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Charles A. Mark, Forest Supervisor
Salmon-Challis National Forest
1206 South Challis Street
Salmon, Idaho 83467

OCT 31 2016

Subject: Biological Opinion for Authorization of Continued Use and Maintenance of Water Diversions in the Panther Creek Watershed, Salmon-Challis National Forest, Lemhi County, Idaho, and Concurrence for Effects to Bull Trout Designated Critical Habitat in Panther Creek (01EIFW00-2017-F-0043)

Dear Mr. Mark:

This letter transmits the U.S. Fish and Wildlife Service's (Service) biological opinion (Opinion) on the effects of the Salmon-Challis National Forest's (Forest) proposed authorization of continued use and maintenance of five stream diversions in the Panther Creek watershed to bull trout (*Salvelinus confluentus*), a species listed as threatened under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.; [Act]), and its designated critical habitat. In a letter dated January 16, 2015, and received by the Service on January 20, 2015, the Forest requested consultation under section 7 of the Act. Your letter included a biological assessment (Assessment) describing effects of the proposed action to bull trout and its designated critical habitat.

Through the Assessment, the Forest determined the proposed authorization of continued use and maintenance of four of the five diversions (Otter Creek, Fourth of July Creek, South Fork Moyer Creek, and Panther Creek) may affect and is likely to adversely affect bull trout. Four of the five diversions (Otter Creek, Fourth of July Creek, South Fork Moyer Creek, and Garden Creek) may affect and are likely to adversely affect bull trout designated critical habitat. In the attached Opinion, the Service finds that effects of the authorization of continued use and maintenance of these diversions are not likely to jeopardize the coterminous United States population of bull trout or destroy or adversely modify designated critical habitat. The Forest also determined the proposed authorization of continued use and maintenance of the Panther Creek water diversion may affect, but is not likely to adversely affect designated critical habitat for bull trout. The Service concurs with the Forest's determination for bull trout designated critical habitat in Panther Creek and presents our rationale below.

Proposed Action

The Forest proposes to authorize continued operation and maintenance of a diversion, and conveyance of water from Panther Creek on and across National Forest System lands. Idaho Department of Water Resources water right license 75-4006 (1891 priority date) authorizes the

diversion of up to 0.1 cubic feet per second (cfs) from April 1 to November 1 for irrigation (Assessment, p. 82). Estimated stream flow in Panther Creek during the water right period of use varies from a low of 106.8 cfs in October to 1,035.4 cfs in June.

The Panther Creek diversion consists of a pump with a screened intake. This diversion's submerged pipe intake lies in close proximity to the stream margin and does not span the channel. It is not known if the screen meets National Marine Fisheries Service pump intake screen criteria. Diverted water is conveyed through a pipeline to streamside private lands. The Assessment provides no information on typical maintenance activities at this diversion. Based on the description of the diversion, the Service assumes most maintenance work of the diversion structure will be conducted by hand.

Bull Trout Designated Critical Habitat Presence in the Action Area

The diversion is located in a portion of Panther Creek that is designated critical habitat, providing habitat for foraging, migration, and overwintering. Panther Creek is within the Middle Salmon-Panther River Critical Habitat Subunit (CHSU), one of the ten CHSUs identified in the Salmon River Basin Critical Habitat Unit.

Potential Impacts and Effects from the Proposed Action

The diversion structure very slightly reduces suitable stream substrate for bull trout. The conveyance pipeline disturbs a very minor amount of riparian vegetation. The minor effects of the loss of this instream habitat and disturbance of riparian vegetation is considered to be insignificant.

Maintenance of the diversion structure is likely to result in sediment being re-suspended in the water column. The increased turbidity would be of very short duration and low concentration because of the small amount of the stream bottom being disturbed. Based on the type and size of the Panther Creek diversion, the Service concludes impacts to turbidity levels, stream substrate, streambanks, and riparian vegetation would be negligible and effects to bull trout designated critical habitat from maintenance activities would be insignificant.

Concurrence

Based on the Service's review of the Assessment, we concur with the Forest's determination that the proposed authorization of continued use and maintenance of the Panther Creek diversion may affect, but is not likely to adversely affect designated critical habitat for bull trout. This concurrence is based on the very low percentage of stream flow diverted from the stream (ranging from 0.003 to 0.093 percent of typical stream flows), and the very limited loss and/or disturbance of stream substrate and riparian area caused by use and maintenance of this diversion. Under the proposed action, the physical or biological features of bull trout designated critical habitat are likely to be maintained in the condition they were at the time of designation of critical habitat. The affected critical habitat would be likely to maintain its capability to support the bull trout and to serve its intended conservation role for the species.

This concludes informal consultation. Further consultation pursuant to section 7(a)(2) of the Act is not required. Reinitiation of consultation on this action may be necessary if new information reveals effects of the action that may affect the listed species or designated critical habitat in a manner or to an extent not considered in the Assessment, the action is subsequently modified in a

manner that causes an effect to the listed species that was not considered in the analysis, or a new species is listed or critical habitat is designated that may be affected by the proposed action.

Thank you for your continued interest in the conservation of threatened and endangered species. If you have any questions regarding this consultation, please contact Laura Berglund of this office at (208) 237-6975 extension 103.

Sincerely,

for Gregory M. Hughes
State Supervisor

Enclosure

cc: SCNF, Salmon (Krieger)

BIOLOGICAL OPINION
FOR THE
PANTHER CREEK WATERSHED DIVERSIONS
LEMHI COUNTY, IDAHO

01EIFW00-2017-F-0043

FISH AND WILDLIFE SERVICE
IDAHO FISH AND WILDLIFE OFFICE
BOISE, IDAHO

for **Supervisor** Sara Thompson

Date 31 October 2016

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INTRODUCTION

This document represents the U.S. Fish and Wildlife Service's (Service) biological opinion (Opinion) on the effects to the threatened bull trout (*Salvelinus confluentus*) and its designated critical habitat from the Salmon-Challis National Forest's (Forest) proposed authorization of continued operation and maintenance of five stream diversions within the Panther Creek watershed in Idaho, and conveyance of water from those diversions on and across National Forest System (NFS) lands. This Opinion was prepared in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; [Act]). Your January 16, 2015, request for consultation was received on January 20, 2015.

This Opinion is primarily based on the Forest's *Biological Assessment for the Authorization of Water Diversions in the Panther Creek Watershed* (USFS 2015, entire), dated January 16, 2015, and other sources of information cited herein. The biological assessment (Assessment) is incorporated by reference in this Opinion.

Consultation History

In 2001, the Forest was sued for not having initiated or completed consultation in accordance with the Act for water diversions located on Forest lands. A June 2002 settlement agreement required the Forest to initiate consultation on all ongoing diversions on Forest lands by December 31, 2007. The settlement agreement referenced and organized the expected consultations by major watershed, including the Panther Creek watershed. A biological assessment was received by the Service in July 2004. The Service requested and received extensions of consultation timeframes as discussions to refine the proposed action continued. On June 21, 2007, the Service sent the Forest a letter indicating we could not proceed further in the consultation process with the information on water diversions provided by the Forest to date.

The Service was sued in July 2009 for failure to complete consultation on water diversions. A settlement was reached in October 2010 that required completion of consultations by February 2012. The Service completed all the required consultations, with the exception of Panther Creek watershed diversions. No additional information concerning Panther Creek watershed diversion was received from the Forest, leaving the Service unable to define the proposed action in this watershed. Subsequently, the Forest received a notice of intent to sue for failure to complete several consultations on water diversions activities, including water diversions within the Panther Creek watershed. The Forest finalized a revised biological assessment for water diversions in the Panther Creek watershed on January 16, 2015.

The Forest identified five water diversions in the Panther Creek watershed that may affect bull trout and its designated critical habitat. In the January 2015 Assessment, the Forest determined that four of the five diversions (Otter Creek, Fourth of July Creek, South Fork Moyer Creek, and Panther Creek) may affect and are likely to adversely affect bull trout. Four of the five diversions (Otter Creek, Fourth of July Creek, South Fork Moyer Creek, and Garden Creek) may affect and are likely to adversely affect bull trout designated critical habitat, while one diversion (Panther Creek) may affect, but is not likely to adversely affect bull trout designated critical habitat. The Service has reviewed the basis for the not likely to adversely affect determination

for designated critical habitat at the Panther Creek diversion and concurs with this finding for reasons discussed in the transmittal letter for this Opinion. Therefore, designated critical habitat for bull trout at the Panther Creek diversion will not be discussed further.

A chronology of this consultation is presented below. A complete decision record for this consultation is on file at the Service's Eastern Idaho Field Office in Chubbuck, Idaho.

August 14, 2013	The Forest notifies the Service of the withdrawal of their previous (2004) request for consultation on the proposed action and their intent to develop a biological assessment based on current conditions.
January 20, 2015	The Service receives the biological assessment for the proposed action.
February 4, 2015	The Service receives a phone call from the Forest to inform us that an error was made in the biological assessment. The biological assessment indicates bull trout occupy Garden Creek, but the stream is unoccupied. No surveys conducted by Idaho Department of Fish and Game (IDFG) or the Forest document the presence of bull trout in Garden Creek.
March 3, 2015	The Service request additional information regarding bull trout populations in the Panther Creek watershed from the Forest.
March 3, 2015	The Forest provides fish population monitoring data in response to the Service's request.
April 8, 2015	The Service informs the Forest that all information required to initiate consultation on the proposed action has been received.
April 20, 2015	The Service meets with the Forest to discuss potential reasonable and prudent measures for the diversions included in this consultation.
June 2015	The Service requests additional information from the Forest regarding bull trout electrofishing sites and stream water temperatures. The Forest provides the information requested.
September 6, 2016	The Forest confirms the likely to adversely affect determination for critical habitat in Fourth of July Creek. The biological assessment inadvertently identified conflicting determinations for critical habitat within the stream.

PURPOSE and ORGANIZATION of this BIOLOGICAL OPINION

In accordance with the requirements of section 7(a)(2) of the Act and its implementing regulations, the formal consultation process culminates in the Service's issuance of an Opinion that sets forth the basis for a determination as to whether the proposed Federal action is likely to jeopardize the continued existence of listed species or to destroy or adversely modify critical habitat, as appropriate. The regulatory definition of jeopardy and a description of the formal

consultation process are provided at 50 CFR[1] 402.02 and 402.14, respectively. If the Service finds that the action is not likely to jeopardize a listed species, but anticipates that it is likely to cause incidental take of the species, then the Service must identify that take and exempt it from the prohibitions against such take under section 9 of the Act through an Incidental Take Statement.

Analytical Framework for the Jeopardy and Destruction or Adverse Modification Analyses

Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis for bull trout in this Opinion relies on four components:

1. *Status of the Species*, which evaluates the rangewide condition of the bull trout, the factors responsible for that condition, and its survival and recovery needs;

2. *Environmental Baseline*, which supplements the findings of the *Status of the Species* analysis by specifically evaluating the condition of bull trout in the action area, the factors responsible for that condition, and the role of the action area in the survival and recovery of the bull trout;

3. *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on bull trout; and

4. *Cumulative Effects*, which evaluates the effects of future, non-Federal activities reasonably certain to occur in the action area on bull trout. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

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

Interim recovery units were defined in the final listing rule for bull trout for use in completing jeopardy analyses (USFWS 1999, p. 58910). Subsequently, the Recovery Plan for the Coterminous United States Population of Bull Trout (*Salvelinus confluentus*), released by the Service in September 2015, formally established six bull trout recovery units, each of which is individually necessary to conserve the entire listed entity (USFWS 2015, p. 33). Pursuant to Service policy, when an action impairs or precludes the capacity of a recovery unit from providing both the survival and recovery function assigned to it, that action may represent jeopardy to the species. When using this type of analysis, the biological opinion describes how the action affects not only the recovery unit's capability, but the relationship of the recovery unit

[1] CFR represents the Code of Federal Regulations which is a codification of the general and permanent rules published in the Federal Register by Executive departments and agencies of the Federal Government. It is published by the Office of the Federal Register National Archives and Records Administration. More information can be found at http://www.gpoaccess.gov/cfr/index.html

to both the survival and recovery of the listed species as a whole. The following analysis uses this approach and considers the role of the action area and core area (discussed below under the *Status of the Species* section) in the function of the recovery unit as context for evaluating the effects of the proposed Federal action, together with any cumulative effects, on the survival and recovery of the bull trout to make the jeopardy determination. Please note that consideration of the recovery units for purposes of the jeopardy analysis is done within the context of making the jeopardy determination at the scale of the entire listed species in accordance with Service policy (USFWS 2006).

Destruction or Adverse Modification Determination

Section 7(a)(2) of the Act requires that Federal agencies insure that any action they authorize, fund, or carry out is not likely to destroy or adversely modify designated critical habitat. A final rule revising the regulatory definition of "destruction or adverse modification" was published on February 11, 2016 (81 FR 7214). The final rule became effective on March 14, 2016. The revised definition states:

> "*Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features.*"

The destruction or adverse modification analysis in this Opinion relies on four components:

1. The *Status of Critical Habitat* analysis, which describes the rangewide condition of critical habitat in terms of key components (i.e., essential habitat features, primary constituent elements, or physical and biological features) that provide for the conservation of the bull trout, the factors responsible for that condition, and the intended value of the critical habitat overall for the conservation/recovery of the bull trout;

2. The *Environmental Baseline* analysis, which analyzes the condition of critical habitat in the action area, the factors responsible for that condition, and the value of the critical habitat in the action area for the conservation/recovery of the bull trout;

3. The *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the key components of critical habitat that provide for the conservation of the bull trout, and how those impacts are likely to influence the conservation value of affected critical habitat; and

4. The *Cumulative Effects*, which evaluate the effects of future, non-Federal activities that are reasonably certain to occur in the action area on the key components of critical habitat that provide for the conservation of the bull trout and how those impacts are likely to influence the conservation value of the affected critical habitat. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

For purposes of making the destruction or adverse modification determination, the Service evaluates if the effects of the proposed Federal action, taken together with cumulative effects, are likely to impair or preclude the capacity of critical habitat in the action area to serve its intended conservation function to an extent that appreciably diminishes the rangewide value of critical habitat for the conservation of the bull trout. The key to making that finding is understanding the value (i.e., role) of the critical habitat in the action area for the conservation/recovery of the bull trout based on the *Environmental Baseline* analysis.

I. DESCRIPTION OF THE PROPOSED ACTION

A. Action Area

The term "action area" is defined in the regulations as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." An action includes activities or programs "directly or indirectly causing modifications to the land, water, or air" (50 CFR 402.02). In this case, the area where land, water, or air is likely to be affected includes lands managed by the Forest within the Middle Salmon-Panther 4th field hydrologic unit code (HUC)[2] watershed. Two of the four 5th field HUCs within the Middle Salmon-Panther 4th field HUC contain active water diversions where land, water, or air is likely to be affected. Three diversions (Otter Creek, Fourth of July Creek, and South Fork Moyer Creek) are located in the Upper Panther 5th field HUC and two (Garden Creek and Panther Creek) are located in the Lower Panther 5th field HUC (Assessment, p. 3). To assist the reader, the action area specific to each water diversion is described below in the *Effects of the Proposed Action* section.

B. Proposed Action

The term "action" is defined in the implementing regulations for section 7 as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas" (50 CFR 402.02).

