United States Department of the Interior

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JUN 1 - 2006

Larry Tripp
District Ranger
Mountain Home Ranger District
Boise National Forest
2180 American Legion Boulevard
Mountain Home, Idaho 83647

Subject: Roaring River Fish Passage Restoration Project, Elmore County, Idaho–Biological Opinion
File #110.0300 2006-F-0471

Dear Mr. Tripp:

This letter transmits the Fish and Wildlife Service's (Service) Biological Opinion (Opinion) on determinations for listed species as documented in the Biological Assessment (Assessment) for the proposed Roaring River Fish Passage Restoration Project (Project), on National Forest System lands in the Middle Fork Boise River watershed. In a letter dated March 27, 2006 and received by the Service on March 31, 2006, the Boise National Forest (Forest) requested formal consultation on the determination under section 7 of the Endangered Species Act (Act) of 1973, as amended, that the Project is likely to adversely affect bull trout (*Salvelinus confluentus*).

You also determined that the Project will have no effect on the gray wolf (*Canis lupus*), the Canada lynx (*Lynx canadensis*), the bald eagle (*Haliaeetus leucocephalus*), the yellow-billed cuckoo (*Coccyzus americanus*), and slickspot peppergrass (*Lepidium papilliferum*). The Service acknowledges these no effect determinations.

The enclosed Opinion, prepared in accordance with section 7 of the Act, is based primarily on our review of the proposed action's effects on bull trout as described in your March 2006 Assessment. Our Opinion concludes that the survival and recovery of bull trout populations will not be jeopardized by the Project. A complete record of this consultation is on file at this office.

Thank you for your continued interest in the conservation of threatened and endangered species. Please contact Johnna Roy at (208) 378-5348 if you have questions concerning this Opinion

Sincerely,

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

Enclosure
cc: BNF SO, Boise (Kellett)
BNF SO, Boise (Bryant)
IDFG, Region 3, Nampa (Leitzinger)

BIOLOGICAL OPINION
FOR THE
ROARING RIVER FISH PASSAGE RESTORATION PROJECT
MOUNTAIN HOME RANGER DISTRICT
BOISE NATIONAL FOREST

2006-F-0471

JUNE 2006
FISH AND WILDLIFE SERVICE
SNAKE RIVER FISH AND WILDLIFE OFFICE
BOISE, IDAHO

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INTRODUCTION

The Fish and Wildlife Service (Service) has prepared the following Biological Opinion (Opinion) in response to the Boise National Forest's (Forest) request for formal consultation on the effects to bull trout (*Salvelinus confluentus*) from the proposed Roaring River Fish Passage Restoration Project (Project). The Forest determined that the Project is likely to adversely affect bull trout. The Service's Opinion is based largely on the analysis presented in the Biological Assessment (Assessment) for this action. We conclude that the survival and recovery of bull trout populations will not be jeopardized by the Project.

CONSULTATION HISTORY

The Forest and the Service have had the following meetings and correspondence concerning the proposed Project.

February 23, 2004	The Service attended a Level 1 Interagency Streamlining Consultation meeting and discussed the Project with the Forest.
June 29, 2005	The Service attended a site visit with the Level 1 Team.
November 29, 2005	The Service attended a site visit with the District Fisheries Biologist.
February 6, 2006	The Service attended a meeting with the Level 1 Team and Forest specialists to determine if the Project was consistent with programmatic consultation.
February 28, 2006	The Service attended a Level 1 Interagency Streamlining Consultation meeting and discussed the Project with the Forest. The Service also provided comments on the draft Assessment.
March 17, 2006	The District fisheries Biologist contacted the Service to discuss the need for a Phase II meeting for the Project. The Service sent an email message documenting the phone conversation and requesting minor edits to the draft Assessment, upon completion of which, the Assessment would be ready for submittal for consultation. The Service did not request a Phase II discussion for the Project.
March 31, 2006	The Service received the final Assessment and request for formal consultation.

BIOLOGICAL OPINION

I. DESCRIPTION OF PROPOSED ACTION

A. Action Area

The Project is located in the lower portion of the Roaring River subwatershed. The Project is located on National Forest System Road 255, approximately 5 miles south of the Atlanta Highway intersection. The legal description of the project is T5N, R8E, Section 2, Boise 35 Meridian, Elmore County, Idaho. This area is located on the Mountain Home Ranger District, Boise National Forest.

B. Proposed Action

The existing culvert is a barrier to upstream fish passage and will be replaced with a multiplate steel box arch culvert to facilitate upstream fish movement. The structure will meet the 2003 interim Forest Service Region 1 and Region 4 guidance for Aquatic Species Passage Design (USDA 2003). The steel multiplate box arch culvert measures 40 feet width, 42 feet length, and 12 feet height. The structure will be delivered to the site in sections and fastened together using bolts. Concrete abutments will either be poured on site or precast abutments which will be lifted into position. Culvert sections will be fastened to the abutments, working from outside to the center of the structure.

The work window for the project is from low flow (usually the end of July) to October 5th. Once instream work begins, the instream portion of the project will be completed within 30 days. The Project duration is dependent on several factors left to the contractor's discretion, although all actions must be approved by the Forest's Project Administrator.

Before Project implementation begins, snorkeling will be conducted by qualified fisheries personnel in the plunge pool below the culvert to 600 feet downstream. If any bull trout are present it will be recorded and the summary of findings will be documented in a completion report.

The Project will consist of five specific stages, as described more fully in the Assessment.

1. Site Preparation. Road #255 will be closed to public access, equipment will be staged at an existing landing approximately 40 feet from the stream channel, a ford will be designated above the existing culvert, a sediment catchment basin will be constructed on the adjacent landing with an inflow pipe from the contruction site and an outlow pipe to the riparian area below the construction site, Sedimat or other instream sediment retention devices will be placed downstream of the plunge pool, and sediment retention materials such as straw bales and filter cloth will be placed to collect sediment from all areas of ground disturbance.

2. Excavation of Road Fill and Footing, Abutment and Wingwall Placement. To avoid the need to divert water from the stream, the existing culvert will remain in place and temporary headwalls will be built to channelize water through the culvert. Road fill and footing channels will be excavated from around the culvert, and concrete footings - either poured or precast structures - placed at a 40-foot width straddling the 13-foot wide culvert. Areas outside the abutment walls will be backfilled.
3. Removal of Culvert and Reconstruction of Stream Channel. Large rock will be added to the plunge pool below the existing culvert to insure grade control for the new structure and prevent downward scour of the stream channel. Other in-stream structures will be placed as necessary above and below the new culvert to protect channel integrity. Stream simulation rock will be placed along the entire length of the new channel except directly underneath the culvert. Approximately 50 feet of stream bank will be reconstructed upstream and downstream of the new structure, and riparian vegetation will be planted. Because the substrate bedding below the culvert will not be known until the footings are excavated, the Fisheries Biologist or Hydrologist will coordinate the appropriate course of action for culvert removal with the Project Administrator. If the culvert is bedded on native rock material, the culvert will be pulled and additional rock will be placed as needed for grade control and stream simulation. If the culvert is embedded in sand, there may be as much as 21 cubic yards of sand that will have to be excavated after the culvert is removed. In this instance, a coffer dam will be constructed and the stream will be diverted between the culvert and the new abutment, the culvert will be removed and sand excavated, stream simulation rock will be added to the new channel, and the stream redirected to the new channel.
4. Construction of New Structure and Road Surface Work. The steel multiplate box arch will be secured to the abutments and adjoining sections will be connected to complete the structure, backfill will be added or removed to bring the road prism to the desired elevation, a 6 inch layer of crushed aggregate will be spread on the road 80 feet from the edges of the structure in both directions, and appropriate drainage will be installed.
5. Site Rehabilitation. All areas of ground disturbance will be treated with erosion-control fabric, mulch, and/or approved seed mixes. Streambanks at the fording location will be rehabilitated through rock placement and riparian vegetation plantings. Sedimat and other in-stream sediment control structures will be removed from the stream channel. Out-of-stream sediment control devices will be maintained as necessary until sites are stabilized with vegetation, and eventually removed. The catchment basin and storage area will be recontoured and drainage structures installed as needed to prevent surface flows. All disturbed areas will be seeded with native seed.

