United States Department of the Interior
FISH AND WILDLIFE SERVICE
Idaho Fish and Wildlife Office
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Boise, Idaho 83709
http://IdahoES.fws.gov

In Reply Refer To:
FWS/IR9/12/ES/IFWO/2022-0000581

17 February 2022

Peter J. Hartman
Division Administrator
Idaho Division
Federal Highway Administration
3050 Lakeharbor Lane, No. 126
Boise, Idaho 83703

Kelly Urbanek
Chief, Regulatory Division
Walla Walla District
U.S. Army Corps of Engineers
201 North 3rd Avenue
Walla Walla, Washington 99362

Subject: Programmatic Idaho Transportation Department Statewide Federal Aid, State, and Maintenance Actions – Consultation Package

Dear Peter Hartman and Kelly Urbanek:

This letter transmits the U.S. Fish and Wildlife Service's (Service) consultation package, including concurrences, conference concurrences, and biological opinion (Opinion), on the effects of the subject action to species and habitats listed under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.; [Act]). In an email dated on September 10, 2021 and received by the Service on September 13, 2021, the Federal Highway Administration and the Army Corp of Engineers (Corps) in cooperation with Idaho Transportation Department (ITD) and the Local Highway Technical Assistance Council (hereby Agencies) requested consultation under section 7 of the Act. Your letter included a biological assessment (Assessment) describing effects of the subject action to the species and critical habitats listed below:

- Bull trout (*Salvelinus confluentus*) and its designated critical habitat
- Snake River physa snail (*Haitia [Physa]natricina*)
- Bliss Rapids snail (*Taylorconcha serpenticola*)
- Northern Idaho ground squirrel (*Urocitellus brunneus*)
- Kootenai River white sturgeon (*Acipenser transmontanus*) and its designated critical habitat
- Banbury Springs lanx (*Idaholanx fresti*)
- Bruneau hot springsnail (*Pyrgulopsis bruneauensis*)
- Southern mountain caribou distinct population segment (DPS) (*Rangifer tarandus caribou*) and its designated critical habitat

- Grizzly bear (*Ursus arctos horribilis*)
- Canada lynx (*Lynx canadensis*) and its designated critical habitat
- Yellow-billed cuckoo (*Coccyzus americanus*) and its designated critical habitat
- Spalding's catchfly (*Silene spaldingii*)
- MacFarlane's four-o'clock (*Mirabilis macfarlanei*)
- Ute ladies'-tresses (*Spiranthes diluvialis*)
- Slickspot peppergrass (*Lepidium papilliferum*) and its proposed critical habitat
- Whitebark pine (*Pinus albicaulis*)
- Monarch butterfly (*Danaus plexippus plexippus*)

Through the Assessment, the Agencies determined that the subject action may affect, and is likely to adversely affect bull trout and its critical habitat, Snake River physa snail, Bliss Rapids Snail, and Northern Idaho ground squirrel. Our Opinion concludes that the subject action will not jeopardize the continued existence of bull trout, Snake River physa snail, Bliss Rapids Snail, and Northern Idaho ground squirrel, and will not destroy or adversely modify designated critical habitat for bull trout.

The Agencies also determined that the subject action may affect but is not likely to adversely affect Kootenai River white sturgeon and its designated critical habitat, Banbury Springs lanx, Bruneau hot springsnail, southern mountain caribou DPS and its designated critical habitat, grizzly bear, Canada lynx, yellow-billed cuckoo and its designated critical habitat, Spalding's catchfly, MacFarlane's four-o'clock, Ute ladies'-tresses, and slickspot peppergrass. The Service concurs with the Agencies' determinations and presents our rationale below.

In addition, the Agencies assessed the effects of the proposed action and made a not likely to jeopardize the continued existence of determination for whitebark pine and monarch butterfly. The Agencies also determined that the proposed action will not adversely modify slickspot peppergrass proposed critical habitat. The Agencies requested to conference on these two species and critical habitat and requested Service concurrence with these determinations. After reviewing the Assessment, we concur with your determination for whitebark pine, monarch butterfly, and slickspot peppergrass proposed critical habitat and present our rationale below.

Further, the Agencies determined that the proposed action will have no effect on Canada lynx critical habitat. The regulations implementing section 7 of the Act do not require the Service to review or concur with no effect determinations. However, the Service does appreciate being informed of your determination.

Clean Water Act

The enclosed concurrences and Opinion also address section 7 consultation requirements for the issuance of any project-related permits required under section 404 of the Clean Water Act. Use of the associated concurrences and Opinion to document that the Corps has fulfilled its responsibilities under section 7 of the Act is contingent upon the following conditions:

1. The action considered by the Corps in their 404 permitting process must be consistent with the proposed action as described in the Assessment such that no detectable difference in the effects of the action on listed species or its critical habitat will occur.
2. Any terms applied to the 404 permit must also be consistent with conservation measures as described in the Assessment and addressed in the concurrences and Opinion.

Thank you for your continued interest in the conservation of threatened and endangered species. A complete record of this consultation is on file at this office. If you have questions regarding this consultation, please contact Katie Powell at 208-378-5293.

Sincerely,

Sandra M. Fisher

for Christopher Swanson
State Supervisor

Enclosure

cc: NMFS, Boise (Lind)
ITD, Boise (Lowe, Terlizzi)
Corps (Skaar)
IDFG (Horsmon, Swearingen, Pozzanghera, Dawson, Johnson, Gray, Richards, Bassista)

CONSULTATION PACKAGE
FOR THE
STATE OF IDAHO'S
IDAHO TRANSPORTATION DEPARTMENT
STATEWIDE FEDERAL AID, STATE, AND MAINTENANCE ACTIONS

2022-0000581

U.S. FISH AND WILDLIFE SERVICE
IDAHO FISH AND WILDLIFE OFFICE
BOISE, IDAHO

Sandra M. Fisher
____
for Christopher Swanson
State Supervisor

Date _______17 February 2022___________

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1. BACKGROUND, INFORMAL CONSULTATION, AND CONFERENCE CONCURRENCE

1.1 Introduction

This document represents the U.S. Fish and Wildlife Service's (Service) consultation package (Package) including the concurrences, conference concurrences, and programmatic biological opinion (Opinion) on the effects of the Programmatic Idaho Transportation Department (ITD) Statewide Federal Aid, State, and Maintenance Actions (Program) to all threatened and endangered (listed) species in Idaho. In an email dated on September 10, 2021, and received by the Service on September 13, 2021, the Federal Highway Administration (FHWA) and the Army Corp of Engineers (Corps) in cooperation with ITD and the Local Highway Technical Assistance Council (LHTAC; hereby Agencies) requested informal consultation, conference concurrence, and formal consultation with the Service under section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.; [Act]). This Package is primarily based on the Agencies' biological assessment (Assessment) (ITD 2021, entire) titled, "Programmatic Biological Assessment Statewide Federal Aid, State and Maintenance Actions State of Idaho Transportation Department Districts 1-6 and the Local Highway Technical Assistance Council (LHTAC)" dated September 10, 2021, and other sources of information cited herein. The Assessment is incorporated by reference in this Package.

1.2 Analytical Framework

In accordance with the requirements of section 7(a)(2) of the Act and its implementing regulations, the formal consultation process culminates in the Service's issuance of an Opinion that sets forth the basis for a determination as to whether the proposed Federal action is likely to jeopardize the continued existence of listed species or to destroy or adversely modify critical habitat, as appropriate. The regulatory definition of jeopardy and a description of the formal consultation process are provided at 50 CFR[1] 402.2 and 402.14, respectively. If the Service finds that the action is not likely to jeopardize a listed species but anticipates that it is likely to cause incidental take of the species, then the Service must identify that take and exempt it from the prohibitions against such take under section 9 of the Act through an Incidental Take Statement.