The Forest's proposed action is to authorize continued operation and maintenance of five water diversions and conveyance of water on and across NFS lands. The five water diversions include: Otter Creek (Idaho Department of Water Resources (IDWR) Claim # 75-2169), Fourth of July Creek (IDWR Claim # 75-10778), South Fork Moyer Creek (IDWR Claim # 75-10127), Garden Creek (IDWR Claim # 75-4349), and Panther Creek (IDWR Claim # 75-4006). Specific details of each diversion are described below in the *Effects of the Proposed Action* section.

C. Interrelated or Interdependent Actions

Removal of water from a stream is authorized by the State of Idaho through issuance of a water right. Thus, removal of water from a stream is not a Federal action. Lacking authorization from

[2] The hydrologic unit codes (HUCs) describe the relation of the hydrologic units to each other to represent the way smaller watersheds drain areas that together form larger watersheds. For example, the Pahsimeroi River watershed is a considered a 4th field HUC. Streams draining into the River would represent 5th and 6th field HUCs.

the Forest to operate and maintain diversions and convey water on and across NFS lands, the ongoing use and maintenance of the water diversion, including diversion of water, would not occur. The Service finds removal of water from a stream meets the criteria for an interdependent action. For ease of analysis and organization of this Opinion, the effects of removal of water from the stream at each diversion will be described in in the *Effects of the Proposed Action* section.

D. Term of Action

Authorization of diversion operation and maintenance and conveyance of water on and across NFS lands is implemented through Forest special use permits (permit) or Colorado Ditch Bill easements (easement)[3]. Forest permits are issued with various lengths of term often ranging from 10 to 50 years, depending on the activity and circumstance. Easements are issued without expiration. The Forest maintains authority and discretion to review and revise permits and easements when necessary. Provided there are no changes to trigger reinitiation (see Section X) of this consultation, the Service considers the term of action to extend to December 31, 2026.

II. STATUS OF THE BULL TROUT

This section presents information about the regulatory, biological, and ecological status of bull trout at a rangewide scale that provides context for evaluating the significance of probable effects caused by the proposed action.

A. Regulatory Status

1. Listing Status

The coterminous United States population of bull trout was listed as threatened under the Act on November 1, 1999 (USFWS 1999, p. 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 (USFWS 1999, pp. 58910-58916).

The bull trout was initially listed as three separate Distinct Population Segments (DPSs) (USFWS 1999, p. 58910). The preamble to the final listing rule 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 Act relative to this species (USFWS 1999, p. 58910):

> *"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*

[3] "...The Act of October 27, 1986 (100 stat. 3047; commonly known as the "Colorado Ditch Bill"), amended Title V of the Federal Land Policy and Management Act of 1976 (FLPMA) (43 U.S.C. 1761) to authorize the Secretary of Agriculture to issue permanent easements without charge for certain water conveyance systems occupying NFS lands and used for agricultural irrigation or livestock watering purposes. Those easements have come to be known as "Ditch Bill easements." The Colorado Ditch Bill included certain criteria that must be met for applicants and their facilities to qualify for the issuance of a Ditch Bill easement..." (Federal Register /Vol. 69, No. 125 /Wednesday, June 30, 2004 , p. 309404-5)

> *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.*"

Please note that consideration of the interim recovery units for purposes of the jeopardy analysis is done within the context of making the jeopardy determination at the scale of the entire listed species in accordance with Service policy (USFWS 2006). See the analytical framework for the jeopardy determination discussed above that explains the use of recovery units in the jeopardy analysis.

2. Threats

Throughout its range, the bull trout is threatened by the combined effects of habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, 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 nonnative species (USFWS 1999, p. 58912).

3. Climate Change

Climate change represents a relatively new threat to bull trout. The current change in world climate is trending toward warmer temperatures (Intergovernmental Panel on Climate Change 2007). Because bull trout are dependent on cold water temperatures, changes toward higher average temperatures could effectively reduce its available habitat (Rieman et al. 2007, p. 4). Rieman et al. (2007, p. 14) found that a change of 0.6 to 5 °Celsius (C) could reduce the percent of large habitat patches by 27 to 97 percent across the bull trout's range.

In Central Idaho, habitat may be affected less by climate change than other areas of the bull trout's range because of the wide range in elevation of current habitat distribution. Given the broad range of the estimate above for reduction of large habitat patches, it is difficult to reasonably interpret what impact the actual changes to bull trout habitat are likely to have on the survival and recovery of the bull trout throughout its range. Rieman et al. (2007, p. 17) caution that their results cannot be extrapolated directly for management of bull trout without consideration of many other factors. Until better models are developed on which to base an understanding of climate change-related effects on the bull trout, Rieman et al. (2007, p. 17) suggest continuation of bull trout conservation efforts to maximize its resiliency.

B. Survival and Recovery Needs

1. Recovery Planning

Between 2002 and 2004, three separate draft recovery plans were completed. The 2002 draft recovery plan addressed bull trout populations within the Columbia, Saint Mary-Belly, and Klamath River basins (USFWS 2002, entire), and included individual chapters for 24 separate recovery units (later referred to as management units). In 2004, draft recovery plans were developed for the Coastal-Puget Sound drainages in western Washington (USFWS 2004) and for the Jarbidge River in Nevada (USFWS 2004a). Those draft plans were not finalized, but have served to identify recovery actions across the range of the species and to provide a framework for implementing numerous recovery actions by our partner agencies, local working groups, and others with an interest in bull trout conservation (USFWS 2015, p. 2).

The Service released the final bull trout recovery plan in September 2015 (USFWS 2015, entire). The final plan incorporated and built upon new information collected on status of bull trout, factors affecting the species, and ongoing conservation efforts across the range of the species since the draft 2002 and 2004 recovery planning efforts. The 2002 and 2004 draft recovery plans provide life history information, habitat characteristics, reasons for decline, and distribution and abundance of bull trout subpopulations covered by those draft plans. The 2015 final recovery plan, utilizing new information and reanalysis, identified six biologically-based recovery units (USFWS 2015, p. 33). Recovery actions for each of the six recovery units include:

- Protect, restore, and maintain suitable habitat conditions for bull trout
- Minimize demographic threats to bull trout by restoring connectivity or populations where appropriate to promote diverse life history strategies and conserve genetic diversity
- Prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout
- Work with partners to conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks, and considering the effects of climate change (USFWS 2015, pp. 50-53)

A Recovery Unit Implementation Plan (RUIP) was developed for each unit, and the Service's Bull Trout Recovery Implementation Team is currently developing guidance on implementation of the RUIPs. While the 2015 final recovery plan supersedes and replaces the previous draft recovery plans, the 2002 and 2004 draft recovery plans still provide important information on bull trout status and life history.

Each of the six recovery units consists of one or more core areas. Approximately 109 occupied core areas are recognized across the coterminous United States range of the bull trout. In addition, six historically occupied core areas, and two "research needs areas" are identified

(USFWS 2105, p. 34). The occupied core areas can be described as simple or complex, and are composed of one or more local populations. See definitions below.

Core Area: a geographic area within a recovery unit occupied by one or more local bull trout populations. Core areas are functionally similar to a metapopulation, in that bull trout within a core area are much more likely to overlap in their use of rearing, foraging, migratory, and overwintering habitat, and in some cases in their use of spawning habitat, than are bull trout from separate core areas.

- Simple Core Area: a geographic area occupied by one bull trout local population. Simple core areas are small in scope, isolated from other core areas by natural barriers, and may contain unique genes or life history adaptations.

- Complex Core Area: a geographic area containing multiple bull trout local populations. Complex core areas are found in large watersheds, have multiple life history forms, and have migratory connectivity between spawning and rearing habitat and foraging, migrating, and overwintering habitat.

Local Population: a group of bull trout within a core area that spawn within a particular stream or portion of a stream system. A local population is considered to be the smallest group of fish that is known to represent an interacting reproductive unit.

C. Rangewide Status and Distribution

The six biologically-based recovery units of the coterminous United States population of bull trout, each of which is individually necessary to conserve the entire listed entity (USFWS 2015, p. 33), are: (1) Coastal Recovery Unit, (2) Klamath Recovery Unit, (3) Mid-Columbia Recovery Unit, (4) Upper Snake Recovery Unit, (5) Columbia Headwaters Recovery Unit, and (6) Saint Mary Recovery Unit. A summary of the current status of the bull trout within these units is provided below.

1. Coastal Recovery Unit

The Coastal Recovery Unit is divided into three geographic regions in western Oregon and Washington: the Puget Sound, Olympic Peninsula, and the Lower Columbia River. Bull trout in the Coastal Recovery Unit exhibit anadromous, adfluvial, fluvial, and resident life history patterns. The anadromous life history form is unique to Puget Sound and Olympic Peninsula regions. This recovery unit contains 21 occupied core areas and 85 local populations, including the Clackamas River core area where bull trout had been extirpated and were reintroduced in 2011. Four historically occupied core areas that could be re-established have been identified. This recovery unit also contains ten shared foraging, migrating, and overwintering (FMO) habitats which are outside core areas and allow for the continued natural population dynamics in which the core areas have evolved. Four core areas within the Coastal Recovery Unit have been identified as current population strongholds: Lower Skagit, Upper Skagit, Quinault River, and Lower Deschutes River. These are the most stable and largest bull trout populations in the recovery unit.

The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, loss of functioning estuarine and nearshore marine habitats, development and related impacts (e.g., flood control, floodplain disconnection, bank armoring, channel straightening, loss of instream habitat complexity), agriculture (e.g., diking, water control structures, draining of wetlands, channelization and the removal of riparian vegetation, livestock grazing), fish passage (e.g., dams, culverts, instream flows) residential development, urbanization, forest management practices (e.g., timber harvest and associated road building activities), connectivity impairment, mining, and the introduction of nonnative species. Conservation measures or recovery actions implemented include relicensing of major hydropower facilities that have provided upstream and downstream fish passage or completely removed dams, land acquisition to conserve bull trout habitat, floodplain restoration, culvert removal, riparian revegetation, levee setbacks, road removal, and projects to protect and restore important nearshore marine habitats.

2. Klamath Recovery Unit

The Klamath Recovery Unit, located in southern Oregon, is the most significantly imperiled recovery unit, having experienced considerable extirpation and geographic contraction of local populations and declining demographic condition, and natural re-colonization is constrained by dispersal barriers and presence of nonnative brook trout (USFWS 2015, p.39). This recovery unit currently contains three core areas and eight local populations. Nine historic local populations of bull trout have been extirpated, and restoring additional local populations will be necessary to achieve recovery. All three core areas have been isolated from other bull trout populations for the past 10,000 years.

The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, habitat degradation and fragmentation, past and present land use practices, agricultural water diversions, nonnative species, and past fisheries management practices. Conservation measures or recovery actions implemented include removal of nonnative fish (e.g., brook trout, brown trout, and hybrids), acquiring water rights for instream flows, replacing diversion structures, installing fish screens, constructing bypass channels, installing riparian fencing, culvert replacement, and habitat restoration.

3. Mid-Columbia Recovery Unit

The Mid-Columbia Recovery Unit is located in eastern Washington, eastern Oregon, and portions of central Idaho. The Mid-Columbia Recovery Unit is divided into four geographic regions: Lower Mid-Columbia, Upper Mid-Columbia, Lower Snake, and Mid-Snake. This recovery unit contains 24 occupied core areas, two historically occupied core areas, one research needs area, and seven FMO habitats. The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, agricultural practices (e.g., irrigation, water withdrawals, livestock grazing), fish passage (e.g., dams, culverts), nonnative species, forest management practices, and mining. Conservation measures or recovery actions implemented include road removal, channel restoration, mine reclamation, improved grazing management, removal of fish barriers, and instream flow requirements.

4. Upper Snake Recovery Unit (includes the action area)

The Upper Snake Recovery Unit is located in central Idaho, northern Nevada, and eastern Oregon. The Upper Snake Recovery Unit is divided into seven geographic regions: Salmon River, Boise River, Payette River, Little Lost River, Malheur River, Jarbidge River, and Weiser River. This recovery unit contains 22 core areas and 206 local populations, with almost 60 percent of local populations being present in the Salmon River Geographic Region. The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, dams, mining, forest management practices, nonnative species, and agriculture (e.g., water diversions, grazing). Conservation measures or recovery actions implemented include instream habitat restoration, instream flow requirements, screening of irrigation diversions, and riparian restoration.

5. Columbia Headwaters Recovery Unit

The Columbia Headwaters Recovery Unit is located in western Montana, northern Idaho, and the northeastern corner of Washington. The Columbia Headwaters Recovery Unit is divided into five geographic regions: Upper Clark Fork, Lower Clark Fork, Flathead, Kootenai, and Coeur d'Alene. This recovery unit contains 35 bull trout core areas, of which 15 are complex core areas and 20 are simple core areas. The 20 simple core areas are each represented by a single local population, many of which may have persisted for thousands of years despite small populations and their isolation. Fish passage improvements within the recovery unit have reconnected previously fragmented habitats. The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, mining and contamination by heavy metals, nonnative species, modified instream flows, migratory barriers (e.g., dams), habitat fragmentation, forest practices (e.g., logging, roads), agriculture practices (e.g., irrigation, livestock grazing), and residential development. Conservation measures or recovery actions implemented include habitat improvement, fish passage, and removal of nonnative species. Unlike the other recovery units, the Columbia Headwaters Recovery Unit does not overlap with salmon distribution. Therefore, bull trout within the Columbia Headwaters Recovery Unit do not benefit from the recovery actions for salmon.

6. Saint Mary Recovery Unit

The Saint Mary Recovery Unit is located in Montana, but is heavily dependent on resources in southern Alberta, Canada. Most of the watershed in this recovery unit is located in Canada. The United States portion includes headwater spawning and rearing habitat and the upper reaches of FMO habitat. This recovery unit contains four core areas and eight local populations. The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, the Saint Mary Diversion operated by the Bureau of Reclamation (e.g., entrainment, fish passage, instream flows), and nonnative species. The primary issue precluding bull trout recovery in this recovery unit relates to impacts of water diversions, specifically at the Bureau of Reclamation's Milk River Project.

D. Life History

Bull trout exhibit both resident and migratory life history strategies. Both resident and migratory forms may be found together, and either form may produce offspring exhibiting either resident or migratory behavior. Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. The resident form tends to be smaller than the migratory form at maturity and also produces fewer eggs. Migratory bull trout spawn in tributary streams where juvenile fish rear 1 to 4 years before migrating to either a lake (adfluvial form), a river (fluvial form), or saltwater (anadromous) to rear as subadults or to live as adults. Bull trout normally reach sexual maturity in 4 to 7 years and may live longer than 12 years. Growth varies depending upon life history strategy. Resident adults range from 150 to 300 millimeters (mm; 6 to 12 inches) total length, and migratory adults commonly reach 600 mm (24 inches) or more. They are iteroparous (they spawn more than once in a lifetime), and both repeat- and alternate-year spawning have been reported, although repeat-spawning frequency and post-spawning mortality are not well documented.

The iteroparous reproductive system of bull trout has important repercussions for the management of this species. Bull trout require two-way passage up and downstream, not only for repeat-spawning, but also for foraging. Most fish ladders, however, were designed specifically for anadromous semelparous salmonids (fishes that spawn once and then die, and therefore require only one-way passage upstream). Therefore, even dams or other barriers with fish passage facilities may be a factor in isolating bull trout populations if they do not provide a downstream passage route.