The Project will include specific design measures to mitigate and reduce levels of impacts to aquatic resources. As described in the Assessment, these include the following.

- A maximum of ten stream crossings with tracked equipment will be allowed for the completion of the Project.
- Instream sediment retention devices such as Sedimat will be installed within the stream, periodically checked throughout the Project, and more added if needed for the duration of the Project.
- A Forest Service-approved spill containment plan will be included in the contract and will address equipment leaks, refueling, land, and in-stream spills, and reporting requirments.
- Stream simulation rock will be sorted to include appropriate size composition as identified in the reference reach.
- Sediment retention materials will be approved by the Project Administrator and will be placed along the toe slope of the road fill and adjacent to the stream channel prior to any ground disturbance, and will remain in place until the appropriate parties agree no sediment will enter the stream channel.
- Weed abatement measures consistent with the 2003 Forest Plan will be implemented including use of certified weed-free straw and vehicle washing.
- During footing construction, sediment-laden water will be pumped to the catchment basin. Return water from the catchment basin to the riparian area will be piped onto sediment retention materials if adequate natural filtration does not exist as determined by the Fisheries Biologist or Hydrologist in agreement with the Project Administrator.

II. STATUS OF THE SPECIES

A. Listing History

On June 10, 1998, the Service issued a final rule listing the Columbia River and Klamath River populations of bull trout as threatened (63 FR 31647) under the authority of the Endangered Species Act (Act). With the listing as threatened of the Jarbidge River population (64 FR 17110, November 1, 1999) and the Coastal-Puget Sound and St. Mary-Belly River populations (64 FR 58910, November 1, 1999), all bull trout in the coterminous United States received full protection under the Act. These five populations listed in the final rule were identified as distinct population segments (DPS).

In recognition of the scientific basis for the identification of bull trout DPSs (i.e., each DPS is unique and significant), the final listing rule specifies that these DPSs will serve as interim recovery units for the purposes of consultation and recovery planning until an approved recovery plan is completed. This Opinion documents our analysis of effects to the Columbia River DPS of bull trout, and by association with the 1999 Federal Register notice, the entire range of the species.

B. Reasons for Listing

Though wide-ranging in parts of Oregon, Washington, Idaho, and Montana, bull trout in the interior Columbia River basin presently occur in only about 45 percent of the historical range (Quigley and Arbelbide 1997; Rieman et al. 1997). Declining trends and associated habitat loss and fragmentation have been documented rangewide (Bond 1992; Schill 1992; Thomas 1992; Ziller 1992; Rieman and McIntyre 1993; Newton and Pribyl 1994; Idaho Department of Fish and Game in litt. 1995). Several local extirpations have been reported, beginning in the 1950s (Rode 1990; Ratliff and Howell 1992; Donald and Alger 1993; Goetz 1994; Newton and Pribyl 1994; Berg and Priest 1995; Light et al. 1996; Buchanan and Gregory 1997; Washington Department of Fish and Wildlife 1997).

The combined effects of habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, angler harvest and poaching, entrainment into diversion channels and dams, and introduced nonnative species (e.g., brook trout, *Salvelinus fontinalis*) have resulted in declines in bull trout distribution and abundance. Land and water management activities such as dams and other diversion structures, forest management practices, livestock grazing, agriculture, road construction and maintenance, mining, and urban and rural development continue to degrade bull trout habitat and depress bull trout populations (Service 2002).

C. Species Description

Bull trout *(Salvelinus confluentus)*, member of the family Salmonidae, are char native to the Pacific Northwest and western Canada. The bull trout and the closely related Dolly Varden (*Salvelinus malma*) were not officially recognized as separate species until 1980 (Robins et al. 1980). Bull trout historically occurred in major river drainages in the Pacific Northwest from the southern limits in the McCloud River in northern California (now extirpated), Klamath River basin of south central Oregon, and the Jarbidge River in Nevada to the headwaters of the Yukon River in the Northwest Territories, Canada (Cavender 1978; Bond 1992). To the west, bull trout current range includes Puget Sound, coastal rivers of British Columbia, Canada, and southeast Alaska (Bond 1992). East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta and the MacKenzie River system in Alberta and British Columbia (Cavender 1978; Brewin and Brewin 1997). Bull trout are wide-spread throughout the Columbia River basin, including its headwaters in Montana and 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 the streams where they spawn and rear. Migratory bull trout spawn and rear in streams for one to four years before migrating to either a lake (adfluvial), river (fluvial), or in certain coastal areas, to saltwater (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 more specific habitat requirements than other salmonids (Rieman and McIntyre 1993). Watson and Hillman (1997) concluded that watersheds must have specific physical characteristics to provide habitat requirements for bull trout to successfully spawn and rear, and that the characteristics are not necessarily ubiquitous throughout these watersheds resulting in patchy distributions even in pristine habitats.

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). Water temperature above 15°C (59°F) is believed to limit bull trout distribution, which may partially explain the patchy distribution within a watershed (Fraley and Shepard 1989; Rieman and McIntyre 1995). Spawning areas are often associated with 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 (44 to 46°F) and optimum water temperatures for egg incubation of 2 to 4°C (35 to 39°F).

All life history stages of bull trout 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). 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. Bull trout prefer relatively stable channel and water flow conditions (Rieman and McIntyre 1993). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997).

The size and age of bull trout at maturity depend upon life-history strategy. Growth of resident fish is generally slower than migratory fish; resident fish tend 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 known (Leathe and Graham 1982; Fraley and Shepard 1989; Pratt 1992; Rieman and McIntyre 1996).

Bull trout typically spawn from August to November during periods of decreasing water temperatures. Migratory bull trout frequently begin spawning migrations as early as April, and have been known to move upstream as far as 250 kilometers (km) (155 miles (mi)) 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 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, macro-zooplankton and small fish (Boag 1987; Goetz 1989; Donald and Alger 1993). Adult migratory bull trout are primarily piscivores, known to feed on various fish species (Fraley and Shepard 1989; Donald and Alger 1993).

E. Population Dynamics

The draft bull trout Recovery Plan (Service 2002) defined core areas as groups of partially isolated local populations of bull trout with some degree of gene flow occurring between them. Based on this definition, core areas can be considered metapopulations. A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meefe and Carroll 1994). In theory, bull trout metapopulations (core areas) can be composed of two or more local populations, but Rieman and Allendorf (2001) suggest that for a bull trout metapopulation to function effectively, a minimum of between five and 10 local populations are required. Bull trout core areas with fewer than five local populations are at increased risk of local extirpation, core areas with between five and 10 local populations are at intermediate risk, and core areas with more than 10 interconnected local populations are at diminished risk (Service 2002).