1.2.1 Jeopardy Determination

Section 7(a)(2) of the 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

[1] The Code of Federal Regulations (CFR) is a codification of the general and permanent rules published in the Federal Register by Executive departments and agencies of the Federal government. More information can be found at http://www.ecfr.gov.

reproduction, numbers, or distribution of that species" (50 CFR 402.02). In accordance with policy and regulation, the jeopardy analysis in this Opinion relies on four components:

1. The Status of the Species, which evaluates the species' current rangewide 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 rangewide population is likely to persist while retaining the potential for recovery or is not viable;
2. The Environmental Baseline, which evaluates the condition of the species in the action area relative to its reproduction, numbers, and distribution; the factors responsible for that condition; and the relationship of the action area to the survival and recovery of the species;
3. 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
4. The 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, the jeopardy determination is made by evaluating the consequences of the proposed Federal action in the context of the species' current rangewide status, considering 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. The key to making this finding is clearly establishing the role of the action area in the conservation of the species as a whole, and how the effects of the proposed action, taken together with cumulative effects, are likely to alter that role and the continued existence (i.e., survival) of the species.

Interim recovery units were defined in the final listing rule for bull trout for use in completing jeopardy analyses (64 FR 58910). Subsequently, six recovery units (RUs) for the bull trout were defined in the final Recovery Plan for the Coterminous United States Population of Bull Trout (USFWS 2015f, entire). Pursuant to Service policy (USFWS 2006, *in litt.,* entire), 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 biological opinion 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 the bull trout in this biological opinion considers the relationship of the action area and affected core areas (discussed below under the Status of the Species section) to the RU and the relationship of the RU 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.

1.2.2 Destruction or Adverse Modification Determination

Section 7(a)(2) of the Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to destroy or to adversely modify designated critical habitat. A final rule revising the regulatory definition of "destruction or adverse modification of critical habitat" was published on August 27, 2019 (84 FR 44976). The final rule became effective on October 28, 2019 (84 FR 50333). The revised definition states: "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."

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

- The Status of Critical Habitat, which describes the rangewide condition of the critical habitat for the species in terms of the key components that provide for the conservation of the listed species, the factors responsible for that condition, and the intended value of the critical habitat overall for the conservation/recovery of the listed species;
- The Environmental Baseline, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the value of the critical habitat in the action area for the conservation/recovery of the species;
- The Effects of the Action, which determines the consequences of the proposed Federal action on the key components of critical habitat that provide for the conservation of the species, and how those impacts are likely to influence the conservation value of the affected critical habitat; and
- The Cumulative Effects, which evaluate the effects of future non-Federal activities that are reasonably certain to occur in the action area on the key components of critical habitat that provide for the conservation of the listed species and how those impacts are likely to influence the conservation value of the affected critical habitat.

For purposes of making the destruction or adverse modification determination, the Service evaluates if the consequences of the proposed Federal action on critical habitat, taken together with cumulative effects, when added to the current rangewide condition of critical habitat, are likely to impair or preclude the capacity of critical habitat in the action area to serve its intended function for the conservation of the listed species. The key to making that finding is clearly establishing the role of critical habitat in the action area relative to the value of critical habitat as a whole, and how the effects of the proposed action, taken together with cumulative effects, are likely to alter that role.

Past designations of critical habitat have used the terms "primary constituent elements" (PCEs), "physical or biological features" (PBFs), or "essential features" to characterize the key components of critical habitat that provide for the conservation of the listed species. The new critical habitat regulations discontinue use of the terms "PCEs" or "essential features" and rely exclusively on use of the term "PBFs" for that purpose because that term is contained in the statute. To be consistent with that shift in terminology and in recognition that the terms PBFs, PCEs, and essential habit features are synonymous in meaning, we are only referring to PBFs herein. Therefore, if a past critical habitat designation defined essential habitat features or PCEs, they will be referred to as PBFs in this document. This does not change the approach outlined above for conducting the "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features.

1.3 Consultation History

A chronology of this consultation is presented below. A complete decision record for this consultation is on file at the Service's Idaho Fish and Wildlife Office in Boise, Idaho.

Jul. 16, 2020	First working group meeting (ITD, National Marine Fisheries Service [NMFS], the Service, and ITD Consultant) was held to discuss the development of the Assessment.
Jul. 2020 – Apr. 2021	The Service attended multiple working group meetings and calls to discuss the development of the Assessment.
Nov. 3, 2020	ITD submitted the first draft of the Assessment to the Service and NMFS for review.
Dec. 2, 2020	The Service sent comments on the first draft of the Assessment to ITD.
Jan. 4, 2021	ITD submitted the second draft of the Assessment to the Service and NMFS for review.
Feb. 1, 2021	The Service sent comments on the second draft of the Assessment to ITD. The Service also provided new map for the grizzly bear.
Mar. 1, 2021	ITD submitted the third draft of the Assessment as well as a comment table to the Service and NMFS for review.
Mar. 31, 2021	The Service sent comments on the third draft of the Assessment to ITD.
May 4, 2021	ITD submitted the fourth draft of the Assessment as well as a comment table to the Service and NMFS for review.
May 25, 2021	The Service sent comments on the fourth draft of the Assessment to ITD.
Jul. 2, 2021	ITD submitted the fifth draft of the Assessment as well as a comment table to the Service and NMFS for review. This version contained completely rewritten Chapters 2 (Project Actions) and 5 (Effects), as well as new Best Management Practices (BMP) Appendices and Pre- and Post-Construction Forms.
Jul. 12, 2021	The Service sent comments on the fifth draft of the Assessment to ITD and included approval of the rewrite for Chapter 5 (Effects).

Aug. 30, 2021	ITD submitted the sixth and final draft of the Assessment as well as a comment table to the Service and NMFS for review.
Sept. 2, 2021	The Service sent notification that they had no further comments on the sixth and final draft of the Assessment.
Sept. 9, 2021	FHWA submitted the final draft of the Assessment to the Service to initiate formal consultation.
Sept.13, 2021	The Service sent an email to FHWA, the Corps, ITD, and others acknowledging receipt of the final Assessment and request for formal consultation. The email noted that formal and informal consultation and informal conference had been initiated.
Sept, 2021 – Feb. 2022	The Service worked internally to develop several drafts of the Package.
Feb. 17, 2022	The Service submitted the final Package to the Agencies.

1.4 Informal Consultation

The Agencies determined that the Program actions may affect but are not likely to adversely affect Kootenai River white sturgeon and its designated critical habitat, Banbury Springs lanx, Bruneau hot springsnail, southern mountain caribou distinct population segment (DPS) and its designated critical habitat, Canada lynx, yellow-billed cuckoo and its designated critical habitat, Spalding's catchfly, MacFarlane's four-o'clock, Ute ladies'-tresses, and slickspot peppergrass. The Service concurs with the Agencies' determinations and presents our rationale below.

1.4.1 Kootenai River White Sturgeon

Kootenai River white sturgeon occur in Boundary County, Idaho. The Assessment (p. 90, Figure 13) shows overlap between areas where sturgeon may occur and location of state or Federal roads and highways. Local roads administered by LHTAC are not shown in Figure 13, but it is assumed that they increase the probability of overlap because of their greater density in the action area. In-water work including bank stabilization, bridge maintenance below the Ordinary High-Water Mark (OHWM), and culvert work (installation, extension, and maintenance) conducted in sturgeon habitat may affect Kootenai River white sturgeon through sedimentation and exposure to chemical contaminants (Assessment, pp. 86-92).

No actions are authorized to occur below the OHWM in occupied sturgeon habitat, therefore avoiding any disturbance to individual sturgeon. The U.S. 95/ Kootenai River Bridge is the only Program-administered road near sturgeon habitat, but the bridge is too large to be considered in the proposed bridge-replacement Program. Bridge repair actions such as pile wraps and pier casing systems could occur here, but minimization measures such as coir logs, and sediment fences would reduce any impacts of sedimentation and chemical contamination to insignificant levels. Additionally, the Agencies will work with the Service to determine appropriate work windows prior to pile wraps and pier casing systems being used in this area. Sturgeon exposed to elevated sedimentation or turbidity levels may be temporarily displaced from preferred habitat or could potentially exhibit sublethal responses such as gill flaring, coughing, avoidance, and increases in blood sugar levels indicating some level of stress (Berg and Northcote 1985, pp. 1412-1416; Bisson and Bilby 1982, pp. 372-373; Sigler et al. 1984, pp. 146-150); (Servizi and Martens 1987, pp. 257-263). If chemical contaminants enter the water, these substances can adversely affect habitat, injure or kill aquatic food organisms, or directly impact white sturgeon. Petroleum-based contaminants such as fuel, oil, and some hydraulic fluids contain poly-cyclic aromatic hydrocarbons, which can cause chronic sublethal effects to aquatic organisms (Assessment, p. 91).