Additional information about the bull trout's life history can be found in the final listing rule (USFWS 1999).

E. Habitat Characteristics

Bull trout have more specific habitat requirements than most other salmonids. Habitat components that influence bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrate, and migratory corridors. Watson and Hillman (1997, p. 247-250) concluded that watersheds must have specific physical characteristics to provide the habitat requirements necessary for bull trout to successfully spawn and rear, and that these specific characteristics are not necessarily present throughout these watersheds. Because bull trout exhibit a patchy distribution, even in pristine habitats, fish should not be expected to simultaneously occupy all available habitats.

Migratory corridors link seasonal habitats for all bull trout life histories. The ability to migrate is important to the persistence of bull trout. Migrations facilitate gene flow among local populations when individuals from different local populations interbreed, or stray, to nonnatal streams. Local populations that are extirpated by catastrophic events may also become reestablished by bull trout migrants.

Cold water temperatures play an important role in determining bull trout habitat, as these fish are primarily found in colder streams (below 59 °Fahrenheit (F)), and spawning habitats are

generally characterized by temperatures that drop below 48 °F in the fall. Thermal requirements for bull trout appear to differ at different life stages. Spawning areas are often associated with cold-water springs, groundwater infiltration, and the coldest streams in a given watershed. Optimum incubation temperatures for bull trout eggs range from 35 to 39 °F, whereas optimum water temperatures for rearing range from about 46 to 50 °F (Goetz 1989, pp. 22, 24, 39). In Granite Creek, Idaho, Bonneau and Scarnecchia (1996, p. 629-630) observed that juvenile bull trout selected the coldest water available in a plunge pool, 46 to 48 °F, within a temperature gradient of 46 to 60 °F. In a landscape study relating bull trout distribution to maximum water temperatures, Dunham et al. (2003, pp. 899-900) found that the probability of juvenile bull trout occurrence does not become high (i.e., greater than 75 percent) until maximum temperatures decline to 52 to 54 °F.

Although bull trout are found primarily in cold streams, occasionally these fish are found in larger, warmer river systems throughout the Columbia River Basin. Factors that can influence bull trout ability to survive in warmer rivers include availability and proximity of cold water patches and food productivity. In the Little Lost River, Idaho, bull trout have been collected in water having temperatures up to 68 °F; however, the trend in the relationship between temperature and species composition shows that bull trout made up less than 50 percent of all salmonids when maximum summer water temperature exceeded 59 °F and less than 10 percent of all salmonids when temperature exceeded 63 °F (Gamett 1999, pp. 28-29).

All life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools. Maintaining bull trout habitat requires stability of stream channels and maintenance of natural flow patterns. Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover. These areas are sensitive to activities that directly or indirectly affect stream channel stability and alter natural flow patterns. For example, altered stream flow in the fall may disrupt bull trout during the spawning period, and channel instability may decrease survival of eggs and alevins in the gravel from winter through spring. Increases in fine sediment can reduce egg survival and emergence.

Bull trout typically spawn from August to November during periods of decreasing water temperatures. Preferred spawning habitat consists of low-gradient stream reaches with loose, clean gravel. Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater. Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992, p. 5), and after hatching, alevins remain in the substrate. Time from egg deposition to emergence of fry may surpass 200 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows.

Migratory forms of the bull trout appear to develop when habitat conditions allow movement between spawning and rearing streams and larger rivers or lakes where foraging opportunities may be enhanced (Frissell 1993, pp. 347-351). Benefits to migratory bull trout include greater growth in the more productive waters of larger streams and lakes, greater fecundity resulting in increased reproductive potential, and dispersing the population across space and time so that spawning streams may be recolonized should local populations suffer a catastrophic loss. In the absence of the migratory bull trout life form, isolated populations cannot be replenished when

disturbance makes local habitats temporarily unsuitable, the range of the species is diminished, and the potential for enhanced reproductive capabilities are lost (Rieman and McIntyre 1993, p. 11).

Additional information about the bull trout's habitat requirements can be found in the final listing rule (USFWS 1999).

F. Diet

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, mysids, and small fish. Adult migratory bull trout feed on various fish species. Fish growth depends on the quantity and quality of food that is eaten, and as fish grow, their foraging strategy changes in quantity, size, or other characteristics. Bull trout that are 110 mm (4.3 inches) long or longer commonly have fish in their diet (Shepard et al. 1984, p. 38), and bull trout of all sizes have been found to eat fish half their length (Beauchamp and Van Tassell 2001, p. 210).

Migration allows bull trout to move to or with a food source, access optimal foraging areas, and exploit a wider variety of prey resources. Migratory bull trout begin growing rapidly once they move to waters with abundant forage that includes fish (Shepard et al. 1984, p. 49). As these fish mature they become larger-bodied predators and are able to travel greater distances in search of prey species of larger size and in greater abundance. In Lake Billy Chinook, as bull trout became increasingly piscivorous with increasing size, the prey species changed from mainly smaller bull trout and rainbow trout for bull trout less than 450 mm (17.7 inches) in length to mainly kokanee for bull trout greater in size (Beauchamp and Van Tassell 2001, p. 213).

Additional information on the bull trout's diet can be found in the final listing rule (USFWS 1999).

G. Previously Consulted-on Effects

1. Rangewide

Consulted-on effects are effects that have been analyzed in section 7 consultations and reported in a biological opinion. In 2003, the Service reviewed all of the biological opinions issued by the Region 1 and Region 6 Service offices, from the time of bull trout listing until August 2003; this summed to 137 biological opinions. The Service completed section 7 consultations on many programs and actions that benefit bull trout. While some of the beneficial programs were small-scale actions such as removing passage barriers and installing 'fish friendly' crossing structures, some were large, such as restoring habitat conditions in degraded streams and riparian areas. Three consultations that had broad and long-term benefits to bull trout were consultations on documents that amended Forest Plans and provided standards and guidelines related to federally listed anadromous and native inland fish on National Forest Service lands in Idaho.

The majority of consultations on projects that resulted in adverse effects were for effects that were short-term and very local. Overall, our review showed that we consulted on a wide array of actions which had varying levels of effect and that none 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.

Between August 2003 and July 2006, the Service issued 198 opinions that included analyses of effects to the bull trout. These opinions also reached "not likely to jeopardize" determinations and the Service concluded that the continued long-term survival and existence of the species had not been appreciably reduced rangewide due to these actions. Since July 2006, a review of the data in our national Tracking and Integrated Logging System reveals only one opinion did not reach a "not likely to jeopardize" determination. This jeopardy opinion was issued to the Environmental Protection Agency (EPA) for Idaho water quality standards for numeric water quality criteria for toxic pollutants. The EPA is implementing the reasonable and prudent alternatives (RPAs) identified in the opinion to avoid jeopardizing the continued existence of the bull trout.

2. Eastern Idaho

For this Opinion, the Eastern Idaho Office examined the record for biological opinions issued since 2003 for those action areas that overlap any or all of the following eight bull trout core areas: Upper Salmon River, Pahsimeroi River, Lemhi River, Middle Salmon River-Panther, Little Lost River, Middle Fork Salmon River, Lake Creek, and Opal Creek (USFWS 2017, entire).

Approximately 71 biological opinions have been issued across the eight bull trout core areas. Seven of them are broad-scale, program-level opinions. In three of those seven, no take was anticipated or none has occurred. In three of the remaining opinions, varying amounts of lethal and nonlethal take of adult bull trout, juvenile bull trout, and bull trout redds were anticipated. In each of those actions, less take than was anticipated has been detected (USFWS 2017, p. 1). One opinion for Idaho water quality standards concluded that the proposed action would likely jeopardize the coterminous U.S. population of bull trout. The RPAs identified in that opinion are being implemented to avoid jeopardizing the continued existence of the bull trout.

III. STATUS OF BULL TROUT CRITICAL HABITAT

A. Legal Status

Ongoing litigation resulted in the U.S. District Court for the District of Oregon granting the Service a voluntary remand of the 2005 bull trout critical habitat designation. Subsequently, the Service published a final critical habitat designation for the coterminous United States population of the bull trout on October 18, 2010 (70 FR 63898); the rule became effective on November 17, 2010. A justification document was also developed to support the rule and is available on our website (http://www.fws.gov/pacific/bulltrout). The scope of the designation involved the species' coterminous range, which includes the Jarbidge River, Klamath River, Columbia River, Coastal-Puget Sound, and Saint Mary-Belly River population segments.

Rangewide, the Service designated reservoirs/lakes and stream/shoreline miles as bull trout critical habitat (Table 1). Designated bull trout critical habitat is of two primary use types: 1) spawning and rearing, and 2) foraging, migration, and overwintering (FMO).

Table 1. Stream/shoreline distance and reservoir/lake area designated as bull trout critical habitat by state.

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

The 2010 revision increases the amount of designated bull trout critical habitat by approximately 76 percent for miles of stream/shoreline and by approximately 71 percent for acres of lakes and reservoirs compared to the 2005 designation.

This rule also identifies and designates as critical habitat approximately 1,323.7 km (822.5 miles) of streams/shorelines and 6,758.8 ha (16,701.3 acres) of lakes/reservoirs of unoccupied habitat to address bull trout conservation needs in specific geographic areas in several areas not occupied at the time of listing. No unoccupied habitat was included in the 2005 designation. These unoccupied areas were determined by the Service to be essential for restoring functioning migratory bull trout populations based on currently available scientific information. These unoccupied areas often include lower main stem river environments that can provide seasonally important migration habitat for bull trout. This type of habitat is essential in areas where bull trout habitat and population loss over time necessitates reestablishing bull trout in currently unoccupied habitat areas to achieve recovery.

The final rule continues to exclude some critical habitat segments based on a careful balancing of the benefits of inclusion versus the benefits of exclusion. Critical habitat does not include: 1) waters adjacent to non-Federal lands covered by legally operative incidental take permits for HCPs issued under section 10(a)(1)(B) of the Act, in which bull trout is a covered species on or before the publication of this final rule; 2) waters within or adjacent to Tribal lands subject to certain commitments to conserve bull trout or a conservation program that provides aquatic resource protection and restoration through collaborative efforts, and where the Tribes indicated that inclusion would impair their relationship with the Service; or 3) waters where impacts to national security have been identified (75 FR 63898). Excluded areas are approximately 10 percent of the stream/shoreline miles and 4 percent of the lakes and reservoir acreage of

designated critical habitat. Each excluded area is identified in the relevant Critical Habitat Unit (CHU) text, as identified in paragraphs (e)(8) through (e)(41) of the final rule. It is important to note that the exclusion of waterbodies from designated critical habitat does not negate or diminish their importance for bull trout conservation. Because exclusions reflect the often complex pattern of land ownership, designated critical habitat is often fragmented and interspersed with excluded stream segments.

B. Conservation Role and Description of Critical Habitat

The conservation role of bull trout critical habitat is to support viable core area populations (75 FR 63898:63943 [October 18, 2010]). The core areas reflect the metapopulation structure of bull trout and are the closest approximation of a biologically functioning unit for the purposes of recovery planning and risk analyses. CHUs generally encompass one or more core areas and may include FMO areas, outside of core areas, that are important to the survival and recovery of bull trout.

Thirty-two CHUs within the geographical area occupied by the species at the time of listing are designated under the final rule. Twenty-nine of the CHUs contain all of the physical or biological features identified in this final rule and support multiple life-history requirements. Three of the mainstem river units in the Columbia and Snake River basins contain most of the physical or biological features necessary to support the bull trout's particular use of that habitat, other than those physical or biological features associated with breeding habitat.

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

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

Within the designated critical habitat areas, the PBFs for bull trout are those habitat components that are essential for the primary biological needs of foraging, reproducing, rearing of young, dispersal, genetic exchange, or sheltering. Based on our current knowledge of the life history, biology, and ecology of this species and the characteristics of the habitat necessary to sustain its

essential life-history functions, we have determined that the following PBFs are essential for the conservation of bull trout.

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

(2) Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.

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

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

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

(6) In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrate, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.

(7) A natural hydrograph, including peak, high, low, and baseflows within the historical and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.

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

(9) Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

The revised PBF's are similar to those previously in effect under the 2005 designation. The most significant modification is the addition of a ninth PBF to address the presence of nonnative predatory or competitive fish species. Although this PBF applies to both the freshwater and marine environments, currently no nonnative fish species are of concern in the marine environment, though this could change in the future.

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

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

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

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

Activities that cause adverse effects to critical habitat are evaluated to determine if they are likely to "destroy or adversely modify" critical habitat by no longer serving the intended conservation role for the species or retaining those PBFs that relate to the ability of the area to at least periodically support the species. Activities that may destroy or adversely modify critical habitat are those that alter the PBFs to such an extent that the conservation value of critical habitat is appreciably reduced (75 FR 63898:63943; USFWS 2004, Vol. 1. pp. 140-193, Vol. 2, pp. 69-114). The Service's evaluation must be conducted at the scale of the entire critical habitat area designated, unless otherwise stated in the final critical habitat rule (USFWS and NMFS 1998, pp. 4-39). Thus, destruction or adverse modification of bull trout critical habitat is evaluated at the scale of the final designation, which includes the critical habitat designated for

the Klamath River, Jarbidge River, Columbia River, Coastal-Puget Sound, and Saint Mary-Belly River population segments. However, we consider all 32 CHUs to contain features or areas essential to the conservation of the bull trout (75 FR 63898:63901, 63944). Therefore, if a proposed action would alter the physical or biological features of critical habitat to an extent that appreciably reduces the conservation function of one or more critical habitat units for bull trout, a finding of destruction or adverse modification of the entire designated critical habitat area may be warranted (75 FR 63898:63943).

C. Current Critical Habitat Condition Rangewide

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

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

1. Effects of Climate Change on Bull Trout Critical Habitat

One objective of the final rule was to identify and protect those habitats that provide resiliency for bull trout use in the face of climate change. Over a period of decades, climate change may directly threaten the integrity of the essential physical or biological features described in PBFs 1, 2, 3, 5, 7, 8, and 9. Protecting bull trout strongholds and cold water refugia from disturbance and ensuring connectivity among populations were important considerations in addressing this potential impact. Additionally, climate change may exacerbate habitat degradation impacts both

physically (e.g., decreased base flows, increased water temperatures) and biologically (e.g., increased competition with nonnative fishes).

D. Previously Consulted-on Effects

1. Rangewide

The Service has formally consulted on the effects to bull trout critical habitat throughout its range. Section 7 consultations include actions that continue to degrade the environmental baseline. However, long-term restoration efforts have also been implemented that provide some improvement in the existing functions within some of the critical habitat units. Just one of the consulted-on actions has resulted in a destruction or adverse modification finding. This opinion was issued to the EPA for Idaho water quality standards for numeric water quality criteria for toxic pollutants. The EPA is implementing the reasonable and prudent alternatives (RPAs) identified in the opinion to avoid destroying or adversely modifying designated critical habitat for the bull trout.

