United States Department of the Interior

FISH AND WILDLIFE SERVICE
Montana Ecological Services Office
585 Shephard Way, Suite 1
Helena, Montana 59601

In Reply Refer to:
File: M.01 Bureau of Indian Affairs
2023-0029584

March 15, 2023

Kari Kingery, Program Manager
Wildlife Management Program
Confederated Salish and Kootenai Tribes
P.O. Box 278
Pablo, MT 59855

Shane Hendrickson, Superintendent
Flathead Agency, Bureau of Indian Affairs
Post Office Box 40
Pablo, MT 59855

Dear Ms. Kingery and Mr. Hendrickson:

This responds to a request for U.S. Fish and Wildlife Service (Service) review and section 7 Endangered Species Act (Act) consultation on the North Fork Jocko Bridge Replacement Project (Project). We received the biological assessment (BA) on November 16, 2022, via email from Kari Kingery of the Confederated Salish and Kootenai Tribes' (CSKT) Wildlife Management Program. Additional information was provided by the CSKT on December 7, 2022. As the Bureau of Indian Affairs' (BIA) designated non-federal representative, the CSKT analyzed the proposed action for effects on federally-listed threatened, endangered, and proposed species, specifically: the threatened bull trout (*Salvelinus confluentus*), bull trout critical habitat, Canada lynx (*Lynx canadensis*), grizzly bear (*Ursus arctos horribilis*), yellow-billed cuckoo (*Coccyzus americanus*), meltwater lednian stonefly (*Lednia tumana*), whitebark pine (*Pinus albicaulis*), Spalding's catchfly (*Silene spaldingii*), and the proposed North American wolverine (*Gulo gulo luscus*). The CSKT made the following determinations for the proposed project:

- *may affect, and is likely to adversely affect* bull trout and its critical habitat,
- *may affect, and is not likely to adversely affect* Canada lynx, nor grizzly bear
- *not likely to jeopardize the continued existence* of the North American wolverine
- *no effect* for Spalding's catchfly, whitebark pine, yellow-billed cuckoo, nor meltwater lednian stonefly

Written concurrence from the Service with *no effect* determinations is not required by the Act.

According to the BA, the project is located on the CSKT Flathead Indian Reservation, approximately 12.5 miles east of Arlee, in Lake County, Montana on the Upper North Fork Jocko River approximately 6 river miles upstream of the confluence with the Jocko River. The CSKT provided a detailed description of the proposed action in the BA, which is incorporated here by reference (CSKT 2022, p. 3-5). In summary, the existing bridge consists of an undersized steel "railroad car" that spans the river and is at the end of its service life. The proposed action is to remove and replace the existing bridge, log abutments, and floodplain relief culverts.

We have reviewed the BA for the proposed project and concur with CSKT's determination that the proposed project *may affect, but is not likely to adversely affect* the threatened grizzly bear, and Canada lynx. We based our evaluation on the information contained in the BA and in our records.

The BA also assessed the proposed North American wolverine and determined that the Project would *not likely jeopardize the continued existence* of the North American wolverine We reviewed your biological assessment, and we concur with your determination, and pursuant to language at CFR 402.12(k), a conference is not required.

As provided in 50 CFR § 402.16, reinitiation of consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if:

(1) the amount or extent of incidental take is exceeded;
(2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion;
(3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or
(4) a new species is listed or critical habitat designated that may be affected by the action.

The attached stand-alone Biological Opinion (BO) addresses the effects of the North Fork Jocko River Bridge Replacement Project on bull trout.

The Service appreciates your efforts to ensure the conservation of listed and proposed species as part of our joint responsibilities under the Endangered Species Act. If you have questions or comments related to this consultation, please contact Beth Davies at bethany_davies@fws.gov.

Sincerely,

BENJAMIN CONARD Digitally signed by BENJAMIN CONARD
Date: 2023.03.15 15:06:51 -06'00'

for Adam Zerrenner,
Office Supervisor

ENDANGERED SPECIES ACT SECTION 7 CONSULTATION

Effects of the North Fork Jocko River Bridge Replacement Project

on

Bull Trout
(*Salvelinus confluentus*)

Consultation Conducted by:

U.S. Fish and Wildlife Service
Montana Ecological Services Office
Helena, Montana

Action Agency:

Bureau of Indian Affairs
Flathead Agency
Pablo, Montana

Ecosphere Number: 2023-0029584

March 15, 2023

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I. Introduction

Section 7(b)(3)(A) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.) requires that the Secretary of Interior (Secretary) issue biological opinions on Federal agency actions that “may affect” listed species or critical habitat. Biological opinions determine if the action proposed by the action agency is likely to jeopardize the continued existence of listed species or destroy or adversely modify critical habitat. Section 7(b)(3)(A) of the Act also requires the Secretary to suggest reasonable and prudent alternatives to any action that is found likely to jeopardize the continued existence of listed species or result in an adverse modification of critical habitat, if any has been designated. If the Secretary determines “no jeopardy,” then regulations implementing the Act (50 C.F.R. § 402.14) further require the Director to specify “reasonable and prudent measures” and “terms and conditions” necessary or appropriate to minimize the impact of any “incidental take” resulting from the action(s).

This biological opinion addresses project related effects to the threatened bull trout (*Salvelinus confluentus*) and bull trout critical habitat in accordance with the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). The U.S. Fish and Wildlife Service (Service) based this opinion on our review of the biological assessment (BA) prepared for the North Fork Jocko River Bridge Replacement Project (hereafter, Project) by the Confederated Salish and Kootenai Tribe (hereafter, CSKT) as the designated non-federal representative of the Bureau of Indian Affairs (BIA), additional information provided during consultation, and information in our files.

This BO addresses only the impacts to the federally listed bull trout and designated bull trout critical habitat within the action area; it does not address the overall environmental acceptability of the proposed action.

Consultation History

August 9th, 2022, the Service met with the CSKT and BIA to discuss the proposed action.

November 16th, 2022 the CSKT sent a letter to the Service requesting initiation of formal consultation on the effects of the Project on bull trout and bull trout critical habitat.

December 7th, The USFWS requested and received additional information regarding the Project. Further information was exchanged throughout the consultation process, which is documented in our files.

II. Proposed Action

A. Action Area

The term "action area" is defined as areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

The Project area is located on the upper North Fork Jocko River approximately 6 river miles upstream of the confluence with the Jocko River on the Flathead Indian Reservation. The legal description of the Project area is Township 17 N, Range 18 W, Section 24, Lake County, Montana. A Map of the project site can be found in the Biological Assessment (BA) (CSKT 2022 Appendix A)

The project area is located within the Columbia Headwaters Recovery Unit, Lower Clark Fork Geographic Region (USFWS 2015). This region comprises two complex core areas for bull trout, Lake Pend Oreille (LPO) and Priest Lake. The project area occurs within the LPO complex core area which is dissected into three disconnected parts by a series of five mainstem dams. Because of the systematic and jurisdictional complexity (three States and a Tribal entity) and the current degree of migratory fragmentation caused by the five mainstem dams, the threats and recovery actions in the LPO core area are described in three parts (LPO-A, LPO-B, LPO-C). Specifically, the project area occurs in the LPO-A core area which lies upstream of Cabinet Gorge Dam, almost entirely in Montana, and includes the main-stem Clark Fork River upstream to the confluence of the Flathead River as well as the portions of the lower Flathead River (e.g., Jocko River drainage) on the Flathead Indian Reservation.

B. Proposed Action

The BA provides a thorough description of the proposed action (CSKT 2022 pp. 3-5), and that description is incorporated here by reference. The Service considered the Conservation Measures detailed in the BA (CSKT 2022 pp. 5-7) to be part of the proposed action and accounted for their full and effective implementation when considering effects to bull trout and its designated critical habitat.

The Confederated Salish and Kootenai Tribes (CSKT) of the Flathead Indian Reservation are proposing to replace a bridge and associated floodplain culverts on the North Fork Jocko River upstream of the Tabor Feeder Canal Diversion (hereafter Tabor Diversion). The bridge is owned by the CSKT and is being replaced using funds authorized and appropriated as part of the Montana Water Rights Protection Act.

The existing bridge consists of a steel "railroad car" that spans the river. It is sited on concrete abutments contained within approach fill on both sides of the river with log wingwalls and abutments. The bridge does not span the full bankfull width of the river and acts as a hydraulic control that has both hydraulic and geomorphological impacts on the North Fork Jocko River. When water is backed up behind the bridge and the road approach fills, existing culverts on both river right and river left provide additional hydraulic capacity through the road crossing. As indicated, the bridge is undersized and also at the end of its service life. All Project activities would occur within an estimated three week period between July 15, and November 15, 2023 pending the flow levels of the North Fork Jocko River. Project implementation is anticipated to occur between July and August during which time the flows of the North Fork Jocko River are at their lowest (< 3 cfs) or intermittent. The availability of project materials may delay project implementation in 2023, at which time the CSKT would postpone the Project with implementation to occur within the same proposed time frame in 2024 (Craig Barfoot, CSKT Fisheries Biologist, personal communication).

III. Analytical Frameworks

A. Jeopardy Determination

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any listed species. Regulations implementing section 7 define "jeopardize the continued existence" as "to engage in an action that reasonably will be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02).

In accordance with regulation (see 84 FR 44976), the jeopardy determination in this Biological Opinion relies on the following four components:

- The *Status of the Species*, which evaluates the species' current range-wide condition relative to its reproduction, numbers, and distribution; the factors responsible for that condition; its survival and recovery needs; and explains if the species' current range-wide population is likely to persist while retaining the potential for recovery or is not viable;

- The *Environmental Baseline*, which evaluates the current condition of the species in the action area relative to its reproduction, numbers, and distribution absent the consequences of the proposed action; the factors responsible for that condition; and the relationship of the action area to the survival and recovery of the species;

- The *Effects of the Action*, which evaluates all future consequences to the species that are reasonably certain to be caused by the proposed action, including the consequences of other activities that are caused by the proposed action, and how those impacts are likely to influence the survival and recovery role of the action area for the species; and,

- *Cumulative Effects*, which evaluates the consequences of future, non-Federal activities reasonably certain to occur in the action area on the species, and how those impacts are likely to influence the survival and recovery role of the action area for the species.

In accordance with policy and regulation (see 84 FR 44976), the jeopardy determination is made by evaluating the consequences of the proposed Federal action in the context of the species' current range-wide 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 the species in the wild.

Recovery Units (RU) for bull trout were defined in the final Recovery Plan for the Coterminous United States Population of [the] bull trout (USFWS 2015). Pursuant to Service policy, when a proposed federal action impairs or precludes the capacity of a RU 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 BO describes how the proposed action affects not only the capability of the RU, but the relationship of the RU to both the survival and recovery of the listed species as a whole.

The jeopardy analysis for bull trout in this BO considers the relationship of the action area and affected core area to the Recovery Unit and the relationship of the Recovery Unit to both the survival and recovery of the bull trout as a whole as the context for evaluating the significance of the effects of the proposed federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Within the above context, the Service also considers how the effects of the proposed federal action and any cumulative effects impact bull trout local and core area populations in determining the aggregate effect to the RU(s). Generally, if the effects of a proposed federal action, taken together with cumulative effects, are likely to impair the viability of a core area population(s) such an effect is likely to impair the survival and recovery function assigned to a RU(s) and may represent jeopardy to the species (70 C.F.R. 56258).

B. Adverse Modification Determination

The adverse modification analysis in this BO relies on four components:

- The *Status of Critical Habitat*, which evaluates the range-wide condition of designated critical habitat for the bull trout in terms of primary constituent elements (PCEs); the factors responsible for that condition and the intended recovery function of the critical habitat overall;

- The *Environmental Baseline*, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area;

- 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 PCEs and how those effects are likely to influence the recovery role of affected critical habitat units or subunits; and

- The *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how those effects are likely to influence the recovery role of affected critical habitat units.

For purposes of the adverse modification determination, the effects of the proposed Federal action on bull trout critical habitat are evaluated in the context of the range-wide condition of the critical habitat, together with any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) and continue to serve its intended recovery role for bull trout. The analysis in this BO places an emphasis on using the intended range-wide recovery function of bull trout critical habitat, especially in terms of maintaining and/or restoring habitat conditions that are necessary to support viable core area populations, and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

C. Baseline Conditions and Effect to Species and Habitat Indicators

To assess baseline conditions and effects to bull trout and bull trout critical habitat, the Service created “A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale” (Framework/Matrix; USFWS 1998). The Framework provides a stand-alone method to systematically assess baseline conditions and project-related effects to bull trout using four Species Indicators to assess Subpopulation Characteristics and six Habitat Pathways incorporating 19 Habitat Indicators.

Habitat Indicators are generally arranged from a finer to broader scale within each Habitat Pathway. For example, under the pathway for Habitat Elements, substrate embeddedness is considered at the reach level, large woody debris, pool frequency and quality, and large pools are at the grouped reach level, off-channel habitat is for the entire stream length, and refugia is at the complete subpopulation watershed (USFWS 1998). Ratings of the species and habitat indicators are then used to derive an “Integration of Species and Habitat Conditions” rating. Individual indicators and the rating integrating habitat and subpopulation conditions are intended to help arrive at a determination of the potential effects of land management activities on bull trout.

Although the same indicators are used to assess effects to both bull trout and designated critical habitat, the analysis for jeopardy determination and adverse modification are conducted independently. The results of neither analysis affect the outcome of the other. Additionally, the magnitude and context of the indicators are used differently for addressing effects to the species and effects to critical habitat. For the determination of effects to the species, influences to individual indicators and their resulting effects to bull trout are assessed. To assess the physical and biological features ascribing bull trout critical habitat, assemblages of indicators indirectly describe the attributes within each PCE of critical habitat. The combined influence to these multiple indicators assesses the effects to critical habitat.

Baseline conditions of individual indicators and the integrated value are rated as “functioning appropriately” (FA), “functioning at risk” (FAR), and “functioning at unacceptable risk” (FUR). Indicators rated FA provide habitats that maintain strong and significant populations, are interconnected and promote recovery of a proposed or listed species or its critical habitat to a status that will provide self-sustaining and self-regulating populations. When a habitat indicator is FAR, these indicators provide habitats for persistence of the species but in more isolated populations and may not promote recovery of a proposed or listed species or its habitat without active or passive restoration efforts. FUR indicates the proposed or listed species continues to be absent from historical habitat, or is rare or being maintained at a low population level; although the habitat may maintain the species at this low persistence level, active restoration is needed to begin recovery of the species.

Baseline ratings have generally been determined for each of the four species indicators, 19 habitat indicators, and the Integration of Species and Habitat Indicators for every 6th field Hydrologic Unit Code (HUC) across the range of bull trout in Montana.

The Framework/Matrix can also be used to determine effects of a proposed action on habitat indicators. Project effects are considered to either “maintain,” “restore,” or “degrade” habitat indicators relative to existing or baseline conditions. Effects are characterized as either “major” effects that will likely produce a change in one functional level to baseline conditions (e.g., change FA to FAR), or “minor” effects that may result in an incremental or cumulative effect but will not result in a functional change within the HUC.