The presence of a sufficient number of adult spawners is necessary to ensure persistence of bull trout populations. In order to avoid inbreeding depression, it is estimated that a minimum of 100 spawners is required. Inbreeding can result in increased homozygosity of deleterious recessive alleles which can in turn reduce individual fitness and population viability (Whitesel et al. 2004). For persistence in the longer term, adult spawning fish are required in sufficient numbers to reduce the deleterious effects of genetic drift and maintain genetic variation. For bull trout, Rieman and Allendorf (2001) estimate that approximately 1,000 spawning adults within any bull trout population are necessary for maintaining genetic variation indefinitely. Many local bull trout populations individually do not support 1,000 spawners, but this threshold may be met by the presence of smaller interconnected local populations within a core area.

For bull trout populations to remain viable (and recover) natural productivity should be sufficient for the populations to replace themselves from generation to generation. A population that consistently fails to replace itself is at an increased risk of extinction. Since estimates of population size are rarely available, the productivity or population growth rate is usually estimated from temporal trends in indices of abundance at a particular life stage. For example, redd counts are often used as an indicator of a spawning adult population. The direction and magnitude of a trend in an index can be used as a surrogate for growth rate.

Survival of bull trout populations is also dependent upon connectivity among local populations. Although bull trout are widely distributed over a large geographic area, they exhibit a patchy distribution even in pristine habitats (Rieman and McIntyre 1993). Increased habitat fragmentation reduces the amount of available habitat and increases isolation from other populations of the same species (Saunders et al. 1991). Burkey (1989) concluded that when species are isolated by fragmented habitats, low rates of population growth are typical in local populations and their probability of extinction is directly related to the degree of isolation and fragmentation. Without sufficient immigration, growth of local populations may be low and probability of extinction high. Migrations also facilitate gene flow among local populations because individuals from different local populations interbreed when some stray and return to non-natal streams. Local populations that are extirpated by catastrophic events may also become reestablished in this manner.

In summary, based on the works of Rieman and McIntyre (1993) and Rieman and Allendorf (2001), the draft bull trout Recovery Plan identified four elements to consider when assessing long-term viability (extinction risk) of bull trout populations: 1) number of local populations; 2) adult abundance (defined as the number of spawning fish present in a core area in a given year); 3) productivity, or the reproductive rate of the population; and 4) connectivity (as represented by the migratory life history form).

F. Status and Distribution

1. Columbia River Distinct Population Segment (DPS)

The Columbia River DPS includes bull trout residing in portions of Oregon, Washington, Idaho, and Montana. Bull trout are estimated to have occupied about 60 percent of the Columbia River Basin, and presently occur in 45 percent of the estimated historical range (Quigley and Arbelbide 1997). The Columbia River DPS has declined in overall range and numbers of fish (63 FR 31647). Although some strongholds still exist with migratory fish present, bull trout generally occur as isolated local populations in headwater lakes or tributaries where the migratory life history form has been lost. Though still widespread, there have been numerous local extirpations reported throughout the Columbia River basin. In Idaho, for example, bull trout have been extirpated from 119 reaches in 28 streams (Idaho Department of Fish and Game in litt. 1995).

Recent literature (Spruell et al. 2003) provides updated information on the genetic population structure of bull trout across the northwestern United States and indicates a need to further evaluate the distinct population structure of bull trout. 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 in the Columbia River DPS. They described these as Coastal, Snake River, and Upper Columbia populations. Whitesel et al. (2004) used this and other information to describe four Conservation Units (Upper Columbia, 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.

2. Southwest Idaho Recovery Unit

The draft bull trout Recovery Plan (Service 2002) identified 22 recovery units within the Columbia River DPS. Recovery units are groupings of bull trout with historical or current gene flow within them and were designated to place the scope of bull trout recovery on smaller spatial scales than the larger DPS. Bull trout in the Project area occur within the Southwest Idaho Recovery Unit.

Achieving recovery goals within each recovery unit is critical to recovering the Columbia River DPS. Recovering bull trout in each recovery unit will maintain the overall distribution of bull trout in their native range. Individual core areas are the foundation of recovery units and conserving core areas and their habitats within recovery units preserves the genotypic and phenotypic diversity that will allow bull trout access to diverse habitats and reduce the risk of extinction from stochastic events. The continued survival and recovery of each individual core area is critical to the persistence of recovery units and their role in the recovery of a DPS (Service 2002).

The Southwest Idaho recovery unit includes the Boise, Payette, and Weiser Rivers. Although there were likely no barriers to bull trout moving among the three river basins via the Snake River historically, today bull trout occupy areas in the basins upstream of dams and uninhabitable areas. The three basins are included in a single recovery unit because they likely functioned as a unit historically, however, each river basin is treated as a recovery subunit because they are now functionally isolated from each other by dams. The Bull Trout Recovery Team identified eight core areas containing 55 local bull trout populations among the three subunits of the Southwest Idaho recovery unit (Service 2002, Service in litt. 2003). The core areas include the Arrowrock, Anderson Ranch, Upper South Fork Payette River, Deadwood River, Middle Fork Payette River, North Fork Payette River, Squaw Creek, and Weiser River. Bull trout in this recovery unit exhibit adfluvial, fluvial and resident life history patterns. There are no known naturally occurring adfluvial life forms in this recovery unit, but as a result of dam construction adfluvial populations have been documented in Arrowrock and Anderson Ranch reservoirs (Stovall 2001).

In the Boise River subunit, two large dams are impassable barriers to upstream fish movement: Anderson Ranch Dam on the South Fork Boise River, and Arrowrock Dam on the mainstem Boise River. Due to these barriers, the Bull Trout Recovery Team delineated two core areas within the Boise River system upstream from Lucky Peak Dam: Anderson Ranch and Arrowrock core areas. The Boise River was not included in the subunit downstream of Lucky Peak Dam because of the lack of upstream fish passage at Lucky Peak Dam and poor habitat quality in the Boise River.

3. Arrowrock Core Area

Bull trout in the Roaring River Passage Restoration Project area are in the Arrowrock core area. The Arrowrock core area includes the Boise River watersheds upstream of Arrowrock Dam, including the North Fork Boise River, Middle Fork Boise River, the South Fork Boise River downstream of Anderson Ranch Dam and the Mores Creek watershed downstream of Arrowrock Dam. The Anderson Ranch Core Area includes the South Fork Boise River watershed upstream of Anderson Ranch Dam. Migratory and resident bull trout occur in both the Arrowrock and Anderson Ranch core areas.

Bull trout in Arrowrock Reservoir have access to the North Fork Boise River, Middle Fork Boise River, and lower South Fork Boise River. The largest tributary to Lucky Peak Reservoir is Mores Creek, in which bull trout inhabit the headwaters (Service 2002, Service in litt. 2003). The upstream portion of Lucky Peak Reservoir is adjacent to the base of Arrowrock Dam. Some fish in Arrowrock Reservoir are entrained over the dam during high flow events and end up in Lucky Peak Reservoir. Bull trout have been documented beginning their movements upstream from Arrowrock Reservoir in late March or early April up into the North Fork and Middle Fork Boise Rivers and continuing until early July (Salow, in litt. 2003a; Salow, in litt. 2003b). These fish spawn in streams in the Middle and North Fork of the Boise River during late July or August. Arrowrock Reservoir, in most years provides a suitable and very productive wintering environment for subadult and adult bull trout (Stovall 2001). Bull trout have also been documented moving from Arrowrock Reservoir up to the South Fork of the Boise River below Anderson Ranch Dam and overwintering in that stretch of the river (Salow, in litt. 2003a; Salow, in litt. 2003b).

There are 16 local populations in the Arrowrock core area as follows: Mores Creek, Rattlesnake Creek, Sheep Creek, Roaring River, Blackwarrior Creek, Bald Mountain Creek, Little Queens River, Queens River, Yuba River, Upper Crooked River, Bear River (including Bear Creek), Lodgepole Creek, Johnson Creek, Big Silver Creek, Ballentyne Creek, Upper North Fork Boise River. Bull trout in the Project area are in the Roaring River local population.