2. Eastern Idaho

For this Opinion, the Eastern Idaho Office examined the record for biological opinions issued since 2010 for those action areas that overlap any or all of the following bull trout critical habitat units or subunits: Upper Salmon River, Pahsimeroi River, Lemhi River, Middle Salmon River-Panther, Little Lost River, Middle Fork Salmon River, Lake Creek, and Opal Creek. Sixteen biological opinions addressing bull trout critical habitat have been issued across these subunits. Fifteen of the 16 biological opinions concluded that the proposed actions were not likely to result in destruction or adverse modification of critical habitat. One opinion for Idaho water quality standards concluded that the proposed action would likely destroy or adversely modify designated critical habitat for the bull trout. The RPAs identified in that opinion are being implemented to avoid destruction or adverse modification of bull trout critical habitat.

IV. ENVIRONMENTAL BASELINE FOR THE BULL TROUT AND BULL TROUT DESIGNATED CRITICAL HABITAT

The preamble to the implementing regulations for section 7 (USFWS 1986, p. 19932) contemplates that the evaluation of ". . . the present environment in which the species or critical habitat exists, as well as the environment that will exist when the action is completed, in terms of the totality of factors affecting the species or critical habitat . . . will serve as the baseline for determining the effects of the action on the species or critical habitat". The regulations at 50 CFR 402.02 define the environmental baseline to include "the past and present impacts of all Federal, State, or private actions and other human activities in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process." The analysis presented in this section supplements the above *Status of the Species* evaluations by focusing on the current condition of the bull trout in the action area, the factors responsible for that condition, inclusive of the factors cited above in the regulatory definition of the environmental baseline, and the role the action area plays in the survival and recovery of the bull trout. Relevant factors on lands

surrounding the action area that are influencing the condition of the bull trout were also considered in completing the status and baseline evaluations herein.

A. Status of Bull Trout in the Action Area

1. Upper Snake Recovery Unit

The action area for this consultation lies entirely within the Middle Salmon River-Panther Core Area, one of 22 core areas within the Upper Snake Recovery Unit. The Upper Snake Recovery Unit encompasses portions of central Idaho, northern Nevada, and eastern Oregon, and includes the Salmon River, Malheur River, Jarbidge River, Little Lost River, Boise River, Payette River, and Weiser River drainages (USFWS 2015a, p. E1). The Upper Snake Recovery Unit includes a total of 206 local populations, with almost 60 percent being present in the Salmon River basin (USFWS 2015a, p. E1).

The Salmon River basin contains 10 of the 22 core areas in the Upper Snake Recovery Unit, and most core areas contain large bull trout populations and many occupied stream segments (USFWS 2015a, pp. E1-E2). Although bull trout habitat quantity and quality have been altered through time by influences including past timber harvest, livestock grazing, and mining, and more recently by residential development, the Salmon River basin provides large areas of intact habitat (USFWS 2002a, pp. 31, 44, 48; USFWS 2015a, p. E1). Both wildfire and fire suppression have had effects on bull trout habitat components within the basin (USFWS 2002a, p. 33). Road densities in the Salmon River basin are relatively low, with 64 percent of the basin having no roads or low road density (USFWS 2002a, pp. 40-41). Bull trout and its habitat can be negatively affected by water diversions. Over 770 known diversions exist in the Salmon River basin (USFWS 2002a, pp. 36-37), but there are no major dams in the Salmon River basin, and connectivity within Salmon River core areas is mostly intact (USFWS 2015a, p. E2).

2. Middle Salmon River-Panther Core Area

The Middle Salmon River-Panther Core Area encompasses 1,377,500 acres and includes the Salmon River and Panther Creek drainages that extend from the confluence of the main Salmon River with the Lemhi River, to its confluence with the Middle Fork Salmon River. This core area has at least 19 local populations (USFWS 2002a, p. 13; USFWS 2015a, p. E92). Migratory bull trout may persist in some of these local populations, but most populations appear to exhibit resident life history expression (USFWS 2002a, p. 66; USFWS 2015a, p. E92).

In 2005, Idaho Department of Fish and Game (IDFG) reported population numbers for the Middle Salmon River-Panther Core Area (IDFG 2005, p. 32) that were based on an extensive modeling effort (IDFG 2005; High et al. 2008). A corrected table (K. Meyer, IDFG, pers. comm., March 11, 2009) showed an approximate population of 72,732 (± 24,772) bull trout (adults and young) for the core area. Using an assumption that 10 percent of the total number is comprised of adult fish (K. Meyer, IDFG, pers. comm., March 11, 2009), that would suggest an adult population in the core area of approximately 7,300 adults (±2,500). More recent information provided by IDFG indicates a stable to decreasing trend in bull trout abundance within this core area (USFWS 2015a, p. E92).

In the 2005 conservation status assessment (USFWS 2005) the Middle Salmon River-Panther Core Area final rank was "at risk". While not the most imperiled (at high risk), the core area was considered at risk because of very limited and/or declining numbers, range, and/or habitat, making bull trout in this core area vulnerable to extirpation. The bull trout 5-year review (USFWS 2008) also determined the core area to be "at risk" overall.

The Service has issued 19 biological opinions addressing Federal actions specific to this core area: four for water diversions (Otter Creek, Lower Salmon River, Middle Salmon River, and Blackbird Mine diversions and settling basins), two for mining operations (Idaho Cobalt Mine and Beartrack Mine), two for ongoing activities at a watershed-level (Panther Creek Ongoing Activities, BLM Travel Plan), ten for grazing in specific allotments (Indian Ridge, Fourth of July Creek, South Fork Williams Creek, Deer-Iron, Carmen Creek, Morgan Creek-Prairie Basin, North Basin, Hat Creek, Cow Creek, and Forney Allotments) and one for emergency wildfire response (Mustang Fire). Each of these opinions found that the actions analyzed were not likely to jeopardize the coterminous U.S. population of bull trout. The aggregate amount or extent of both lethal and nonlethal take of bull trout caused by these Federal actions is estimated by the Service to be at the scale of 164 to 214 bull trout (mostly juveniles). Take of adult and juvenile bull trout was anticipated to result from entrainment or stranding at water diversions. Take of 92 to 257 bull trout redds was anticipated to result from livestock trampling. Surveys conducted from 2010 to date have not found any take of bull trout redds caused by the actions addressed in the opinions. Limited surveys have found no take of bull trout due to entrainment at a diversion.

Impacts to bull trout habitat from past livestock grazing and water diversions (primarily for agriculture) are prevalent in this core area (USFWS 2002a, pp. 34, 37). Although portions of the Middle Salmon River–Panther Core Area are within wilderness or other designated roadless areas, roads have been established in the floodplains of some streams, resulting in increased peak flows, reduced off-channel habitat, and elevated sediment loads (USFWS 2002a, pp. 41-42). Reported road density of this core area is 0.7 mile/square mile (USFWS 2005, p.49). Past mining activities have impacted stream channel conditions and water quality. Ongoing release of contaminants to some streams is a concern (USFWS 2002a, p. 46).

3. Action Area

The information presented below describes conditions within the watersheds in which the water diversions are located. Conditions of the watersheds are included to provide a complete description of the environmental baseline. Conditions at the broader watershed scale may vary from those at the finer scale of the action area for each diversion. To assist the reader, the action area specific to each water diversion and information about bull trout and its habitat in the specific action area is described below in the *Effects of the Proposed Action* section. This will allow a more convenient comparison of the specific conditions and circumstances of each water diversion and the potential effects of the proposed action.

a. Population Information

The Otter Creek, Fourth of July Creek, and South Fork Moyer Creek diversions are located in the Upper Panther Creek 5th field HUC. Within this watershed, the bull trout population appears

stable with more than 500 adult bull trout and all age classes represented. Tributaries in the Upper Panther watershed are well connected and in close proximity to each other. The extent of fluvial bull trout use of the watershed is unknown. Brook trout, a threat to bull trout due to potential competition and hybridization, predominate in the lower reaches of the watershed, while bull trout predominate in the upper reaches (Assessment, p. 97).

The Garden Creek and Panther Creek diversions are located in the Lower Panther Creek 5th field HUC. Within this watershed, the bull trout population appears stable with an estimated population of more than 500 adult bull trout. However, bull trout densities are depressed, indicating low survival in Panther Creek. Connectivity within this watershed is high. Fluvial bull trout use of the watershed appears depressed. Brook trout, a threat to bull trout due to potential competition and hybridization, are not known to occur in this watershed (Assessment, p. 109).

Bull trout in Otter Creek, Fourth of July Creek, South Fork Moyer Creek, and Panther Creek belong to the Panther Creek local population, one of the 19 local populations in the Middle Salmon River-Panther core area. The 2015 bull trout recovery plan is silent on the specific role of this bull trout local population in the survival and recovery of the listed species, but the recovery approach identified in the plan is intended to ensure adequate, long-term conservation of genetic diversity, life history features, and broad geographical representation of bull trout populations, while acknowledging that a small number of local population extirpations could occur without preventing recovery of the species (USFWS 2015, p. 45).

b. Habitat Information

As mentioned above in the *Status of the Species* section, the survival and recovery needs of the bull trout can be described generally as cold stream temperatures, clean water quality, complex channel characteristics, and large patches of habitat that are well connected. Therefore, to determine the overall effect of a proposed action on the bull trout for purposes of a jeopardy analysis, it is logical to try to ascertain how, and to what extent, those basic needs are likely to be impacted by a proposed action. But first, a baseline condition of those habitat parameters, inclusive of conditions in the action area, needs to be described to form the context for evaluating the potential impacts of the proposed action on bull trout.

One tool that was developed to assist in describing the condition of watersheds and streams on which bull trout depends is entitled *A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale* [4] (Appendix 9 in Lee et al. 1997). It is commonly referred to as the "Matrix of Pathways and Indicators" and, at its most basic level, is a table which identifies the important elements or indicators of a bull trout's habitat. Using this table assists in consistent organization and assessment of current conditions and in judging how those indicators may be impacted by a proposed action (Lee et al. 1997, p. 9-6). The action area is within the Upper and Lower Panther Creek watersheds. The Forest included matrix analyses for these watersheds in Appendix A of the Assessment, and they are summarized in Table 2 below.

4 This document was adapted from a National Marine Fisheries Service document called *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (NMFS 1996).

Table 2. Matrix of Pathways and Indicators for the Action Area

Pathway	Indicators	Functioning Appropriately	Functioning at Risk	Functioning at Unacceptable Risk
Subpopulation Characteristics	Subpopulation Size		UPC, LPC	
	Growth and Survival (including incubation survival)		UPC, LPC	
	Life History Diversity and Isolation		UPC, LPC	
	Persistence and Genetic Integrity		UPC, LPC	
Water Quality	Temperature	UPC		LPC
	Sediment	UPC	LPC	
	Chemical Characteristics	UPC	LPC	LPC
Habitat Access	Physical Barriers	UPC, LPC		
Habitat Elements	Large Woody Debris	LPC	UPC	
	Pool Frequency and Quality	UPC	LPC	
	Off-channel Habitat		UPC, LPC	
	Refugia	UPC	LPC	
Channel Condition and Dynamics	Width:Depth Ratio	UPC	LPC	
	Streambank Condition	UPC	LPC	
	Floodplain Connectivity	UPC	LPC	
Flow/Hydrology	Peak and Base Flows	UPC	LPC	
	Increase in Drainage Network	UPC, LPC		
Watershed Conditions	Road Density and Location		UPC, LPC	
	Disturbance History		UPC	LPC
	Riparian Habitat Conservation Area		UPC, LPC	
	Disturbance Regime	UPC		LPC
Integration of Species and Habitat Conditions	Habitat Quality and Connectivity		UPC, LPC	

UPC – Upper Panther Creek watershed
LPC – Lower Panther Creek watershed

Four indicators are functioning at unacceptable risk in the Lower Panther Creek watershed. Although most tributary streams in the Lower Panther Creek watershed have shown substantial improvement since the Clear Creek Fire in 2000, Panther Creek and Clear Creek still display impacts to water temperature and sediment related to the fire. The Clear Creek Fire completely removed canopy cover from some streams, resulting in a 10 °F increase in maximum summer water temperatures. Additionally, due to acid rock drainage from the Blackbird Mine, Panther Creek from Blackbird Creek downstream to its confluence with the Salmon River is listed as a 303(d) water quality limited stream segment. Overall road density in the Lower Panther Creek watershed is low. Some tributary drainages fall almost entirely within wilderness, but other streams have been impacted by streamside roads (Assessment, pp. 110-111, 113).

Generally, conditions in the Upper Panther Creek watershed are better than in the Lower Panther Creek watershed. Bull trout and its habitat in this watershed have been impacted by many ongoing and past activities, but effects of fire, logging, mining, and road building vary considerably throughout the watershed. A limited number of roads encroach upon the floodplains of streams (Assessment, pp. 99-100).

Water diversions scattered throughout the Upper and Lower Panther Creek watersheds do not appear to have impacted peak and base flows substantially. The Assessment does not indicate the Forest has found widespread or severe impacts to bull trout from these diversions. Although the starting period of use date for many diversions in the Upper Panther Creek watershed is in early April, water is often not diverted until mid to late May when the water rights holder can physically access the diversion, often after peak flows have occurred in the tributaries. In the Lower Panther Creek watershed, the Forest expects the extensive canopy removal caused by the Clear Creek Fire to result in long-term changes to peak and base flows (Assessment, pp. 99, 112-113).

B. Status of Bull Trout Designated Critical Habitat in the Action Area

1. Salmon River Basin Critical Habitat Unit

The action area falls within the Salmon River Basin Critical Habitat Unit (CHU), one of the 32 CHUs throughout the range of the bull trout (USFWS 2010, p. 9). The Salmon River Basin CHU encompasses the entire Salmon River basin, extending across central Idaho from the Snake River to the Idaho-Montana border. This CHU is the largest CHU in the Upper Snake Recovery Unit, and includes 4,583.5 miles of stream and 4,160.6 acres of lake and reservoir surface area designated as critical habitat. Large portions of this CHU occur within the Frank Church River of No Return Wilderness. The Salmon River Basin CHU contains the largest populations of bull trout in the Upper Snake Recovery Unit. Bull trout populations in this CHU exhibit adfluvial, fluvial, and resident life history strategies (USFWS 2010, p. 673).

2. Middle Salmon-Panther River Critical Habitat Subunit

The Salmon River Basin CHU is comprised of ten critical habitat subunits (CHSU). The action area lies entirely within one of these CHSUs, the Middle Salmon-Panther River CHSU. This CHSU contains many individuals, a large amount of habitat, and moderate threat level. The

Middle Salmon-Panther River CHSU provides a migratory corridor between multilple CHSUs, and bull trout populations in this CHSU exhibit both resident and fluvial life history strategies. Designated critical habitat in this CHSU includes 615.6 miles of stream (USFWS 2010, p. 745).

3. Action Area

Otter Creek, Fourth of July Creek, South Fork Moyer Creek, Garden Creek, and Panther Creek are designated critical habitat. The primary habitat function of all these streams is as spawning and rearing habitat. Panther Creek provides spawning and rearing habitat from its confluence with Moyer Creek upstream to its headwaters (16.1 miles), and FMO habitat from its confluence with the Salmon River upstream to its confluence with Moyer Creek (29.3 miles).

Physical or biological features (PBFs) are used to describe habitat features that are essential to the conservation of the bull trout. Table 3 below displays the PBFs and associated diagnostic pathway/indicators that relate to each PBF. The baseline conditions of the diagnostic pathway/indicators were presented above in Table 2.