D. Baseline Conditions and Effects to Primary Constituent Elements (PCEs) of Critical Habitat

The final rule designating critical habitat for bull trout uses the term Primary Constituent Element (PCE). The new critical habitat regulations (CFR 402.01 and 402.12) eliminated the term PCE and use the Act’s phrase Physical or Biological Features (PBF). The change does not alter the approach used in conducting a “destruction or adverse modification” analysis. In this biological opinion, we maintain the use of the term PCE as identified in the final rule for designated bull trout critical habitat.

Designated critical habitat for bull trout is comprised of the nine PCEs described below in section IV:B. PCEs encompass the physical and biological features of critical habitat that cannot be measured by a single metric. Assemblages of species and habitat indicators from the Framework (USFWS 1998) are used to describe the components of each PCE. Some indicators explain a greater proportion of the physical and biological components of a PCE, but there is not a one-to-one relationship between any of the indicators and the PCEs of critical habitat.

The refugia indicator is relevant to all PCEs because in order for the refugia indicator to be rated “functioning appropriately,” most - if not all - of the PCEs must be adequately represented. The PCEs are predominately based on habitat indicators rather than species indicators. Only one of the species indicators applies to the evaluation of any PCE; persistence and genetic integrity is used with two habitat indicators (temperature and refugia) to address PCE 9.

IV. Status of the Species and Critical Habitat

A. Bull trout

The bull trout was listed as a threatened species in the coterminous United States in 1999 (64 FR 58910). Throughout its range, bull trout are threatened by the combined effects of habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, grazing, the blockage of migratory corridors by dams or other diversion structures, poor water quality, incidental angler harvest, entrainment, and interactions with non-native species. Since the listing of bull trout, the general distribution of bull trout in the coterminous United States has changed very little and occupied bull trout core areas have not been extirpated (USFWS 2015).

The bull trout recovery plan identified six recovery units within the listed range of the species (USFWS 2015). Each recovery unit is further organized into multiple bull trout core areas, which are mapped as non-overlapping watershed-based polygons that include one or more local populations. A *local population* is defined as a group of bull trout that spawn within a particular stream or portion of a stream system (USFWS 2015). Within the coterminous United States, 109 occupied core areas are currently recognized, which comprise 600 or more local populations of bull trout (USFWS 2015). Core areas are functionally similar to bull trout metapopulations, in that bull trout within a core area are much more likely to interact, both spatially and temporally, than are bull trout from separate core areas.

The Service has also identified a number of marine or mainstem riverine habitat areas outside of bull trout core areas that provide foraging, migration, and overwintering (FMO) habitat that may be shared by bull trout originating from multiple core areas. These shared FMO areas support the viability of bull trout populations by contributing to successful overwintering survival and dispersal among core areas (USFWS 2015). a detailed account of bull trout biology, life history, threats, demography, and conservation needs, refer to Appendix A: Status of the Species - Bull Trout.

B. Bull Trout Critical Habitat

On October 18, 2010, the USFWS issued a final revised critical habitat designation for the bull trout (75 FR 63898). The conservation role of bull trout critical habitat is to support viable core area populations (75 FR 63898). The critical habitat designation includes 32 critical habitat units in six recovery units located throughout the coterminous range of the bull trout in Washington, Oregon, Idaho, Montana, and Nevada. Designated bull trout critical habitat is of two primary use types: (1) spawning and rearing, and (2) foraging, migration, and overwintering (FMO) habitat. Critical habitat units 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.

The final rule excludes some critical habitat segments. Critical habitat does not include (1) waters adjacent to non-Federal lands covered by legally operative incidental take permits for Habitat Conservation Plans issued under 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 USFWS; or (3) waters where impacts to national security have been identified (75 FR 63898).

Bull trout have more specific habitat requirements than most other salmonids (75 FR 63898). To delineate bull trout critical habitat, the USFWS considered the physical and biological features that are essential to the species and may require special management considerations or protection, or the bull trout critical habitat primary constituent elements (PCEs). The bull trout critical habitat PCEs, as revised in 2010, are as follows (75 FR 63898):

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) 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 2–15° C (36–59° 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; streamflow; 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 substrates, 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 base flows within historic 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 non-native 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.

For a detailed account of the status of designated bull trout critical habitat, refer to Appendix B: Status of Critical Habitat—Bull Trout.

C. Relationship of the Action Area to the Hierarchy of Bull Trout

The bull trout recovery plan considers a hierarchical order of demographic units ranging from local populations to the range of bull trout within the coterminous United States (Tables 1 & 2). This stepdown organization is important for implementing recovery, tracking consultation under section 7 of the Endangered Species Act, identifying and protecting critical habitat, and other aspects of planning and coordination. Core areas represent the closest approximation of a biologically functioning unit for bull trout, containing habitat that could supply all elements for the long-term security of bull trout and one or more local bull trout populations (USFWS 2015). Local populations are considered the smallest group of fish that are known to represent an interacting reproductive unit. The combination of core habitat and a core population (one or more designated local bull trout populations that exist within core habitat) constitutes the basic unit on which to gauge recovery within a recovery unit. Generally smaller, more adjunct resident populations of bull trout that do not meet the criteria for designation as local populations by the U.S. Fish and Wildlife Service may also occur within core areas.

The headwater core areas of the Clark Fork and Flathead converge into the Lower Clark Fork Geographic Region, which comprises two complex core areas, Lake Pend Oreille (portions of Montana, Idaho, and Washington) and Priest Lake (solely in Idaho). Because of the systematic and jurisdictional complexity (three States and a Tribal entity) and the current degree of migratory fragmentation caused by five mainstem dams, the threats and recovery actions in the LPO core area are very complex and described in three parts. LPO-A is upstream of Cabinet Gorge Dam, almost entirely in Montana, and includes the mainstem Clark Fork River upstream to the confluence of the Flathead River as well as the portions of the lower Flathead River (e.g., Jocko River) on the Flathead Indian Reservation.

The proposed project would affect bull trout in the North Fork Jocko River local population (n=1) within the Lake Pend Oreille (LPO) complex core area, specifically, LPO-A.

Table 1. Hierarchy of Units of Analysis for Bull Trout for the Project

Name/ Units of Scale	Hierarchical Relationship
Coterminous United States	Range of the species within the coterminous United States (i.e., the listed ESA entity)
Columbia Headwaters Recovery Unit	One of 6 recovery units in the coterminous United States
Lower Clark Fork Geographic Region	One of 5 geographic regions within the Columbia Headwaters Recovery Unit
Lake Pend Oreille Core Area (complex)	The largest single core area in the Columbia Headwaters RU with 35 local bull trout populations – *subdivided into subunits A, B, and C – with the Action Area in LPO-A (15 of 35 local populations)
North Fork Jocko Local Population	1 of 15 local populations in LPO-A

D. Relationship of the Action Area to Critical Habitat

The proposed project will occur in the Lower Clark Fork River subunit of the Clark Fork River Basin Critical Habitat Unit (CHU 31). CHU 31 contains 5,356.0 kilometers (3,328.1 miles) of streams and 119,620.1 hectares (295,586.6 acres) of lakes and reservoirs designated as critical habitat. The proposed action would affect designated critical habitat in the North Fork Jocko River which is considered potential spawning and rearing (SR) habitat. Table 2 shows the hierarchical units for bull trout critical habitat in the action area.

Table 2. Hierarchy of bull trout critical habitat units of analysis.

Name/ Units of Scale	Hierarchical Relationship
Coterminous United States	Range of bull trout - 32 Critical Habitat Units
Clark Fork River Basin Critical Habitat Unit	One of 32 Units. Stream miles in Clark Fork River Basin Unit 31 are 15.8% of the total in the coterminous U.S.
Lower Clark Fork River Critical Habitat Subunit	One of 12 critical habitat subunits within the Clark Fork River Basin Unit.
North Fork Jocko River	One of several streams/water bodies within the Lower Clark Fork Subunit, designated as S/R habitat.

V. Environmental Baseline

Under the provisions of section 7(a)(2), when considering the “effects of the action” on listed species, the Service is required to consider the “environmental baseline.” Regulations implementing the Act (50 C.F.R. § 402.02) define the environmental baseline as the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in progress. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency’s discretion to modify are part of the environmental baseline.

A. Status of Bull Trout within the Action Area

The status of bull trout in the action area is described below by core area. The Final Recovery Plan (USFWS 2015) identified a bull trout core area as the closest approximation of a biologically functioning unit for bull trout. Core areas contain both spawning and rearing (SR), and foraging, migration and overwintering (FMO) habitat. Core areas constitute the basic unit on which to gauge recovery (USFWS 2015). Information on status is derived from the BA, the

Conservation Strategy for Bull Trout on U.S. Forest Service Lands in Western Montana (USFS 2013), Recovery plan for the coterminous United States population of bull trout (USFWS 2015, bull trout recovery plan for the Columbia Headwaters Recovery Unit (USFWS 2015b), and information gathered from relevant biologists during the consultation. A brief synopsis of the Lake Pend Oreille (LPO) core area followed by details pertinent to the baseline conditions of the LPO-A Core Area are discussed below.

B. Lake Pend Oreille (LPO) Core Area

The LPO Core Area is one of the largest and most complex bull trout core areas in the upper Columbia River watershed. In the 2015 Final Bull Trout Recovery Plan the Service subdivided the LPO Core Area into three segments due to the systematic and jurisdictional complexity (three States and a Tribal entity) and the migratory fragmentation caused by five mainstem dams. LPO-A is upstream of Cabinet Gorge Dam, almost entirely in Montana, and includes the mainstem Clark Fork River upstream to the confluence of the Flathead River as well as the portions of the lower Flathead River (e.g., Jocko River) on the Flathead Indian Reservation. LPO-B is the Pend Oreille lake basin proper and its tributaries, extending between Albeni Falls Dam downstream from the outlet of Lake Pend Oreille and Cabinet Gorge Dam just upstream of the lake; almost entirely in Idaho. LPO-C is the lower basin (i.e., lower Pend Oreille River), downstream of Albeni Falls Dam to Boundary Dam (1 mile upstream from the Canadian border) and bisected by Box Canyon Dam; including portions of Idaho, eastern Washington, and the Kalispel Reservation. In total, the LPO Core Area encompasses over 4.46 million acres of bull trout FMO, and spawning and rearing habitat across Montana, Idaho and Washington.

In 1952 and 1958, respectively, Cabinet Gorge and Noxon Dams were constructed which blocked upstream access for bull trout, and left a few smaller tributaries to support the entire Lake Pend Oreille bull trout population. With the completion of these two dams, in addition to the Thompson Falls Dam, the once robust bull trout population was effectively isolated into four distinct units (Lake Pend Oreille, Cabinet Gorge and tributaries, Noxon and tributaries, and above Thompson Falls Dam) with only downstream connectivity.

By the 1990's, bull trout populations had been eliminated or severely reduced throughout much of the LPO core area. Small fluvial populations still existed in many of the larger, less developed watersheds. However, chronic impacts from existing developments, combined with climate change and a drought that caused low flows and warm water, further impacted bull trout populations.

Overall, current bull trout numbers in the LPO core area are very low. Since 2018, notable improvements to connectivity within the larger LPO core area have occurred, including the improvement of connectivity via the Avista Utility Company's Fish Transport Program. This program includes a trap and transport of upstream and downstream migrating bull trout in the Lower Clark Fork River at the Cabinet Gorge dams. Furthermore, the Cabinet Gorge Dam Fishway began limited operation in spring of 2022 and is expected to be fully operational in the spring of 2023. While these activities occur far downstream of the action area, these improvements have the potential to positively influence the adfluvial life history form of bull trout within the Jocko River, by reconnecting these local populations to highly productive FMO habitat in Lake Pend Oreille. While numbers of the adfluvial life history form of bull trout in the Jocko River local populations remain very low, migratory adult bull trout have been captured below Cabinet Gorge Dam by Avista, and subsequently transported to their natal tributaries, with the cooperation of the CSKT biologists (USFWS BO 2022)

C. LPO-A

Part A of the LPO Core Area (LPO-A) includes the mainstem Clark Fork River upstream of Cabinet Gorge Dam to the confluence of the Flathead River as well as the portions of the lower Flathead River (e.g., Jocko River) on the Flathead Indian Reservation. LPO-A encompasses the action area for the Project and includes 15 of the 35 local populations in the LPO Core Area. Bull trout densities in LPO-A were historically much higher than they are today. Impacts to bull trout populations in LPO-A began in the early part of the 20th century, and have continued through the present time. Some of the past impacts have been reduced or eliminated, and therefore some stressors on the population no longer play as large of a role as they did historically. The primary threats to bull trout in the LPO-A core area are listed in Table 3.

Table 3. Primary threats in the LPO-A core area as identified in the Columbia Headwaters RUIP for bull trout (USFWS 2015b).

LPO-A Core Area Primary Threats		
Habitat	**Demographic**	**Nonnatives**
Upland/Riparian Land Management: Sediment from forest roads, logging, and livestock grazing cause riparian and instream degradation, loss of large woody debris, and pool reduction in FMO habitat and most SR tributaries upstream of Cabinet Gorge Dam. **Instream Impacts:** Transportation and utility corridors along riparian areas contribute to degradation through the loss of large woody debris, pool reduction, and increased sedimentation in some SR tributaries. Placer mining as well as active and proposed mines affect hydrology, increase sediment, and cause passage issues for bull trout. **Water Quality:** Water temperatures in mainstem FMO habitat in Cabinet Gorge, Noxon Rapids, and Thompson Falls Reservoirs; and lower reaches of most tributaries are marginally high for bull trout survival in the summer, and conditions are worsening. This concentrates bull trout in isolated pockets of cold water at the mouths of cold water tributaries where they are highly vulnerable to anglers and predators.	**Connectivity Impairment:** The FMO habitat is fragmented by large mainstem dams leading to low population size and risk of extirpation on now isolated SR habitat. Bull trout are currently trucked and transported upstream at Cabinet Gorge and Noxon Rapids Dams on the Clark Fork River. Improved connectivity is needed to full remediate the effects of this fragmentation and enhance persistence of bull trout in isolated upstream SR habitat in Montana.	**Nonnative fish:** Nonnative lake trout, smallmouth and largemouth bass, walleye, northern pike, and brown trout occupy the artificial reservoir habitat (FMO) in Cabinet Gorge, Noxon Rapids, and Thompson Falls Reservoirs. All are highly piscivorous species. They may prey on bull trout to varying degrees (especially migrating juveniles).

We assume that distributions of bull trout populations in LPO-A are significantly restricted from historical patterns. At least two large streams (Pilgrim Creek and Elk Creek) that once likely supported strong fluvial populations now contain few, if any bull trout. Remaining migratory populations, however, are geographically distributed throughout LPO-A. The proportion of fluvial to resident forms is likely much different than historical, due to the low numbers of fluvial fish in the population. Resident populations are generally isolated by natural conditions (USFS 2013).

In addition to the dams, numerous small scale impacts to bull trout gradually occurred throughout LPO-A in the early part of the 20th century that had impacts to bull trout and their habitats (USFS 2013). These included grazing and agricultural development along many of the important low gradient spawning streams, road and energy corridor development in riparian areas, and logging and road development in tributary streams. However, these impacts were likely not of the same magnitude as the construction of dams on the Lower Clark Fork River.