G. Consulted-on Effects within the DPS

Consulted-on effects are those effects that have been analyzed through section 7 consultation as reported in a biological opinion. These effects are an important component of objectively characterizing the current condition of the species. To assess consulted-on effects to bull trout, the Service has analyzed all of the biological opinions received by the Region 1 and Region 6 Offices, from the time of listing until August 2003; this summed to 137 biological opinions. Of these, 124 biological opinions (91 percent) applied to activities affecting bull trout in the Columbia Basin DPS. The geographic scale of these consultations varied from individual actions (e.g., construction of a bridge or pipeline) within one basin to multiple-project actions occurring across several basins.

Our analysis showed that we consulted on a wide array of actions that had varying level of effects. Many of the actions resulted in only short-term adverse effects – some with long-term beneficial effects. Some of the actions resulted in long-term adverse effects. No actions that have undergone consultation were found to appreciably reduce the likelihood of survival and recovery of the bull trout. Furthermore no actions that have undergone consultation were anticipated to result in the loss of local populations of bull trout.

H. Conservation Needs

Recovery for bull trout will entail reducing threats to the long-term persistence of populations and their habitats, ensuring the security of multiple interacting groups of bull trout, and providing habitat conditions and access to them that allow for the expression of various life-history forms (Service 2002). The draft Bull Trout Recovery Plan identifies the following tasks needed for achieving recovery: 1) protect, restore, and maintain suitable habitat conditions for bull trout; 2) prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout; 3) establish fisheries management goals and objectives compatible with bull trout recovery; 4) characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout; 5) conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks; 6) use all available conservation programs and regulations to protect and conserve bull trout and bull trout habitats; and 7) assess the implementation of bull trout recovery by management units, and revise management unit plans based on evaluations.

I. 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 designated critical habitat for bull trout within the action area for this Project.

III. ENVIRONMENTAL BASELINE

The environmental baseline is defined as the current habitat condition including the past and present impacts on bull trout of all Federal, state or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impacts of state or private actions that are contemporaneous with the consultation in process.

A. Status of the Species in the Action Area

The Roaring River subwatershed contains one of the sixteen local populations of bull trout that inhabit the Arrowrock core area. In 2004, biologists from the U.S. Bureau of Reclamation, Idaho Department Fish and Game, and Forest surveyed Roaring River to determine bull trout distribution and abundance. The surveys detected a small local population restricted to 4.5 miles of spawning habitat in Roaring River and the East Fork Roaring River below the Scott Creek confluence. Forest biologists believe natural cascades create migratory barriers in the East Fork Roaring River and Middle Fork Roaring River that isolate this spawning habitat. Forest survey information for the Roaring River local population indicates the total catch estimate for adult bull trout is 36 adults and the total catch estimate for all bull trout is 264 individuals, and both estimates are expected to be low. Within the Arrowrock core area, migratory bull trout are present, although these fish are unable to access the Roaring River local population because the existing culvert isolates the Roaring River local population from the other 15 local populations. No migratory fish have been documented by electroshocking surveys above the culvert barrier, however, Idaho Department of Fish and Game located a radio-tagged bull trout through the culvert and into the upper Roaring River watershed in 1997. This fish is considered an anomaly by Forest biologists, due to the large fish size and ideal flow conditions. Forest records also indicate an angler caught a migratory bull trout below and within 600 feet of the culvert. No subadult or juvenile bull trout have been documented within 600 feet of the culvert, although only one electroshocking and one snorkeling survey have been completed.

B. Factors Affecting the Species in the Action Area

As previously described in the Status of the Species section of this Opinion, bull trout distributions, abundance, and habitat quality have declined rangewide primarily from the combined effects of habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, angler harvest, poaching, entrainment, and introduced nonnative fish species. Land and water management activities that depress bull trout populations and degrade habitat include dams and other water diversion structures, forest management practices, livestock grazing, agriculture, road construction and maintenance, mining, and development. All of these activities have occurred or are occurring in the Arrowrock core area and impact bull trout.

Approximately 75 percent of the Roaring River subwatershed is inventoried roadless area, and very little land management activities have occurred within the riparian conservation areas. The subwatershed has 23 miles of road, of which 4.7 miles are in the riparian conservation areas. The road density is 0.2 miles per square mile. Some timber harvest has occurred and will continue to occur, but this management activity is a lower priority than restoration and maintenance of the aquatic resources. Based on the low density of roads and lack of timber management activities, there has been little change to the drainage network in the subwatershed and bull trout habitat quality is considered high. Because of the numerous ecological effects of road construction and associated activities such as timber harvest (Jones et al. 2000, Trombulak and Frissell 2000), road density can be used as an indicator of watershed condition where less than one mile of road per square mile of watershed indicates high condition, one to three miles indicates moderate condition, and greater than three miles indicates low condition (National Marine Fisheries Service 1996). There appears to be an inverse relationship between watershed road density and bull trout occurrence in that bull trout typically do not occur where road densities exceed 1.7 miles per square mile (Service 2002). Bull trout population strongholds occur most often in roadless areas (Quigley and Arbelide 1997).

An additional factor directly affecting bull trout within the action area is capturing and handling bull trout for research and restoration projects (electrofishing and radio-tagging) as well as surveying for bull trout by snorkeling. These activities are regulated by Idaho Department of Fish and Game under an agreement with the Service under section 6 of the Act, and are not expected to result in significant impacts to bull trout population numbers and distribution in the action area.

C. Local Population Risk Assessment

Although the estimated population numbers presented in the "Status of the Species in the Action Area" section of this Opinion represent very rough approximations of bull trout abundance in the local populations, they do provide an indication of the relative risk to local populations from inbreeding depression. Reiman and Allendorf (2001) estimate that between 50 and 100 spawning adults are needed to minimize potential inbreeding effects in local populations. Based on these estimates, the Roaring River local population is at increased risk of extirpation through inbreeding effects. Because the existing culvert blocks connectivity between the Roaring River local population and other local populations in the core area, this local population may be at increased risk of extirpation because of low numbers. Restoring fish passage at the culvert barrier will have an overall beneficial influence on the population by increasing the potential for improved genetic diversity by incorporating migratory bull trout into the population. The Project will benefit local bull trout populations and reduce the risk of extirpation in the long-term by restoring connectivity between the Roaring River local population and the other local populations in the core area, and by providing migratory bull trout access to 4.5 miles of high quality bull trout habitat. Reconnecting the Roaring River local population with the other local populations will also improve the viability of the Arrowrock core area metapopulation.

IV. EFFECTS OF THE ACTION ON BULL TROUT

A. Direct and Indirect Effects

Direct effects are defined as those that result from the proposed action and directly or immediately impact the species or its habitat. Indirect effects are those that are caused by or will result from the proposed action and are later in time but are still reasonably certain to occur (50 CFR §402).

This Project will restore passage which will result in short and long-term improvement to the growth and survival of bull trout by optimizing access to habitats and prey base. Reconnecting habitat in Roaring River will also strengthen the resilience of the isolated local population to disturbances and environmental change. Rieman and Dunham (2000) recognized that small isolated populations face greater threats to changing environments than larger, well-connected populations. Long-term beneficial effects to bull trout are expected from increased connectivity between local populations in the Arrowrock core area, increased genetic diversity and productivity of the Roaring River local population from access by fluvial and adfluvial adults, and access to 4.5 miles of high quality bull trout habitat.