Table 3. Pathways/indicators PBF cross walk

Diagnostic Pathway/indicator	PBF 1 – Springs, seeps, groundwater	PBF 2 – Migratory habitats	PBF 3 – Abundant food base	PBF 4 – Complex habitats	PBF 5 – Water Temperature	PBF 6 – Substrate features	PBF 7 – Natural hydrograph	PBF 8 – Water quality and quantity	PBF 9 – Predators and competition
Water Quality									
Temperature		x	x		x			x	
Sediment		x	x			x		x	
Contaminants	x	x	x					x	
Habitat Access									
Physical Barriers	x	x	x						x
Habitat Elements									
Embeddedness	x		x			x			
LWD				x		x			
Pool Frequency			x	x		x			
Large Pools				x	x				
OffChannel Habitat				x					
Refugia		x			x				x
Channel									
Width:Depth		x		x	x				
Streambank	x			x	x	x			
Floodplain Connect	x		x	x	x		x	x	
Flow/Hydrology									
Peak/Base Flows	x	x			x		x	x	
Drainage Network	x						x	x	
Watershed									
Road Density	x				x		x		
Disturb. History				x			x	x	x
Riparian Area	x		x	x	x		x		
Disturb. Regime				x			x	x	

Factors affecting the environmental baseline of bull trout critical habitat in the action area are similar to those described for bull trout populations and habitat in the action area. See pages 23 through 27 above. In summary, the baseline as presented in Table 2, indicates that most of the indicators in the Upper Panther Creek watershed are functioning appropriately, while most indicators in the Lower Panther Creek watershed are functioning at risk. Condition of PBFs relies on the condition of the associated indicators.

V. EFFECTS OF THE PROPOSED ACTION

A. Direct and Indirect Effects of the Proposed Action

The implementing regulations for section 7 define "effects of the action" as "the direct and indirect effects of an action on the species together with the effects of other activities that are interrelated or interdependent with that action, which will be added to the environmental baseline" (USFWS 1986, p. 19958). "Indirect effects" are caused by or result from the agency action, are later in time, but are still reasonably certain to occur (USFWS 1986, p. 19958).

1. Analytical Approach and Assumptions

In the following evaluation, the Service relied on the published scientific literature regarding potential water diversion impacts to fish and riparian/aquatic environments and a series of assumptions about bull trout distribution, density, and habitat use. Because of the construct of these assumptions, they are more likely to overestimate, rather than underestimate, the impacts of the proposed action on the bull trout and its critical habitat. When examining the potential impacts to a species that is listed as threatened under the Act, and there is substantial imprecision or uncertainty in some of the information, this approach is a reasonably cautious and prudent approach for assessing impacts to populations of that species. Absent the consideration of the full potential of effects, detrimental impacts to the species can go unrecognized (National Research Council 1995, p.167). The Service also relied in part upon the Forest's effects analysis in their Assessment.

a. Assumptions for Determining Action Area

In the Assessment, the Forest does not specifically provide the estimated area or extent of impact at each diversion. Therefore, the Service considers the action area to start at a point 100 m above the diversion. The determination of 100 m above the diversion is based on the following rationale regarding potential for resident fish movement. Information on the movement of smaller resident bull trout is scarce. Hilderbrand and Kershner (2000, pp. 1164-1167) found that radio tagged cutthroat trout (*Oncorhynchus clarkii*; a similar species) moved a median distance of 576 m in the spring and 55 m in the summer. Because the impact of diversions is likely to be highest during the summer, the Service chooses to use 100 m upstream of the diversion as the area that would most likely contain fish whose movements could expose them to the impacts of the diversion. Though larger than the reported 55 m, the Service feels that for an analysis on impacts to a threatened species 100 m is reasonable because it is unlikely to be an underestimate of area influenced by the action.

To define the extent of the action area below the diversion we calculated the distance from the point of the diversion to the next downstream confluence with a similar sized or larger stream. Our assumption is that at this point, the incoming stream would dampen the effect of the water withdrawal at the diversion. Depending on the local circumstances, the Service may have selected some other feature downstream that would likely cause the effects from the diversion to become immeasurable, and ended the action area at that point.

b. Assumptions for Determining Bull Trout Density

There are some important assumptions that will be made in the following description of the status of bull trout in the action area for each diversion. One assumption is related to the density of bull trout at a specific site. Data on bull trout density is not always available for a stream reach associated with a water diversion. However, to adequately analyze the impact of the proposed action on bull trout at the local and listed entity scale, some approximation of the number of bull trout potentially exposed to project impacts needs to be made.

It is most likely that the dominant form of bull trout in the streams analyzed in this Opinion (during the irrigation season) is smaller resident fish, not fluvial fish. This is especially likely since many streams lack an established fluvial population altogether. A few fluvial fish may ascend the tributaries during high water events, but in most years the size of the tributary streams preclude use by the larger fluvial bull trout.

If specific density data are not available, the Service may use densities from streams with similar physical characteristics (surrogate) or may rely on a combination of data from the literature. Specifically for the Middle Salmon River-Panther Core Area, IDFG (2005, p. 49) reports bull trout density per 100 m (linear length of stream) for survey sites in many streams throughout the core area. Where available, the Service will use the specific estimates reported by IDFG (if local or better estimates are not available) to estimate the number of bull trout that might be exposed to diversion impacts. If local information is available, the Service will use it and identify its origin.

Another assumption embedded in this simplistic estimate based on length of action area and population density is that all of a stream is suitable habitat and is occupied at the estimated density. The Service knows this is rarely the case. In most streams, there are reaches that are not occupied by bull trout because some habitat requirement necessary for bull trout is missing or there is a condition that bull trout avoid. For example, some reaches may lack pools or hiding cover, be occupied by competing nonnative trout, or have water velocities, depths, or stream gradients that are avoided by bull trout. The Service lacks the information to identify those specific areas that bull trout would not likely occupy, so we maintain our original assumptions on the number of fish in an action area based on assumed density and the extent of the action area.

One last assumption is that the fish represented by the density figure are from all age classes, but are likely dominated by juvenile or subadult fish. This assumption is supported by capture data from a migration study in northeastern Oregon (Homel and Budy 2008, p. 873). Also, studies have shown that juveniles or young of the year compose the majority (48 to 84 percent) of fish lost to irrigation diversions and canals (Der Hovanisian 1995, p. 4). Based on this information, the Service will assume that juveniles likely represent up to 84 percent of the fish present in an action area.

2. General Overview of Potential Effects of Water Diversions to Bull Trout

Determining the impacts of water diversion and changes in stream flow on stream habitat and fish populations is often difficult because the interrelationships between habitat and fish are often complex and result from mechanisms that are interconnected. In other words, a single

environmental impact may affect several portions of a fish's life history through more than one pathway or mechanism. Following an overview discussion of these pathways, a description of how the proposed action is likely to cause effects to bull trout, if any, is presented by individual diversion.

Generally, the likely effects to bull trout and its habitat from diversions fall into five broad categories listed below:

1. Potential entrainment of bull trout by the diversion structure
2. Potential impairment of bull trout movement below the diversion structure, including stranding
3. Potential impairment of passage upstream of diversion
4. Potential degradation of bull trout habitat at the diversion structure and immediate surroundings
5. Potential impacts caused by maintenance activities

a. Effects from Entrainment of Bull Trout at the Diversion Structure

The primary direct effect to all post-hatching bull trout from the movement of water into canals or ditches is the potential for being physically removed from the stream. Once in the irrigation ditch or canal, bull trout are likely to be exposed to the negative effects of high water temperatures, lack of cover, lack of food, predation, and low dissolved oxygen levels. Physical injury and death can also occur due to movement into pumps, pipes, and onto fields via flood irrigation. Even if the fish survive in the canals and ditches, when the diversion is turned off, the fish can be trapped. All of these impacts are negative and typically deadly for affected bull trout. In rare situations, the ditch may carry such a large portion of a stream's flow for such an extended time that it maintains better summer habitat conditions than the stream. In these cases, fish are often attracted into the canals and ditches and may survive through the diversion season. Unfortunately, when the diversion is shut down the fish become trapped and subject to the injuries and mortality mentioned above.

b. Effects from Lowered Water Levels Below the Diversion Structure

When small streams are used to supply water to off-stream areas, the amount of water remaining in the stream can drop significantly. In some cases, this may cause sections of streams below diversions to become dewatered or so shallow that fish are trapped in pools or sections of the stream wholly disconnected from other portions of the stream. This is caused because fish cannot move over rocks and material that were once covered by water. These diversion effects not only occur on the main channels of streams, but also in backwater or off-stream habitats.

<u>Mechanisms for Impacts to Bull Trout Eggs and Fry</u>

Bull trout typically spawn when the water temperature drops to approximately 48 to 50 °F. Depending on elevation and local conditions, this temperature drop generally occurs sometime after mid-August. Bull trout deposit their eggs from late August through November in stream reaches providing appropriate water depth, velocity, and substrate size. Additionally, salmonids

have been shown to select spawning sites in proximity to cover (Witzel and McCrimmon 1983, p. 766). The eggs incubate for 100 to 145 days, depending on water temperature, hatching in late winter or early spring. When eggs hatch, alevins stay in the redd continuing to develop. Fry is the life stage at which the fish begin to swim and feed. Fry remain in the stream substrates for up to three weeks. Fry normally emerge from the gravel in early April through May. This long association with the spawning site means any substantial reduction of water flow during the period from late August through May puts bull trout eggs or fry at risk.

Eggs or fry that are no longer submerged or not submerged deeply enough in water become desiccated and die. Also, because fry are less capable of swimming, they would be less likely to avoid stranding because they would not be able to move over normally submerged material to rearing areas for food and protection, making them vulnerable to starvation or predation. Under conditions where stream volume is reduced and water movement slows, temperature in rearing areas can rise above optimum temperatures causing lowered resistance to disease and parasites and can result in the death of fry from lower oxygen levels (Spence et al. 1996, p. 98).

Mechanisms for Impacts to Young of the Year and Juvenile Bull Trout

Juvenile bull trout use areas on or near the substrate, often behind cobbles or boulders that allow them to inhabit low-velocity areas (Bonneau and Scarnecchia 1998, p. 788). Additionally, Bonneau and Scarnecchia (1998, p. 788) reported juvenile bull trout avoided shallow water (less than 15 centimeters) during the day, but did use shallow stream margins at night. During the day, bull trout did not occupy feeding positions (near the current), but were observed roaming slack water areas and picking prey items from the bottom. Many other bull trout were found beneath the substrate or resting on the bottom, evidently not feeding. Bonneau and Scarnecchia (1998, p. 788) also observed that young of the year used shallow stream margins almost exclusively both day and night. They speculated that occupancy of low velocity stream margins would allow young of the year to avoid larger fish during the day and to conserve energy. Juvenile bull trout may occupy deep complex areas of the channel during the day to maximize energy conservation, evade predation, and avoid high light intensities, but are known to move to shallow shoreline areas of the river channel at night to feed (Muhlfeld et al. 2003, p. 168). For juvenile bull trout, the loss of shallow water habitat through reduced stream flows could result in increased exposure to predation and the loss of feeding habitat. Reduced streamflows could also result in the stranding of young of the year, especially as shallow water along stream margins becomes more exposed.

Mechanisms for Impacts to Adult Bull Trout

Potential impacts to adult fish are similar to those for juveniles. Adult fish find it more difficult to escape deteriorating conditions because of physical barriers created by lowered water levels (Maret et al. 2005, p. 2). Depending on the size of the pool or the length of time the dewatering persists, adult fish can become stranded and die. Fish restricted to smaller and narrower stream segments than normal have fewer resting and hiding areas and are easier for predators to see and kill (Spence et al. 1996, pp. 75-76). Adult bull trout confined and crowded into small areas are subject to increased competition, stress, and predation. Higher water temperatures associated

with smaller pools and slower moving water are also associated with increased susceptibility to disease in salmonids (Spence et al. 1996, p. 76).

c. Effects from Impairment of Passage

There are two common methods for capturing or diverting water from a stream channel into a ditch, canal, or pipeline: 1) permanent structures, usually concrete or wood; and 2) temporary structures such as rock and debris dams. In many small stream diversions, the water is diverted into the diversion canal or ditch by a "push up" dam. These dams are commonly made of rocks, boards, and pieces of canvas or tarp material and jut into the stream, sometimes completely across the channel, forming a small dam. While most are built or rebuilt each spring and adjusted by hand as the season progresses, some are constructed and maintained by mechanized equipment (e.g., backhoe or front end loader).

Adult bull trout migrate into cooler sections of streams to search out areas to spawn and deposit eggs; dewatered areas and diversion dams can be barriers to such movement. If fish passage barriers are in place for long periods of time (years) detrimental effects to the isolated fish population can occur (USFWS 1999, p. 58912). Fish in river and tributary systems that have been temporarily but routinely isolated over many years are subject to reduced productivity and reduced opportunities for breeding between smaller populations (USFWS 1999, p. 58912). If complete isolation persists for decades, genetic weaknesses in the affected populations can emerge that make these populations less robust and less able to maintain their full distribution across the landscape. Loss of connectivity between populations can also preclude colonization of areas where local extinction has occurred (USFWS 1999, p. 58912).

d. Effects from Installation and Maintenance of Diversion Structures in Streams

The disturbance to the stream substrate associated with mechanized construction of push up dams can cause injury or death of any life form of bull trout that does not avoid the worksite; individuals near the site can be impacted by sediment released into the stream, crushed outright, or impacted by accidental spills of petrochemicals. Vegetation and streambanks can be impacted if materials for building the dam are taken from the banks. Depending on the concentration and duration of increased turbidity in the stream, effects to bull trout could range from minor behavioral modifications to death (Bash et al. 2001, pp. 6-8). Additionally, sediment settling into the substrate also has the potential to smother eggs in the gravel or change the substrate to being unsuitable for spawning (Bash et al. 2001, p. 22).

e. Effects from Degradation of Habitat Quality Downstream of the Diversion Structure

Reduction in riparian groundwater, exacerbated by water withdrawals during the summer when growth of riparian vegetation peaks, could inhibit or prevent vegetation from becoming established because water might not be available to the root zone during the growing season (Spence et al. 1996, p. 52). Bull trout can be adversely affected by diminished growth, health, and density of riparian plants, shrubs, and trees, because they provide bank stabilization, shade, organic and woody debris, and sources of food (insects). These effects may persist after the diversion season.

3. Potential Effects of Individual Water Diversions to Bull Trout

a. Otter Creek Diversion

Proposed Action

The proposed action is continued operation and maintenance of a diversion, and conveyance of water from Otter Creek on and across NFS lands. The Otter Creek diversion is located approximately 4,000 feet downstream from the headwaters of Otter Creek, near Morgan Creek Summit. This diversion is authorized under a Ditch Bill easement. IDWR Claim # 75-2169 allows for the diversion of up to 3.28 cubic feet per second (cfs) from April 1 to November 1 for irrigation (Assessment, p. 7).