Changes in fish species composition has occurred within LPO-A through stocking programs and illegal introductions. Brown trout, brook trout, northern pike, walleye, smallmouth and largemouth bass, and other non-native species have become established in reservoirs and tributaries, creating predation, competition, and hybridization pressures that impact bull trout populations.

Across the range of bull trout, redd counts are typically used as an index of abundance to gauge the relative strength of adult escapement and provide information on adult bull trout abundance at the watershed and/or population level (Al-Chokhachy et al. 2005). In 2001, an effort to quantify bull trout spawning (e.g., redd counts) began in Montana tributaries within LPO-A. In 2021, a total of 21 streams were surveyed for bull trout redds, with index reaches surveyed from 17 streams (Moran 2022). Index Reaches are standardized sections of streams that are surveyed annually and encompass the majority of bull trout spawning areas within each stream. Non-index Reaches are additional exploratory areas within a stream that are periodically surveyed. The total number of redds reported for each stream include the Index Reach totals, plus the non-Index Reach redds observed elsewhere in the stream. The redd counts are divided up by region, where Region 2 is represented by counts in tributaries entering the Cabinet Gorge Reservoir; Region 3 is represented by counts in tributaries entering Noxon Reservoir; and Region 4 is represented by counts in the Thompson River drainage above Thompson Falls Dam.

A total of 37 bull trout redds were observed in 2021, 32 of which were observed within Index Reaches of the streams surveyed within LPO-A. This represented the second consecutive year in which bull trout Index Reach total redd counts set record lows since roughly comparable efforts began in 2001 (Moran 2022). The total number of bull trout redds and the Index Reach total were 58 and 59% less than the previous ten-year (i.e., 2011–2020) averages (Moran 2022). Across all of the regions (region 2, 3, and 4) the total number of redds ranged between 37 and 168 from 2001- 2021 and averaged 85 redds.

D. North Fork Jocko River local population

The North Fork Jocko River has been strongly influenced by the physical presence of the Tabor Diversion, its operations, and their influence on stream hydrology and sediment transport. This unscreened diversion is likely a complete barrier to upstream passage by bull trout under most, if not all operational conditions and flows, however, bull trout have been documented upstream of the Tabor Diversion in the approximately 2.5-3.0 miles of generally high-quality habitat that exists upstream of the dam. This specific reach of stream is bounded by the Tabor Diversion on the lower end and a natural barrier falls on the upper end and encompasses the action area for this Project.

Population monitoring data collected by the CSKT since the mid 1980's indicate a general declining trend in bull trout numbers in the North Fork Jocko River. Below the Tabor Diversion, bull trout exhibit both resident and migratory life histories. Redd count surveys have detected bull trout redds low in the system just upstream of the confluence of the Jocko River, and as far upstream as the confluence with Falls Creek. Bull trout redds have also been detected in the mainstem Jocko River just below the North Fork Jocko River. In general, bull trout redds are difficult to detect or discern in the North Fork Jocko River due to the presence of co-occurring brook trout and other large migratory fish, of which there are a few. At two long-term population monitoring sites below the Tabor Diversion bull trout have not been detected since 2018, at which time the sample rate was only 1 fish per hour of electrofishing (Figures 1 & 2, Craig Barfoot, CSKT Fisheries Biologist, personal communication).

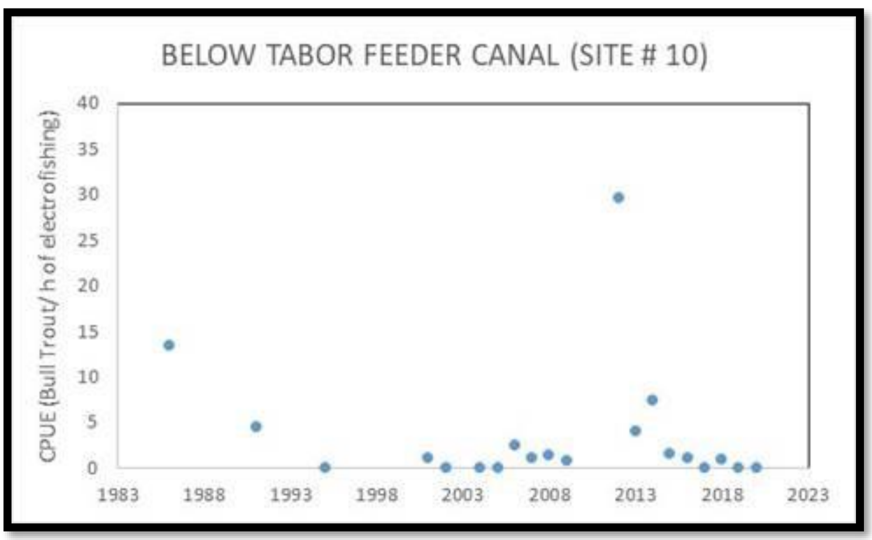

Figure 1. One of two CSKT Fisheries Program long term bull trout population monitoring sites on the North Fork Jocko River below the tabor diversion (Craig Barfoot, CSKT Fisheries Biologist, personal communication).

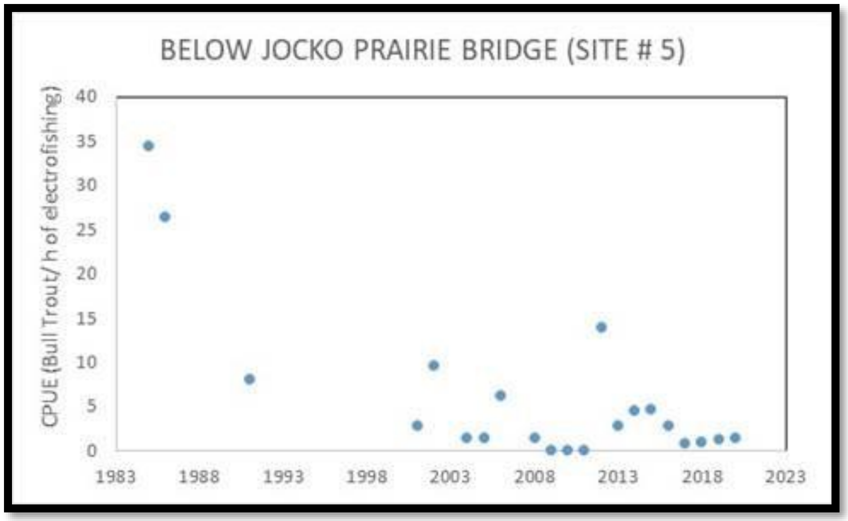

Figure 2. One of two CSKT Fisheries Program long term bull trout population monitoring sites on the North Fork Jocko River below the tabor diversion (Craig Barfoot, CSKT Fisheries Biologist, personal communication).

Upstream of the Tabor Diversion at two systematic bull trout monitoring sites sampled nearly annually since 2003, the CSKT have detected bull trout, notably in 2007 and 2012 with several fish detected via electrofishing. In 2018, only 2 bull trout were detected in this reach of the North Fork Jocko River, and none have been detected since. The CSKT Fisheries Program presumes that bull trout historically observed upstream of the Tabor Diversion were stream residents while bull trout downstream of the diversion display both life history types. High between-year variability and declining numbers suggest migratory fish drive the system.

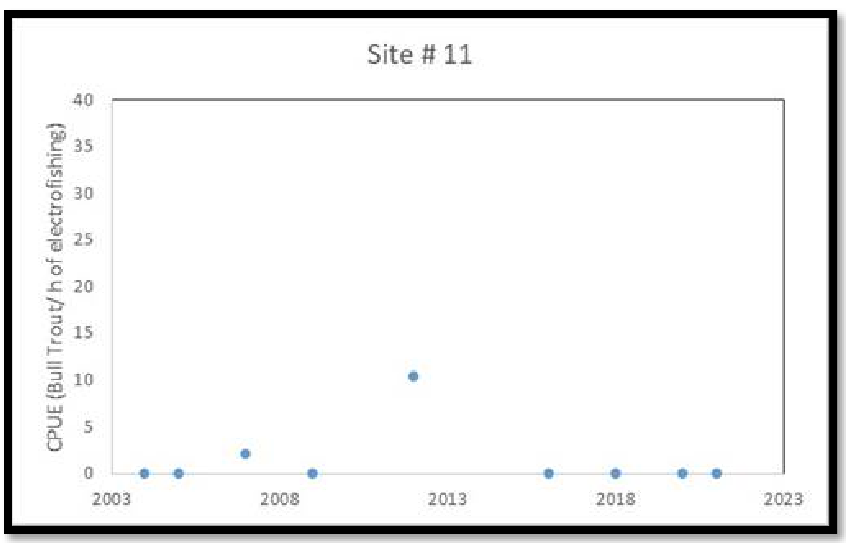

Figure 3. One of two CSKT Fisheries Program systematic bull trout monitoring sites on the North Fork Jocko River above the tabor diversion (Craig Barfoot, CSKT Fisheries Biologist, personal communication).

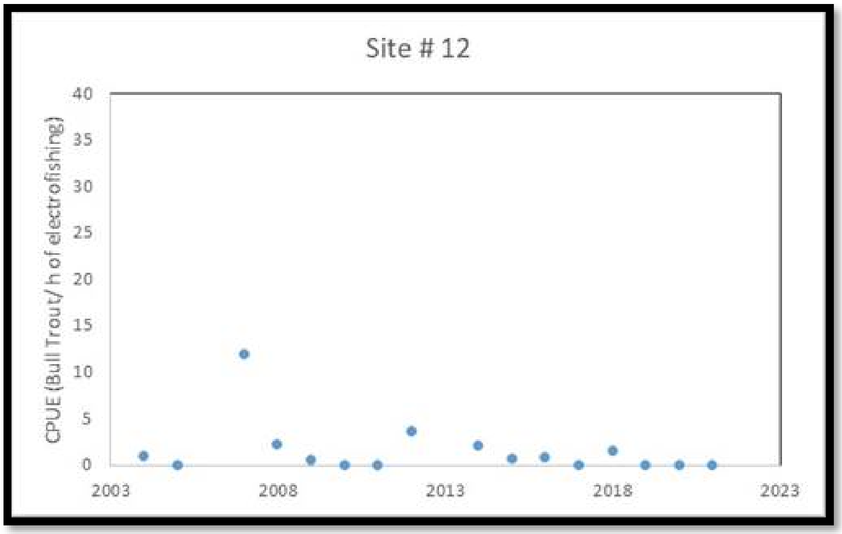

Figure 4 One of two CSKT Fisheries Program systematic bull trout monitoring sites on the North Fork Jocko River above the tabor diversion (Craig Barfoot, CSKT Fisheries Biologist, personal communication).

E. Status of Critical Habitat within the Action Area

The proposed action will occur in the Lower Clark Fork River subunit of the Clark Fork River Basin Critical Habitat Unit (CHU 31). Critical habitat applies only to those specifically designated streams (75 FR 63898) and only to the area within the ordinary high watermark. CHU 31 contains 5,356.0 kilometers (3,328.1 miles) of streams and 119,620.1 hectares (295,586.6 acres) of lakes and reservoirs designated as critical habitat. The Clark Fork River Basin CHU is essential to maintaining bull trout distribution within this unique geographic region of the Columbia Headwaters Recovery Unit in large part because it represents the evolutionary heart of the migratory adfluvial bull trout life history form (U.S. Fish and Wildlife Service 2009). Flathead Lake and Lake Pend Oreille are the two largest lakes in the range of the species. Bull trout from those core areas historically grew to be large and migrated upstream up to 322 kilometers (200 miles) to spawning and rearing habitats. These habitats were partially fragmented by hydroelectric dams and other manmade barriers but are increasingly being reconnected with removal of dams (Milltown Dam) and improved fish passage (Cabinet Gorge and Thompson Falls dams). The resident life history form of bull trout is minimally present in this CHU and fluvial bull trout play a reduced role relative to adfluvials. The two major lakes (Flathead and Pend Oreille), and over 20 additional core areas established in smaller isolated headwater lakes, are the primary refugia for the naturally occurring adfluvial form of bull trout across their range.

Critical habitat within the Project action area occurs in the North Fork Jocko River. The North Fork Jocko River is classified as bull trout spawning and rearing habitat. Downstream, the mainstem Jocko River provides FMO habitat. The status of bull trout critical habitat at the stream segment level (i.e. North Fork Jocko River) is presented in tables 4 and 5 below (see section VI:A and VI:G).

VI. Effects of the Action

Under regulations implementing the Act (50 C.F.R. § 402.02), "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. The effects discussed below are the result of implementing the proposed action.

A. Effects to Bull Trout Using Species and Habitat Indicators

The Service uses “A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale” (Framework/Matrix; USFWS 1998). The methods and framework for this approach were presented in detail in Section III:C.

Table 4 presents the baseline functional designation of population and habitat indicators for the affected 6th code HUC within the action area, as well as the effects of the proposed action on each indicator. Major effects to a habitat indicator results in a change in one level of baseline condition (e.g. FA to FAR). Minor effects indicate the action may result in an incremental or cumulative effect but does not result in a functional change to the system. For the purposes of this checklist, restore (R) means to change the function of an indicator one that is more favorable for bull trout (i.e. FUR to FAR). Maintain (M) means that the function of an indicator does not change, and degrade (D) means to change the function of an indicator that worse for bull trout.

Table 4. Matrix of Pathway Indicators for the North Fork Jocko River, and effects of the proposed action on each indicator. Baseline ratings were obtained from NRCS (2010), CSKT (2022), USFWS (2015b), USFWS (2018). The numbers following the habitat indicators correspond to the PCEs.

North Fork Jocko River Diagnostic Indicators	**Baseline Conditions in the Action Area**	**Minor Effects of the Action(s)**	**Major Effects of the Action(s)**
	FA/FAR/FUR*	M/D/R*	M/D/R*
Species Indicators			
Subpopulation Characteristics			
Subpopulation Size	FUR	M	M
Growth & Survival	FUR	M	M
Life History, Diversity, & Isolation	FAR	M	M
Persistence & Genetic Integrity[9]	FUR	M	M
Habitat Indicators			
Water Quality			
Temperature[1,2,5,8,9]	FAR	M	M
Sediment[1,2,3,4,6]	FUR	D	M
Chemical Contaminants/Nutrients[1,2,3,8]	FAR	D	M

Habitat Access			
Physical barriers[2]	FUR	M	M
Habitat Elements			
Substrate Embeddedness[1,2,3,4,6]	FUR	D	M
Large Woody Debris[3,4]	FAR	M	M
Pool Frequency & Quality[3,4]	FAR	M	M
Large Pools[4,5]	FAR	M	M
Off Channel Habitat[1,3,4,5]	FAR	M	M
Refugia[1,2,3,4,5,6,7,8,9]	FAR	M	M
Channel Condition & Dynamics			
Wetted Width/Depth Ration[2,4,5,8]	FAR	M	M
Streambank Condition[1,3,4,5,6,7,8]	FAR	D	M
Floodplain Connectivity[1,3,4,5,6,7,8]	FUR	M	M
Flow Hydrology			
Changes in Peak/Base Flows[1,2,5,7,8]	FAR	M	M
Drainage Network Increase[1,5,6,7,8]	FAR	M	M
Watershed Conditions			
Road Density & Location[1,4,5,6,78]	FUR	M	M
Disturbance History[1,5,7]	FAR	M	M
Riparian Conservation Areas[1,3,4,5,6,7,8]	FAR	M	M
Disturbance Regime[4,6,8]	FAR	M	M
Integration of Species & Habitat Condition	FAR	M	M

Subpopulation characteristics are based on four indicators that are assessed at the watershed scale*:* (1) subpopulation size, (2) growth and survival, (3) life history diversity and isolation, and (4) persistence and genetic integrity. The proposed action will not affect the life history diversity and isolation, and persistence and genetic integrity indicators (Table 4).