The primary source for sediment delivery is from resuspension of sediments occurring from in-water work activities within Kootenai River tributaries, which are not occupied sturgeon habitat. These redeposits typically settle out within 900 to 1200 feet (ft) downstream of in-water work activities and may reach the Kootenai River (Assessment, p. 91). However, any additional sediment which might be delivered to the Kootenai River would be insignificant relative to the size of the river and its existing sediment load. In addition, Kootenai River white sturgeon are adapted to high-sediment conditions in the Kootenai River (Assessment, p. 92). And although some Program activities will require heavy machinery, equipment will not enter flowing water, which limits the potential for chemical contamination to occur. Additionally, BMPs such as fuel spill and equipment leak contingencies and preventions outlined in Appendix A will be sufficient to minimize the risk of negative impacts to Kootenai River white sturgeon from toxic contamination related to accidental spills to insignificant levels. Any other actions proposed would occur on road segments that are greater than 1200 ft from designated sturgeon critical habitat; no impacts would occur to sturgeon at this distance.

Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, may affect, but is not likely to adversely affect Kootenai River white sturgeon. This concurrence is based on the following. No in-water maintenance actions are proposed in occupied sturgeon habitat. The U.S. 95/Kootenai River Bridge is the only location where a Program-administered road is directly adjacent to sturgeon habitat. All other maintenance locations will be greater than 1200 ft from sturgeon habitat. Best management practices will reduce the effects from any bridge repair or maintenance activities to an insignificant level. Sediment effects from in-water actions in tributaries that are not occupied by sturgeon are expected to be insignificant due to the distance of these locations from the river and relative to the size of the river and its existing sediment load.

1.4.2 Kootenai River White Sturgeon Critical Habitat

Kootenai River white sturgeon critical habitat occurs in Boundary County, Idaho. The Assessment (p. 90, Figure 13) shows overlap between the county where sturgeon critical habitat occurs and location of state or Federal roads and highways. Local roads administered by LHTAC are not shown in Figure 13, but it is assumed that they increase the probability of overlap because of their greater density in the action area. However, there are no in-water work actions that occur in designated sturgeon critical habitat.

Under the Act, the Service is required to identify the physical or biological features (PBFs) essential to the conservation of habitat, or areas occupied at the time of listing. PBFs are those specific elements that provide for a species' specific life-history processes and are essential to the conservation of the species. The PBFs of sturgeon critical habitat are: (1) water flow velocity; (2) water depth; (3) spawning temperature; (4) rocky substrates; and (5) sediment (Assessment, pp. 93-94) (FR 73 39513).

The only PBF that may be impacted by the proposed Program would be PBF 5 (sediment). Sediment may be delivered to sturgeon critical habitat from in-water work in nearby tributaries; however, the distance from tributary work to critical habitat is anticipated to be greater than 1200 ft. Any sediment reaching critical habitat would have insignificant effects to PBF 4 and PBF 5. Increased sediment in critical habitat can affect channel geomorphology, particularly the reduction or alteration of rocky substrates; the loss of rocky substrates can reduce the potential for successful adhesion and incubation of sturgeon eggs (73 FR 39506). Potential effects to PBF 4 and PBF 5 from on- or near-shore work are expected to be insignificant with full implementation of BMPs to control erosion (e.g., use of coir logs and sediment fences and no work during precipitation events or when precipitation is imminent). Program activities will have no effect on the other PBFs.

Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, may affect, but is not likely to adversely affect Kootenai River white sturgeon critical habitat. This concurrence is based on no in-water maintenance activities that are proposed in sturgeon critical habitat, and sediment effects to PBF 4 and PBF 5 from in-water work in tributaries to the Kootenai River which are expected to be insignificant due to the distance of these locations from the river.

1.4.3 Banbury Springs Lanx

Banbury Springs lanx populations are located in four isolated springs along the Snake River in Gooding County, Idaho. The Assessment (p. 110, Figure 16) shows overlap between the county where the Banbury Springs lanx may occur and the location of state and Federal roads and highways. Populations of lanx are not known to be near any Program-administered roads. Local roads administered by LHTAC are not shown in Figure 16, but it is assumed that they increase the probability of overlap because of their greater density in the action area. Given this overlap, Banbury Springs lanx and its habitat may be subject to the effects of LHTAC road maintenance activities. These activities could result in erosion and sediment delivery to the Snake River, its tributaries, or adjacent cold-water springs complexes. These effects can degrade or inundate habitat used by snails during all life history phases, could reduce food abundance, and may cause snail mortality. Although the proposed action could potentially affect lanx during Program implementation, utilization of BMPs will reduce impacts to discountable levels.

Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, may affect, but is not likely to adversely affect Banbury Springs lanx. This concurrence is based on the fact that populations of lanx are not known to be located in close proximity to any Program-administered action, and effects of Program activities will be avoided or minimized as a result of implementation of BMPs (Appendix A).

1.4.4 Bruneau Hot Springsnail

Bruneau hot springsnails are endemic to geothermal springs and seeps that occur along five miles of the Bruneau River, including portions of Hot Creek (a tributary to the Bruneau River), in southwest Idaho. Figure 17 (Assessment, p. 114) shows little to no overlap between areas where the Bruneau hot springsnail may occur and the locations of state or Federal roads and highways. Local roads administered by LHTAC are not shown in Figure 17, but it is assumed that they increase the probability of overlap because of their greater density in the action area.

Depending on the location, road maintenance activities as well as bridge construction, bank stabilization, and culvert replacement or extension could potentially affect habitat for the Bruneau hot springsnail, including springs, thermal springs, and seeps. Effects to this species from Program activities could impact all life history phases. Program activities have the potential to increase sedimentation and disturb aquatic species through noise and vibrations which can reduce food abundance and temporarily disturb or inundate springsnails. However, any potential effects of Program activities on local roads would be reduced to discountable levels with implementation of BMPs, such as erosion and sediment controls and pollution prevention techniques (Appendix A), which are designed to avoid or minimize adverse effects to aquatic species. In addition, all Program activities will be evaluated by the Service prior to implementation.

Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, may affect, but is not likely to adversely affect Bruneau hot springsnail. This concurrence is based on the limited extent and amount of potential habitat for the Bruneau hot springsnail within Idaho, as well as the location of Program activities that are not likely to occur in proximity to springsnail habitat. Any effects from Program activities will be minimized to discountable levels as a result of implementation of BMPs.

1.4.5 Southern Mountain Caribou

After emergency listings in 1983 (48 FR 1722 and 48 FR 49245), the Service issued a final rule listing the southern Selkirk Mountains population of woodland caribou as endangered in Idaho, Washington, and southeast British Columbia on February 29, 1984 (49 FR 7390). In October 2019, the Service published a final rule designating the southern mountain caribou distinct population segment (DPS) of woodland caribou as endangered under the Endangered Species Act (Act). The southern mountain caribou DPS is composed of 17 subpopulations (11 extant, 6 extirpated) (FR 84 52598).

Southern mountain caribou historically occurred in the northwest corner of Idaho; however, the last known caribou of the DPS from the South Selkirks and four caribou from the South Purcells were translocated to the larger Columbia North subpopulation in early 2019. Southern mountain caribou were last reported to cross the border in late 2018 when a bull and cow were sighted in northwest Montana. Previous radio-tracking data also indicated that a collared bull entered Washington for about 10 days in late 2014. Caribou presence in the action area is expected to be unlikely. In the unlikely event they do occur, it is anticipated they would be transient individuals and their presence temporary as all caribou that have wandered into the U.S. in the past have subsequently returned to Canada. We do not expect transient individuals to establish home ranges or migratory pathways in the action area or caribou analysis area.