The Otter Creek diversion structure is made of rock and tarp and completely spans the stream channel. There is a fish bypass pipe from the diversion structure back into Otter Creek. At the beginning of the water conveyance ditch there is a lockable metal sliding culvert gate and a bubbler fish screen. A field inspection conducted in August 2014 characterizes the condition of the diversion structure and headgate as "good". The Otter Creek ditch runs approximately 1.5 miles and conveys water from the Otter Creek drainage into the Morgan Creek drainage (Assessment, pp. 7-19). Although IDWR Claim # 75-2169 allows for diversion of up to 3.28 cfs, the fish screen accommodates the diversion of only 2.0 cfs of water from Otter Creek. The water right holder cannot alter the screen to allow diversion of the full water right without prior approval of the Forest (USFWS 2005, Appendix A).

The water right holder is required to inspect the facility each year prior to use and make necessary repairs. Work that is considered other than routine maintenance and/or minor repair must be discussed, and approved in advance by the Forest. The water right holder is not allowed to bring in or use heavy equipment without prior approval from the Forest (USFWS 2005, Appendix A). Therefore, the Service assumes most maintenance work and reconstruction of the diversion structure (placing rocks and tarps in place in the stream) will be conducted using hand tools.

Action Area

Using the assumptions described above, for purposes of this consultation, the Service considers the action area to include Otter Creek from 100 m above the diversion downstream to its confluence with Panther Creek (approximately 4,345 m).

Status of Bull Trout and Critical Habitat

Surveys conducted by the Forest and IDFG indicate resident bull trout are present in Otter Creek. Bull trout have been documented above and below the diversion. Bull trout redds have been detected in the lowermost reaches of Otter Creek (USFS 2003, p. 43; USFWS 2005, Appendix A). Surveys at two sites in Otter Creek (specific locations unknown) produced densities of 2.4 to 7.0 bull trout per 100 linear m (IDFG 2005, p. 49). Lacking more specific population information, the Service will assume bull trout density is the overall average of both sites,

meaning 4.7 bull trout per 100 linear m. Using this information to calculate an estimate of bull trout present within the action area, we find five bull trout above the diversion and 205 bull trout below the diversion (mostly juveniles).

Otter Creek is designated critical habitat, providing spawning and rearing habitat. Available data indicate stream water temperatures generally fall within water temperature requirements for bull trout spawning and rearing, but brief periodic exceedances of optimum temperatures have occurred (USFS 2016, pp. C12-C13). Stream sediment levels and width to depth ratio are within the expected range for streams in natural condition (USFS 2003, p. 12). Streambanks in lower Otter Creek are considered stable (USFS 2003, p. 12), and photographs taken in 2014 near the diversion (Assessment, pp. 12-15) indicate highly stable, well vegetated streambanks. The Forest noted substantial amounts of suitable spawning substrate for resident bull trout throughout lower Otter Creek (USFS 2003, p. 12). Estimated stream flow (in cfs) during the water right period of use is displayed below in Table 4.

Table 4. Estimated Stream Flow in Otter Creek, by Month

April	May	June	July	August	September	October
1.53	9.75	10.3	2.23	1.1	0.78	0.61

Direct and Indirect Effects of the Proposed Action

Entrainment

The Otter Creek diversion is unlikely to entrain bull trout because it is equipped with a bubbler fish screen and fish bypass pipe from the diversion structure back into Otter Creek. For these reasons, the Service finds effects to bull trout from entrainment at this diversion are discountable.

Impairment

Bull trout are known to occur both upstream and downstream of the diversion. When in use diverting water, the diversion structure spans the entire width of the stream channel and is a barrier to both upstream and downstream movement of fish. Limiting access to portions of the stream for up to seven months of the year could limit the feeding and spawning opportunities for bull trout.

Habitat Impacts

The diversion structure slightly reduces instream habitat by occupying an area that could otherwise be used by bull trout. The diversion structure occupies approximately 1 cubic yard within the stream channel. The conveyance ditch is approximately 1 m wide and slightly reduces the amount of riparian vegetation within the riparian area of Otter Creek. The minor effects of the loss of 1 cubic yard of instream habitat and approximately 1 m of riparian vegetation along the streambank of a 3.5 mile long stream is considered to be insignificant.

Near-stream or instream maintenance activities have the potential to displace bull trout in the action area. However, the effects to bull trout would be minimal because disturbance would be localized and any fish present would be able to easily move away to other suitable areas. Such movement is likely to be of short duration and is not likely to interfere with normal feeding,

breeding, or sheltering behavior of bull trout. Maintenance of the diversion structure is likely to result in sediment being re-suspended in the water column. The increased turbidity would be of short duration and low concentration because of the small amount of the stream bottom being disturbed. The terms and conditions of the Ditch Bill easement operation and maintenance plan would limit the disturbance of streambanks and riparian vegetation to minor impacts within a small area. The Service concludes effects to bull trout from maintenance activities would be insignificant.

Effects of Interdependent Actions

Entrainment

Reduction of stream flow resulting from diversion of water is unlikely to result in entrainment of bull trout in the Otter Creek diversion because the diversion is equipped with a bubbler fish screen and fish bypass pipe from the diversion structure back into Otter Creek. For these reasons, the Service finds effects to bull trout from entrainment at this diversion are discountable.

Impairment

Reduction of stream flow resulting from diversion of water likely impairs movement of bull trout within Otter Creek. Bull trout are known to occur both upstream and downstream of the diversion. During some months of the water right period of use, 100 percent of the flow of Otter Creek could be diverted. Some "leakage" of stream flow below the diversion occurs. At a time when the water right typically exceeds the stream flow available in the channel (August), the Forest found approximately a 90 percent reduction in stream flow immediately downstream of the diversion structure (i.e., 10 percent of the stream flow was left in the channel). The Forest has also reported that numerous springs and unnamed tributaries increase Otter Creek's discharge below the diversion (USFS 2003, p. 13).

Although the channel of Otter Creek is not entirely dewatered, movement of some bull trout in the stream would likely be impaired to such a degree as to interfere with essential feeding, breeding, and sheltering behavior during much of the water right period of use.

Habitat Impacts

Reduction of stream flow resulting from diversion of water reduces habitat quality and quantity for bull trout in Otter Creek. During some months of the water right period of use, 100 percent of the flow of Otter Creek could be diverted. Some "leakage" of stream flow below the diversion occurs. At a time when the water right typically exceeds the stream flow available in the channel (August), the Forest found approximately a 90 percent reduction in stream flow immediately downstream of the diversion structure (i.e., 10 percent of the stream flow was left in the channel). The Forest has also reported that numerous springs and unnamed tributaries increase Otter Creek's discharge below the diversion (USFS 2003, p. 13).

Although the channel of Otter Creek is not entirely dewatered, bull trout would likely be subject to increased stress, competition, and predation as less habitat is available for resting, hiding, and feeding. As stream flow is reduced, the capability of Otter Creek to support a bull trout population is reduced.

Summary of Effects

When in place, the diversion structure impairs upstream and downstream passage of up to 255 bull trout (mostly juveniles). Upstream and downstream passage is further impaired by the reduction of stream flow resulting from diversion of water. Impairment of fish passage limits a fish's ability to feed and avoid predators. Further, passage impairment may prevent adult bull trout from accessing suitable spawning habitat. The physical barrier created by the diversion structure and reduced stream flow would adversely affect PBFs 1 (seeps, springs, groundwater), 2 (migratory habitats), 3 (food base), and 9 (predators and competition). Less water in the stream would result in less area available for thermal refugia, aquatic macroinvertebrates, and cover for bull trout to avoid predators.

Based on the priority date of the IDWR water right claim number, this diversion has likely been in use since 1961. The condition of many bull trout habitat indicators has remained good. Water temperature, sediment level, width to depth ratio, streambank stability, and riparian vegetation appear to be functioning appropriately. However, available instream habitat for bull trout is reduced by the diversion structure and the reduced stream flow. The lowered flows in the stream may have reduced pool quality and frequency, and refugia habitat for bull trout which would result in adverse effects to PBFs 3 (food base), 4 (complex habitat), and 9 (predators and competition). Loss of pool and refugia habitat would reduce available food for bull trout and cover for bull trout to avoid predators.

b. Fourth of July Creek Diversion

Proposed Action

The proposed action is continued operation and maintenance of a diversion, and conveyance of water from Fourth of July Creek on and across NFS lands. This diversion is located on Fourth of July Creek, approximately 0.2 mile upstream from its confluence with Panther Creek. This diversion is authorized under a Forest permit. IDWR Claim # 75-10788 allows for the diversion of up to 0.09 cfs from April 1 to November 1 for irrigation (Assessment, pp. 25-27).

The Fourth of July Creek diversion structure consists of rock entirely spanning the stream channel. There is no lockable, measureable headgate and screen at the point of diversion. Currently the diversion is active, but the ditch is eroding, allowing more than half the water diverted to return to the stream. A field inspection conducted in August 2014 characterizes the condition of the diversion structure as "good" (Assessment, pp. 25, 33).

The Assessment provides no information on typical maintenance activities at this diversion. The Service assumes, based on the photographs in the Assessment and the size and type of diversion, that most maintenance work and reconstruction of the diversion structure (piling rocks up in the stream) will be conducted by hand.

Action Area

Using the assumptions described above, for purposes of this consultation, the Service considers the action area to include Fourth of July Creek from 100 m above the diversion downstream to its confluence with Panther Creek (approximately 322 m).

Status of Bull Trout and Critical Habitat

Surveys conducted by the Forest and IDFG indicate bull trout are present in Fourth of July Creek. The Forest has identified 3.16 miles of Fourth of July Creek as bull trout spawning habitat (USFS 2012, p. 26). Surveys at one site in Fourth of July Creek (specific location unknown) produced a density estimate of 19.0 bull trout per 100 linear m (IDFG 2005, p. 49). Lacking more specific population information, the Service will use this information to calculate an estimate of bull trout present within the action area. We estimate 19 bull trout above the diversion and 62 bull trout below the diversion (mostly juveniles).

Fourth of July Creek is designated critical habitat, providing spawning and rearing habitat. Available data indicate stream water temperatures generally fall within water temperature requirements for bull trout spawning and rearing, but periodic exceedances of optimum temperatures have occurred during summer months (USFS data). Based on photographs taken in 2014 near the diversion, streambanks in lower Fourth of July Creek appear stable and well vegetated (Assessment, pp. 30-32). Multiple Indicator Monitoring (MIM) conducted by the Forest in 1999 found streambanks to be 74 percent stable; the ecological status of the riparian vegetation was late seral (USFS 2012, p. C22). Estimated stream flow (in cfs) during the water right period of use is displayed below in Table 5.

Table 5. Estimated Stream Flow in Fourth of July Creek, by Month

April	May	June	July	August	September	October
1.4	5.8	8.0	2.5	1.1	0.9	0.8

Direct and Indirect Effects of the Proposed Action

Entrainment

This diversion structure could entrain bull trout because it is not screened.

Impairment

When in use diverting water, the diversion structure spans the entire width of the stream channel and is a barrier to both upstream and downstream movement of fish. Limiting access to portions of the stream for up to seven months of the year could limit the feeding and spawning opportunities for bull trout.

Habitat Impacts

The diversion structure slightly reduces instream habitat by occupying an area that could otherwise be used by bull trout. The conveyance ditch is approximately 1 m wide and slightly reduces the amount of riparian vegetation within the riparian area of Fourth of July Creek. The

minor effects of the loss of this instream habitat and riparian vegetation along the streambank of a 4.1 miles long stream is considered to be insignificant.

Near-stream or instream maintenance activities have the potential to displace bull trout in the action area. However, the effects to bull trout would be minimal because disturbance would be localized and any fish present would be able to easily move away to other suitable areas. Such movement is likely to be of short duration and is not likely to interfere with normal feeding, breeding, or sheltering behavior of bull trout. Maintenance of the diversion structure is likely to result in sediment being re-suspended in the water column. The increased turbidity would be of short duration and low concentration because of the small amount of the stream bottom being disturbed. Based on the type and size of the Fourth of July Creek diversion, the Service concludes disturbance of streambanks and riparian vegetation would be minor and effects to bull trout from maintenance activities would be insignificant.

Effects of Interdependent Actions

Entrainment

Flow alteration associated with this diversion could result in entrainment of bull trout in the conveyance ditch because there is no fish screen to prevent fish access to the ditch.

Impairment

Reduction of stream flow resulting from diversion of water likely impairs movement of bull trout within Fourth of July Creek at some times. Diversion of water during the water right period of use would not reach or exceed the typical stream flow of Fourth of July Creek. The percentage of flow diverted ranges from 1 to 11 percent. The Forest estimates this diversion structure is capable of diverting 75 percent of the flow in the stream (Assessment, pp. 36-37).

Although the channel of Fourth of July Creek is not entirely dewatered, movement of some bull trout in the stream would likely be impaired to such a degree as to interfere with essential feeding, breeding, and sheltering behavior when 10 percent or more of the typical stream flow in Fourth of July Creek is diverted.

Habitat Impacts

Reduction of stream flow resulting from diversion of water reduces habitat quality and quantity for bull trout in Fourth of July Creek. Although the Forest has observed that the channel of Fourth of July Creek is not entirely dewatered below the diversion structure (Assessment, p. 36), bull trout would likely be subject to increased stress, competition, and predation as less habitat is available for resting, hiding, and feeding. As stream flow is reduced, the capability of Fourth of July Creek to support a bull trout population is reduced.

Summary of Effects

Because the diversion is not screened, up to 19 bull trout (mostly juveniles) could be entrained in the Fourth of July Creek diversion and ultimately die. When in place, the diversion structure impairs upstream and downstream passage of up to 81 bull trout (mostly juveniles). Upstream and downstream passage is further impaired by the reduction of stream flow resulting from

diversion of water. Impairment of fish passage limits a fish's ability to feed and avoid predators. Further, passage impairment may prevent adult bull trout from accessing suitable spawning habitat. The physical barrier created by the diversion structure and reduced stream flow would adversely affect PBFs 1 (seeps, springs, groundwater), 2 (migratory habitats), 3 (food base), and 9 (predators and competition). Less water in the stream would result in less area available for thermal refugia, aquatic macroinvertebrates, and cover for bull trout to avoid predators.

Based on the priority date of the IDWR water right claim number, this diversion has likely been in use since 1961. The condition of several bull trout habitat indicators has remained good. Water temperature, streambank stability, and riparian vegetation appear to be functioning appropriately. However, available instream habitat for bull trout is reduced by the diversion structure and the reduced stream flow. The lowered flows in the stream may have reduced pool quality and frequency, and refugia habitat for bull trout which would result in adverse effects to PBFs 3 (food base), 4 (complex habitat), and 9 (predators and competition). Loss of pool and refugia habitat would reduce available food for bull trout and cover for bull trout to avoid predators.

c. South Fork Moyer Creek Diversion

Proposed Action

The proposed action is continued operation and maintenance of a diversion, and conveyance of water from South Fork Moyer Creek on and across NFS lands. This diversion is located on South Fork Moyer Creek, approximately 250 feet downstream from the confluence of an unnamed tributary with South Fork Moyer Creek. This diversion is currently authorized under a Forest permit, but the water right holder has filed an application for a Ditch Bill easement. IDWR Claim # 75-10127 allows for the diversion of up to 1.2 cfs from April 1 to November 1 for irrigation (Assessment, pp. 42-44).

The South Fork Moyer Creek diversion structure is made of wood and tarp and completely spans the stream channel. There is no lockable, measureable headgate and screen at the point of diversion. The conveyance system is a ditch with a buried culvert and no headgate. The diversion was inactive when inspected in 2014, but stream flow was seeping into the ditch. Because there was a break in the ditch wall, water was flowing back into the stream approximately 300 feet from the start of the ditch. In August 2014, the condition of the diversion structure was characterized as "good", while the condition of the diversion headgate was characterized as "poor" (Assessment, pp. 42-44).