Water quality The indicators that comprise the water quality habitat characteristic include; (1) water temperature, (2) sediment, and (3) chemical contamination/nutrients. The proposed action will not affect water temperature.

Sediment- The Service anticipates additional short term increases in sediment to the North Fork Jocko River due to coffer dam installation and later removal, and use of the ford downstream of the bridge during project implementation. No increases in turbidity are anticipated during replacement of floodplain relief culverts because they do not convey flow during low-flow periods when the project is expected to occur. Furthermore, proposed design features and effective BMP management outlined within the BA (CSKT 2022), along with the Terms and Conditions defined below in this biological opinion, will minimize the effects to bull trout by reducing the amount, timing, and duration of sediment delivery to streams. Any construction activity that could produce sediment-laden water will likely comprise only a portion of 2 days and are anticipated to dissipate within 0.25-0.5 mile downstream.

High levels of suspended sediment and turbidity can result in direct mortality of fish by damaging and clogging gills (Curry and MacNeill 2004). Fish gills are delicate and easily damaged by abrasive silt particles (Bash et al. 2001a). Fish are more susceptible to increased suspended sediment concentrations at different times of the year or in watersheds with naturally high sediment such as glaciated streams. Fish secrete protective mucous to clean the gills (Erman and Ligon 1985). In glaciated systems or during winter and spring high flow conditions when sediment concentrations are naturally high, the secretion of mucous can keep gills clean of sediment. Protective mucous secretions are inadequate during the summer months, when natural sediment levels are low in a stream system. Consequently, sediment introduction at this time may increase the vulnerability of fish to stress and disease (Bash et al. 2001b).

Newcombe and Jensen (1996) have shown that construction effects upon fish are based on Suspended sediment mg/L over time expressed as duration in hours or days. Past monitoring efforts indicate that total suspended sediment levels, elevated during the construction activity can quickly (within 1 to 3 hours post construction) return to pre activity levels. The duration and magnitude of sediment load increases during instream construction reflect watercourse size, volume of flow, construction activity, the effectiveness of Best Management Practices and sediment particle sizes. The dispersion of suspended sediment concentrations within the plume will reflect the flow conditions of the receiving waterbody (Julien, 1995). Very low flow conditions can result in minimal dilution and high suspended solid concentrations. However, the distance of downstream transport may be minimized. Flushing flows during high water may or may not remove additional sediment deposited in the streambed. Beschta and Jackson (1979) reported that stream energy may be used to transport and embed additional sediment occurring during high flows instead of flushing existing fines from the gravels. Quantitative estimates and effects of changes to the overall sediment budget in the action area cannot be accurately determined.

Sediment can also have an effect on bull trout and other fish populations in general through impacts or alterations to the macroinvertebrate communities or populations. Aquatic insect abundance can decline by approximately 50 percent when substrate embeddedness reaches a level of one-third (Waters 1995). Decreased growth rates can occur when increased substrate embeddedness leads to a reduction in aquatic insect production (Bjornn et al. 1977; Weaver and Fraley 1991; Bowermann et. al 2014). Higher turbidity and suspended sediment can reduce primary productivity by decreasing light intensity and periphytic (attached) algal and other plant communities (Anderson et al. 1976; Henley et al. 2000; Suren and Jowett 2001). Sedimentation can alter the habitat for macroinvertebrates, changing the species density, diversity and structure of the area (Waters 1995; Anderson et al. 1976; Reid and Anderson 1999; Shaw and Richardson 2001).

Chemical contamination/nutrients- The proposed action has some potential for the addition of toxic substances to the river that could have long-term effects on macroinvertebrate production, and could decrease available foraging habitat for bull trout. All construction equipment will be inspected daily (during workdays) to ensure hydraulic, fuel, and lubrication systems are in good condition and free of leaks to prevent these materials from entering any stream. Vehicle servicing and refueling areas, fuel storage areas, and construction staging and materials storage areas will be located a minimum of 150 feet from the ordinary high water mark (OHWM), and contained properly to ensure that spilled fluids or stored materials do not enter any aquatic resource. These minimization measures to reduce potential delivery of toxic substances will likely be effective.

Habitat Elements The habitat elements pathway consists of the following six indicators: (1) substrate embeddedness, (2) large woody debris, (3) pool frequency and quality, (4) large pools, (5) off-channel habitat, and (6) refugia. The proposed action will not change pool frequency or quality, the availability or depth of large pools, off-channel habitat or refugia, or large woody debris.

Substrate Embeddedness- Substrate embeddedness is defined as the degree to which large particles (e.g., boulders, gravel) are surrounded or covered by fine sediment, usually measured in classes according to percentage covered (U.S. Fish and Wildlife Service 2015). The sediment and substrate embeddedness indicators are therefore closely related, with the difference lying in the habitat pathway and bull trout life stage these two indicators address. The sediment indicator is intended to addresses the Water Quality pathway, while substrate embeddedness addresses the Habitat Elements pathway (U.S. Fish and Wildlife Service 1998). Increased substrate embeddedness reduces spawning and rearing success at all life stages (effects to redds, eggs, and alevins) and may also reduce productivity of macroinvertebrates that are a food source for bull trout (see sediment discussion above).

Although the North Fork Jocko River is designated as spawning and rearing habitat for bull trout, the reach of the river within the action area has had no documented occurrence of bull trout since 2018, and is currently not functioning as suitable SR habitat due to the backwater effects from the downstream Tabor Diversion. Bull trout that may be present within the action area likely utilize the area as a migratory corridor to reach the more intact and pristine habitat upstream of the bridge. Therefore, it is highly unlikely that any eggs or fry will be present during project implementation, and thus, the likelihood of bull trout egg, fry, or juvenile mortality remain very low. Furthermore, Project implementation is planned during which the flows of the North Fork Jocko River are very low (<3 cfs) or intermittent.

B. Species Response to the Action

This section integrates habitat effects and predicts how these effects are likely to influence the numbers, distribution, and reproduction of the affected populations of bull trout. The expected bull trout population response to the proposed activities is associated with impacts to the aquatic habitat (habitat indicators) and the resulting impacts to individual bull trout.

Effects to Local Populations

One designated local population of bull trout occurs in the Project action area. Local populations are generally independent populations that represent discrete reproductive units. The Project would have short-term adverse effects to bull trout (should they be present) and critical habitat in the form of additional sediment from project related activities, however the magnitude and duration of the adverse effects are not likely to significantly affect the local population. It is expected that bull trout in the North Fork Jocko River will maintain current population levels, based on past history.

Effects to the Core Area

Because the project does not impair the viability of the North Fork Jocko River Local Population it will not impair the viability of the larger LPO-A Core Area.

Effects to the Recovery Unit

Because the Project does not impair the viability of the North Fork Jocko River Local Population and thereby the LPO-A Core Area, it will not impair or preclude the capacity of the Columbia Headwaters Recovery Unit from providing both the survival and recovery function assigned to it.

C. Effects to Bull Trout Designated Critical Habitat

Effects to each PCE of designated critical habitat are assessed by analyzing effects to the assemblage of Framework/Matrix indicators comprising the PCE (USFWS 1998). The methods for this approach, as well as the relationship between Framework/Matrix habitat indicators and PCEs were presented in Section III:D).

Table 4 (above) presents the baseline functional designation of population and habitat indicators and their associated PCE for the affected 6th code HUC within the action area, as well as the effects of the proposed action on each indicator. The North Fork Jocko River Bridge Replacement Project would provide a minor, short-term “degrade” to two indicators affecting PCEs within the SR habitat of the North Fork Jocko River; *sediment* and *substrate embeddedness*. “Substrate embeddedness” is defined as the degree to which large particles (e.g., boulders, gravel) are surrounded or covered by fine sediment, usually measured in classes according to percentage covered (USFWS 2015). The sediment and substrate embeddedness indicators are therefore closely related, with the difference lying in the habitat pathway and bull trout life stage these two indicators address. The sediment indicator is intended to address the Water Quality pathway, while substrate embeddedness addresses the Habitat Elements pathway (USFWS 1998). Effects to each PCE (1,2,3,4 and 6) within the North Fork Jocko River from the degradation of these two indicators are discussed below. The Project is expected to have no effect, or insignificant effects to PCEs 5,7,8, and 9.

PCE1- Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.

Project activities would generally occur outside of areas that influence springs, seeps, groundwater sources, and subsurface water connectivity. These areas are usually incorporated within RHCA buffers and would be avoided through project design. The connectivity between subsurface water sources and critical habitat in the North Fork Jocko River is likely to be unaffected by project activities.

PCE2- 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.

The Tabor Diversion sited roughly 0.25 mile downstream of the bridge was constructed nearly a century ago and has no fish protection structures. The diversion is a likely barrier to upstream fish passage under most, if not all, flow and operational conditions. However, bull trout have been documented upstream of the Tabor Diversion as recently as 2018. The minor, “degrade” to sediment and substrate embeddedness may result in intermittent barriers to potential bull trout migratory movements at locations immediately downstream of sediment delivery points. These events are expected to be pulse events during implementation of project activities particularly if the reach is not intermittent at the time such activities are conducted. A minor, short-term “degrade” followed by a minor, long-term “restore” to existing conditions once project activities are completed would be expected for this PCE within the action area.

PCE3- An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

Existing substrate in the action area of the bridge is compromised by the downstream Tabor Diversion, which interferes with sediment transport. Consequently, the area under backwater influence of the structure extends nearly to the existing bridge, and already has high levels of fine sediment, which undoubtedly limits the diversity and abundance of aquatic invertebrates and the aquatic productivity of the reach in general. A small amount of substrate in the bridge abutment area will be disturbed from the proposed action. This substrate may contain benthic invertebrate prey if the reach is not intermittent at the time of construction. However, the disturbed areas will be minimal and benthic species should rapidly recolonize via drift from upstream areas. Nonetheless, the benthic invertebrate community in this area is already likely compromised from current embeddedness and occasional intermittency. A minor, short-term “degrade” followed by a minor, long-term “restore” to existing conditions due to natural processes would be expected for this PCE within the action area.

PCE4- 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.

The immediate shoreline below the OHWM is currently disturbed from the existing bridge abutments and log cribs. This area will continue to be modified and stabilized with new riprap. The new bridge will have a much wider span and setback abutments outside of the OHWM. Thus the proposed action will affect bank condition through vegetation removal and installation of riprap. Such actions would likely result in reductions of bank and habitat complexity. Such actions would likely result in a minor long-term reduction in bank condition within the immediate project area.

PCE6- 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 substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.

This PCE specifically applies to bull trout spawning and rearing areas. While sediment and substrate embeddedness impact spawning and rearing areas, the action area for the project (0.5 mile downstream) is currently not functioning as spawning and rearing habitat due to the backwater conditions and sediment storage caused by the Tabor Diversion structure. Therefore, this PCE will not be affected.

Table 5. Effects to Primary Constituent Elements (PCE) of designated critical habitat in the Project action area.

Core Area Waterbody	**PCE's of Bull Trout Critical Habitat**								
	PCE1	PCE2	PCE3	PCE4	PCE5	PCE6	PCE7	PCE8	PCE9
North Fork Jocko River	m	d/r	d/r	d/r	m	m	m	m	m

r = restore, m = maintain, d = degrade. Lower case = minor effects, uppercase = major effects.

VII. Cumulative effects

The implementing regulations for section 7 of the Act define *cumulative effects* as those effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area of the Federal action subject to consultation (50 CFR 402.02). According to section 7 regulations (50 CFR 402.17(a)), conclusion of *reasonably certain to occur* must be based on clear and substantial information, using the best scientific and commercial data available. 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. It is important to note that the section 7 definition (related to the Act) is not the same as the definition of “cumulative effects” under the National Environmental Policy Act.

Numerous smaller private landowners within the LPO-A Core Area implement activities such as timber harvest, road building and maintenance, livestock grazing, water diversion, residential development, and agriculture. Future private activities will continue and, presumably increase. As population density rises, demand for residential and commercial development is also likely to grow. Such increased use and demand would increase the importance of quality habitat on CSKT lands as strongholds for bull trout persistence and recovery.

Non-native fish species are identified as a primary threat to the LPO-A Core Area in the Columbia Headwaters RUIP (USFWS 2015b). Hybridization of bull trout and brook trout is a significant threat throughout LPO-A. These threats are primarily considered as sport fish species (e.g., brook trout, northern pike) and populations continue to increase. The extent to which non-native fish populations grow in both size and distribution within the larger LPO-A Core Area is largely under the jurisdiction of state fish and wildlife agencies. As such, the continued proliferation of non-native fish species throughout the LPO-A Core area (and the declines in bull trout populations that have resulted) will continue to threaten bull trout populations in the LPO-A Core Areas until a solution to this threat can be agreed upon and implemented.

Angler harvest and poaching has been identified as one reason for bull trout decline (USFWS 2015b). It is likely that recreational fishing, especially in known spawning streams in the fall, will increase as the human population in western Montana increases. Misidentification of bull trout has been a concern because of the similarity of appearance with brook trout. Although harvest of bull trout in the action area is illegal, incidental catch likely occurs. The fate of released bull trout is unknown, but some level of hooking mortality is likely due to the associated injuries and the stress of handling fish (Long 1997). Unintentional and illegal harvest could have a direct effect on the bull trout in the action area. The extent of the effect is dependent on the amount of increased recreational fishing pressure, which is a function of the increased number of people fishing each season. Illegal poaching is difficult to quantify, but generally increases in likelihood as the human population in the vicinity grows (Ross 1997). This may increase as the human population grows.

Global climate change and the related warming of our climate have been well documented. Evidence of global climate change/warming includes widespread increases in average air and ocean temperatures, accelerated melting of glaciers, and rising sea level. Given the increasing certainty that climate change is occurring and is accelerating (IPCC 2007, Battin et al. 2007), we can no longer assume that climate conditions in the future will resemble those in the past. Potential increases in water temperature due to climate change are likely to occur in the future. The impact of increased water temperature on bull trout is difficult to predict, but we anticipate that higher temperatures will reduce the distribution of bull trout within the action area as some streams become unsuitable. Further, we anticipate that increased water temperature will also affect bull trout by creating more favorable conditions for non-native fish species such as brook trout and potentially brown trout.