Project activities have the potential to harass and harm individual bull trout in the temporary time frame. Juvenile or sub-adult bull trout migrating downstream of spawning and rearing habitat have the potential to occupy the construction site during construction activities. Project activities also have the potential to continue to block bull trout upstream migratory movements during culvert replacement. Due to the site complexity and uncertainty regarding presence of bull trout within the construction areas, the potential for some level of harassment or harm cannot be discounted.

A short-term increase in suspended and deposited sediment is the main adverse effect expected from the Project. Sediment and turbid water will be produced during the following activities: fording of tracked equipment, construction of the footings/abutments, removal of the existing culvert, and stream channel construction. The removal of the culvert and the placement of stream simulation rock in the stream, and the re-watering of a dry channel should produce similar volumes of sediment/turbidity transport and pulse duration. Because of the uncertainty of the substrate composition below the culvert, two different methods could be taken to reduce the impacts from the sediment/turbidity expected during culvert removal and stream simulation construction (see Proposed Action section). This Opinion will analyze the effects of this worst-case scenario, which will occur if the existing culvert is embedded in sand. If bull trout are present within 600 feet downstream of the culvert, the sediment/turbidity increases may cause attrition through downstream displacement or acute lethal or sublethal effects to individuals. This 600 foot distance was derived from the USFWS Biological Opinion for Fish Passage Restoration Activities in Eastern Oregon and Washington, where effects of culvert replacement/removal were determined to impact bull trout up to 600 feet downstream of project sites (Service 2004). These temporary adverse effects on growth and survival are expected to be localized (within approximately 600 feet downstream) and brief (less than 30 days).

Sediment/turbidity levels will increase in the plunge pool directly below the existing culvert and fill the interstitial space of the class 4 riprap. Pool filling from the expected pulse of sediment should be limited to one habitat unit immediately downstream from the culvert. The class 4 riprap should prevent scour of the pool during high flow events, while allowing only limited sediment to be transported downstream at any given time. Sedimat placed below the pool should limit the transport of sediment beyond the pool to colloidal material (clay fraction) and mica. Any suspended sediment that escapes the pool and the Sedimat is unlikely to be measurable more than 600 feet downstream of the construction site.

Bull trout are highly susceptible to sediment inputs and require the lowest turbidity and suspended sediment levels of all salmonids for spawning, incubation, and juvenile rearing (Service 1998). Bull trout spawning and rearing habitat only occurs above the crossing, therefore, there will be no impacts to spawning and rearing habitat from the pulse of sediment. Any impacts to bull trout will be limited to sub-adult out-migrating fish and adult migratory fish, if present, and to the habitat character within approximately 600 feet downstream from the construction site. To date, only one electrofishing survey has been completed within the 600 feet below the culvert (in 2004) and no bull trout were identified. Night snorkeling in 2004 did not identify any bull trout downstream from the culvert. However, telemetry documented one migratory bull trout (Flatter 1998), and during the mid 1990's a 17-inch bull trout was caught through angling below the culvert. The potential that sub-adult and adult bull trout could be within the 600 feet of the construction site cannot be discounted.

Social (Berg and Northcote 1985) and feeding behavior (Noggle 1978) can be disrupted by increased levels of suspended sediment. Pools, which are an essential habitat type, can be filled by sediment and degraded or lost (Kelsey et al. 1981; Megahan 1982). Increases in suspended sediment have been shown to affect salmonid behavior in several ways. Fish may avoid high concentrations of suspended sediments altogether (Hicks et al. 1991). Even small elevations in suspended sediment may reduce feeding efficiency and growth rates of some salmonids (Sigler et al. 1984). A reasonable expectation would be that, in order to avoid adverse effects, bull trout may move away from areas with elevated levels of suspended sediment. Bison and Bilby (1982) found that juvenile coho salmon (*Oncorhynchus kisutch*) avoided increasingly turbid waters in a laboratory setting. Relocating to avoid sediment may have indirect adverse effects on bull trout. Salmonids exhibit a dominance hierarchy where the dominant fish (usually the largest) maintain the most desirable territories (i.e., defended area) in terms of available cover and food sources (Gilmour et al. 2005). Subordinate fish may be excluded from food and cover resources and show reduced fitness and mortality (Gilmour et al. 2005). Berg and Northcote (1985) found that dominance hierarchies broke down and territories were not defended when juvenile coho salmon were exposed to short term sediment pulses. The Service assumes bull trout behave similarly to other studied salmonids. Based on this assumption we expect bull trout that abandon territories in order to avoid turbidity associated with culvert replacement projects, may suffer increased competition, predation (through loss of cover), stress, and reduced feeding efficiency.

Increased sediment and suspended solids have the potential to affect primary production and benthic invertebrate abundance, due to reductions in photosynthesis within murky waters. Thus, food availability for fish may be reduced as sediment levels increase (Cordone and Kelley 1961; Lloyd et al. 1987). Sediment deposition may also result in short-term reduction in macro-invertebrate abundance (potential bull trout food resource) in areas of sediment deposition (Henley et al. 2000). However, deposition areas will be relatively small and localized in the Project area so effects on bull trout prey availability or foraging efficiency are expected to be insignificant. Additionally, high flow events during the spring following Project implementation are expected to flush any deposited sediment from the Project area.

The primary negative impact to bull trout and habitat is expected to occur through the transportation of sediment downstream and the pulse of turbid water expected after removal of the culvert and return of flow to dewatered areas. The increase in sediment and suspended solids may have lethal or sub-lethal effects to bull trout within the area 600 feet downstream of the construction site. The temporary and short-term adverse effects should be minimized by the incorporation of the mitigation measures and special

Project design features. Although the measures to reduce sediment/turbidity are effective in reducing the potential sediment/suspended solids, the mitigations/special Project design features are not expected to completely avoid the impacts to fish and fish habitat.

Jakober (2002) monitored suspended sediments on a culvert replacement project which included installation of an oversized (54 inch diameter, 48 feet long) round pipe sunk 20% below the natural stream bottom. The replacement included stream diversion, stream simulation rock placement inside the culvert, and re-watering. The results showed that 90% of the sediment was introduced in the first 30 minutes and 95% occurred within the first 120 minutes. It took 90 minutes for turbidity to clear downstream of the new culvert and a slight haze was present 2.5 hours following re-watering. Based on the review of literature, it is expected that the sediment/turbidity plume should be limited to less than 600 feet and should dissipate within 3-4 hours (Casselli et al. 2000, Jakober 2002, Service 2004). The effects are likely to quickly return to pre-existing levels considering the volume of substrate likely to be introduced and high volume of stream flow (Jakober 2002, Casselli 2000).

Monitoring of in-channel work on the Nez Perce National Forest showed that the highest sediment concentrations immediately downstream of the where machinery was working – concentrations ranged from 270 to 623 mg/l (Forest Service 2002). Concentrations in the mixing zone ranged from 69 to 190 mg/l. Visible suspended sediment was observed for no more than 10 minutes following disturbance, although it is not clear from the report how long the machine worked and how long associated suspended sediment was produced.

Based on the work of Newcombe and Jensen (1996) sublethal adverse effects are expected for juvenile and adult salmonids at suspended sediment concentrations as low as 55 mg/l at exposure times of three hours. This level of exposure may produce short-term reductions in feeding rates and feeding success, and minor physiological stress. Compared with other salmonids, bull trout are more sensitive to sediment and require the lowest suspended sediment levels (Bash et al. 2001). Based on the monitoring results summarized above, the Service anticipates that bull trout present in the action area during Project implementation (which may include juvenile and sub-adult out-migrating fish and migratory adults) may be adversely affected by exposure to suspended sediment concentrations exceeding 55 mg/l for durations of three hours or more.