The Assessment provides no information on typical maintenance activities at this diversion. The Service assumes, based on the photographs in the Assessment and the size and type of diversion, that most maintenance work and reconstruction of the diversion structure (blocking the buried culvert with a tarp and placing rocks on the tarp at the diversion structure) will be conducted by hand.

Action Area

Using the assumptions described above, for purposes of this consultation, the Service considers the action area to include South Fork Moyer Creek from 100 m above the diversion downstream to its confluence with Moyer Creek (approximately 2,200 m).

Status of Bull Trout and Critical Habitat

Surveys conducted by the Forest and IDFG indicate bull trout are present in South Fork Moyer Creek. The Forest has identified 4.3 miles of lower South Fork Moyer Creek as bull trout spawning habitat (USFS 2016, p. 29). Based on population surveys, the Forest believes South Fork Moyer Creek supports a strong bull trout population, particularly in the lower reaches near the confluence with Moyer Creek. Surveys at one site in South Fork Moyer Creek (specific location unknown) produced a density estimate of 4.0 bull trout per 100 linear m (IDFG 2005, p. 49). Lacking more specific population information, the Service will use this information to calculate an estimate of bull trout present within the action area. We estimate 4 bull trout above the diversion and 88 bull trout below the diversion (mostly juveniles).

South Fork Moyer Creek is designated critical habitat, providing spawning and rearing habitat. Available data indicate stream water temperatures generally exceed water temperature requirements for bull trout spawning and rearing until September (USFS data). Based on photographs taken in 2014 near the diversion, streambanks in South Fork Moyer Creek appear stable and well vegetated (Assessment, pp. 48-50). At one monitoring site near the confluence of South Fork Moyer Creek with Moyer Creek, streambank stability had declined from 2004 to 2014 and sediment levels had increased. At a MIM site near the diversion, the Forest found streambank stability had increased to 89 percent in 2014 and greenline ecological status was late seral (USFS 2016, pp. C14, C16, C19-C20). Estimated stream flow (in cfs) during the water right period of use is displayed below in Table 6.

Table 6. Estimated Stream Flow in South Fork Moyer Creek, by Month

April	May	June	July	August	September	October
5.7	23.3	32.0	10.0	4.3	3.4	3.3

Direct and Indirect Effects of the Proposed Action

Entrainment

This diversion structure could entrain bull trout because it is not screened.

Impairment

When in use diverting water, the diversion structure spans the entire width of the stream channel and impairs both upstream and downstream movement of fish. A field inspection determined upstream and downstream passage of adult and juvenile bull trout is possible, but particularly upstream passage would be difficult (Assessment, pp. 56-57). Limiting access to portions of the stream for up to seven months of the year could limit the feeding and spawning opportunities for bull trout.

Habitat Impacts

The diversion structure slightly reduces instream habitat by occupying an area that could otherwise be used by bull trout. The conveyance ditch is approximately 1 m wide and slightly reduces the amount of riparian vegetation within the riparian area of South Fork Moyer Creek. The minor effects of the loss of this instream habitat and riparian vegetation along the streambank of a 7.6 miles long stream is considered to be insignificant.

Near-stream or instream maintenance activities have the potential to displace bull trout in the action area. However, the effects to bull trout would be minimal because disturbance would be localized and any fish present would be able to easily move away to other suitable areas. Such movement is likely to be of short duration and is not likely to interfere with normal feeding, breeding, or sheltering behavior of bull trout. Maintenance of the diversion structure is likely to result in sediment being re-suspended in the water column. The increased turbidity would be of short duration and low concentration because of the small amount of the stream bottom being disturbed. Based on the type and size of the South Fork Moyer Creek diversion, the Service concludes disturbance of streambanks and riparian vegetation would be minor and effects to bull trout from maintenance activities would be insignificant.

Effects of Interdependent Actions

Entrainment

Flow alteration associated with this diversion could result in entrainment of bull trout in the conveyance ditch because there is no fish screen to prevent fish access to the ditch.

Impairment

Reduction of stream flow resulting from diversion of water likely impairs movement of bull trout within South Fork Moyer Creek. Diversion of water during the water right period of use would not reach or exceed the typical stream flow of South Fork Moyer Creek. The percentage of flow diverted ranges from 4 to 36 percent. The Forest estimates this diversion structure is capable of diverting 50 percent of the flow in the stream (Assessment, p. 58).

Although the channel of South Fork Moyer Creek is not entirely dewatered, movement of some bull trout in the stream would likely be impaired to such a degree as to interfere with essential feeding, breeding, and sheltering behavior, primarily during those months when 10 percent or more of the typical stream flow in South Fork Moyer Creek is diverted.

Habitat Impacts

Reduction of stream flow resulting from diversion of water reduces habitat quality and quantity for bull trout in South Fork Moyer Creek. Although it is unlikely the channel of South Fork Moyer Creek is entirely dewatered below the diversion structure at any time (Assessment, p. 58), bull trout would likely be subject to increased stress, competition, and predation as less habitat is available for resting, hiding, and feeding. As stream flow is reduced, the capability of South Fork Moyer Creek to support a bull trout population is reduced.

Summary of Effects

Because the diversion is not screened, up to 4 bull trout (mostly juveniles) could be entrained in the South Fork Moyer Creek diversion and ultimately die. When in place, the diversion structure impairs upstream and downstream passage of up to 92 bull trout (mostly juveniles). Upstream and downstream passage is further impaired by the reduction of stream flow resulting from diversion of water. Impairment of fish passage limits a fish's ability to feed and avoid predators. Further, passage impairment may prevent adult bull trout from accessing suitable spawning habitat. The physical barrier created by the diversion structure and reduced stream flow would adversely affect PBFs 1 (seeps, springs, groundwater), 2 (migratory habitats), 3 (food base), and 9 (predators and competition). Less water in the stream would result in less area available for thermal refugia, aquatic macroinvertebrates, and cover for bull trout to avoid predators.

Based on the priority date of the IDWR water right claim number, this diversion has likely been in use since 1964. Available information indicates the condition of bull trout habitat varies throughout South Fork Moyer Creek. It is not clear from the Assessment or available information if diverting water from the stream caused the less than optimal conditions. However, diverting water from the stream has resulted in less available instream habitat for bull trout. The lowered flows in the stream may have reduced pool quality and frequency, and refugia habitat for bull trout which would result in adverse effects to PBFs 3 (food base), 4 (complex habitat), and 9 (predators and competition). Loss of pool and refugia habitat would reduce available food for bull trout and cover for bull trout to avoid predators.

d. Garden Creek Diversion

Proposed Action

The proposed action is continued operation and maintenance of a diversion, and conveyance of water from Garden Creek on and across NFS lands. This diversion is located on Garden Creek, approximately 800 feet upstream from its confluence with Panther Creek. IDWR water right license 75-4349 (1957 priority date) authorizes the diversion of up to 0.3 cfs from April 15 to November 15 for irrigation and up to 0.08 cfs from January 1 to December 31 for stockwater and domestic use (Assessment, p. 66).

The Garden Creek diversion consists of a four inch diameter flexible corrugated pipe buried in the gravel of a small side channel of Garden Creek. This pipe conveys water to a small holding pond on private land where water is redistributed to various points through small pipelines. The pond has a return flow pipeline which prevents pond overflow and returns excess water to a private land reach of Garden Creek (Assessment, p. 66).

The Assessment provides no information on typical maintenance activities at this diversion. The Service assumes, based on the photographs in the Assessment and the size and type of diversion, that most maintenance work of the diversion structure will be conducted by hand.

Action Area

Using the assumptions described above, for purposes of this consultation, the Service considers the action area to include Garden Creek from 100 m above the diversion downstream to its confluence with Panther Creek (approximately 244 m).

Status of Bull Trout and Critical Habitat

Surveys conducted by IDFG and the Forest have not documented the presence of bull trout in Garden Creek. The stream is considered unoccupied.

Garden Creek is designated critical habitat, providing spawning and rearing habitat. Available stream water temperature data from lower Garden Creek indicate water temperatures exceed the water temperature requirements for bull trout spawning and rearing. Sediment levels are relatively low and are considered to be functioning appropriately. Width to depth ratio and streambank stability were negatively impacted by intense localized thunderstorms and subsequent debris flows in 2002 and 2003 (USFS 2005, p. 13, 15-17). Based on photographs taken in 2014 near the diversion, streambank stability and vegetation cover along Garden Creek appears to be improving (Assessment, pp. 70-72). Estimated stream flow (in cfs) during the water right period of use is displayed below in Table 7.

Table 7. Estimated Stream Flow in Garden Creek, by Month

April	May	June	July	August	September	October	November
2.2	8.8	12.0	3.8	1.6	1.3	1.2	1.1

Direct and Indirect Effects of the Proposed Action

Entrainment

Bull trout are not known to occur in this stream. Additionally, the pipe intake is buried in the gravels of the stream bottom, precluding entrainment of fish.

Impairment

Bull trout are not known to occur in this stream. Additionally, this diversion does not impair upstream or downstream fish passage.

Habitat Impacts

The diversion structure very slightly reduces suitable stream substrate for bull trout. The conveyance pipeline disturbs a very minor amount of riparian vegetation. The minor effects of the loss of this instream habitat and disturbance of riparian vegetation is considered to be insignificant.

Maintenance of the diversion structure is likely to result in sediment being re-suspended in the water column. The increased turbidity would be of very short duration and low concentration because of the small amount of the stream bottom being disturbed. Based on the type and size of the Garden Creek diversion, the Service concludes disturbance of streambanks and riparian

vegetation would be negligible and effects to bull trout habitat from maintenance activities would be insignificant.

Effects of Interdependent Actions

Entrainment

Bull trout are not known to occur in this stream. Additionally, the pipe intake is buried in the gravels of the stream bottom, precluding entrainment of fish.

Impairment

Because bull trout are not known to occur in this stream, reduction of stream flow resulting from diversion of water would not impair movement of bull trout within Garden Creek.

Habitat Impacts

Reduction of stream flow resulting from diversion of water reduces habitat quality and quantity for bull trout in Garden Creek and may be a factor limiting bull trout use of Garden Creek.

Summary of Effects

Bull trout are not known to occur in Garden Creek. The diversion structure and conveyance pipeline very slightly decrease suitable stream substrate and riparian vegetation.

Based on the priority date of the IDWR water right claim number, this diversion has likely been in use since 1957. Habitat conditions in Garden Creek have been impacted in the past by intense localized thunderstorms and resultant debris flows. It is not clear from the Assessment or available information if diverting water from the stream caused less than optimal bull trout habitat conditions. However, diverting water from the stream has resulted in less available instream habitat for bull trout. The lowered flows in the stream may have reduced pool quality and frequency, refugia habitat for bull trout, and aquatic macroinvertebrate abundance. It is likely PBFs 1 (seeps, springs, groundwater), 2 (migratory habitats), 3 (food base), 4 (complex habitat), and 9 (predators and competition) have been adversely affected. Loss of pool and refugia habitat would reduce available food for bull trout and cover for bull trout to avoid predators.

e. Panther Creek Diversion

The proposed action is continued operation and maintenance of a diversion, and conveyance of water from Panther Creek on and across NFS lands. This diversion is located on Panther Creek, approximately 0.3 mile upstream of the confluence of Beaver Creek with Panther Creek. IDWR water right license 75-4006 (1891 priority date) authorizes the diversion of up to 0.1 cfs from April 1 to November 1 for irrigation (Assessment, p. 82).

The Panther Creek diversion consists of a pump with a screened intake. It is not known if the screen meets NMFS pump intake screen criteria. Diverted water is conveyed through a pipeline to streamside private lands.

The Assessment provides no information on typical maintenance activities at this diversion. Based on the description of the diversion, the Service assumes most maintenance work of the diversion structure will be conducted by hand.

Action Area

Using the assumptions described above, for purposes of this consultation, the Service considers the action area to include Panther Creek from 100 m above the diversion downstream to the confluence of Beaver Creek with Panther Creek (approximately 483 m). The downstream extent of the action area was selected because the confluence with Beaver Creek would likely cause the effects from the Panther Creek diversion to become immeasurable.

Status of Bull Trout and Critical Habitat

Bull trout have been documented above and below this diversion. Surveys at 11 sites in Panther Creek (specific locations unknown) produced densities of 0.0 to 5.5 bull trout per 100 linear m (IDFG 2005, p. 49). Lacking more specific information, the Service will assume bull trout density is the overall average for the stream, meaning 0.96 bull trout per linear m. Using this information to calculate an estimate of bull trout present within the action area, we find 1 bull trout above the diversion and 5 bull trout below the diversion, likely adults because this reach of Panther Creek does not provide spawning and rearing habitat.

The diversion is located in a portion of Panther Creek that is designated critical habitat, providing habitat for foraging, migration, and overwintering. Available stream water temperature data from lower Panther Creek indicate water temperatures exceed optimum stream water temperatures for bull trout. Sediment levels are relatively low and are considered to be functioning appropriately. Streambanks tend to be fairly stable, primarily due to the large boulder substrate within the canyon reaches (USFS 2005, p. 13, 15-16). Estimated stream flow (in cfs) during the water right period of use is displayed below in Table 8.

Table 8. Estimated Stream Flow in Panther Creek, by Month

April	May	June	July	August	September	October
185.8	753.1	1,035.4	323.8	139.6	110.7	106.8

Direct and Indirect Effects of the Proposed Action

Entrainment

This pipe intake is screened, but it is not known if the screen meets NMFS pump intake screen criteria. If the screen does not meet NMFS pump intake screen criteria, entrainment or impingement of bull trout could occur.

Impairment

This diversion's submerged pipe intake does not span the channel. The intake lies in close proximity to the stream margin and does not impair upstream or downstream fish passage.

Habitat Impacts

The diversion structure very slightly reduces suitable stream substrate for bull trout. The conveyance pipeline disturbs a very minor amount of riparian vegetation. The minor effects of the loss of this instream habitat and disturbance of riparian vegetation is considered to be insignificant.

Near-stream or instream maintenance activities have the potential to displace bull trout in the action area. However, the effects to bull trout would be minimal because disturbance would be localized and any fish present would be able to easily move away to other suitable areas. Such movement is likely to be of short duration and is not likely to interfere with normal feeding, breeding, or sheltering behavior of bull trout. Maintenance of the diversion structure is likely to result in sediment being re-suspended in the water column. The increased turbidity would be of very short duration and low concentration because of the small amount of the stream bottom being disturbed. Based on the type and size of the Panther Creek diversion, the Service concludes disturbance of streambanks and riparian vegetation would be negligible and effects to bull trout from maintenance activities would be insignificant.

Effects of Interdependent Actions

Entrainment

Diversion of flows is not likely to result in bull trout being entrained. Diversion of water during the water right period of use would not reach or exceed the typical stream flow of Panther Creek. The percentage of flow diverted ranges from 0.003 to 0.093 percent (Assessment, p. 89). Sufficient water would be available in the stream channel for fish to avoid the pump intake. The Service finds effects to bull trout via entrainment at this diversion to be discountable.