Figure 18 (Assessment, p. 121) shows the potential overlap between areas where southern mountain caribou may occur and the location of state or Federal roads and highways. Local roads administered by LHTAC are not shown in Figure 18, but it is assumed that they increase the probability of overlap because of their greater density in the action area. The location of Program-administered roads and southern mountain caribou habitat do not overlap, and there will be no effect on southern mountain caribou habitat or individuals from road maintenance activities covered under this Program.

Any future efforts to reintroduce caribou will require intact, sufficient, and available habitat that meets caribou resource needs. Road-maintenance activities and road improvements (paving or widening) may affect caribou. Well-maintained roads likely result in an increase in the number of people recreating in caribou habitat and consequently, an increase in human disturbance effects on caribou. Human disturbance has been identified as a threat to caribou, which can increase physiological stress and energy expenditure and alter caribou habitat occupancy (FR 84 52598). Human disturbance forces caribou to use inferior habitat and can increase their risk of depredation (FR 84 52598). However, Program activities occurring on LHTAC-administered roads within caribou habitat will be assessed, and the Agencies will coordinate with the Service. If needed based on the assessment of habitat and occupancy, site-specific activities will be adapted to ensure the effects from proposed actions to southern mountain caribou will remain discountable.

Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, may affect, but is not likely to adversely affect southern mountain caribou. This concurrence is based on the very low probability of caribou occupancy within the action area as well as the location of ITD-administered roads and the lack of overlap to southern mountain caribou habitat. Human disturbance, although unlikely, could occur from road maintenance activities and road widening on LHTAC-administered roads. However, timely coordination with the Service will ensure that caribou are not present in the action area during road maintenance activities; any impacts from disturbance would be discountable.

1.4.6 Southern Mountain Caribou Critical Habitat

Designated critical habitat for the southern mountain caribou DPS consists of approximately 30,010 acres (ac) in (Boundary County) Idaho and portions of Washington (50 FR 52598). State or Federal roads and highways overlap caribou critical habitat (Assessment, p. 121 Figure 18). There is no overlap of Program administered roads and caribou critical habitat.

The Service identified the PBFs essential to the conservation of the southern mountain caribou DPS (77 FR 71042). Based on current knowledge of the species life-history processes and habitat characteristics, the Service determined that the PBFs specific to the southern mountain caribou DPS are:

PBF 1— Mature to old-growth western hemlock (*Tsuga heterophylla*)/western red cedar (*Thuja plicata*) climax forest, and subalpine fir (*Abies lasiocarpa*)/Engelmann spruce (*Picea* *engelmanni*) climax forest at least 5,000 ft in elevation; these habitats typically have 26–50% or greater canopy closure.

PBF 2— Ridge tops and high-elevation basins that are generally 6,000 ft in elevation or higher, associated with mature to old stands of subalpine fir/Engelmann spruce climax forest, with relatively open (approximately 50%) canopy.

PBF 3— Presence of arboreal hair lichens (*Bryoria spp.)*.

PBF 4— High-elevation benches and shallow slopes, secondary stream bottoms, riparian areas, and seeps, and subalpine meadows with succulent forbs and grasses, flowering plants, horsetails, willow, huckleberry, dwarf birch, sedges, and lichens. The southern mountain caribou DPS, including pregnant females, use these areas for feeding during the spring and summer seasons.

PBF 5— Corridors/Transition zones that connect the habitats described above. If human activities occur, they are such that they do not impair the ability of caribou to use these areas.

Caribou critical habitat does not overlap with any roads that are covered under this Program. However, local roads may connect with U.S. Forest Service (USFS) roads located in caribou critical habitat and maintaining those connective local roads may have effects to critical habitat by increasing traffic volume and recreational access. We do not anticipate effects to PBFs 1-4 because new roads and road upgrades are not proposed in critical habitat. Effects to PBF 5 through connectivity to USFS roads in critical habitat are expected to be discountable because of the lack of overlap between caribou critical habitat and roads administered under this Program.

Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, may affect, but is not likely to adversely affect southern mountain caribou DPS critical habitat. This concurrence is based on the location of ITD-administered roads and the lack of overlap to caribou critical habitat. Road maintenance activities on connecting local roads may affect caribou critical habitat but are expected to be discountable because any human disturbance effects would be avoided or minimized on an activity-specific basis.

1.4.7 Grizzly Bear

On July 28, 1975, the Service listed the grizzly bear as threatened in the lower 48 States under the Act (40 FR 31734). Grizzly bears may occur in several counties in Idaho. Figure 19 (Assessment, p. 137) shows the overlap between areas where the grizzly bear may occur and the location of state and Federal roads and highways. Local roads administered by LHTAC are not shown in Figure 19, but it is assumed that they increase the probability of overlap because of their greater density in the action area.

No new roads will be constructed as part of the Program actions, and the majority of activities will stay within the existing right-of-way (ROW). Acquiring slivers of ROW is possible when road-widening activities occur; however, these acquisitions would not displace or fragment grizzly bears from their habitat. Direct habitat loss due to the road footprint is not considered a major factor influencing grizzly bear populations (Proctor et al. 2018, p. 7). The amount of habitat impacted is limited to the ROW and potential small increases of the ROW area. Therefore, individual bears are not expected to be impacted by habitat loss or alteration. We consider two consequences of grizzly bear exposure to roads: (1) increased human-caused mortality of bears; and (2) reduced bear access to suitable habitat caused by bear avoidance or displacement, including fragmentation and loss of connectivity.

Increased mortality

Grizzly bears can become habituated to roads for a variety of reasons (e.g., subadult bears for refugia from aggressive males, low-cost travel corridor, or high-quality roadside forage). Habituated bears, most often sub-adults, are more likely to wander into areas of greater human presence and respond to attractants such as human food or garbage, which increases the likelihood of human-bear encounters. Bears that are not killed as a result of these human-bear conflicts may be removed from the area (i.e., management removal) and no longer contribute to the local wild population. Thus, road improvements that result in increased human presence, access, and road speed, may increase human-caused fatalities of individuals and decrease survival and reproductive rates of the wild population.

Bear and human interactions during maintenance activities will be reduced to discountable levels by implementing BMPs (Appendix A) that include food storage, trash removal, education, and awareness. Any improvements that lead to increases in speed or human access within areas where grizzly bear may be present will 1) include that information in the notification and the activity, 2) will be further evaluated for probability of grizzly bear presence, and if cannot be discounted, 3) will include documentation of nearby wildlife crossings that could be used by grizzly bears, and 4) include analysis of law enforcement or other speed control mechanisms. The Agencies will communicate with adjacent landowners or the Service prior to Program implementation to be aware of current grizzly bear activity in the area. If a grizzly bear enters the project area during maintenance or use, the IDFG and Service will be notified. If the activity analysis determines there may be significant effects to grizzly bears from improving the road, the activity will be consulted on separately.

Reduced Habitat Access and Connectivity

Road-maintenance activities will not result in substantial changes to grizzly bear forage or cover, because all work will occur along existing alignments and acquisition of only minor amounts of ROW associated with the primary action are allowed. Road-maintenance activities associated with the proposed action could potentially increase disturbance above the current baseline. Road use results in varying levels of grizzly bear avoidance and displacement. Research has repeatedly shown that grizzly bears generally tend to avoid all public access roads and that grizzly bears often adopt nocturnal use patterns where they do occur near public access roads. Foraging in suboptimal conditions (i.e., at night or in low visibility) affects bear’s feeding, fitness, and breeding and specifically include: (1) lessening forage efficiency (time spent foraging versus time spent in vigilance or flight); and (2) increasing intraspecific competition where resources are limited. Not all habitat avoidance results in adverse effects to grizzly bears. Grizzly bears are already likely avoiding habitats adjacent to many of these roads and additional displacement (i.e., long-term avoidance of habitat areas) on already paved roads is unlikely. If road-maintenance activities will result in increased speeds or access, they could occur to a level that creates new displacement and would be consulted on separately as discussed above.

Program actions will not affect grizzly bear denning habitat because they will all occur within existing ROWs (or small ROW acquisitions), where grizzly bears do not den. Grizzly bears usually dig dens on steep slopes (ranging from 30 to 60 degrees) where wind and topography cause an accumulation of deep snow and where the snow is unlikely to melt during warm periods (USFWS 2021, p. 46). Disturbance near denning habitat may be most consequential shortly after den emergence of a female with cubs. Females and their cubs remain in the den site area for several weeks after emergence from dens (USFWS 2021, p. 41). Females with cubs have high energetic needs, and cubs have limited mobility for several weeks after leaving the den. Disturbance levels displace females with cubs after den emergence could impair the fitness of the female and safety of the cubs. If cubs attempt to follow their mother, they will likely experience decreased fitness and the family group may be pushed to less suitable habitat. After den emergence in spring, grizzly bears seek sites that melt snow early and produce green vegetation (Kasworm et al. 2020, p. 35). Increased speeds or use on roads could fragment habitat such that female grizzly bears with cubs are not easily able to access spring habitat could also result in decreased fitness of females and cubs. However, program activities are not expected to disturb females with cubs shortly after den emergence because weather and soil conditions at that time of year (e.g. existing snow cover, saturated soils due to snowmelt) would likely limit the ability to accomplish the proposed maintenance activities.

Roads can reduce the total amount of seasonal habitat available, which may force grizzly bears to travel further to find suitable habitat and potentially compete with other bears. Females that have to travel further to find suitable habitat may have increased stress or decreased nutritional status, which may reduce reproductive fitness. This avoidance and need for alternate travel pathways may be passed down to cubs and extend the length of fitness consequences to future generations.

While connectivity does not appear to be impeding at least occasional male transients, females, especially those with cubs, typically disperse in more risk-averse ways. As populations expand, human development is also increasing, including improving road capacity and density. Roads without wildlife crossings can isolate grizzly bears, forcing them to travel through areas of higher risk of injury or death to meet their life history needs and reducing demographic and genetic exchange opportunities. Inter-ecosystem connectivity is an important component of grizzly bear current and future conditions (USFWS 2021, p. 13). Displacement from preferred habitats may significantly modify normal grizzly bear behavioral patterns and contribute to isolation of populations by acting as barriers to movement. Grizzly bears may still attempt to navigate high-risk areas where they are interspersed with high-quality habitat. The consequences of high route densities on grizzly bear populations depends on the type of motorized routes, proximity to population centers, and increased potential fatalities from human-bear conflict. Because the proposed activities are occurring on already existing roads, we anticipate only minor impediments to grizzly bear movement from activities that increase speed or human access. Any impacts to habitat access and connectivity will be reduced to discountable levels.

Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, may affect, but is not likely to adversely affect grizzly bear. This concurrence is based on activities occurring on already existing roads, food storage and sanitation measures, no new roads being constructed in grizzly bear habitat, and separate consultation on any Program activities that could increase speed or human access in grizzly bear habitat. Any effect to grizzly bear forage and cover will be avoided or minimized to discountable levels as a result of implementation of staying within the existing ROWs. Additionally, effects to grizzly bear access to habitat and connectivity will be avoided and minimized to discountable levels as a result of implementation of BMPs (e.g., site-specific food storage requirements, separately consulting on increased speed or human access).

1.4.8 Canada Lynx

The Service published a proposed rule on July 8, 1998 to list the lynx under the Act (63 FR 36994). On March 24, 2000, the Service published the final rule listing the Contiguous U.S. DPS as a threatened species in forested portions of the States of Colorado, Idaho, Maine, Michigan, Minnesota, Montana, New Hampshire, New York, Oregon, Utah, Vermont, Washington, and Wisconsin (65 FR 16052). Canada lynx may occur in several counties throughout Idaho. Lynx are considered residents in the Purcell, Selkirk, and Cabinet mountain ranges in the State's northern panhandle (i.e., Boundary and Bonner Counties) (Assessment, p. 146). Outside of these areas, lynx primarily use other Idaho areas for dispersal and are not resident. Figure 20 (Assessment, p. 149) shows the overlap between areas where lynx may occur and the location of state and Federal roads and highways. Local roads administered by LHTAC are not shown in Figure 20, but it is assumed that they increase the probability of overlap because of their greater density in the action area.

Program activities such as road improvements may increase traffic speed in lynx habitat or increase noise that could result in impacts such as temporary displacement or an increased likelihood of collisions. However, it is unlikely that lynx will occur in the immediate action area because adjacent habitat is likely available for lynx to use to avoid disturbance during Program implementation. Effects from displacement or a potential increase in the likelihood of collision may occur but would be discountable because lynx are not likely to travel nearby. In the unlikely event a lynx did travel nearby, the effects from road improvements would be insignificant.

Additionally, resident, reproducing lynx are not known to exist in Idaho near any state or Federal highways; therefore, maintenance, improvements, widening, and potential for increased use of roads will not occur near occupied resident lynx habitat. Further, Program actions are not expected to alter any lynx foraging or denning habitat or result in changes to lynx prey diets. Therefore, effects to resident, reproducing lynx from these Program actions is not likely and effects would be discountable.

In other areas where transient lynx may be present, effects may occur from habitat alteration from road maintenance activities. However, any vegetation removal as a result of Program actions will be small in scale and short in duration and is not expected to measurably change the amount of suitable habitat available for transient lynx. Additionally, BMPs, such as documenting known lynx locations and identifying opportunities to accommodate connectivity during Program implementation, will be implemented to reduce any effects to Canada lynx insignificant levels (Appendix A).

Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, may affect, but is not likely to adversely affect Canada lynx. This concurrence is based on the unlikely event that lynx will occur in the immediate vicinity of any maintenance actions, and if they did occur, any potential effects would be impossible to measure compared to baseline conditions. Program actions are not expected to alter any lynx foraging or denning habitat or result in changes to lynx prey diets. Impacts from noise or collision are expected to be discountable or insignificant, depending on activity location and timing. Habitat alterations could occur in lynx habitat; however, any effects are expected to be insignificant, because the proposed actions will be spatially limited and of short duration.

1.4.9 Yellow-billed Cuckoo

Western yellow-billed cuckoo can occur throughout Idaho primarily as transients, but in eastern Idaho, nesting has been documented (Assessment, pp.161-164). The most recent statewide assessment estimated the breeding population in Idaho to no more than 10 to 20 breeding pairs in the Snake River Basin (Reynolds, Timothy D., Hinckley, Chad I. 2005, p. 7). Figure 22 (Assessment, p. 164) shows the overlap between areas where the yellow-billed cuckoo may occur and the location of state and Federal roads and highways. Local roads administered by LHTAC are not shown in Figure 22, but it is assumed that they increase the probability of overlap because of their greater density in the action area.

The primary threat to the western yellow-billed cuckoo in Idaho is the loss and degradation of riparian habitat that is used for nesting, perching, and foraging. Program actions that could lead to loss of cuckoo habitat include mechanical removal and thinning of riparian vegetation during two-lane bridge construction, excavation, and embankment for roadway construction, passing lane construction, and bank stabilization. Additionally, surface disturbing activities can result in soil compaction and loss of vegetative cover required by cuckoos. Soil disturbance may also increase the abundance of invasive non-native plant species into cuckoo habitat, which may degrade habitat quality. However, vegetation treatments will occur on small scales, and Program activities are not likely to reduce the overall availability of habitat used by yellow-billed cuckoos. Additionally, there are several BMPs in place, such as preserving native vegetation and reclaiming disturbed areas with similar vegetation communities, to minimize effects to riparian vegetation (Appendix A) which will reduce any impacts to yellow-billed cuckoo habitat to insignificant levels.

Additionally, Program actions have the potential to directly impact individuals through disturbance depending on their individual nature, timing, and location. For example, maintenance of roads can facilitate increased human disturbance into wildlife habitat, including the riparian corridors inhabited by yellow-billed cuckoos. Increased human disturbance in cuckoo habitat can lead to temporary displacement and avoidance of high-quality nesting and foraging habitat. BMPs are in place, such as conducting pre-project surveys for cuckoos when activities are proposed within or adjacent to critical habitat, to reduce impacts of Program actions to insignificant levels.

Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, may affect, but is not likely to adversely affect yellow-billed cuckoo. This concurrence is based on Program activities that are not likely to reduce the availability of nesting, perching, or foraging habitat for this species. Also, because cuckoos in most of the state are transient or migrant individuals, and the estimated breeding population in Idaho is likely limited to no more than 10 to 20 breeding pairs in the eastern Snake River Basin, the proposed Program actions are likely to have insignificant effects on the yellow-billed cuckoo as a result of implementation of BMPs.

1.4.10 Yellow-billed Cuckoo Critical Habitat

On April 21, 2021, the Service issued a final rule designating 298,845 ac of critical habitat for western yellow-billed cuckoo DPS, including 21,445 ac within 3 units in Idaho (86 FR 20798). The Assessment (p. 164, Figure 22) shows the overlap between the counties where yellow-billed cuckoo critical habitat occurs and location of state or Federal roads and highways. Local roads administered by LHTAC are not shown in Figure 22, but it is assumed that they increase the probability of overlap because of their greater density in the action area.

The Service considers the following PBFs essential to the conservation of western yellow-billed cuckoo and may require special management considerations or protection.

PBF 1— Rangewide breeding habitat - Riparian woodlands. This PBF includes breeding habitat found throughout the DPS range. Rangewide breeding habitat is composed of woodlands within floodplains or in upland areas or terraces often greater than 325 ft in width and 200 ac or more in extent with an overstory and understory vegetation component in contiguous or nearly contiguous patches adjacent to intermittent or perennial watercourses. The slope of the watercourses is generally less than 3% but may be greater in some instances. Nesting sites within the habitat have an above average canopy closure (greater than 70%), and have a cooler, more humid environment than the surrounding riparian and upland habitats.

PBF 2— Adequate prey base. Presence of prey base consisting of large insect fauna (for example, cicadas, caterpillars, katydids, grasshoppers, large beetles, dragonflies, moth larvae, spiders), lizards, and frogs for adults and young in breeding areas during the nesting season and in post breeding dispersal areas.

PBF 3— Hydrologic processes, in natural or altered systems, that provide for maintaining and regenerating breeding habitat. This PBF includes hydrologic processes found in rangewide breeding habitat as well as additional hydrologic processes unique to the Southwest in southwestern breeding habitat:

The Service defines designated critical habitat for yellow-billed cuckoo as areas that contain at least PBF 1. Based on use of the areas as breeding, the Service concludes that all areas identified contain all or most of the PBFs, but in some cases, these features are less prevalent, or their presence is variable over time due to the changing nature of habitat from hydrologic processes.

Program actions that may affect PBFs 1 and 2, include actions that would temporarily or permanently destroy or alter western yellow-billed cuckoo critical habitat which could in turn alter the prey base for individual cuckoos. Such activities could include, but are not limited to, discharge of fill material and stream channelization from bank stabilization actions and bridge construction. These activities could permanently eliminate available riparian habitat and food availability or degrade the general suitability, quality, structure, abundance, longevity, and vigor of riparian vegetation and microhabitat components necessary for nesting, migrating, food, cover, and shelter. Effects to PBFs 1 and 2 are expected to be insignificant because there are BMPs, such as preserving native vegetation and reclaiming disturbed areas with similar vegetation communities, to minimize effects to riparian vegetation (Appendix A) that will be implemented to reduce impacts to the riparian habitat and subsequently the prey base needed by western yellow-billed cuckoos. Additionally, activities that occur within or adjacent to critical habitat will require surveys by a qualified biologist prior to implementation (Appendix A).

Program actions that may affect PBF 3 include actions that would temporarily or permanently alter hydrologic processes. Such activities could include, but are not limited to, placement of fill into wetlands or streams and any work that occurs under the OHWM. Effects to PBF 3 are expected to be insignificant because there are BMPs (Appendix A) for each of these Program actions that will be implemented to reduce impacts to hydrologic processes needed by yellow-billed cuckoos. Additionally, activities that occur within or adjacent to critical habitat will require surveys by a qualified biologist prior to implementation.

Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, may affect, but is not likely to adversely affect yellow-billed cuckoo critical habitat. This concurrence is based on effects from Program actions being reduced to insignificant levels through surveys completed by a qualified biologist and implementation of BMPs.

1.4.11 Spalding's Catchfly

Spalding's catchfly is known to exist in four counties in Idaho (Idaho, Latah, Lewis, and Nez Perce). Figure 23 (Assessment, p. 174) shows the potential overlap between areas where Spalding's catchfly occurs and the location of state and Federal highways and roads. Potential habitat for Spalding's catchfly may also be located in surrounding counties, but no known locations have been identified outside of the counties listed above. Local roads administered by LHTAC are not shown in Figure 23, but it is assumed that they increase the probability of overlap because of their greater density in the action area.

Spalding's catchfly may exist on or adjacent to highway ROW, and unknown individuals or populations could be at risk from road-maintenance activities (note: ROW maintenance activities such as mowing and herbicide use are not covered under this Program). Road construction and maintenance (e.g., two-lane bridge construction, excavation and embankment for roadway construction, road widening, bank stabilization, and geotechnical drilling) in Spalding's catchfly habitat may impact Spalding's catchfly by crushing plants, burying seeds, and covering plants with soil or dust. However, impacts to known populations or suitable habitats from road maintenance activities can be avoided, because species surveys will be performed by a qualified botanist knowledgeable about the species prior to Program implementation. This will reduce effects from Program actions to the species to discountable levels.

Additional effects from Program actions include the spread of invasive non-native plants, impacts to pollinators, and increased risk of wildfire ignition and severity of wildfires from increased densities of invasive non-native plants. These effects could result in mortality to individual plants, reduced seed production, and reduced contribution to population level seed banks. However, the following BMPs will be incorporated to minimize effects to Spalding's catchfly to discountable levels:

1. When activities take place within suitable habitat, species surveys will be conducted by a qualified botanist during the appropriate survey period;
2. Areas with known plants or unsurveyed suitable habitat will be marked on the ground with stakes and flagging in order to ensure these areas are avoided for equipment staging and Program activities;

3. During Program implementation, a botanist consultant will be onsite to ensure BMPs are being implemented as described; and
4. Ensure that all equipment is cleaned (weed free) prior to arriving at the project site in order to reduce the potential for introducing or spreading noxious weeds.
5. See Appendix A for Personnel Qualifications and Survey Protocols.

Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, may affect, but is not likely to adversely affect Spalding's catchfly. This concurrence is based on the high likelihood that impacts to this species can be avoided, and the implementation of BMPs will reduce impacts of the Program actions to discountable levels.

1.4.12 MacFarlane's Four-O'clock

The entire geographic range of MacFarlane's four-o'clock falls within the canyon grasslands ecosystem of northeastern Oregon (Wallowa County) and northwestern Idaho (Idaho County) (USFWS 2009a, p. 6). There are 13 known Elemental Occurrences (EOs) of MacFarlane's four-o'clock: nine in Idaho and four in Oregon (USFWS 2009a, p. 5). An EO is the distinct geographic location where a species occurs. Figure 24 (Assessment, p. 181) shows the potential overlap between areas where MacFarlane's four-o'clock may occur and the location of state and Federal highways and roads. Local roads administered by LHTAC are not shown in Figure 24, but it is assumed that they increase the probability of overlap because of their greater density in the action area.

MacFarlane's four-o'clock may occur on or adjacent to highway ROW, and unknown individuals or populations could be affected by road-maintenance activities (note: ROW maintenance activities such as mowing and herbicide use are not covered under this Program). Road-maintenance activities in MacFarlane's four-o'clock habitat may impact the species by crushing plants, burying seeds, and covering plants with soil or dust. Impacts to known populations or suitable habitats from road maintenance activities can be avoided, because species surveys will be performed by a qualified botanist knowledgeable about the species prior to Program implementation. This will reduce effects from Program actions to the species to discountable levels.