Project activities will have no long-term influence on sediment/turbidity in the subwatershed and will have only temporary impacts to bull trout migratory habitat. In-channel sediment transport is expected to last until stabilization of the substrate occurs, probably after the first spring flow event following construction. Sediment-control measures associated with ground disturbance areas are expected to eliminate sediment transport toward the stream channel until vegetative recovery occurs. BOISED modeling has shown that sediment production generally returns to pre-Project levels three to five years after implementation (Forest Service 1991). However, with the use of a combination of erosion control fabric, mulch, seeding, and displaced riparian vegetation for rehabilitation of the area, sediment delivery will be minimized and recovery should be accelerated.

Localized substrate embeddedness is expected to increase from additional sediment delivery and transport downstream from the site in the temporary and short-term. Bull trout overwintering and migratory habitat may be reduced within 600 feet below the culvert due to increased embeddedness. The overall subwatershed conditions for overwintering and migratory habitat should continue to provide adequate habitat. Localized embeddedness should return to pre-existing levels within the short-term timeframe through natural sediment routing mechanisms.

The streambanks adjacent to the culvert and at the temporary crossing will be disturbed during the construction activities. This disturbance is expected to occur for less than 200 feet on both sides of the channel, but will be stabilized during site rehabilitation. Approximately 50 feet of streambank will be constructed after removal of the culvert. This construction will include onsite materials such as logs, large rock, and riparian vegetation to create a natural streambank where the culvert once was. The rehabilitation will include armoring upstream and downstream of the new structure with adequately sized riprap and replacing streambank material and riparian vegetation.

Other potential adverse effects to bull trout may result from the introduction of toxic fuels, lubricants, coolants, or hydraulic fluids into the stream through accidental spills or equipment leaks. The risk of these effects will be minimized because equipment will be cleaned or external oil, grease, dirt, and mud, and any leaks repaired before arriving on site. Equipment will be checked for leaks daily and fuel storage and refueling will occur at the greatest possible distance from surface water. Washout water from cleaning concrete equipment and tools may also be toxic to bull trout because of its very high alkalinity.

Turbidity, sedimentation, and activities adjacent to Roaring River are likely to adversely impact bull trout. Project design criteria will be used to minimize sediment effects and prevent exposure from reaching levels where bull trout mortality might occur. These impacts are only expected to occur to bull trout located within 600 feet below the construction area and the impacts are expected to be sub-lethal on those individuals. In the short- and long-term, connectivity between Arrowrock Core Area populations will be improved and the Roaring River Population should be resilient to disturbance and environmental changes through the presence of migratory fish. The population size may increase due to the presence of migratory fish although the population should continue to fluctuate around an equilibrium limited by the 4.5 miles of spawning and rearing habitat. Habitat conditions will remain as they currently exist and will continue to provide high quality habitat for bull trout.

B. Effects of Interrelated or Interdependent Actions

The Service did not identify any interrelated or interdependent actions associated with the Project.

V. CUMULATIVE EFFECTS

Illegal and inadvertent harvest of bull trout is also considered a cumulative effect. Harvest can occur through both misidentification and deliberate catch. Schmetterling and Long (1999) found that only 44 percent of the anglers they interviewed in Montana could successfully identify bull trout. Similarly Polzin and Fredenberg (2005) surveyed anglers at Swan Lake, Montana, and found that only about 54 and 26 percent of the respondents could correctly identify adult and juvenile bull trout respectively. Being aggressive piscivores, bull trout readily take lures or bait (Ratliff and Howell 1992). Spawning bull trout are particularly vulnerable to harvest because the fish are easily observed during autumn low flow conditions. Hooking mortality rates range from 4% for nonanadromous salmonids with the use of artificial lures and flies (Schill and Scarpella 1997) to a 60% worst case scenario for bull trout taken with bait (Idaho Department of Fish and Game 2001). Thus, even in cases where bull trout are released after being caught some mortality can be expected.

VI. CONCLUSION

The Service has reviewed 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 the Project is not likely to jeopardize the continued existence of the Arrowrock core area or the Columbia River Distinct Population Segment (DPS) of bull trout, and therefore the species as listed in the final rule (64 FR 58932, November 1, 1999).

The Service concludes that direct effects to bull trout would be limited to short-term disturbance, feeding rate reduction, and physiological distress resulting in take in the form of harm or harassment. These anticipated effects should be minimized by the design criteria incorporated into the Project proposal. The Service expects that the numbers, distribution, and reproduction of bull trout in the action area, the Arrowrock core area, the Southwest Idaho recovery unit, or in the Columbia Basin DPS will not be significantly changed as a result of this Project. Connectivity between bull trout habitat and local populations in the Arrowrock core area will be improved. As such, we have concluded that the survival and recovery of bull trout populations will not be jeopardized by Project activities. Project implementation is expected to provide long-term benefits to bull trout in the North Fork, Middle Fork and lower South Fork Boise River watersheds in the long-term through improvements to habitat condition and access.

There is no designated critical habitat in the action area so none will be affected.

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 in the definition of take in the Act means an act which actually kills or injures wildlife. Such act may 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 by annoying these species to such an extent as to significantly disrupt normal behavioral 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 Forest has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest 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 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

Based on survey data, the Service assumes bull trout may be present in the action area during the Project. However, it is difficult for us to anticipate the exact number of individual bull trout that will be present and at risk of incidental take as a result of implementation of the Project. Therefore, we will use the amount of habitat affected as a surrogate. We anticipate that any and all bull trout in the immediate vicinity of the culvert replacement site in Roaring River and downstream 600 feet (i.e., the assumed extent of downstream suspended sediment effects) will be subject to take in the form of harassment or harm from direct exposure to increased levels of suspended sediment and turbidity and deposited sediment expected from Project implementation. Elevated suspended sediment may not only result in direct injury (gill irritation, physiological stress, reduced feeding efficiency), but may also result in harassment and an increased likelihood of injury by causing bull trout to move out of areas of elevated suspended sediment. Moving out of these areas may cause loss of territories, increase competition and stress, and reduce feeding efficiency. Deposited sediment may harm bull trout juveniles. Incidental take of bull trout is anticipated to occur during one 30-day in-stream work window between July 31 and October 5, (the proposed culvert replacement work window). There is a risk of incidental take from erosion of disturbed streambank areas in the Project area and associated sediment deposition in the Roaring River until the site has revegetated. This risk will abate after the first year when vegetation begins to reestablish.

Incidental take will be limited to bull trout in Roaring River in the Project area defined above. The life stages expected to be harmed or harassed include adult and subadult fish. The Service expects no direct lethal take of bull trout. If the incidental take anticipated by this document (i.e., harm or harassment to bull trout within the action area) is exceeded, Project activities associated with this exceedance will cease and the Forest will immediately contact the Service to determine if consultation should be reinitiated. Authorized take will be exceeded if Project activities result in bull trout mortality, or if suspended sediment exceeds exposure (concentration and duration) levels determined to have more than minor physiological effects to bull trout within 600 feet downstream of the culvert replacement site. Authorized take will also be exceeded if instream work or unanticipated erosion and sedimentation occurs outside of the July 31 to October 30 work window.