The cumulative effects within the action area are reflected in bull trout population numbers and life history forms and the habitat conditions described herein. All core areas are at risk of the continued increase of non-native fish species and fisheries management; and concern for the viability and effects to bull trout populations are well documented (USFWS 2015). Activities occurring on private lands at the same time that the proposed federal activities may exert cumulative adverse effects on bull trout. However, some non-federal activities will likely improve conditions for bull trout over the long-term and will work in conjunction with federal actions toward recovery of bull trout in some instances.

VIII. Conclusion

The *effects of the action* and *cumulative effects* are added to the *environmental baseline* and in light of the *status of the species* (and critical habitat if applicable), the Service formulates an opinion as to whether the action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. Should the federal action result in a jeopardy situation and/or adverse modification conclusion, the Service may propose reasonable and prudent alternatives that the federal agency can take to avoid violation of section 7(a)(2).

After reviewing the current status of bull trout, the environmental baseline for the action area, the effects of the proposed management actions, and the cumulative effects, it is the Service's biological opinion that the actions as proposed, are ***not likely to jeopardize the continued existence*** of bull trout; ***nor result in the destruction or adverse modification of designated bull trout critical habitat***. Our rational follows.

Jeopardy Determination

Jeopardy determinations for bull trout are made at the scale of the listed entity, which is the coterminous United States population (64 FR 58910). This follows the April 20, 2006, analytical framework guidance described in the Service's memorandum to Ecological Services Project Leaders in Idaho, Oregon and Washington from the Assistant Regional Director – Ecological Services, Region 1 (USFWS 2006). The guidance indicates that a biological opinion should concisely discuss all the effects and take into account how those effects are likely to influence the survival and recovery functions of the affected [then] interim recovery unit(s), which should be the basis for determining if the proposed action is "likely to appreciably reduce both survival and recovery of the coterminous United States population of bull trout in the wild."

As discussed in Section III:A, the approach to the jeopardy analysis in relation to the proposed action follows a hierarchal relationship between units of analysis that characterize effects at the lowest unit or scale of analysis (the local population) toward the highest unit or scale of analysis (Recovery Unit). The hierarchal relationship between units of analysis (local population, core areas) is used to determine whether the proposed action is likely to jeopardize the survival and recovery of bull trout. Should the adverse effects of the proposed action not rise to the level where it appreciably reduces both survival and recovery of the species at a lower scale, such as the local or core population, the proposed action could not jeopardize bull trout in the coterminous United States (i.e., rangewide). Therefore, the determination would result in a no-jeopardy finding.

After reviewing the current status of bull trout, the environmental baseline (including effects of federal actions covered by previous consultations) for the action area, the effects of the proposed project, and cumulative effects, it is the Service's biological opinion that the proposed action, along with the accompanying Terms and Conditions below, is not likely to jeopardize the continued existence of bull trout. Implementing regulations for section 7 (50 CFR 402) defines "jeopardize the continued existence of" as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." Our conclusion is based on, but not limited to, the information presented in the 2022 biological assessment (CSKT 2022), information exchanged between the CSKT and the Service, and information in our files cited throughout.

Our conclusion is based on the magnitude of the project effects in relation to the core area bull trout populations, aggregated to the geographic region (where applicable), then to the recovery unit, and finally to the range-wide population in the United States. Our rationale for this no jeopardy conclusion is based on the following:

- The adverse effects of the project resulting from actions related to in-water work will be short-term in nature (sporadically over 3 weeks) and will cease following project implementation.

- Project design elements will minimize erosive forces of flood flows while increasing longevity of the structure and associated hydraulic capacity.

- Implementation of the proposed action is not anticipated to reduce the reproduction, numbers, or distribution of bull trout within the Lake Pend Oreille Core Area; nor will the proposed action reduce reproduction, numbers, or distribution to the degree that survival or recovery is reduced.

As a result, the Service concludes that implementation of this project is not likely to appreciably reduce the reproduction, numbers, or distribution of bull trout at the scale of the North Fork Jocko River Local Population, the LPO-A Core Area, and by extension Columbia Headwaters Recovery Unit. Therefore, the Service concludes that this project will not appreciably reduce both the survival and recovery and would not jeopardize bull trout at the range-wide scale of the listed entity, the coterminous population of the United States.

Adverse Modification Determination

Pursuant to current national policy and the statutory provisions of the Act, destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species (50 CFR 404.02).

The approach to the adverse modification analysis in relation to the proposed action follows a hierarchical relationship between units of analysis (discussed in detail in Section III:B). The hierarchical relationship between units of analysis (e.g., stream segment, critical habitat subunit) is used to determine whether the proposed action is likely to adversely modify designated bull trout critical habitat. Should the adverse effects of the proposed action not rise to the level where it appreciably diminishes the value of critical habitat at a lower scale, such as the individual stream segment or subunit, the proposed action could not adversely modify bull trout critical habitat at larger scales such as the critical habitat unit or the coterminous United States (i.e., range wide). Thus, the determination will result in a no adverse modification finding.

After reviewing the current status of bull trout critical habitat in the Lower Clark Fork River Critical Habitat Subunit, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that implementation of the proposed action is not likely to destroy or adversely modify bull trout critical habitat.

The proposed action is anticipated to adversely affect designated critical habitat in the Lower Clark Fork River Critical Habitat Subunit by temporarily diminishing the function of some of the PCEs due to implantation of project activities (see Section VI:C). However, we do not anticipate that these effects will appreciably diminish the value of critical habitat as a whole for the conservation of the species, and therefore are not expected to adversely modify critical habitat at the scale of the Clark Fork River Critical Habitat Unit (Unit 31), and by extension range-wide.

IX. Incidental Take Statement

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. *Take* is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct (Act, section 3). *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 (50 CFR 17.3). *Harass* is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering (50 CFR 17.3). *Incidental take* is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity (50 CFR 402.02). Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the Terms and Conditions of this Incidental Take Statement.

The measures described below are not discretionary and must be undertaken by the BIA and CSKT so that they become binding conditions of any contract or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The BIA and CSKT have a continuing duty to regulate and oversee the activity covered by this Incidental Take Statement. If the BIA and CSKT fail to assume and implement the terms and conditions of the Incidental Take Statement, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the BIA and CSKT must ensure that progress of the action and its impact on the species is reported to the Service as specified in the Incidental Take Statement [50 CFR 402.14(i)(3)].

The BA (CSKT 2022) describes actions anticipated to occur during implementation of the North Fork Jocko River Bridge Replacement Project. Some of the actions described in the BA, when implemented, are likely to adversely affect bull trout. Thus, the Service anticipates that implementation of the project, as proposed, will likely impart a level of adverse effects to individual bull trout to the extent that incidental take will occur even though long-term improvements will be realized.

Amount or Extent of Take Anticipated

The Service anticipates that project activities may result in incidental take of bull trout in the form of harm, harassment or mortality related to the expected short-term degradation of aquatic habitat parameters as a result of increased levels of activity-created sediment and possible chemical contaminants. Activity-created sediment, when additively combined with the degraded baseline habitat ratings, may impact bull trout habitat indicators including *sediment* and *substrate embeddedness*. Sedimentation from the proposed activities is the primary effect of concern and is anticipated to have adverse effects (sub-lethal) by impairing feeding and sheltering patterns of juvenile and adult bull trout, should they be present, to the extent of injury or mortality (harm and/or harassment).

Although BMPs will be implemented to prevent chemical contaminants from entering the North Fork Jocko River, chemicals from construction equipment might enter the waterway and have short-term adverse effects through harm to juvenile and adult bull trout to the extent of injury (harm).

The Service anticipates a low level of take from the proposed action during project implementation due to proposed conservation measures. The amount of take that may result from implementation of the action is difficult to quantify for the following reasons:

- The amount of sediment produced or delivered is determined by a number of factors that are not only influenced by local site parameters such as topography and soil type, but are influenced by weather, time of implementation and effectiveness of the mitigation measures.

- The amount and location of sediment deposition depends on numerous factors (e.g. flow regime, size of stream, channel roughness).

- Because of the wide-ranging distribution of bull trout, difficulties in the identification and detection of dead or impaired individuals, and the likelihood that not all mortalities float to the surface, detection of injured or dead individuals may be difficult.

According to Service policy, as stated in the Endangered Species Consultation Handbook (Handbook; U.S. Fish and Wildlife Service and National Marine Fisheries Service, 1998b), some detectable measure of effect should be provided, such as the relative occurrence of the species or a surrogate species in the local community, or amount of habitat used by the species, to serve as a measure for take. Take also may be expressed as a change in habitat characteristics affecting the species.

In this biological opinion, the Service uses the action area, approximately 0.25 mile upstream and 0.5 mile downstream of the project area, and the duration of the project (3 weeks between July 15th and November 15th). The level of take covered by these surrogate measures would be exceeded if:

1. Turbidity monitoring and all over minimization measures within the project BA are not adequately utilized to ensure affects to bull trout are minimized.

2. Sediment is transported more than 0.5 mile downstream of the bridge.

3. Sediment producing activities exceed 2 days over the three week implementation time period.

4. The implementation period for the project exceeds 3 weeks.

The Service anticipates that incidental take of bull trout will occur intermittently in the North Fork Jocko River approximately 0.25 mile upstream and 0.5 mile downstream from the project area. Take would be expected to occur when the installation and removal of cofferdams, and use of the existing ford occur if the river is not intermittent as anticipated. The North Fork Jocko River is designated as bull trout spawning and rearing habitat (USFWS 2015), however due to the presence of the unscreened Tabor Diversion structure 0.25 miles downstream of the action area, its impacts to upstream habitat (sediment storage and embeddedness) and the absence of bull trout and bull trout redds upstream of the Tabor Diversion, take would apply to adult and juvenile bull trout (should they be present) within the action area. If at any time during implementation of the project, the CSKT and BIA conducts proposed activities in a manner that differs from that described in the proposed action, then the amount of take we anticipate could be exceeded. Should the CSKT and BIA anticipate that permitted take will be exceeded, the Service should be consulted prior to those activities' occurrence.

Effect of Take

In the accompanying biological opinion, the Service determined that the extent and type of take described is not likely to jeopardize the continued existence of bull trout in the North Fork Jocko River, and therefore, is not likely to jeopardize the continued existence of bull trout within the Columbia Headwaters Recovery Unit. Therefore, the Service concludes the action will not jeopardize the continued existence of bull trout within the coterminous United States population of the bull trout.

Reasonable and Prudent Measures

Incidental take statements typically provide reasonable and prudent measures that are expected to reduce the amount of incidental take. Reasonable and prudent measures refer to those actions the Director believes are necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take resulting from proposed actions [50 CFR §402.02]. Reasonable and prudent measures are nondiscretionary and must be implemented by the action agency in order for the exemption in section 7(o)(2) to apply. The Service concludes the following Reasonable and Prudent Measures (RPMs) are necessary and appropriate to minimize impacts of incidental take of bull trout caused by the proposed action:

1. The CSKT and BIA shall identify and implement means to reduce the potential for incidental take of bull trout due to the duration of sediment delivery to the North fork Jocko River during project implementation.

2. The CSKT and BIA shall implement and monitor activities to ensure compliance with the BA, and incidental take statement for this project. The reporting requirement are described in the terms and conditions below.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the BIA and CSKT must ensure compliance with the following terms and conditions that implement the reasonable and prudent measure described above and outline reporting and monitoring requirements. These terms and conditions are non-discretionary:

To implement RPM#1:

1. BIA and CSKT shall ensure all in-water work and sediment producing activities occur in a period of time that does not exceed 2 days, and the complete bridge and floodplain

relief culvert replacement (Project) does not exceed 3 total weeks between July 15 and November 15, 2023.

To implement RPM#2

1. BIA and CSKT shall maintain and monitor all implemented conservation and minimization measures for effectiveness to ensure they are minimizing sediment delivery. These efforts shall include turbidity monitoring immediately downstream of in-water work and shall occur throughout the project's timeframe as long as active in-water work is ongoing.

2. Instream work conducted within the channel shall be kept to the minimum amount necessary, preferably during periods of low flow. This includes, but is not limited to, construction and installation of bank stabilization materials and placement of the new precast bridge. Instream construction work shall be completed in the shortest amount of time possible.

3. Upon discovery of ineffective minimization measures, BIA and CSKT shall implement corrective actions immediately.

4. BIA and CSKT shall provide the Service with a report detailing the results of the downstream turbidity monitoring, and the extent downstream where increased sediment levels were observed. This report will be provided to the service by December 31st in the year which the project was completed (2023 or 2024).

5. Upon locating dead, injured or sick bull trout, notification must be made within 24 hours to the Service's Montana Ecological Services Office at (406) 449-5225. Information relative to the date, time and location of dead or injured bull trout when found, and possible cause of injury or death should be recorded if available.

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 recommendations that: (1) identify discretionary measures a Federal agency can take to minimize or avoid the adverse effects of a proposed action on listed or proposed species, or designated or proposed critical habitat, (2) identify studies, monitoring, or research to develop new information on listed or proposed species, or designated or proposed critical habitat, and, (3) include suggestions on how an action agency can assist species conservation as part of their action and in furtherance of their authorities under section 7(a)(1) of the Act. The Service provides the following recommendations:

1. Monitor and track the type and uses of the ford at the North Fork Jocko Bridge. Should heavy use and degradation of ford approaches become apparent, the installation of barriers, or potential complete elimination of the ford may be needed to reduce the

contribution of sediment from the ford into the North Fork Jocko River spawning and rearing habitat to protect bull trout.

2. Implement recovery actions identified in the Service's Bull Trout Recovery Plan and the associated Columbia River Headwaters Recovery Unit Implementation Plan (USFWS 2015, 2015b).

Reinitiation Notice

This concludes consultation on the action outlined in your November 16, 2022 request for consultation on the effects of the North Fork Jocko Bridge Replacement Project on bull trout and bull trout critical habitat. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if:

1) the amount or extent of incidental take is exceeded;
2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion;
3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or
4) a new species is listed or critical habitat designated that may be affected by the action.

The Service retains the discretion to determine whether the conditions listed in (1) through (4) have been met and reinitiation of formal consultation is required.

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Appendix A: Status of the species- bull trout

Introduction

This section provides information about bull trout (*Salvelinus confluentus*) life history, habitat preferences, geographic distribution, population trends, threats, and conservation needs. This includes description of the effects of past human activities and natural events that have led to the current status of the bull trout. This information provides the background for analyses in later sections of the biological opinion. The proposed and final listing rules contain a physical species description (63 FR 31647; 64 FR 58910). Additional information can be found at the following website: https://ecos.fws.gov/ecp/species/8212.

Listing and Current Range

The coterminous United States population of the bull trout was listed as threatened on November 1, 1999 (64 FR 58910). The threatened bull trout occurs in the Klamath River Basin of south-central Oregon; the Jarbidge River in Nevada; the Willamette River Basin in Oregon; Pacific Coast drainages of Washington, including Puget Sound; major rivers in Idaho, Oregon, Washington, and Montana, within the Columbia River Basin; and the Saint Mary-Belly River, east of the Continental Divide in northwestern Montana (Bond 1992; Brewin and Brewin 1997; Cavender 1978; Leary and Allendorf 1997; 63 FR 31647; 64 FR 58910; 75 FR 2269; USFWS 2015).