Additional effects include spread of invasive non-native plants, impacts to pollinators, and increased risk of wildfire ignition and severity of wildfires from increased densities of invasive non-native plants. These effects could result in mortality to individual plants, reduced seed production, and reduced contribution to population level seed banks. The following BMPs will be incorporated into the Program to minimize effects to MacFarlane's four-o'clock to discountable levels:

1. When activities take place within suitable habitat, species surveys will be conducted by a qualified botanist during the appropriate survey period;
2. Areas with known plants or unsurveyed suitable habitat will be marked on the ground with stakes and flagging in order to ensure these areas are avoided for equipment staging and Program activities;

3. During Program implementation, a botanist consultant will be onsite to ensure BMPs are being implemented as described; and
4. Ensure that all equipment is cleaned (weed free) prior to arriving at the project site in order to reduce the potential for introducing or spreading noxious weeds.
5. See Appendix A for Personnel Qualifications and Survey Protocols.

Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, may affect, but is not likely to adversely affect MacFarlane's four-o'clock. This concurrence is based on the high likelihood that impacts to this species can be avoided, and implementation of BMPs will reduce impacts of the Program actions to discountable levels.

1.4.13 Ute Ladies'-tresses

Ute ladies'-tresses was first discovered in Idaho in 1996 along the South Fork of the Snake River in Jefferson, Madison, and Bonneville Counties (Moseley 1997, p. 1). Currently, there are 24 populations representing eight EOs: four populations are found on USFS lands, 16 on Bureau of Land Management (BLM) lands, and four on private lands. Approximately 3,117 plants were counted in Idaho during 2009 census work (USFWS 2017a, p. 13). Figure 25 (Assessment, p. 186) shows the potential overlap between areas where Ute ladies'-tresses may occur and the location of state and Federal highways and roads. Local roads administered by LHTAC are not shown in Figure 25, but it is assumed that they increase the probability of overlap because of their greater density in the action area.

Typically, Ute ladies'-tresses occurs in stable wetland and seep areas within historical floodplains of major rivers. Because of the cryptic nature (up to 10-year dormancy) of this species' life history and the relatively broad characterization of potential habitat throughout its large range, it is impossible to rule out the possibility that new populations may be found in areas within or adjacent to highway ROW and be impacted by proposed actions covered under this Program. Virtually all known Ute ladies'-tresses occurrences in Idaho are, or at one time were, associated with the Snake River floodplain in early to mid-seral riparian habitats and are unlikely to be located adjacent to Program-administered roads. Impacts to known populations or suitable habitats from road maintenance activities can be avoided, because species surveys will be performed by a qualified botanist knowledgeable about the species prior to Program implementation. This will reduce effects from Program actions to the species to discountable levels.

Additional effects include spread of invasive non-native plants and impacts to pollinators. These effects could result in mortality to individual plants, reduced seed production, and reduced contribution to population level seed banks. The Service will evaluate all activities prior to implementation, and the following BMPs will be incorporated into the Program to minimize effects to Ute ladies'-tresses to discountable levels:

1. When activities take place within suitable habitat, species surveys will be conducted by a qualified botanist during the appropriate survey period;
2. Areas with known plants or unsurveyed suitable habitat will be marked on the ground

with stakes and flagging in order to ensure these areas are avoided for equipment staging and Program activities;

3. During Program implementation, a botanist consultant will be onsite to ensure BMPs are being implemented as described; and
4. Ensure that all equipment is cleaned (weed free) prior to arriving at the project site in order to reduce the potential for introducing or spreading noxious weeds.
5. See Appendix A for Personnel Qualifications and Survey Protocols.

Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, may affect, but is not likely to adversely affect Ute ladies'-tresses. This concurrence is based on the high likelihood that impacts to this species can be avoided, and implementation of BMPs will reduce impacts of the Program actions to discountable levels.

1.4.14 Slickspot Peppergrass

Slickspot peppergrass occurs in southwestern Idaho in Ada, Canyon, Gem, Elmore, Payette, and Owyhee Counties. There are 115 extant slickspot peppergrass EOs and subEOs (USFWS 2020, p. 7). This represents an increase in the number of occupied EOs since the 2009 final Listing Rule (74 FR 52014), when 80 extant slickspot peppergrass EOs were known. In the case of slickspot peppergrass, EOs are groups of slickspot peppergrass plants that all occur within 0.6 miles (mi) of each other; that is, all slickspot peppergrass plants within a 0.6-mile distance of one another are aggregated into a single EO (85 FR 44584).

Surveys have resulted in the discovery of new EOs (17 since 2009), the expansion of some existing EOs, and, in some cases, merging of EOs, if occupied slick spots of expanded EOs occur within 0.6 miles of other EOs. The total area of known extant EOs and subEOs from July 2018 IFWIS data is about 16,279 ac. Figure 26 (Assessment, p. 195) shows overlap between areas where slickspot peppergrass may occur and the location of state and Federal highways and roads. Local roads administered by LHTAC are not shown in Figure 26, but it is assumed that they increase the probability of overlap because of their greater density in the action area.

Slickspot peppergrass may exist on or adjacent to highway ROW, and unknown individuals or populations could be affected by Program actions (note: ROW maintenance activities such as mowing and herbicide use are not covered under the Program). Road maintenance activities that occur in slickspot peppergrass habitat may impact the species by crushing plants, burying seeds, and covering plants with soil or dust. Additional effects include spread of invasive non-native plants, damage to or loss of slickspots, wind or water facilitated soil or dust deposition on slickspots, impacts to pollinators, and increased risk of wildfire ignition and severity of wildfires from increased densities of invasive non-native plants. These effects could result in mortality to individual plants, reduced seed production, and reduced contribution to population level seed banks (USFWS 2020, pp. 64-72). However, the following BMPs will be incorporated into Program actions to minimize all effects to slickspot peppergrass to discountable levels:

1. When activities take place within suitable habitat, species surveys will be conducted by a qualified botanist during the appropriate survey period;

2. Areas with known plants or unsurveyed suitable habitat will be marked on the ground with stakes and flagging in order to ensure these areas are avoided for equipment staging and Program activities;
3. During Program implementation, a botanist consultant will be onsite to ensure BMPs are being implemented as described; and
4. Ensure that all equipment is cleaned (weed free) prior to arriving at the project site in order to reduce the potential for introducing or spreading noxious weeds.
5. See Appendix A for Personnel Qualifications and Survey Protocols.

Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, may affect, but is not likely to adversely affect slickspot peppergrass. This concurrence is based on the high likelihood that impacts to this species can be avoided, and implementation of BMPs will reduce impacts of the Program actions to discountable levels.

1.4.15 Conclusion

This concludes informal consultation. Further consultation pursuant to section 7(a)(2) of the Act is not required. Reinitiation of consultation on this action may be necessary if: (1) new information reveals effects of the action that may affect the listed species or critical habitat in a manner or to an extent not considered in the assessment; (2) the action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the analysis; or (3) a new species is listed or critical habitat is designated that may be affected by the proposed action.

1.5 Conference Concurrence

The Agencies assessed the effects of the Program actions and made a not likely to jeopardize the continued existence of determination for whitebark pine and monarch butterfly. The Agencies also determined that the proposed action will not adversely modify slickspot peppergrass proposed critical habitat. The Agencies requested to conference on these two species and critical habitat and requested Service concurrence with these determinations. After reviewing the Assessment, we concur with your determination for whitebark pine, monarch butterfly, and slickspot peppergrass proposed critical habitat and present our rationale below.