B. Effect of the Take

The Columbia River DPS comprises 22 management units including the Southwest Idaho recovery unit (Service 2002). The Southwest Idaho recovery unit contains eight core areas with 55 local populations. The Arrowrock core area contains 16 local populations. Take is expected to be confined to individual migratory bull trout in the Roaring River local population. The anticipated take may be reduced by design criteria incorporated into the Project to avoid and reduce adverse effects. The probability that the Project will eliminate this local population of bull trout is insignificant. Local bull trout densities and distribution are not expected to be significantly altered. As only one out of a total of 55 local populations in the Southwest Idaho recovery unit may be affected, it is unlikely that the Project will impair productivity or population numbers of bull trout in the Southwest Idaho recovery unit or in the Columbia River DPS.

Sediment effects will be short-term. In the long-term, the Project will benefit bull trout by increasing the amount of available habitat and restoring a migratory component to the local population.

C. Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measure is necessary and appropriate to minimize take resulting from Project implementation:

- Minimize the potential for harm or harassment of bull trout and disruption of riparian and aquatic habitat from Project activities.

D. Terms and Conditions

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

1a. After the first major post-Project rain event and until the Project area has revegetated to the extent that further erosion is not expected, the Forest will inspect the site to ensure that no erosion and sediment delivery are occurring, and will take corrective measures to prevent erosion if necessary.

1b. If the use of concrete is required, the Forest will restrict washout of concrete trucks and other equipment to locations that will minimize the risk of introducing wastewater to bull trout habitat.

E. Monitoring

1. Before Project implementation begins, snorkeling will be conducted by qualified fisheries personnel in the plunge pool below the culvert to 600 feet downstream. Bull trout present will be recorded and the summary of findings will be documented in a report distributed the Service Level 1 Interagency Streamlining Consultation Team member.

2. A Forest Fisheries Biologist will be at the site during culvert removal to document the pulse of sediment during activities that produce sediment. The Forest will thoroughly monitor instream work activities for turbidity (used as a surrogate for determining concentration of suspended sediment). The Forest will take measures to assure that turbidity levels do not exceed 25 nephelometric turbidity units (NTUs)[1] over background levels for more than three consecutive hours at downstream monitoring stations. A minimum of two monitoring stations shall be established at each work site: one upstream of the instream work site, and one downstream. Distance between the work site and the downstream monitoring station will be 300 feet, or as determined appropriate by the Fisheries Biologist. Turbidity will be measured during those times when turbidity is most likely to result from Project activities. All erosion and sediment control measures will be maintained until construction is complete and disturbed areas are stabilized.

3. Upon locating any dead, injured, or sick bull trout resulting from Project activities, such activities shall be terminated and notification must be made within 24 hours to the Service's Division of Law Enforcement at (208) 378-5333.

[1] See Appendix A of this Opinion – Rationale for Turbidity Threshold

Additional protection measures may be developed through discussions with the Service.

4. During Project implementation the Forest shall promptly notify the Service of any emergency or unanticipated situations arising that may be detrimental for bull trout relative to the proposed activity.

VIII. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act requires 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 intended to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends that the Forest implement the following conservation measures.

1. In order to better assess sediment effects on bull trout from future instream projects, take suspended sediment samples at the turbidity monitoring stations established for the Project. Although turbidity and suspended sediment concentration are correlated, the relationship varies between individual streams and watersheds (Bash et al. 2001, Lewis et al. 2002, Rowe et al. 2003). Measuring suspended sediment will assist in making stream-specific correlations between suspended sediment concentrations and turbidity.

2. Continue to promote recovery of bull trout by identifying additional habitat restoration opportunities and implementing these actions in the near-term.

3. Continue to survey and monitor bull trout populations and habitat.

To keep the Service informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification on implementation of any conservation recommendations.

IX. REINITIATION NOTICE

This concludes formal consultation on the Roaring River Fish Passage Restoration Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action 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 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.

LITERATURE CITED

Bash, J., C. Berman, and S. Bolton. 2001. Effects of turbidity and suspended solids on salmonids. Center for Streamside Studies, University of Washington, Seattle, Washington.

Berg, L. and T.G. Northcote. 1985. Changes in territorial, gill-flaring, and feeding behavior in juvenile coho salmon (*Oncorhyncus kisutch*) following short-term pulses of suspended sedidment. Canadian Journal of Fisheries and Aquatic Sciences. 42(8):1410-1417.

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. Montana Fish, Wildlife, and Parks, Job Progress Report, Project F-78-R-1, Helena, MT.

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(1): 56-62.

Bisson, P.A. and R.E. Bilby. 1982. Avoidance of suspended sediment by juvenile coho salmon. North American Journal of Fisheries Management 2(4):371-374.

Bond, C.E. 1992. Notes on the nomenclature and distribution of the bull trout and the effects of human activity on the species. Pages 1-4 *in* Howell, P.J. and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries Society, Corvallis, OR.

Brewin, P.A. and M.K. Brewin. 1997. Distribution maps for bull trout in Alberta. Pages 206-216 *in* Mackay, W.C., M.K. Brewin and M. Monita, editors. 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. Pages 1-8 *in* Mackay, W.C., M.K. Brewin and M. Monita, editors. Friends of the Bull Trout Conference Proceedings.

Burkey, T.V. 1989. Extinction in nature reserves: the effect of fragmentation and the importance of migration between reserve fragments. Oikos 55:75-81.

Casselli, J., B. Riggers, and A. Rosquist. 1999. 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(3):139-174.

Cordone, A. J., and D. W. Kelley. 1961. The influences of inorganic sediment on the aquatic life of streams. California Fish and Game 47: 189-228.

Dodds, W.K and M. R. Whiles. 2004. Quality and quantity of suspended particles in rivers: continent-scale patterns in the United States. Environmental Management 33:355-367.

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.

Flatter, B. 1998. Life History and population status of migratory bull trout *Salvelinus confluentus* in Arrowrock Reservoir, Idaho. Idaho Department of Fish and Game.

Fraley, J.J. and B.B. Shepard. 1989. Life history, ecology and population status of migratory bull trout (*Salvelinus confluentus*) in the Flathead Lake and River system, Montana. Northwest Science 63(4):133-143.

Gilmour, K.M., J.D. DiBattista, and J.B. Thomas. 2005. Physiological causes and consequences of social status in salmonid fish. Integrative and Comparative Biology 45:263-273.

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

Goetz, F.A. 1994. Distribution and juvenile ecology of bull trout (Salvelinus confluentus) in the Cascade Mountains. M.S. Thesis, Oregon State University, Corvallis, OR.

Henley, W.F., M.A. Patterson, R.J. Neves, and A. Dennis Lemly. 2000. Effects of sedimentation and turbidity on lotic food webs: a concise review for natural resource managers. Reviews in Fisheries Science 8(2): 125-139.

Hicks, B. J., et al. 1991. Response of salmonids to habitat change. Pages 483-518 *in* Meehan, W.R., editor. Influences Of Forest And Rangeland Management On Salmonid Fishes and Their Habitats. American Fisheries Society Special Publication 19.

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, ID.

Idaho Department of Fish and Game. 2001. Regional Fisheries Management Investigations: North Fork Clearwater River Bull Trout. Project 9, Volume 128, Article 07. Idaho Department of Fish and Game, Lewiston, Idaho.

Jones, J.A., F.J. Swanson, B.C. Wemple, and K.U. Snyder. 2000. Effects of roads on hydrology, geomorphology, and disturbance patches in stream networks. Conservation Biology 14: 76-85.

Kelsey, H.M., Madej, M.A., Pitlick, J., Coughlan, M., Best, D., Bending, R. and P. Stroud. 1981. Sediment sources and sediment transport in the Redwood Creek Basin: a progress report. Redwood National Park Research and Development Technical Report 3. National Park Service. 114 p.

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

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

Leathe, S.A. and P. Graham. 1982. Flathead Lake fish food habits study. E.P.A. through Steering Committee for the Flathead River Basin Environmental Impact Study.

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.

Lloyd, D.S. 1987. Turbidity as a water quality standard for salmonid habitats in Alaska. North American Journal of Fisheries Management 7:34-45.

Lloyd, D.S., J.P. Koenings, and J.D. LaPerriere. 1987. Effects of turbidity in fresh waters of Alaska. North American Journal of Fisheries 7:18-33.

Megahan, W.F. 1982. Channel sediment storage behind obstructions in forested drainage basins draining the granitic bedrock of the Idaho batholith. In: Swanson, [and others]. Sediment budgets and routing in forested drainage basins. General Technical Report PNW-141. Portland, Oregon: USDA Forest Service, Pacific Northwst Reserch Station. 114-121.

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

National Marine Fisheries Service. 1996. Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale. National Marine Fisheries Service, Environmental and Technical Services Division, Habitat Conservation Branch.

Newcombe, C.P. and J.O.T. Jensen. 1996. Channel suspended sediments and fisheries: a synthesis for quantitative assessment of risk and impact. North American Journal of Fisheries Management 16: 693-727.

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

Noggle, C. C. 1978. Behavioal, physiological, and lethal effects of suspended sediment on juvenile salmonids. Masters thesis, University of Washington, Seattle.

Oliver, G.G. 1979. Fisheries investigations in tributaries of the Canadian portion of the Libby Reservoir. Fish and Wildlife Branch, Kootenay Region.

Polzin, P. and W. Fredenberg. 2005. Salmonid fish recognition skills of anglers at Swan Lake, Montana. Fish and Wildlife Service, Kalispell, Montana.

Pratt, K.L. 1992. A review of bull trout life history. Pages 5-9 *in* Howell, P. J. and D. V. Buchanan, editors. Proceedings of the Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries Society, Corvallis, OR.

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. 1174-1185pp.

Ratliff, D. E. and P. J. Howell. 1992. The Status of Bull Trout Populations in Oregon. Pages10-17 *in* Howell, P.J. and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries Society, Corvallis, OR.

Rich, C.F., Jr. 1996. Influence of abiotic and biotic factors on occurrence of resident bull trout in fragmented habitats, western Montana. M.S. thesis. Montana State University, Bozeman, MT.

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.

Reiman B. E., and J. B. Dunham. 2000. Metapopulations and salmonids: a synthesis of life history patterns and empirical observations. Ecology of Freshwater Fish. 9:51-64

Rieman, B.E. and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. General Technical Report INT-302, Intermountain Research Station, U.S. Department of Agriculture, Forest Service, Boise, ID. (Bull Trout - B58).

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 (3):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.C. Lee and R.F. Thurow. 1997. Distribution, status and likely future trends of bull trout within the Columbia River and Klamath basins.

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, MD.

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, CA.

Saunders, D.A., R.J. Hobbs, and C.R. Margules. 1991. Biological consequences of ecosystem fragmentation: A review. Conservation Biology 5:18-32.

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

Schill, D.J. and R.L. Scarpella. 1997. Barbed hook restrictions in catch-and-release trout fisheries: a social issue. North American Journal of Fisheries Management 17(4): 873-881.

Schmetterling, D.A. and M.H. Long. 1999. Montana anglers' inability to identify bull trout and other salmonids. Fisheries 24: 24-27.

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

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, editors. Friends of the Bull Trout Conference Proceedings.

Sigler, J. W., T.C. Bjornn, and F.H. Everest. 1984. Effects of chronic turbidity on density and growth of steelhead and coho salmon. Transactions of the American Fisheries Society 113:142-150.

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.

Stovall, S.H., editor. 2001. Boise-Payette-Weiser subbasin summary. Prepared for the Northwest Power Planning Council. Scott Grunder, Subbasin Team Leader, Idaho Department of Fish and Game. Draft October, 26, 2001.

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

Trombulak, S.C. and C.A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14: 18-30.

U.S. Department of Agriculture, Forest Service. 2003. Guidance for Aquatic Species Passage Design, Forest Service Northern Region & Intermountain Region. Letter from the Regional Forester. December 4, 2003.

U.S. Department of Agriculture, Forest Service. 2002. Annual Addendum to the Lower Selway and Middle Fork Clearwater Subbasin 1999 Biological Assessment. Nez Perce National Forest, Grangeville, Idaho.

U.S. Department of Agriculture, Forest Service. 1991 Boise National Forest. BOISED User's Guide and Program Documentation.

U.S. Department of the Interior, Fish & Wildlife Service. 2002. Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. Fish and Wildlife Service, Portland, Oregon.

U.S. Department of the Interior, Fish & Wildlife Service. 2004. Biological Opinion for USDA Forest Service Fish Passage Restoration Activities in Eastern Oregon and Washington 2004-2008. Region 1, U.S. Fish and Wildlife Service. Portland, Oregon, and Western Washington Fish and Wildlife Office, Lacey, Washington.

U.S. Department of the Interior, Fish & Wildlife Service. 1998. 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.

Washington Department of Fish and Wildlife. 1997. Washington State salmonid stock inventory. Bull trout/Dolly Varden. September 1997. 437pp.

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.

Whitesel, T.A., J. Brostrom, T. Cummings, J. Delavergne, W. Fredenberg, H. Schaller, P. Wilson, and G. Zydlewski. 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.

Ziller, J.S. 1992. Distribution and relative abundance of bull trout in the Sprague River subbasin, Oregon. Pages 18-29 *in* Howell, P.J. and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries Society, Corvallis, OR.

IN LITERATURE

Idaho Department of Fish and Game, in litt. 1995. List of streams compiled by IDFG where bull trout have been extirpated, fax from Bill Horton, IDFG, to Trish Klahr, U.S. Fish and Wildlife Service, Boise, Idaho.

Salow, T, in litt. 2003a. Boise Bull trout project, update for April 2003 bull trout research. E-mail transmission. U.S. Bureau of Reclamation. May 1, 2003.

Salow, T, in litt. 2003b. Boise Bull trout project, update for July 2003 bull trout research. E-mail transmission. U.S. Bureau of Reclamation. July 25, 2003.

U.S. Department of the Interior, Fish & Wildlife Service. in litt. 2003. Draft Chapter 18, Southwest Idaho Recovery Unit, Bull Trout Recovery Plan. U.S. Fish and Wildlife Service, Boise, Idaho. Modified December 30, 2003.

APPENDIX

APPENDIX A: Rationale for Turbidity Threshold

Newcombe and Jensen (1996) predicted adverse effects (minor physiological distress, reduced feeding rate) to adult and juvenile salmonids when exposed to suspended sediment concentrations of 55 mg/l for three hours. This is the approximate threshold we are trying to establish for the Project. Turbidity is less difficult and more economical to measure than suspended sediment and studies show correlations between the two parameters. 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. However, the relationship between turbidity and suspended sediment varies between watersheds and even between different locations within the same watershed (Henley et al. 2000). It appears, after reviewing the literature (Lloyd 1987, Lloyd et al. 1987, Dodds and Whiles 2004), that 25 NTUs provides an approximation of the desired 55 mg/l threshold. In the Roaring River drainage, 25 NTUs may actually correspond to a higher (or lower) suspended sediment concentration, but even at levels as high as 403 mg/l, generally similar sublethal effects are expected for an exposure duration of three hours (Newcombe and Jensen 1996). Not knowing the exact relationship between turbidity and suspended sediment in Project area, applying the 25 NTU threshold appears reasonable in terms of reducing risks to bull trout.