The final listing rule for the United States coterminous population of the bull trout discusses the consolidation of five DPSs into one listed taxon and the application of the jeopardy standard in accordance with the requirements of section 7 of the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 et seq.), relative to this species. The final listing rule also established five interim recovery units for each of these DPSs for the purposes of ESA section 7 consultation and species recovery (64 FR 58930).

Six draft recovery units were identified based on new information (75 FR 63898) that confirmed they were needed to ensure a resilient, redundant, and representative distribution of bull trout populations throughout the range of the listed entity. The final Recovery Plan for the Coterminous Bull Trout Population (bull trout recovery plan) formalized these six recovery units (USFWS 2015; Figure 1). The final recovery units replace the previous five interim recovery units and will be used in the application of the jeopardy standard for ESA section 7 consultation proceedures.

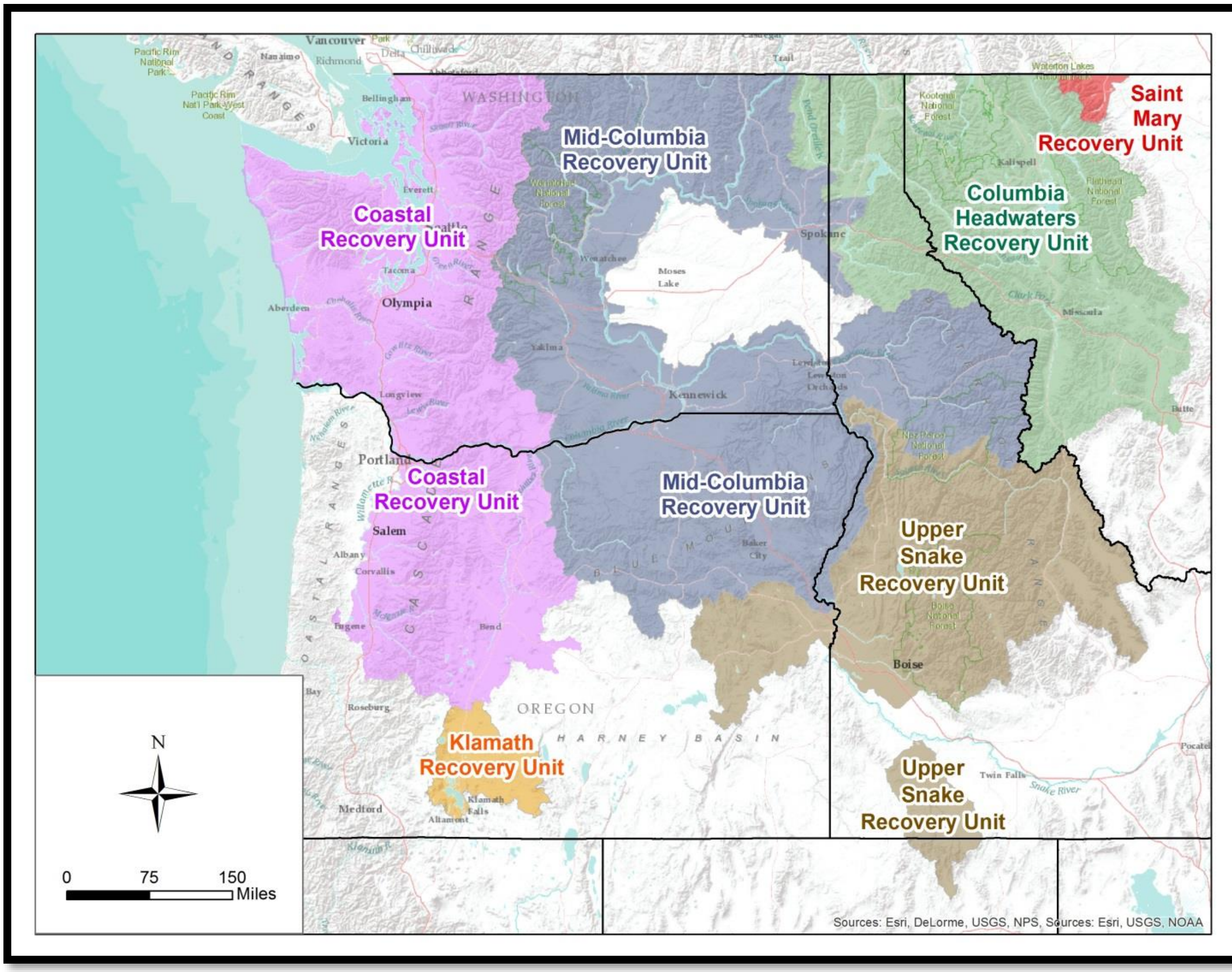

Figure 1. Locations of the six bull trout recovery zones in the coterminous United States (USFWS 2015)

Reasons for listing, range-wide trends, and 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, grazing, the blockage of migratory corridors by dams or other diversion structures, poor water quality; incidental angler harvest; entrainment, which is a process by which aquatic organisms are pulled through a diversion or other device into diversion channels; and introduced non-native species (63 FR 31647; 64 FR 58910). Poaching and incidental mortality of bull trout during other targeted fisheries are identified and described in the bull trout recovery plan (see Threat Factors B and D) as additional threats (USFWS 2015a). Since the time of coterminous listing of the species (64 FR 58910) and designation of its critical habitat (69 FR 59996; 70 FR 56212; 75 FR 63898), a great deal of new information has been collected on the status of bull trout. The U.S. Fish and Wildlife Service's (USFWS) Science Team Report (Whitesel, et al. 2004), the bull trout core areas templates (USFWS 2005a; USFWS 2009), Conservation Status Assessment (USFWS 2005), and 5-year species status reviews (USFWS 2008; USFWS 2015g) have provided additional information about threats to, and the status of, the species. The final recovery plan lists other documents and meetings that compiled information about the status of bull trout (USFWS 2015). As well, the 5-year species status review in 2015 maintained the listing status of bull trout as threatened based on the information compiled in the final bull trout recovery plan (USFWS 2015g) and the recovery unit implementation plans (RUIPs) (USFWS 2015-f).

When first listed, the status of bull trout and its threats were reported by the USFWS at subpopulation scales. In 2002 and 2004, the draft recovery plans (USFWS 2002, 2004, and 2004a) included detailed information on threats at the recovery unit scale (i.e. similar to subbasin or regional watersheds), thus incorporating the metapopulation concept with core areas and local populations. In the 5-year species status review completed in 2008, the USFWS established threats categories (i.e., dams, forest management, grazing, agricultural practices, transportation networks, mining, development and urbanization, fisheries management, small populations, limited habitat, and wild fire; USFWS 2008). In the bull trout recovery plan, threats and recovery actions are described for 109 core areas; forage, migration and overwintering areas; historical core areas; and research needs areas in each of the six recovery units (USFWS 2015). Primary threats are described in three broad categories for all recovery areas described in the listed range of the species: habitat, demographic, and non-native fish. The 2015 5-year species status review references the final recovery plan and the recovery unit implementation plans and incorporates by reference the threats described therein (USFWS 2015g). Although significant recovery actions have been implemented since the time of listing, the 5-year species status review concluded that bull trout still meets the definition of a threatened species under the ESA (USFWS 2015g).

New or emerging threats

The bull trout recovery plan describes new or emerging threats, climate change, and other threats (USFWS 2015). Climate change was not addressed as a known threat when the bull trout was listed. The bull trout recovery plan and RUIPs (USFWS 2015a-f) summarize the threat of climate change and acknowledge that some bull trout local populations and core areas may not persist into the future due to small populations, isolation, and effects of climate change (USFWS 2015). The bull trout recovery plan further states that use of best available information will ensure future conservation efforts that offer the greatest long-term benefit to sustain bull trout and their required coldwater habitats (USFWS 2015). Mote et al. (2014) summarized climate change effects to include rising air temperature, changes in the timing of streamflow related to changing snowmelt, increases in extreme precipitation events, lower summer stream flows, and other changes. A warming trend in the mountains of western North America is expected to decrease snowpack, hasten spring runoff, reduce summer stream flows, and increase summer water temperatures (Poff et al. 2002; Koopman et al. 2009; PRBO Conservation Science 2011). Lower flows resulting from reduced snowpack could influence habitat quality, which might adversely affect bull trout reproduction and survival. Warmer water temperatures could lead to physiological stress and could also benefit non-native fishes that prey on or compete with bull trout. Increases in the number and size of forest fires could also result from climate change (Westerling et al. 2006) and could adversely affect watershed function by resulting in faster runoff, lower base flows during the summer and fall, and increased sedimentation rates. Lower flows also may result in increased groundwater withdrawal for agricultural purposes and resultant reduced water availability in certain stream reaches occupied by bull trout (USFWS

2015b). Although all salmonids are likely to be affected by climate change, bull trout are especially vulnerable given that spawning and rearing are constrained by their location in upper watersheds and the requirement for cold water temperatures (Battin et al. 2007; Rieman et al. 2007). Climate change is expected to reduce the extent of cold water habitat (Isaak et al. 2015), and increase competition with non-native fish species (e.g., lake trout, brown trout, brook trout, and northern pike) for resources in remaining suitable habitat. Several authors project that brook trout, a fish species that competes for resources with, predates on, or hybridizes with bull trout, will continue increasing their range in several areas (i.e., an elevation shift in distribution) due to the effects from climate change (Wenger et al. 2011, Isaak et al. 2010, 2014; Peterson et al. 2013; Dunham 2015).

Distribution

The historical range of bull trout includes major river basins in the Pacific Northwest at about 41–60 degrees North latitude, from the southern limits in the McCloud River in northern California and the Jarbidge River in Nevada to the headwaters of the Yukon River in the Northwest Territories, Canada (Cavender 1978; Bond 1992). To the west, the bull trout's range includes Puget Sound, various coastal rivers of British Columbia, Canada, and southeast Alaska (Bond 1992). Bull trout occur in portions of the Columbia River and tributaries within the basin, including its headwaters in Montana and Canada. Bull trout also occur in the Klamath River basin of south-central Oregon. East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta and Montana and in the MacKenzie River system in Alberta and British Columbia, Canada (Cavender 1978; Brewin and Brewin 1997).

Reproductive biology

The iteroparous reproductive strategy (i.e., fishes that spawn multiple times, and therefore require safe two-way passage upstream and downstream) of bull trout has important repercussions for the management of this species. Bull trout require passage both upstream and downstream, not only for repeat spawning but also for foraging. Most fish ladders, however, were designed specifically for anadromous semelparous salmonids (i.e., fishes that spawn once and then die, and 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 safe downstream passage route. Additionally, in some core areas, bull trout that migrate to marine waters must pass both upstream and downstream through areas with net fisheries at river mouths, which can increase the likelihood of mortality to bull trout during these spawning and foraging migrations.

Growth varies depending upon life-history strategy. Resident adults range from 6–12 inches in total length, and migratory adults commonly reach 24 inches or more (Goetz 1989; Pratt 1985). The largest verified bull trout is a 32-pound specimen caught in Lake Pend Oreille, Idaho, in 1949 (Simpson and Wallace 1982, p. 95).

Bull trout typically spawn from August through November during periods of increasing flows and decreasing water temperatures. Preferred spawning habitat consists of low-gradient stream reaches with loose, clean gravel (Fraley and Shepard 1989). Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989; Pratt 1992; Rieman and McIntyre 1996). Depending on water temperature, incubation is normally 100–145 days (Pratt 1992). After hatching, fry remain in the substrate, and time from egg deposition to emergence may surpass 220 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows (Pratt 1992; Ratliff and Howell 1992).

Early life stages of fish, specifically the developing embryo, require the highest inter-gravel dissolved oxygen (IGDO) levels and are the most sensitive life stage to reduced oxygen levels. The oxygen demand of embryos depends on temperature and on stage of development, with the greatest IGDO required just prior to hatching.

A literature review conducted by the Washington Department of Ecology (WDOE 2002) indicates that adverse effects of lower oxygen concentrations on embryo survival are magnified as temperatures increase above optimal for incubation. Normal oxygen levels seen in rivers used by bull trout during spawning ranged from 8–12 mg/L in the gravel, with corresponding instream levels of 10–11.5 mg/L (Stewart et al. 2007). In addition, IGDO concentrations, water velocities in the water column, and especially the inter-gravel flow rate, are interrelated variables that affect the survival of incubating embryos (ODEQ 1995). Due to a long incubation period of 220 or more days, bull trout are particularly sensitive to adequate IGDO levels. An IGDO level below 8 mg/L is likely to result in mortality of eggs, embryos, and fry.

Population structure

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 (Rieman and McIntyre 1993). Resident bull trout complete their entire life cycle in or near the tributary streams in which they spawn and rear. The resident form tends to be smaller and produces fewer eggs than the migratory form at maturity (Goetz 1989). Migratory bull trout spawn in tributary streams where juvenile fish rear 1–4 years before migrating to either a lake (adfluvial form), river (fluvial form; Fraley and Shepard 1989; Goetz 1989), or saltwater (anadromous form) to rear as subadults and to live as adults (Brenkman and Corbett 2005; McPhail and Baxter 1996; WDFW et al. 1997). Bull trout normally reach sexual maturity in 4–7 years and may live longer than 12 years. Bull trout are iteroparous, meaning they spawn more than once in a lifetime. Repeat- and alternate-year spawning has been reported, although repeat-spawning frequency and post-spawning mortality are not well-documented (Fraley and Shepard 1989; Leathe and Graham 1982; Pratt 1992; Rieman and McIntyre 1996).

Bull trout are naturally migratory, which allows them to capitalize on temporally abundant food resources. Resident forms may develop where natural or manmade barriers occur or where foraging, migrating, or overwintering habitats for migratory fish are minimized (Swanberg, 1997; Brenkman and Corbett 2005; Goetz et al. 2004; Starcevich et al. 2012; USFWS 2016). For example, multiple life history forms (e.g., resident and fluvial) and multiple migration patterns have been noted in the Grande Ronde River (Baxter 2002). Some river systems have retained habitat conditions that allow free movement between spawning and rearing areas and the mainstem rivers. In these areas with connectivity, bull trout can migrate between large rivers, lakes, and spawning tributaries. Other migrations in central Washington have shown that fluvial and adfluvial life forms travel long distances, migrate between core areas, and mix together in many locations where connectivity exists (Ringel et al 2014; Nelson and Nelle 2008). Such multiple life history strategies help to maintain the stability and persistence of bull trout populations to environmental changes. Benefits of connected habitat for migratory bull trout include greater growth in the more productive waters of larger streams, lakes, and marine waters; greater fecundity resulting in increased reproductive potential; and dispersing the population across space and time so that spawning streams may be recolonized if local populations suffer a catastrophic loss (Frissell 1999; MBTSG 1998; Rieman and McIntyre 1993). In the absence of the migratory bull trout life form, isolated populations cannot be replenished when disturbances make local habitats temporarily unsuitable. Therefore, the range of the species is diminished, and the potential for a greater reproductive contribution from larger size fish with higher fecundity is lost (Rieman and McIntyre 1993).