Impairment

Reduction of stream flow resulting from diversion of water is not likely to impair movement of bull trout within Panther Creek. Diversion of water during the water right period of use would not reach or exceed the typical stream flow of Panther Creek. The percentage of flow diverted ranges from 0.003 to 0.093 percent (Assessment, p. 89). The Service finds effects to bull trout from this negligible flow reduction to be insignificant.

Habitat Impacts

Reduction of stream flow resulting from diversion of water could reduce habitat quality and quantity for bull trout in Panther Creek. However, the negligible flow reduction of 0.003 to 0.093 percent of stream flow is not likely to generate any impacts to aquatic habitat. The Service finds effects to bull trout from habitat impacts to be discountable.

Summary of Effects

Although the Panther Creek diversion is screened, it is not known whether the screen meets NMFS pump intake screen criteria. Thus, there is a possibility that 6 bull trout could be entrained in the diversion or impinged on the screen. Neither the diversion structure nor the removal of stream flow impairs fish passage. Such a small percentage of stream flow is removed from Panther Creek that impacts to bull trout habitat are unmeasurable.

B. Effects of Interrelated or Interdependent Actions

The implementing regulations for section 7 define interrelated actions as 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. As addressed above in the *Description of the Proposed Action* section, effects of interdependent actions were discussed above for each diversion. No interrelated actions have been identified in this consultation.

VI. CUMULATIVE EFFECTS

The implementing regulations for section 7 define cumulative effects to include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. No cumulative effects have been identified in this consultation.

VII. CONCLUSION

A. Bull Trout

After reviewing the current status of the bull trout, the environmental baseline for the action area, the effects of the proposed action, and any cumulative effects, it is the Service's biological opinion that the Forest's proposed authorization of continued operation and maintenance of five water diversions and conveyance of water on and across NFS lands within the Panther Creek watershed is not likely to jeopardize the coterminous U.S. population of the bull trout. The Service's rationale for this determination is presented below.

Maintenance of the diversions could cause some disturbance of bull trout or impact sediment levels. Disturbance and sedimentation effects would be infrequent, localized, short-term, and of low severity. Effects to bull trout and its habitat resulting from use of the diversions and the associated reduction in stream flows have been described above in the *Effects of the Proposed Action* section for each stream. Impaired passage of bull trout in the affected streams and entrainment of bull trout into diversion conveyances are likely to occur on an annual basis. Not all diversions result in both these effects, and the extent of the effects varies at each diversion.

The five diversions considered in this Opinion are scattered throughout the Panther Creek watershed, not concentrated in any one subwatershed. Three diversions (Otter Creek, Fourth of July Creek, and South Fork Moyer Creek) are located in the Upper Panther 5th field HUC and two (Garden Creek and Panther Creek) are located in the Lower Panther 5th field HUC. Both these subwatersheds have an estimated adult bull trout population of more than 500. Using the assumption that adult bull trout comprise 10 percent of the total population (K. Meyer, IDFG, pers. comm., March 11, 2009), that would suggest a total population in each subwatershed of at least 5,000 bull trout (500 adults and 4,500 juveniles).

Within the Upper Panther 5th field HUC, up to 428 bull trout (mostly juveniles) are expected to be subject to disruption of essential feeding, breeding, and sheltering behaviors due to impairment of fish passage caused by the diversions and associated flow reductions. While some of these 428 bull trout will die, others are expected to experience sublethal effects. Up to 23 bull trout (mostly juveniles) are expected to die due to entrainment in diversion conveyances. Within the Lower Panther 5th field HUC, no bull trout are expected to be subject to disruption of essential feeding, breeding, and sheltering behaviors due to impairment of fish passage caused by the diversions and associated flow reductions. Up to 6 bull trout (likely adults) are expected to die due to entrainment in diversion conveyances or impingement on screens. The number of bull trout impacted is a small percentage of the total population in each 5th field HUC. Because most bull trout within the Panther Creek local population are not affected by these diversions, the level of impact is unlikely to appreciably reduce the viability of the local population.

Based on the priority dates of the IDWR water rights numbers, all five of these diversions have likely been in use since at least 1964. Based on available information about past and current habitat conditions in these streams, it is likely habitat conditions will improve or be maintained under the proposed action. Bull trout populations in these streams persist and occur in relatively high densities in some streams (e.g., Otter Creek, South Fork Moyer Creek). Although effects of water diversion are adverse in some of the streams, the total amount of water diverted from these five streams is negligible compared to the estimated stream flows in lower Panther Creek during the water right period of use.

For the above reasons, the Service concludes that the anticipated level of effects caused by the continued operation and maintenance of five stream diversions and the reduction of stream flows resulting from diversion of water to bull trout and its habitat over the term of the proposed action, taking into account the environmental baseline and cumulative effects in the action area, is likely to be compatible with sustaining the viability of the Panther Creek local population of the bull trout. Habitat quality for the bull trout on the Forest is likely to be maintained or improved under the proposed action based on available information about habitat conditions.

B. Designated Critical Habitat

After reviewing the current status of the designated critical habitat for bull trout, the environmental baseline for the action area, the effects of the proposed action, and any cumulative effects, it is the Service's biological opinion that the Forest's proposed authorization of continued operation and maintenance of five water diversions and conveyance of water on and across NFS lands within the Panther Creek watershed is not likely to result in destruction or adverse modification of designated critical habitat for bull trout. The Service's rationale is presented below.

The Service anticipates minor reductions in PBF 1 (seeps, springs, groundwater), PBF 2 (migratory habitats), PBF 3 (food base), PBF 4 (complex habitat), and PBF 9 (predators and competition). The diversion structures and reduced stream flow would result in less area available for thermal refugia, food production (aquatic macroinvertebrates), and cover for bull trout to avoid predators. These effects are not expected to occur evenly across the Panther Creek

watershed, but be confined to the five streams with the diversion structures that are the subject of this consultation.

Based on the priority dates of the IDWR water rights numbers, all five of these diversions have likely been in use since at least 1964. Based on available information about past and current habitat conditions in these streams, it is likely habitat conditions will improve or be maintained under the proposed action.

The Service concludes that the level of adverse effects to bull trout critical habitat in the action area is not likely to cause a further degradation of those physical or biological features in streams where they are below objectives and expects habitat conditions to be maintained or improved. The affected critical habitat would be likely to maintain its capability to support the bull trout and to serve its intended conservation role for the species. If the adverse effects of the proposed action are not substantial within the action area, then they are unlikely to be discernible at the designated critical habitat rangewide scale.

VIII. 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 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 an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal 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 an Incidental Take Statement. The measures described below are non-discretionary, and must be undertaken by the Forest so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply.

A. Amount or Extent of Take Anticipated

Based on the results presented in the *Effects of the Action* analysis above, the Service finds that incidental take of the bull trout is likely to occur in the form of harm caused by impaired passage of bull trout within Otter Creek, Fourth of July Creek, and South Fork Moyer Creek. Up to 428 bull trout (mostly juveniles) will be impacted annually.

Additionally, incidental take of bull trout is likely to occur in the form of entrainment of bull trout into diversion conveyances and/or impingement of bull trout on screens. This take is

expected to be lethal and impact up to 29 bull trout (mostly juveniles) annually in Fourth of July Creek, South Fork Moyer Creek, and Panther Creek.

Although the Service has identified a specific quantity of take anticipated, actually counting the number of bull trout experiencing passage impairment or entrainment/impingement in each stream would be extremely difficult. Because the diversions are in remote locations, take could occur at any time during the water right period of use, and the general difficulty of observing juvenile bull trout, counting the number of bull trout impacted would be impractical and may be impossible. For this reason, the Service will use a surrogate measure to characterize the extent of take.

Because the Service's analysis of effects was based on the impacts of a specific amount of water being withdrawn from the streams, the Service finds that water withdrawal, measured by period of use and quantity (in cfs) of water diverted, is an acceptable and measureable surrogate for measuring the amount of take of bull trout from operation of these diversions. Incidental take is exceeded if, in any year, 1) the amount of water diverted exceeds the maximum diversion rate of the water right identified for each diversion or 2) a diversion is in operation beyond the dates specified by the water right.

B. Effect of the Take

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to jeopardize the coterminous United States population of the bull trout.

C. Reasonable and Prudent Measures

The Service finds that the following Reasonable and Prudent Measures are necessary and appropriate to minimize the impacts of incidental take of the bull trout reasonably certain to be caused by the proposed action.

Reasonable and Prudent Measure 1 – The Forest shall minimize harm to bull trout from impairment of fish passage in Otter Creek, Fourth of July Creek, and South Fork Moyer Creek.

Reasonable and Prudent Measure 2 – The Forest shall minimize take of bull trout from entrainment of bull trout into diversion conveyances and/or impingement on screens in Fourth of July Creek, South Fork Moyer Creek, and Panther Creek.

Reasonable and Prudent Measure 3 – The Forest shall monitor and report to ensure incidental take is not exceeded.

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 terms and conditions which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are not discretionary.

Term and Condition 1 to implement Reasonable and Prudent Measure 1:

By November 30, 2019, flow measuring devices will be installed at the Otter Creek, Fourth of July Creek, South Fork Moyer Creek, and Garden Creek diversions. The Forest shall assist the diverters in completing the installation by providing specific information on programs or contacts to assist them with this work.

Term and Condition 2 to implement Reasonable and Prudent Measure 1:

By November 30, 2019, the Forest shall evaluate the current conditions at the Otter Creek, Fourth of July Creek, and South Fork Moyer Creek diversions and will make recommendations to the Service on the implementation of measures to minimize take of bull trout caused by impairment of fish passage at these diversions. Appropriate measures to reduce take of bull trout will be implemented by November 30, 2024, in coordination with and the approval of the Service.

Term and Condition 1 to implement Reasonable and Prudent Measure 2:

By November 30, 2019, the Forest shall evaluate the current conditions at the Fourth of July Creek and South Fork Moyer Creek diversions and will make recommendations to the Service on the implementation of measures to minimize take of bull trout. Appropriate measures to reduce take of bull trout will be implemented by November 30, 2024, in coordination with and the approval of the Service.

Term and Condition 2 to implement Reasonable and Prudent Measure 2:

By November 30, 2019, the Forest shall evaluate the existing screen on the Panther Creek diversion pipe intake to determine if the screen is in compliance with NMFS pump intake screen criteria and notify the Service of their findings. If the existing screen is not compliant with NMFS pump intake screen criteria, the Forest shall assist the diverters in completing the installation of a NMFS criteria screen by providing specific information on programs or contacts to assist them with this work. Installation of a NMFS criteria screen will be completed by November 30, 2024.

Term and Condition 1 to implement Reasonable and Prudent Measure 3:

The Forest shall conduct monitoring and reporting of incidental take as follows. Annually, the Forest shall verify that water withdrawal at the five diversions does not exceed the maximum diversion rate of the water right identified for each diversion and that the diversion is not in operation beyond the dates specified by the water right. The Forest can determine the best method and process for acquiring that determination. The site-specific determination can be made by a site visit, observation and measurement, or by using data or information from the diverter or other source, but the determination must be accompanied by the signature of the person attesting to and verifying the validity of the obtained record.

By March 1 of each year for the term of the proposed action, the Forest shall submit a completed form (see Appendix A) to the Team Leader of the Service's Eastern Idaho Field Office in Chubbuck, Idaho.

IX. 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 new information on listed species.

The Service recommends that the Forest implement measures to protect and improve riparian areas of headwater streams known to support bull trout. These headwater streams become increasingly valuable in light of global climate change projections.

The Service recommends that the Forest encourage continued use of hand tools for repair and maintenance of diversion structures, rather than use of heavy equipment, to minimize impacts to bull trout and its habitat.

X. REINITIATION-CLOSING STATEMENT

This concludes formal consultation on the Forest's proposal to authorize continued operation and maintenance of five diversions within the Panther Creek watershed, and conveyance of water from those diversions on and across National Forest System lands in Lemhi County, Idaho. 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.

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APPENDIX A

Annual Monitoring Report Form for Actions covered under the Service's biological opinion for the Panther Creek Water Diversions (01EIFW00-2017-F-0043).

Please submit annually by December 31 to the Team Leader of the Service's Eastern Idaho Field Office, 4425 Burley Dr., Suite A, Chubbuck, Idaho 83202; telephone (208) 237-6975. Please include name and contact information in case additional information is needed.

Otter Creek

1. Has anything changed at this diversion that could have resulted in the take estimate (Section VIII of the biological opinion) being exceeded?

2. Has anything changed at this diversion that would potentially change the impacts to fish in a way different than those described in the Forest's biological assessment and the Service's biological opinion?

3. Have any entrained, dead or injured bull trout been observed or salvaged at this diversion? How many, and what were their disposition?

4. Did the diversion rates exceed those that were identified as part of the action?

5. To date, what specific progress has been made to implement the reasonable and prudent measures and terms and conditions (specific to this diversion) from the incidental take statement (Section VIII)?

Fourth of July Creek

1. Has anything changed at this diversion that could have resulted in the take estimate (Section VIII of the biological opinion) being exceeded?

2. Has anything changed at this diversion that would potentially change the impacts to fish in a way different than those described in the Forest's biological assessment and the Service's biological opinion?

3. Have any entrained, dead or injured bull trout been observed or salvaged at this diversion? How many, and what were their disposition?

4. Did the diversion rates exceed those that were identified as part of the action?

5. To date, what specific progress has been made to implement the reasonable and prudent measures and terms and conditions (specific to this diversion) from the incidental take statement (Section VIII)?

South Fork Moyer Creek

1. Has anything changed at this diversion that could have resulted in the take estimate (Section VIII of the biological opinion) being exceeded?

2. Has anything changed at this diversion that would potentially change the impacts to fish in a way different than those described in the Forest's biological assessment and the Service's biological opinion?

3. Have any entrained, dead or injured bull trout been observed or salvaged at this diversion? How many, and what were their disposition?

4. Did the diversion rates exceed those that were identified as part of the action?

5. To date, what specific progress has been made to implement the reasonable and prudent measures and terms and conditions (specific to this diversion) from the incidental take statement (Section VIII)?

Garden Creek

1. Has anything changed at this diversion that could have resulted in the take estimate (Section VIII of the biological opinion) being exceeded?

2. Has anything changed at this diversion that would potentially change the impacts to fish in a way different than those described in the Forest's biological assessment and the Service's biological opinion?

3. Have any entrained, dead or injured bull trout been observed or salvaged at this diversion? How many, and what were their disposition?

4. Did the diversion rates exceed those that were identified as part of the action?

5. To date, what specific progress has been made to implement the reasonable and prudent measures and terms and conditions (specific to this diversion) from the incidental take statement (Section VIII)?

Panther Creek

1. Has anything changed at this diversion that could have resulted in the take estimate (Section VIII of the biological opinion) being exceeded?

2. Has anything changed at this diversion that would potentially change the impacts to fish in a way different than those described in the Forest's biological assessment and the Service's biological opinion?

3. Have any entrained, dead or injured bull trout been observed or salvaged at this diversion? How many, and what were their disposition?

4. Did the diversion rates exceed those that were identified as part of the action?

5. To date, what specific progress has been made to implement the reasonable and prudent measures and terms and conditions (specific to this diversion) from the incidental take statement (Section VIII)?

Salmon Challis NF Official:_____
Date:_____

Contact Information: