveniles within 600 feet downstream of a project site may exhibit abandonment of that area, avoidance activities, or other behavioral responses. The Service recognizes that it is unlikely that all juvenile bull trout will experience these effects, and that these effects are not likely at all project sites, but it is not possible to determine the local, project specific effects with more precision at the programmatic level. Even given this imprecision, the Service concludes that the effects to juvenile bull trout would not impact overall survival or affect subpopulation characteristics.

Project implementation may temporarily block fish passage. Passage obstruction is not expected to exceed one week, with one day being more common. Since project activities will cover a relatively small area (less than 200 feet of stream) and will occur over a very short time, the effect of passage obstruction is considered to be minor. All resident bull trout that are present downstream of the project site may be denied access to upstream habitats while project work is occurring. This harassment effect is only expected at locations where the existing culvert or road crossing structure did not represent a passage barrier already. Minor forms of injury may occur such as minor physiological stress associated with restricted movement to potentially more suitable habitats upstream. In the unknown number of cases where project activities will overlap with juvenile bull trout occurrence we anticipate short-term periods of increased juvenile predation. We only anticipate that these effects will rise to the level of take at a small number of project sites, and that effects associated with passage obstruction will only adversely affect a small number of fish at any given location. In many cases the effects associated with passage obstruction are not expected to rise to the level of take, or will not adversely affect bull trout.

The effects of the proposed action considered in this Opinion are not expected to result in the death of any bull trout except for short-term increased predation of juveniles, and possible lethal effects to bull trout related to site preparation and dewatering. Implementation of the proposed action may result in project-related effects associated with dewatering the channel at a particular site, potential impingement of bull trout on block nets, injury or death from electroshocking activities, and other injury and/or mortality associated with handling may occur during the implementation of projects covered under this programmatic consultation. These activities are regulated by the Idaho Department of Fish and Game via collection permit requirements. The Service has already analyzed effects of the Department's program and determined that it is not likely to jeopardize bull trout. Our February 14, 2000, Biological Opinion exempts the State of Idaho from take prohibitions for activities they regulate through their program, so it is not necessary to anticipate them again here.

To summarize elements considered in this Incidental Take Statement, sublethal take is exempted for a 90 minute period during and immediately following flow reintroduction when suspended sediment levels are likely their highest. However, sublethal take is not exempted if suspended sediment levels reach or exceed 22,026 mg/l or remain at 3,000 mg/l for 3 hours or more, which Newcomb and Jensen (1996) anticipate as levels that may be lethal for fish. Take of bull trout resulting from sediment levels beyond those conditions described above are not exempted by this Incidental Take Statement. Elevated suspended sediment levels will return to background levels within a 24 hour period and within 600 feet downstream of the stream crossing structure. Fish passage shall not be impeded for more than one week. This take may occur at up to 156 project locations across the action area per year, with no more than 12 actions carried out on any administrative unit in any given year.

**B. Effect of the Take**

In the preceding Opinion, the Service has determined that the level of take anticipated as a result of the proposed action is not likely to jeopardize the Columbia River or Jarbidge River distinct population segments of bull trout. The proposed action is not expected to reduce the reproduction, status, and distribution of bull trout in the action area, and will not appreciably reduce the likelihood of survival and recovery of the Columbia River distinct population segment.

We do not anticipate appreciable changes in the numbers, distribution, or reproduction of bull trout in any of the core areas or local populations that occur in the action area. Over the long term, the projects implemented under this programmatic consultation are expected to contribute to the conservation and recovery of bull trout throughout the action area, and the Columbia River and Jarbidge River distinct population segments.

## C. Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize take of bull trout.

> The Forest Service and the Bureau shall implement actions to minimize the effect of the take anticipated to bull trout populations.

## D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Forest Service and Bureau must comply with the following terms and conditions, which implements the reasonable and prudent measure described above and outlines required reporting/monitoring requirements. These terms and conditions are non-discretionary.

a. No group of projects implemented under this Opinion shall have the potential for adverse population-level effects to bull trout within the action area. The Action Agencies shall strategically plan the location and timing of project implementation such that incidental take and adverse effects to any given local population are minimized. Culvert Teams for each administrative unit shall coordinate with other teams when actions are carried out in watersheds that cross jurisdictional boundaries to determine whether multiple actions are proposed for the same watershed.

b. Action Agencies shall implement conservation measures identified by Level 1 teams to address concerns at a site-specific level. The Level 1 team will recommend conservation measures only as needed when measures proposed as part of the Program are insufficient or inadequate. Alternative measures will be developed together with Culvert Teams, and effects resulting from these alternative measures will remain consistent with those described earlier in this Opinion and in the Assessment.

The reasonable and prudent measure, with its implementing terms and conditions, is designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

## E. Monitoring and Reporting Requirements

When incidental take is anticipated, the terms and conditions must include provisions for monitoring to report the progress of the action and its impact on the species (50 CFR §402.14(i)(3)). The Service has anticipated incidental take of bull trout

associated with suspended sediment levels related to actions carried out under this Program. The Forest Service and Bureau shall conduct monitoring activities to ensure that the effects of project implementation are consistent with those described in this Opinion, thus ensuring that the incidental take exempted herein is not exceeded.

The Action Agencies shall monitor turbidity at a reasonable sample of projects implemented under this consultation to assure that the incidental take exempted in this Opinion associated with suspended sediment (intensity, duration) has not been exceeded. The precise number of projects necessary to fulfill the reasonableness of this requirement shall be determined through coordination between the Culvert and Level 1 Teams, but shall not be less than one project per administrative unit per year. Turbidity 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. Samples will be collected at one-half hour intervals downstream of the project for a period of four hours during and immediately after channel re-watering. After that, samples will be collected at 1 hour intervals at the 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.

It is clear that turbidity measurements are not appropriate surrogates for total suspended solids in all cases, and that many 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 at most levels, and some studies (Dodds and Whiles 2004) show high statistical correlations between the two parameters. Most of the time turbidity measurements take 30 seconds and can be done on site and therefore allow for rapid adjustments in project activities if turbidity approaches unacceptable levels. Given the relative risk of the Program to bull trout, and the high cost of total suspended solids measurements, the Service recommends that the action agencies monitor projects using turbidity measurements as a surrogate for total suspended solids.

The Forest Service and the Bureau shall ensure that turbidity monitoring results, and documentation of all activities conducted under the State of Idaho's scientific collection permit are provided to the Snake River Fish and Wildlife Office in Boise, Idaho. Additionally, as proposed in the Assessment, the action agencies shall ensure that the Service receives all pre- and post-project checklists.

## VIII. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act, directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation Recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery programs, or to develop

information. The Service has identified the following conservation recommendations for the Forest Service and the Bureau's consideration.

1. Conduct monitoring and studies to assess the results and effectiveness of the stream crossing replacement and improvement Program.

    a. Monitor bull trout movement and habitat use. Determine whether and when previously unoccupied habitat is reoccupied. Monitor subpopulation numbers and distribution to assess changes and effectiveness of stream crossing projects and the significance of those changes.

    b. Coordinate with other administrative units to track and document changes in bull trout status and distribution associated with the Program.

2. Work cooperatively and strategically with the Service, NOAA Fisheries, other State and Federal agencies, and non-governmental organizations to maximize the benefits of bull trout conservation and recovery actions. Prioritize locations for restoration actions. Identify opportunities to work together on individual actions through cooperative planning, funding, implementation, and monitoring. Where multiple projects are proposed for a watershed area, coordinate planning and implementation to maximize the collective benefits of the projects.

To ensure that we maintain the most up-to-date information on the status of the species, we request that you inform the Service of any actions you undertake associated with these conservation recommendations.

## IX. REINITIATION--CLOSING STATEMENT

This concludes formal consultation for the potential effects of the programmatic stream crossing structure replacement and removal action on the bull trout. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Regarding item number two in the paragraph above, the action agencies, NOAA Fisheries, and the Service have worked cooperatively to initiate a study to assess the relationship between total suspended solids and turbidity in relation to program

implementation. This study may provide new or additional information that was not considered in this Opinion. Pending coordination and discussion among the members of the Interagency Fish Passage Consultation Team, results of this study may necessitate a reevaluation of this Opinion.

## LITERATURE CITED


Allendorf, F.W., and R. Leary. 1986. Heterozygosity and fitness in natural populations of animals. Chapter 4 *in* Soule, M.E., (ed.), Conservation biology: the science of scarcity and diversity. Sinauer Associates, Sunderland, Massachusetts.

Allendorf, F.W., D. Bayles, D.L. Bottom, K.P. Currens, C.A. Frissell, D. Hankin, J.A. Lichatowich, W. Nehlsen, P.C. Trotter, and T.H. Williams. 1997. Prioritizing Pacific salmon stocks for conservation. Conservation Biology 11:140-152.

Bain, M.B., and K.M. Hynd. 1999. Water transparency. Pages 175-179 *in* M.B. Bain and N.J. Stevenson, editors. Aquatic Habitat Assessment: Common methods. American Fisheries Society, Bethesda, MD.

Batt, P. 1996. Governor Philip E. Batt's State of Idaho bull trout conservation plan. Boise, Idaho.

Bakke, P.D., B. Peck, and S. Hager. 2002. Geomorphic Controls on Sedimentation Impacts, HC11C-0847. Poster presented at AGU 2002 Fall Meeting, San Francisco, CA. US FWS, Western Washington Fish and Wildlife Office, Lacey, WA.

Bash, J., C. Cerman, and S. Bolton. 2001. Effects of Turbidity and Suspended Solids on Salmonids. Center for Streamside Studies, University of Washington. 74 pgs.

Baxter, C.V., and F.R. Hauer. 2000. Geomorphology, hyporheic exchange, and the selection of spawning habitat by bull trout *(Salvelinus confluentus)*. Canadian Journal of Aquatic Science 57:1470-1481.

Berg, R.K., and E.K. Priest. 1995. Appendix Table 1: A list of stream and lake fishery surveys conducted by U.S. Forest Service and Montana Fish, Wildlife and Parks fishery biologists in the Clark Fork River drainage upstream of the confluence of the Flathead River from the 1950's to the present. Job Progress Report, Project F-78-R-1. Montana Fish, Wildlife, and Parks, Helena, Montana.

Boag, T.D. 1987. Food habits of bull char, *Salvelinus confluentus*, and rainbow trout, *Salmo gairdneri*, coexisting in a foothills stream in northern Alberta. Canadian Field-Naturalist 101:56-62.

Bond, C.E. 1992. Notes on the nomenclature and distribution of the bull trout and the effects of human activity on the species. *In* Howell, P.J., and D.V. Buchanan, (eds.), Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.

Bonneau, J.L., and D.L. Scarnecchia. 1996. Distribution of juvenile bull trout in a thermal gradient of a plunge pool in Granite Creek, Idaho. Transactions of the American Fisheries Society 125:628-630.

Brewin, P.A., and M.K. Brewin. 1997. Distribution maps for bull trout in Alberta. *In* Mackay, W.C., M.K. Brewin, and M. Monita, (eds.), Friends of the bull trout conference proceedings.

Buchanan, D.M., and S.V. Gregory. 1997. Development of water temperature standards to protect and restore habitat for bull trout and other cold water species in Oregon. *In* Mackay, W.C., M.K. Brewin, and M. Monita, (eds.), Friends of the bull trout conference proceedings.

Casselli, J., B. Riggers, and A. Rosquist. 2000. Seigel Creek Culvert Removal, Water Monitoring Report. Lolo National Forest, Missoula, MT. 9 pgs.

Cavender, T.M. 1978. Taxonomy and distribution of the bull trout, *Salvelinus confluentus* (Suckley), from the American Northwest. California Fish and Game 64:139-174.

Donald, D.B., and D.J. Alger. 1993. Geographic distribution, species displacement, and niche overlap for lake trout and bull trout in mountain lakes. Canadian Journal of Zoology 71:238-247.

Dunham, J.B., and B.E. Rieman. 1999. Population structure of bull trout: influences of physical, biotic, and geometrical landscape characteristics. Ecological Applications 9:642-655.

Dunham, J.B., B. Rieman, and G. Chandler. 2003. Influences of temperature and environmental variables on the distribution of bull trout within streams at the southern margin of its range. North American Journal of Fisheries Management 23:894-904.

Earhart, H.G. 1984. Monitoring total suspended solids by using nephelometry. Environmental Management 8:81-86.

Ecovista. 2003. Draft Clearwater subbasin assessment. Prepared for the Northwest Power and Conservation Council. Portland, Oregon, November 2003.

Epifanio, J., G. Haas, K. Pratt, B. Rieman, P. Spruell, C. Stockwell, F. Utter, and W. Young. 2003. Integrating conservation genetic considerations into conservation planning: a case study of bull trout in the Lake Pend Oreille-lower Clark Fork River system. Pages 10-24 *in* Fisheries 28:8.

Fraley, J.J., and B.B. Shepard. 1989. Life history, ecology and population status of migratory bull trout (*Salvelinus confluentus*) in the Flathead Lake River system, Montana. Northwest Science 63:133-143.

Frankham, R. 1995. Effective population size/adult population size ratios in wildlife: a review. Genetical Research 66:95-107.

Garland, R.D., K.F. Tiffan, D.W. Rondorf, and L.O. Clark. 2002. Comparison of subyearling fall chinook salmon's use of riprap revetments and unaltered habitats in Lake Wallula of the Columbia River. North American Journal of Fisheries Management 22(4):1283-1289.

Goetz, F.A. 1989. Biology of the bull trout, *Salvelinus confluentus*, a literature review. Willamette National Forest, Eugene, Oregon.

Goetz, F.A. 1994. Distribution and juvenile ecology of bull trout (*Salvelinus confluentus*) in the Cascade Mountains. Master's Thesis, Oregon State University, Corvallis, Oregon.

Hoelscher, B., and T.C. Bjornn. 1989. Habitat, densities, and potential production of trout and char in Pend Oreille Lake tributaries. Job Completion Report, Project F-71-R-10, Subproject III, Job No. 8. Idaho Department of Fish and Game, Boise, Idaho.

Idaho Department of Fish and Game. 1995. Subject: List of stream extirpations for bull trout in Idaho.

Jakober, M. 1995. Autumn and winter movement and habitat use of resident bull trout and westslope cutthroat trout in Montana. Master's Thesis, Montana State University, Bozeman, Montana.

Jakober, M. J. 2002. Sheep Creek Culvert Replacement Sediment Monitoring, Bitterroot National Forest. Monitoring Report, 6 pgs.

Leathe, S.A., and P. Graham. 1982. Flathead Lake fish food habits study. U.S. Environmental Protection Agency Final Report R008224-0104. Montana Fish, Wildlife, and Parks, Helena, Montana.

Lesica, P., and F.W. Allendorf. 1995. When are peripheral populations valuable for conservation? Conservation Biology 9:753-760.

Light, J., L. Herger, and M. Robinson. 1996. Upper Klamath Basin bull trout conservation strategy, a conceptual framework for recovery. Part one. The Klamath Basin bull trout working group.

Meffe, G.K., and C.R. Carroll. 1994. Principles of conservation biology. Sinauer Associates, Inc., Sunderland, Massachusetts.

Newcombe, C.P., and D.D. MacDonald. 1991. Effects of suspended sediments on aquatic ecosystems. North American Journal of Fisheries Management 11:72-82.

Newcombe, C. P., and J. O. Jensen. 1996. Channel Suspended Sediment and Fisheries: A Synthesis for Quantitative Assessment of Risk and Impact. North American Journal of Fisheries Management 16(4).

Newton, J.A., and S. Pribyl. 1994. Bull trout population summary: Lower Deschutes River subbasin. Oregon Department of Fish and Wildlife, The Dalles, Oregon.

Northwest Power and Conservation Council. 2004a Boise-Payette-Weiser subbasins assessment. Portland, Oregon, May 2004.

Northwest Power and Conservation Council. 2004b. Salmon River subbasin assessment. Portland, Oregon, May 2004.

Oregon Department of Environmental Quality. 2004. Best management practices for storm water discharges associated with construction activities. Norwest Region document. 57 pp.

Poole, G.C., and C.H. Berman. 2001. An ecological perspective on in-stream temperature: natural heat dynamics and mechanisms of human caused thermal degradation. Environmental Management 27(6):787-802.

Pratt, K.L. 1992. A review of bull trout life history. *In* Howell P.J., and D.V. Buchanan, (eds.), Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.

Quigley, T.M., and J.J. Arbelbide. 1997. An assessment of ecosystem components in the Interior Columbia Basin and portions of the Klamath and Great basins. Vol. III. pp. 1174-1185.

Ratliff, D.E., and P.J. Howell. 1992. The status of bull trout populations in Oregon. *In* Howell, P.J., and D.V. Buchanan, (eds.), Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.

Rich, C.F., Jr. 1996. Influence of abiotic and biotic factors on occurrence of resident bull trout in fragmented habitats, western Montana. Master's Thesis, Montana State University, Bozeman, Montana.

Rieman, B.E., and F.W. Allendorf. 2001. Effective population size and genetic conservation criteria for bull trout. North American Journal of Fisheries Management 21:756-764.

Rieman, B.E., and J.D. McIntyre. 1993. Demographic and habitat requirements of bull trout. General Technical Report INT-302. U.S. Forest Service, Intermountain Research Station, Boise, Idaho.

Rieman, B.E., and J.D. McIntyre. 1995. Occurrence of bull trout in naturally fragmented habitat patches of varied size. Transactions of the American Fisheries Society 124:285-296.

Rieman, B.E., and J.D. McIntyre. 1996. Spatial and temporal variability in bull trout redd counts. North American Journal of Fisheries Management 16:132-141.

Rieman, B.E., D. Lee, G. Chandler, and D. Meyers. 1997. Does wildfire threaten extinction for salmonids? Responses of redband trout and bull trout following recent large fires on the Boise National Forest. *In* Proceedings of fire effects and endangered species and habitats conference. November 13 to 16, 1995, Coeur d' Alene, Idaho.

Robins, C.R., R.M. Bailey, C.E. Bond, J.R. Brooker, E.H. Lachner, R.N. Lea, and W.B. Scott. 1980. A list of common and scientific names of fishes from the United States and Canada. American Fisheries Society Special Publication 12, Bethesda, Maryland.

Rode, M. 1990. Bull trout, *Salvelinus confluentus* (Suckley) in the McCloud River: status and recovery recommendations. Administrative Report Number 90-15. California Department of Fish and Game, Sacramento, California.

Salow, T. 2001. Population structure and movement patterns of adfluvial bull trout (*Salvelinus confluentus*) in the North Fork Boise River basin, Idaho. Master's Thesis, Boise State University, Boise, Idaho.

Salow, T., and D.M. Cross. 2003. Distribution, abundance, and influence of habitat conditions for bull trout (*Salvelinus confluentus*) in the North Fork Boise River basin, Idaho. Summary report submitted to the U.S. Fish and Wildlife Service. Bureau of Reclamation, Snake River Area Office West, Boise, Idaho.

Schill, D.J. 1992. River and stream investigations. Idaho Department of Fish and Game.

Scmetterling, D.A., C.G. Clancy, and T.M. Brandt. 2001. Effects of riprap bank reinforcement on stream salmonids in the western United States. Fisheries 26(7): 6-13.

Sedell, J.R., and F.H. Everest. 1991. Historic changes in pool habitat for Columbia River basin salmon under study for TES listing. Draft report. U.S. Department of Agriculture, Pacific Northwest Research Station, Corvallis, Oregon.

Selong, J.H., T.E. McMahon, A. Zale, and F.T. Barrows. 2001. Effect of temperature on growth and survival of bull trout with application of an improved method for determining thermal tolerance in fishes. Transactions of the American Fisheries Society 130:1026-1037.

Servizi, J.A., and D.W. Martens. 1987. Some effects of suspended Fraser River sediments on sockeye salmon (*Oncorhynchus nerka*), *in* H. D. Smith, L. Margolis, and C. C. Wood *eds.* Sockeye salmon (*Oncorhynchus nerka*) population biology and future management. Canadian Special Publications of Fisheries and Aquatic Sciences 96:254-264.

Servizi, J.A., and D.W. Martens. 1992. Sublethal responses of coho salmon (*Oncorhynchus kisutch*) to suspended sediments. Canadian Journal of Fisheries and Aquatic Sciences 49: 1389-1395.

Sexauer, H.M., and P.W. James. 1997. Microhabitat use by juvenile trout in four streams located in the Eastern Cascades, Washington. Pages 361-370 *in* Mackay, W.C., M.K. Brown, and M. Monita, (eds.), Friends of the bull trout conference proceedings.

Shepard, B., K. Pratt, and P. Graham. 1984. Life histories of westslope cutthroat and bull trout in the upper Flathead River basin, Montana. EPA Contract No. R008225-01-5. Montana Department of Fish, Wildlife and Parks, Helena, Montana. 115 pp.

Spruell, P., A.R. Hemmingsen, P.J. Howell, N. Kanda, and F.W. Allendorf. 2003. Conservation genetics of bull trout: geographic distribution of variation at microsatellite loci. Conservation Genetics 4:17-29.

Thomas, G. 1992. Status of bull trout in Montana. Report for the Montana Department of Fish, Wildlife and Parks, Helena, Montana.

Thurow, R. 1987. Evaluation of the South Fork Salmon River steelhead trout fishery restoration program. Lower Snake River Fish and Wildlife Compensation Plan Contract No. 14-16-0001-86505. Job Completion Report. Idaho Department of Fish and Game, Boise, Idaho.

USDA Forest Service. 2003a. Payette National Forest-Land and resource management plan and Environmental Impact Statement and appendices. McCall, Idaho.

USDA Forest Service San Dimas Technology and Development Center. 2004. Designing for Aquatic Species Passage at Road-Stream Crossings, Training Manual from March 15-19 Workshop in Boise, Idaho.

USDA Forest Service and U.S. Bureau of Land Management. 2005. Biological Assessment for stream crossing structure replacement and removal activities affecting ESA-listed species in Idaho National Forests and Idaho/Nevada Bureau of Land Management Public Lands. June 9, 2005.

U.S. Fish and Wildlife Service. 1998a. A framework to assist in making Endangered Species Act determinations of effect for individual or grouped actions at the bull trout subpopulation watershed scale. Boise, Idaho.

U.S. Fish and Wildlife Service. 1998b. Final rule: endangered and threatened wildlife and plants; determination of threatened status for the Klamath River and Columbia River distinct population segments of bull trout. Federal Register, June 10, 1998, Vol. 63, No. 111, pp. 31647-31674.

U.S. Fish and Wildlife Service. 1999a. Final rule: endangered and threatened wildlife and plants; determination of threatened status for bull trout in the coterminous United States. Federal Register, November 1, 1999, Vol. 64, No. 210, pp. 58909-58933.

U.S. Fish and Wildlife Service. 1999b. Final rule: endangered and threatened wildlife and plants; determination of threatened status for the Jarbidge River population segment of bull trout. Federal Register, April 8, 1999, Vol. 64, No. 67, pp. 17110-17125.

U.S. Fish and Wildlife Service. 2000. Revised section 7 programmatic consultation on issuance of section 10(a)(1)(A) scientific take permits and section 6(c)(1) exemption from take for bull trout *(Salvelinus confluentus)*. Boise, Idaho.

U.S. Fish and Wildlife Service. 2002. Bull trout (*Salvelinus confluentus*) draft recovery plan. Portland, Oregon.

U.S. Fish and Wildlife Service. 2004a. Draft recovery plan for the Jarbidge River distinct population segment of bull trout *(Salvelinus confluentus)*. Portland, Oregon.

U.S. Fish and Wildlife Service. 2004b. Biological Opinion for USDA Forest Service fish passage restoration activities in eastern Oregon and Washington 2004-2008. Oregon and Western Washington Fish and Wildlife Offices. Portland, Oregon and Lacey, Washington.

U.S. Fish and Wildlife Service. 2005. Biological Opinion for U.S. Bureau of Reclamation operations and maintenance in the Snake River basin above Brownlee Reservoir. Boise, Idaho.

Vidergar, D. 2000. Population estimates, food habits and estimates of consumption of selected predatory fishes in Lake Pend Oreille, Idaho. Master's Thesis, University of Idaho, Moscow, Idaho.

Wagner, W.H. and F.S. Wagner. 1994. Another widely disjunct, rare and local North American moonwort (Ophioglossaceae: Botrychium subg. Botrychium). American Fern Journal 84(1):5-10.

Wang, S., J.J. Hard, and F. Utter. 2002. Salmonid inbreeding: a review. Reviews in Fish Biology and Fisheries 11:301-319.

Washington Department of Fish and Wildlife. 2004. Washington State salmonid stock inventory, Bull trout/Dolly varden. October 2004. 441 pp.

Watson, G., and T. Hillman. 1997. Factors affecting the distribution and abundance of bull trout: an investigation into hierarchical scales. North American Journal of Fisheries Management 17:237-252.

Whiteley, A.R., P. Spruell, and F.W. Allendorf. 2003. Population genetics of Boise basin bull trout (*Salvelinus confluentus*). Final report to the Bureau of Reclamation under Grant No. 1425-01FG107420. Bureau of Reclamation, Snake River Area Office, Boise, Idaho.

Whitesel, T.A., and 7 coauthors. 2004. Bull trout recovery planning: a review of the science associated with population structure and size. Science Team Report #2004-01, U.S. Fish and Wildlife Service, Regional Office, Portland, Oregon.

Wright, D.G., and G.E. Hopky. 1998. Guidelines for the Use of Explosives in or near Canadian Fisheries Waters. Canadian Tech. Report of Fisheries and Aquatic Sciences, 2107.

Ziller, J.S. 1992. Distribution and relative abundance of bull trout in the Sprague River subbasin, Oregon. *In* Howell, P.J., and D.V. Buchanan, (eds.), Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society, Corvallis, Oregon.

# Appendix A. Pre-and Post-Project Documentation List Stream Crossing Removal and or Replacement Programmatic Consultation (adapted from Appendix C of the Assessment)

## 1. Pre-Project Documentation List

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: _____
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 _____

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

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

## 2. Post-Project Documentation List

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: _____

Area dewatered during project:_____
Method(s) of fish collection during project:_____
If applicable to site, suspended sediment levels (mg/l) recorded at 30 minute intervals (Include: time, distance from crossing, and intensity mg/l):_____
Headcutting above and below project area: _____
Substrate retention, recruitment, and size: _____
Erosion from sites associated with project: _____
Success of fish passage rehabilitation: _____
Checklist of mitigation actions implemented: _____

# APPENDIX B. CONSERVATION MEASURES APPLICABLE TO PROGRAMMATIC ACTIVITIES (As Identified in the Assessment)

## Stream Crossing Replacement and or Removal Programmatic Consultation

**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:

- 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 section 6 cooperative agreement (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). 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 (RCA) 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 (COR) 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, Supplement to Programmatic BA for Road Maintenance on Public Lands Administered by the Salmon-Challis Forest, and BLM Salmon, Challis, and Idaho Falls Field Offices in the Upper Salmon River Basin and Lost River Subbasin).

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 BAEffects 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 [dbh]) 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.

# Appendix C. Bull Trout Recovery Units and Core Areas in the Action Area for the Stream Crossing Removal and/or Replacement Programmatic Consultation (Adapted from Appendix B of the Assessment)

Salmon River Recovery Unit
Upper Salmon River
Pahsimeroi River
Lake Creek
Lemhi River
Middle Salmon-Panther
Opal Lake
Middle Fork Salmon River
Middle Salmon-Chamberlain
South Fork Salmon River
Little-Lower Salmon River

Southwest Idaho Recovery Unit
Upper South Fork Payette River
Deadwood River
Middle Fork Payette River
North Fork Payette River
Squaw Creek
Weiser River
Arrowrock
Anderson Ranch
Lucky Peak

Clearwater River Recovery Unit
North Fork Clearwater River
Fish Lake (North Fork Clearwater River)
Lochsa River
Fish Lake (Lochsa River)
Selway River
South Fork Clearwater River
Lower and Middle Fork Clearwater River

Little Lost River Recovery Unit
Little Lost River

Hells Canyon Complex Recovery Unit (Idaho)
Pine-Indian-Wildhorse

Jarbidge River DPS
Jarbidge River