Spruell et al. (2003) summarized genetic information on bull trout population structure by analyzing 1,847 bull trout from 65 sampling locations—four located in three coastal drainages (Klamath, Queets, and Skagit Rivers), one in the Saskatchewan River drainage (Belly River), and 60 scattered throughout the Columbia River Basin. Spruell (2003) concluded that a consistent pattern exists among genetic studies of bull trout, regardless of whether examining allozymes, mitochondrial DNA, or, most recently, microsatellite loci. Typically, the genetic pattern shows relatively little genetic variation within populations, but substantial divergence among populations. Microsatellite loci analysis supports the existence of at least three major genetically differentiated groups, or evolutionary lineages, of bull trout (Spruell et al. 2003). The genetically differentiated groups were characterized as follows:

1. “Coastal”, including the Deschutes River and all of the Columbia River drainage downstream, as well as most coastal streams in Washington, Oregon, and British Columbia. A compelling case also exists that the Klamath Basin represents a unique evolutionary lineage within the Coastal group.
2. “Snake River”, which also included the John Day, Umatilla, and Walla Walla rivers. Despite close proximity of the John Day and Deschutes Rivers, a striking level of divergence between bull trout in these two systems was observed.
3. “Upper Columbia River”, which includes the entire basin in Montana and northern Idaho. A tentative assignment was made by Spruell et al. (2003, p. 25) of the Saskatchewan River drainage populations (east of the continental divide), grouping them with the upper Columbia River group.

Spruell et al. (2003) noted that within the major assemblages, populations were further subdivided, primarily at the level of major river basins. Taylor et al. (1999) surveyed bull trout populations, primarily from Canada, and found a major divergence between inland and coastal populations. Costello et al. (2003) suggested the patterns reflected the existence of two glacial refugia, consistent with the conclusions of Taylor and Costello (2006), Spruell et al. (2003), and the biogeographic analysis of Haas and McPhail (2001). Both Taylor et al. (1999) and Spruell et al. (2003, p. 21) concluded that the Deschutes River represented the most upstream limit of the coastal lineage in the Columbia River Basin.

More recently, the USFWS identified additional genetic units within the coastal and interior lineages (Ardren et al. 2011). Based on a recommendation in the USFWS's 5-year species status review (USFWS 2008), the USFWS reanalyzed the 27 recovery units identified in the 2002 draft bull trout recovery plan (USFWS 2002) by utilizing, in part, information from previous genetic studies and new information from additional analysis (Ardren et al. 2011). In this examination, the USFWS applied relevant factors from the joint USFWS and U.S. National Marine Fisheries Service Distinct Population Segment policy (USFWS 1996) and subsequently identified six draft recovery units that contain assemblages of core areas that retain genetic and ecological integrity across the range of bull trout in the coterminous United States. These six draft recovery units were used to inform designation of critical habitat for bull trout by providing a context for deciding what habitats are essential for recovery (USFWS 2010). The following six recovery units were adopted in the final bull trout recovery plan (USFWS 2015a) and described further in the RUIPs (USFWS 2015a-f): Coastal, Klamath, Mid-Columbia, Columbia Headwaters, Saint Mary, and Upper Snake. A number of additional genetic analyses within core areas have been completed to understand uniqueness of local populations (Hawkins and Van Barren 2006, 2007; Small et al. 2009; DeHann and Neibauer 2012).

Population dynamics

Although bull trout are widely distributed over a large geographic area, they exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993). Increased habitat fragmentation reduces the amount of available habitat and increases isolation from other populations of the same species (Saunders et al. 1991). Burkey (1989) concluded that when species are isolated by fragmented habitats, low rates of population growth are typical in local populations and their probability of extinction is directly related to the degree of isolation and fragmentation. Without sufficient immigration, growth for local populations may be low and probability of extinction high (Burkey 1989, entire; Burkey 1995).

Metapopulation concepts of conservation biology theory have been suggested relative to the distribution and characteristics of bull trout, although empirical evidence is relatively scant (Rieman and McIntyre 1993; Dunham and Rieman 1999; Rieman and Dunham 2000). A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994). For inland bull trout, metapopulation theory is likely most applicable at the watershed scale, where habitat consists of discrete patches or collections of habitat capable of supporting local populations. Local populations are, for the most part, independent and represent discrete reproductive units. Low-rate dispersal patterns among component populations influences the persistence of at least some of the local populations over the long-term (Rieman and Dunham 2000). Ideally, multiple local populations distributed throughout a watershed provide a mechanism for spreading risk because the simultaneous loss of all local populations is unlikely. However, habitat alteration, primarily through the construction of impoundments, dams, and water diversions has fragmented habitats, eliminated migratory corridors, and in many cases isolated bull trout in the headwaters of tributaries (Rieman and Clayton 1997; Dunham and Rieman 1999; Spruell et al. 1999; Rieman and Dunham 2000).

Human-induced factors, as well as other natural factors affecting bull trout distribution, have likely limited the expression of the metapopulation concept for bull trout to patches of habitat within the overall distribution of the species (Dunham and Rieman 1999). Despite the theoretical fit, recent bull trout investigations do not provide certainty as to whether a metapopulation dynamic is occurring (e.g., a balance between local extirpations and recolonizations) across the range of the bull trout. The persistence of bull trout in large or closely interconnected habitat patches (Dunham and Rieman 1999) may simply reflect a general deterministic trend towards extinction of the species, where the larger or interconnected patches are relics of historically wider distribution (Rieman and Dunham 2000). In contrast, Whitesel et al. (2004) identified several ways that bull trout distribution fits the metapopulation theory, which is supported by genetic evidence for the presence of metapopulation processes for bull trout in the Boise River Basin in Idaho (Whiteley et al. 2003).

Habitat characteristics

The habitat requirements of bull trout are often generally expressed as the four “Cs”: cold, clean, complex, and connected habitat. Cold stream temperatures; clean water quality that is relatively free of sediment and contaminants; complex channel characteristics, including abundant large wood and undercut banks; and large patches of such habitat that are well connected by unobstructed migratory pathways are all needed to promote conservation of bull trout throughout all hierarchical levels.

Bull trout have more specific habitat requirements than most other salmonids (Rieman and McIntyre 1993). 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 (Fraley and Shepard 1989; Goetz 1989; Hoelscher and Bjornn 1989; Howell and Buchanan 1992; Pratt 1992; Rich 1996; Rieman and McIntyre 1993; Rieman and McIntyre 1995; Sedell and Everest 1991; Watson and Hillman 1997). Watson and Hillman (1997) concluded that watersheds must have specific physical characteristics to provide the habitat requirements necessary for successful bull trout spawning and rearing but that these specific characteristics are not required to be ubiquitous throughout a watershed. Because bull trout exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993), bull trout 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 (Rieman and McIntyre 1993). Migrations facilitate gene flow among local populations when individuals from different local populations interbreed or stray to non-natal streams. Bull trout migrants may also reestablish local populations that are extirpated by catastrophic events. However, the genetic structuring of bull trout indicates that gene flow among bull trout populations is limited, which may encourage local adaptation within individual populations and suggests that the re-establishment of extirpated populations may take a long time (Rieman and McIntyre 1993; Spruell et al. 1999). Migration also allows bull trout to access more abundant or larger prey, which facilitates growth and reproduction. Additional benefits of migration and its relationship to foraging are discussed below in section 4.6 Diet. Water temperatures play an important role in determining habitat quality, as bull trout are primarily found in colder streams and spawning habitats are generally characterized by water temperatures below 9 °C (Fraley and Shepard 1989; Pratt 1992; Rieman and McIntyre 1993). Spawning areas are often associated with cold-water springs, groundwater infiltration, and the coldest streams in a given watershed (Pratt 1992; Rieman and McIntyre 1993). Optimum incubation temperatures for bull trout eggs range from 2–6 °C, whereas optimum water temperatures for rearing ranges from about 6–10 °C (Buchanan and Gregory 1997; Goetz 1989).

In Granite Creek, Idaho, Bonneau and Scarnecchia (1996) observed that juvenile bull trout selected the coldest water available in a plunge pool (8–9 °C) with a temperature gradient of 8–15 °C. In a landscape study relating bull trout distribution to maximum water temperatures, Dunham et al. (2003) found that the probability of juvenile bull trout occurrence does not become high (i.e., > 0.75) until maximum temperatures decline to 11–12 °C.

Although bull trout are found primarily in cold streams, the species is occasionally found in larger, warmer river systems throughout the Columbia River basin (Buchanan and Gregory 1997; Fraley and Shepard 1989; Rieman and McIntyre 1993; Rieman and McIntyre 1995). Availability and proximity of cold-water patches and food productivity can influence bull trout’s ability to survive in warmer rivers (Myrick 2002).

All life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Fraley and Shepard 1989; Goetz 1989; Hoelscher and Bjornn 1989; Pratt 1992; Rich 1996; Sedell and Everest 1991; Sexauer and James 1997; Thomas 1992; Watson and Hillman 1997). Maintaining bull trout habitat requires stable and complex stream channels and stable stream flows (Rieman and McIntyre 1993). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997). 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 autumn may disrupt bull trout during the spawning period, and channel instability may decrease survival of eggs and young juveniles in the gravel from winter through spring (Fraley and Shepard 1989; Pratt 1992; Pratt and Huston 1993). Pratt (1992) indicated that increases in fine sediment reduce egg survival and emergence.

Diet

Bull trout are opportunistic feeders, with food habits primarily a function of size and life history strategy. Fish growth depends on the quantity and quality of food that is eaten, and as fish grow their foraging strategy changes as their food changes, in quantity, size, or other characteristics (Quinn 2005). Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macrozooplankton, and small fish (Boag 1987; Donald and Alger 1993; Goetz 1989). Sub-adult and adult migratory bull trout generally feed on various fish species (Donald and Alger 1993; Fraley and Shepard 1989; Leathe and Graham 1982). Bull trout of all life stages older than fry have been found to eat fish half their length (Beauchamp and VanTassell 2001). In nearshore marine areas of western Washington, bull trout feed on Pacific herring (*Clupea pallasi*), Pacific sand lance (*Ammodytes hexapterus*), and surf smelt (*Hypomesus pretiosus*; Goetz et al. 2004; WDFW 1997).

Bull trout migration and life history strategies are closely related to their feeding and foraging strategies and their environment. Migration allows bull trout to access optimal foraging areas and exploit a wider variety of prey resources, both within and between core areas. Connectivity between the spawning, rearing, overwintering, and forage areas maintains access to foraging diversity. There have been recent studies documenting movement patterns in the Columbia River basin that document long distance migrations (Borrows et al 2016; Schaller et al 2014; USFWS 2016). For example, a data report documented a juvenile bull trout from the Entiat made over a 200-mile migration between spawning grounds in the Entiat River to foraging and overwintering areas in Columbia and Yakima River near Prosser Dam (PTAGIS 2015). As well, in the Skagit River system, anadromous bull trout make migrations as long as 121 miles between marine foraging areas in Puget Sound and headwater spawning grounds, foraging on salmon eggs and juvenile salmon along their migration route (WDFW et al. 1997). Anadromous bull trout also use marine waters as migration corridors to reach seasonal habitats in non-natal watersheds to forage and possibly overwinter (Brenkman and Corbett 2005; Goetz et al. 2004).

Conservation needs

The 2015 bull trout recovery plan established the primary strategy for recovery of bull trout in the coterminous United States (USFWS 2015). The primary strategy includes the following (1) conserve bull trout so that they are geographically widespread across representative habitats and demographically stable; (2) manage and ameliorate the primary threats in each of six recovery units at the core area scale such that bull trout are not likely to become endangered in the foreseeable future; (3) work cooperatively with partners to develop and implement bull trout recovery actions in each of the six recovery units; and (4) account for new information and future climate effects, apply adaptive management principles and focus on actions, and potentially locations, that provide the greatest resilience to climate-related threats (USFWS 2015). Information presented in prior draft recovery plans published in 2002 and 2004 (USFWS 2002, 2004, 2004a) provided information that identified the original list of threats and recovery actions across the range of the species and provided a framework for implementing numerous recovery actions by our partner agencies, local working groups, and others with an interest in bull trout conservation. Many recovery actions were completed prior to finalizing the recovery plan in 2015.

The 2015 bull trout recovery plan (USFWS 2015) integrates new information collected since the 1999 listing regarding bull trout life history, distribution, demographics, conservation successes, among others, and integrates and updates previous bull trout recovery planning efforts across the range of the coterminous bull trout listing. Using this information, the USFWS developed a recovery approach that (1) focuses on the identification and effective management of known and remaining threat factors to bull trout in each core area; (2) acknowledges that some extant bull trout core area habitats will likely change (and may be lost) over time; and (3) identifies and focuses recovery actions in those areas where success is likely to meet our goal of ensuring the certainty of conservation of genetic diversity, life history features, and broad geographical representation of remaining bull trout populations so that the protections of the ESA are no longer necessary (USFWS 2015).

To implement the recovery strategy, the 2015 bull trout recovery plan establishes that the recovery of bull trout will entail effectively managing threats to ensure the long-term persistence of populations and their habitats, ensuring the security of multiple interacting groups of bull trout, and providing habitat conditions and access to them that allow for the expression of various life history forms within each of six recovery units (USFWS 2015). The bull trout recovery plan defined the following four categories of recovery actions:

1. Protect, restore, and maintain suitable habitat conditions for bull trout;
2. Minimize demographic threats to bull trout by restoring connectivity or populations, where appropriate, to promote diverse life history strategies and conserve genetic diversity;
3. Prevent and reduce negative effects of non-native fishes and other non-native taxa on bull trout; and
4. 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).

Bull trout recovery is based on a geographical hierarchical approach. Bull trout are listed as a single distinct population segment (DPS) within the five-state area of the coterminous United States. The single DPS is subdivided into six biological-based recovery units: (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 (USFWS 2015). A viable recovery unit should demonstrate that the three primary principles of biodiversity have been met: representation (conserving the genetic makeup of the species); resiliency (ensuring that each population is sufficiently large to withstand stochastic events); and redundancy (ensuring a sufficient number of populations to withstand catastrophic events; USFWS 2015).

Each of the six recovery units contain multiple bull trout core areas, which are non-overlapping watershed-based polygons, and each core area includes one or more local population. Currently there are 109 occupied core areas, which comprise 611 local populations (USFWS 2015). Six core areas were historically occupied by bull trout but are now extirpated. One research needs area was identified, where bull trout occurred historically, but their current presence in, and use of, the area are uncertain (USFWS 2015). Core areas are identified as complex or simple (USFWS 2015). Complex core areas contain multiple local bull trout populations, are found in large watersheds, have multiple life history forms, and have migratory connectivity between spawning and rearing habitat and foraging, migration, and overwintering habitats (FMO). Simple core areas are those that contain one bull trout local population. Simple core areas are small in scope, isolated from other core areas by natural barriers, and may contain unique genetic or life history adaptations.

A core area is a combination of core habitat (i.e., habitat that could supply all elements for the long-term security of bull trout) and a core population (a group of one or more local bull trout populations that exist within core habitat) and constitutes the basic unit on which to gauge recovery within a recovery unit. Core areas require both habitat and bull trout to function, and the number (replication) and characteristics of local populations inhabiting a core area provide a relative indication of the core area’s likelihood to persist. A core area represents the closest approximation of a biologically functioning unit for bull trout. Core areas are presumed to reflect the metapopulation structure of bull trout.

A local population is a group of bull trout that spawn within a particular stream or portion of a stream system (USFWS 2015). A local population is considered the smallest group of bull trout that is known to represent an interacting reproductive unit. For most waters where specific information is lacking, a local population may be represented by a single headwater tributary or complex of headwater tributaries. Gene flow between local populations (e.g., those within a core population) may occur but is assumed to be infrequent compared with that among individuals within a local population.

Population units

The bull trout recovery plan (USFWS 2015) designates six bull trout recovery units, as described above. These units replace the five previously identified interim recovery units (USFWS 1999). The USFWS will address the conservation of these final recovery units in section 7(a)(2) consultations on proposed Federal actions. The bull trout recovery plan (USFWS 2015) identified threats and factors affecting the bull trout within these units. A detailed description of recovery implementation for each recovery unit is provided in separate recovery unit implementation plans (RUIPs; USFWS 2015a-f), which identify recovery actions and conservation recommendations needed for each core area, FMO areas, historical core areas, and research needs areas. Each recovery units listed and discussed in the sections below is necessary to maintain the bull trout's numbers and distribution, as well as its genetic and phenotypic diversity, all of which are important to ensure the species' resilience to changing environmental conditions. For more details on Federal, State, and tribal conservation actions, see the actions since listing, contemporaneous actions, and environmental baseline discussions below.

Coastal Recovery Unit

The Coastal RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015a). The Coastal Recovery Unit is divided into three Geographic Regions: Puget Sound, Olympic Peninsula, and the Lower Columbia River regions. This recovery unit contains 20 core areas comprising 84 local populations and a single potential local population in the historic Clackamas River core area where bull trout had been extirpated and were reintroduced in 2011. This recovery unit also has four historically occupied core areas that could be re-established (USFWS 2015, 2015a).

Although population strongholds do exist across the three regions, populations in the Puget Sound region generally have better demographic status while the Lower Columbia River region exhibits the least robust demography (USFWS 2015a). Puget Sound and the Olympic Peninsula currently support the only anadromous local populations of bull trout. This recovery unit also contains ten shared FMO habitats, which allow for the continued natural population dynamics in which the core areas have evolved (USFWS 2015a). There are four core areas within the Coastal Recovery Unit that have been identified as current population strongholds: Lower Skagit, Upper Skagit, Quinault River, and Lower Deschutes River (USFWS 2015, 2015a). These are the most stable and abundant bull trout populations in the recovery unit. The Puget Sound region supports at least two core areas containing a natural adfluvial life history.

The demographic status of the Puget Sound populations is better in northern areas. Barriers to migration in the Puget Sound region are few, and significant amounts of headwater habitat occur in protected areas (USFWS 2015a). 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 non-native species (USFWS 2015a). Conservation measures or recovery actions implemented or ongoing include relicensing of major hydropower facilities that have provided upstream and downstream fish passage or complete removal of 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 (USFWS 2015a).

Klamath Recovery Unit

The Klamath RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015b). The Klamath Recovery Unit is located in southern Oregon and northwestern California. The Klamath Recovery Unit 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 non-native brook trout (USFWS 2015). This recovery unit currently contains three core areas and eight local populations (USFWS 2015, 2015b). Nine historic local populations of bull trout have become extirpated (USFWS 2015b). All three core areas have been isolated from other bull trout populations for the past 10,000 years (USFWS 2015b). 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, non-native species, and past fisheries management practices (UFWS 2015b). Conservation measures or recovery actions implemented or ongoing include removal of non-native 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, culver replacement, and habitat restoration (USFWS 2015b).

Mid-Columbia Recovery Unit

The Mid-Columbia RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015c). The Mid-Columbia Recovery Unit is located within 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 Geographic regions. This recovery unit contains 24 occupied core areas comprising 142 local populations, two historically occupied core areas, one research needs area, and seven FMO habitats (USFWS 2015, 2015c). 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), non-native species, forest management practices, and mining (USFWS 2015c). Conservation measures or recovery actions implemented or ongoing include road removal, channel restoration, mine reclamation, improved grazing management, removal of fish barriers, and instream flow requirements (USFWS 2015c).

Columbia Headwaters Recovery Unit

The Columbia Headwaters RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015d). 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 geographic regions (USFWS 2015d). This recovery unit contains 35 bull trout core areas, 15 of which are complex core areas that represent larger interconnected habitats, and the remaining 20 are simple core areas that are isolated headwater lakes with a single local population. Many of the simple core area local populations have persisted for thousands of years, despite small populations and isolated existence (USFWS 2015d). Fish passage improvements within the recovery unit have reconnected some previously fragmented habitats (USFWS 2015d), while others remain fragmented. Unlike other recovery units in Washington, Idaho and Oregon, the Columbia Headwaters Recovery Unit does not include anadromous fish (USFWS 2015d). Therefore, bull trout within the Columbia Headwaters Recovery Unit do not benefit from the recovery actions for salmon (USFWS 2015d). The current condition of the bull trout in this recovery unit is attributed to the adverse effects of climate change, mostly historical mining and contamination by heavy metals, expanding populations of non-native fish predators and competitors, 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 (USFWS 2015d). Conservation measures or recovery actions implemented or ongoing include habitat improvement, fish passage, and removal of non-native species (USFWS 2015d).

Upper Snake Recovery Unit

The Upper Snake RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015e). 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 207 local populations, with over 70 percent of the local populations occurring in the Salmon River Region (USFWS 2015, 2015e). 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, non-native species, and agriculture (e.g., water diversions, grazing; USFWS 2015e). Conservation measures or recovery actions implemented or ongoing include instream habitat restoration, instream flow requirements, screening of irrigation diversions, and riparian restoration (USFWS 2015e).

Saint Mary Recovery Unit

The Saint Mary RUIP describes the threats to bull trout and the site-specific management actions necessary for recovery of the species within the unit (USFWS 2015f). The Saint Mary Recovery Unit is located in Montana but is heavily linked to downstream resources in southern Alberta, Canada. Most of the Saskatchewan River watershed, which the Saint Mary flows into, 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 seven local populations (USFWS 2015f) in the U.S. headwaters. The current condition of the bull trout in this recovery unit is attributed primarily to the outdated design and operations of the Saint Mary Diversion, operated by the U.S. Bureau of Reclamation (e.g., entrainment, fish passage, instream flows), and, to a lesser extent, habitat impacts from development and non-native species (USFWS 2015f). The primary issue precluding bull trout recovery in this recovery unit relates to impacts of water diversions, specifically at the U.S. Bureau of Reclamation's Milk River Project (USFWS 2015f). Multiple implemented or ongoing recovery actions are not identified in the Saint Mary RUIP; however, the USFWS is conducting interagency and tribal coordination to accomplish conservation goals for the bull trout (USFWS 2015f).

Federal, State, and Tribal actions since listing

Since the listing of bull trout in 1999, numerous conservation measures that contribute to the conservation and recovery of bull trout have been and continue to be implemented across its range in the coterminous United States. These measures are being undertaken by a wide variety of local and regional partnerships, including State fish and game agencies, State and Federal land management and water resource agencies, Tribal governments, power companies, watershed working groups, water users, ranchers, and landowners.

In many cases, these bull trout conservation measures incorporate or are closely interrelated with work being done for recovery of salmon and steelhead, which are limited by many of the same threats. These include removal of migration barriers (culvert removal or redesign at stream crossings, fish ladder construction, dam removal, etc.) to allow access to spawning or FMO habitat; screening of water diversions to prevent entrainment into unsuitable habitat in irrigation systems; habitat improvement (riparian revegetation or fencing, placement of coarse woody debris in streams) to improve spawning suitability, habitat complexity, and water temperature; instream flow enhancement to allow effective passage at appropriate seasonal times and prevent channel dewatering; and water quality improvement (decommissioning roads, implementing best management practices for grazing or logging, setting pesticide use guidelines) to minimize impacts from sedimentation, agricultural chemicals, or warm temperatures.

At sites that are vulnerable to development, protection of land through fee title acquisition or conservation easements is important to prevent adverse impacts or allow for the implementation of recovery actions. In several bull trout core areas, continued fisheries management efforts to suppress non-native fish species is warranted, particularly brown trout, brook trout, lake trout, and northern pike (Fredenberg et al. 2007; DeHaan et al. 2010; DeHaan and Godfrey 2009; Fredericks and Dux 2014; Rosenthal and Fredenberg 2017). A more comprehensive overview of conservation successes for each recovery unit from 1999–2013 is summarized in the Summary of Bull Trout Conservation Successes and Actions since 1999 (USFWS 2013).

Projects that have undergone ESA section 7 consultation have occurred throughout the range of bull trout. Solely or in aggregate, these projects could affect the species' status. The USFWS has conducted periodic reviews of prior Federal actions that were subject to ESA section 7 consultation. A detailed discussion of consulted-on effects in the proposed action area is provided in the environmental baseline section of the biological opinion.

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Appendix B: Status of critical habitat- bull trout

Current Designation

The U.S. Fish and Wildlife Service (USFWS) published a final critical habitat designation for the coterminous United States population of the bull trout (*Salvelinus confluentus*) on October 18, 2010 (final rule; 70 FR 63898); the rule became effective on November 17, 2010. Critical habitat is defined as the specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but that will be needed for its recovery. The final rule designated critical habitat units (CHUs) for the bull trout in the coterminous United States (70 FR 63898; Figure 1). A justification document describes occupancy, and the rationale for why these habitat areas are essential for the conservation of bull trout was developed to support the final rule (USFWS 2010). The USFWS designated bull trout critical habitat across the species' coterminous range and partitioned critical habitat into stream/shoreline distance and reservoirs/lakes area (70 FR 63898; 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 and in total.

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

The final rule designated approximately 1,323.7 km (822.5 miles) and 6,758.8 ha (16,701.3 acres) of unoccupied stream/shoreline and reservoir/lake habitat, respectively, as designated critical habitat to address bull trout conservation needs in specific geographic areas where bull trout did not occur at the time of listing. These unoccupied areas were determined to be essential for restoring functioning migratory bull trout populations based on currently available scientific information (70 FR 63898). These unoccupied areas often include mainstem 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 the following areas: (1) waters adjacent to non-Federal lands covered by legally operative incidental take permits for habitat conservation plans (HCPs) issued under section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (ESA), in which bull trout is a covered species on or before the publication of the 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 USFWS; or (3) waters where impacts to national security have been identified (75 FR 63898). Excluded areas are approximately 10 percent of the stream/shoreline distance and four percent of the reservoir/lake area of designated critical habitat. Each excluded area is identified in the relevant CHU text, as identified in paragraphs (e)(8) through (e)(41) of the final rule. Fewer than 2,000 stream miles and 20,000 acres of lake and reservoir surface area were excluded from the designation of critical habitat. The exclusion of waterbodies from designated critical habitat does not negate or diminish their importance for bull trout conservation, nor reduce authorities that protect the species under the ESA. Because exclusions reflect the often complex pattern of land ownership, designated critical habitat is often fragmented and interspersed with excluded stream segments.

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). 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. The 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 (Figure 1). Twenty-nine of the CHUs contain all of the physical or biological features identified in the final rule and support multiple life history requirements. Three of the mainstem river units in the Columbia and Snake River basins contain most, but not all, of the physical or biological features necessary to support the bull trout's particular use of that habitat; these areas lack features associated with Primary Constituent Elements (PCEs) 5 and 6, which relate to 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); (2) provide for persistence of strong local populations, in part, by providing habitat conditions that encourage movement of migratory fish (MBTSG 1998; Rieman and McIntyre 1993); (3) are large enough to incorporate genetic and phenotypic diversity but small enough to ensure connectivity between populations (Hard 1995; Healey and Prince 1995; MBTSG 1998; Rieman and McIntyre 1993); and (4) are distributed throughout the historic range of the species to preserve both genetic and phenotypic adaptations (Hard 1995; MBTSG 1998; Rieman and Allendorf 2001; Rieman and McIntyre 1993).

The Olympic Peninsula and Puget Sound CHUs are essential to the conservation of amphidromous bull trout, which are unique to the Coastal-Puget Sound population segment.

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 contain PCEs that are critical to adult and sub-adult foraging, overwintering, and migration.

Primary constituent elements for bull trout critical habitat

Within the designated critical habitat areas, the PCEs 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 the bull trout and the characteristics of the habitat necessary to sustain its essential life-history functions, we determined in our final designation that the following PCEs are essential for the conservation of bull trout.

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) 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 2–15 °C (36–59 °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; streamflow; 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 substrates, 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 base flows within historic 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 non-native 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.

Primary constituent element 9 addresses the presence of non-native predatory or competitive fish species. Although this PCE applies to both the freshwater and marine environments, currently no non-native fish species are of concern in the marine environment, though this could change in the future.

Critical habitat designated within each CHU includes the stream channels within the designated stream reaches and has a lateral extent 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 1–2 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 USFWS assumes in many cases this is the full-pool level of the waterbody. In areas where only one side of the waterbody is designated (i.e., 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 (33 feet) relative to the mean low low-water (MLLW) line (e.g., 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 includes the average extent of the photic zone and 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 within CHUs are not designated as critical habitat. However, the quality of marine and freshwater habitat along streams, lakes, and shorelines is intrinsically related to the character of these adjacent features and human activities that occur outside of the designated critical habitat within the CHUs can have significant effects on physical and biological features of the aquatic environment.

Activities that are likely to cause adverse effects to critical habitat are evaluated to determine if they are likely to “destroy or adversely modify” critical habitat such that the critical habitat will no longer serve the intended conservation role for the species or retain those PCEs 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 PCEs to such an extent that the conservation value of critical habitat is appreciably reduced (75 FR 63898). The USFWS evaluates such adverse effects at the scale of the entire critical habitat area designated, unless otherwise stated in the final critical habitat rule (USFWS and NMFS 1998). Thus, 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). 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 adverse modification of the entire designated critical habitat area may be warranted (75 FR 63898).

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 historic 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 non-native species (63 FR 31647; 64 FR 17112).

There is widespread agreement in the scientific literature that many factors related to human activities have impacted bull trout habitat function and continue to do so. Among the many factors that contribute to degraded PCEs, 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; Rieman and McIntyre 1993); (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; MBTSG 1998); (3) the introduction and spread of non-native 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; Rieman et al. 2006); (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.

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 PCEs 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 non-native fishes). For more discussion regarding impacts of climate change, see the status of the species and environmental baseline sections in the biological opinion.

Consulted on effects to critical habitat

The USFWS has formally consulted on the effects to bull trout critical habitat throughout the designated range. Section 7 consultations include actions that continue to degrade the environmental baseline, in many cases. However, long-term restoration efforts are also proposed and have been implemented, which provide some stability or improvement in the existing functions within some of the critical habitat units. For a detailed analysis of prior consulted-on effects in the action area, see the environmental baseline section in the biological opinion.

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