1.5.1 Whitebark Pine

The current range of whitebark pine occurs in scattered areas of the Great Basin but is most typically found on cold and windy high-elevation or high-latitude sites in western North America. In general, the upper elevational limits of whitebark pine decrease with increasing latitude throughout its range (Assessment, p. 202). In central Idaho, whitebark pine occurs predominately at elevations greater than 8,600 ft. Banner Summit in Boise and Custer Counties

(7,056 ft) on SH-21 and Lost Trail Pass on US-93 in Lemhi County (7,014 ft) are at lower elevations than where the USFS has found this tree occurring, and tree species at these passes are composed of lodgepole pine (*Pinus contorta*) and subalpine fir (Assessment, p. 202). The highest mountain pass in Idaho and the only pass in Idaho where whitebark pine trees and habitat currently exist near Program-administered roads is on SH-75 at Galena Summit in Blaine County (8,701 ft). In North Idaho, whitebark pines are typically found above 5,800 ft to 5,900 ft, but they have been found as low as 5,300 ft in the coldest locations. They are not expected to occur below an elevation of 5,000 ft. State managed highway routes are generally below 5,000 ft in North Idaho, and Program actions are unlikely to impact the species (Assessment, pp. 205-206). Figure 27 (Assessment, p. 204) shows potential overlap between areas where whitebark pine may occur and the location of state and Federal highways and roads. Local roads administered by LHTAC are not shown in Figure 27, but it is assumed that they increase the probability of overlap because of their greater density in the action area.

Soil disturbance from road maintenance activities such as road widening and bank stabilization in whitebark pine habitat can result in increased introduction/establishment of invasive plants, resulting in reduced competitive success of whitebark pine (USFWS 2018a, p. 137). Soil disturbance associated with road maintenance activities may damage or kill whitebark pine seedlings (i.e., heavy equipment can crush seedlings). Use of heavy equipment can also compact soil, resulting in impacts to whitebark pine root structure and erosion during rain events that may impact the whitebark pine seedbank. Additionally, equipment can increase the risk of wildfire ignition in whitebark pine habitat. For, BMPs will be incorporated into the Program to minimize all effects to whitebark pine to discountable levels for activities that occur in whitebark pine habitat at Galena Summit, on passes above 5,000 in North Idaho, or in areas where local roads are in whitebark pine habitat.

Best Management Practices to minimize effects to whitebark pine include:

1. Species surveys will be conducted by a qualified botanist when activities take place within suitable habitat;
2. Areas with known plants or unsurveyed suitable habitat will be marked on the ground with stakes and flagging in order to ensure these areas are avoided for equipment staging and Program activities;
3. A botanist consultant will be onsite to ensure BMPs are implemented as described during Program implementation; and
4. Ensure that all equipment is cleaned (weed free) prior to arriving at the project site in order to reduce the potential for introducing or spreading noxious weeds into the species' habitat.
5. See Appendix A for Personnel Qualifications and Survey Protocols.

Conference Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, is not likely to jeopardize the continued existence of whitebark pine. This concurrence is based on the high probability that impacts to this species can be avoided, and implementation of BMPs will reduce impacts of the Program actions to discountable levels. Although the Act does not require conferencing on proposed species, the Agencies assessed the effects of the proposed action to whitebark pine and requested a conference. Therefore, this section shall serve as our conference concurrence that the proposed action is not likely to adversely affect whitebark pine. If whitebark pine is listed under the Act during the term of this action and there have been no significant changes that could warrant reanalysis of effects to whitebark pine, the Agencies should contact the Service in writing to affirm the validity of the conference concurrence and request it be adopted as a standard concurrence to ensure continued coverage under the Act.

1.5.2 Monarch Butterfly

Monarch butterflies are found throughout North America to southern Canada (up to about 50° N latitude), but are uncommon in western Washington, northwest Oregon, and western British Columbia, where native milkweeds are currently and generally absent (WAFWA 2019, p. 7). Once widespread and common throughout its range, monarch populations have undergone significant declines. The western population of monarchs that breeds west of the Rocky Mountains and largely overwinters in coastal California has declined 74% since the late 1990s (WAFWA 2019, p. 2).

Monarch habitat is often described in terms of breeding, migratory, and overwintering habitats (WAFWA 2019, p. 14). Breeding habitat essentially features native milkweeds to provide food for larvae and other flowers to provide nectar for adults but may also include trees or shrubs for shading and roosting, and connectivity among these habitat elements. Migratory habitat consists of nectar plants for adults during spring and fall migration and, in some locales, trees for roosting (Assessment, p. 209). Breeding and migratory habitats are often synonymous since they contain the same key components (milkweed, nectar sources, and roosting structure) that sustain monarch reproduction and migration.

Figure 28 (Assessment, p. 216) shows potential overlap between areas where monarchs and milkweed may occur and the location of state and Federal highways and roads. Local roads administered by LHTAC are not shown in Figure 28, but it is assumed that they increase the probability of overlap because of their greater density in the action area. As shown by Figure 28, monarchs can be found throughout Idaho and use suitable habitat such as low-growing, early successional vegetation with milkweed or flowering plants for breeding and migratory stopover areas. According the WAFWA (WAFWA 2019, p. 79), the Snake River Plain is considered a significant breeding area for monarchs.

Highway maintenance and construction activities involving ground disturbance or vegetation removal (e.g., two-lane bridge construction, excavation and embankment for roadway construction, roadway widening, small structure repair, and culvert installation and maintenance) in areas of suitable monarch habitat may adversely affect monarch butterflies by removing or disturbing milkweed and blooming flowering nectar resources. Off-road access, vegetation management, and construction activities may indirectly harm monarchs if they result in major disturbance to foraging habitats. Additionally, direct mortality of immature or adult monarchs may also occur from collisions with vehicles, especially in areas where traffic speeds and volumes are high (Cardno 2020, p. 24).

Monarchs may be present on or adjacent to highway ROW, and unknown individuals or populations could be at risk from road maintenance activities. Right-of-way maintenance activities such as mowing and herbicide use are not covered under the Program. The following

BMPs are in place to reduce impacts to monarchs to insignificant levels:

1. In areas where milkweed and monarchs may be present, surveys for milkweed and flowering nectar plants will be conducted by a qualified botanist;
2. If suitable monarch habitat (milkweed and nectar sources) is found, these areas will be marked on the ground with stakes and flagging in order to ensure these areas are avoided for equipment staging and Program implementation activities;
3. During Program implementation, a monitor will be onsite to ensure BMPs are being implemented as described; and
4. Ensure that all equipment is cleaned (weed free) prior to arriving at the project site in order to avoid introducing or spreading noxious weeds into monarch habitat.
5. See Appendix A for Personnel Qualifications and Survey Protocols.

Conference Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, is not likely to jeopardize the continued existence of the monarch butterfly. This concurrence is based on ROW maintenance activities such as mowing and herbicide use are not covered under the Program, and that implementation of BMPs will reduce impacts of the Program actions to monarch butterfly to insignificant levels. Although the Act does not require conferencing on candidate species, the Agencies assessed the effects of the proposed action to monarch butterfly and requested a conference. Therefore, this section shall serve as our conference concurrence that the proposed action is not likely to adversely affect monarch butterfly. If the monarch butterfly is listed under the Act during the term of this action and there have been no significant changes that could warrant reanalysis of effects to monarch butterfly, the Agencies should contact the Service in writing to affirm the validity of the conference concurrence and request it be adopted as a standard concurrence to ensure continued coverage under the Act.

1.5.3 Slickspot Peppergrass Proposed Critical Habitat

The Service proposed to designate critical habitat for slickspot peppergrass on May 10, 2011. The proposed designation was revised on February 12, 2014 (79 FR 8402). The most recent revision occurred on July 23, 2020, when the Service proposed to designate 42,129 ac of critical habitat in Ada, Elmore, Gem, Payette, Owyhee Counties in southwestern Idaho (85 FR 44584). Figure 26 (Assessment, p. 195) shows overlap between areas where slickspot peppergrass proposed critical habitat may occur and the location of state and Federal highways and roads. Local roads administered by LHTAC are not shown in Figure 26, but it is assumed that they increase the probability of overlap because of their greater density in the action area.

Based on current knowledge of habitat characteristics required to sustain the species' life-history processes, the Service determined that the PBFs of critical habitat specific to slickspot peppergrass are:

1. Ecologically functional microsites or "slick spots" that are characterized by:
   a. High sodium and clay content, and a three-layer soil horizonation sequence, for successful seed germination, seedling growth, and maintenance of the seed bank. The surface horizon consists of a thin, silty, vesicular, pored (small cavity) layer

that forms a physical crust (the silt layer). The subsoil horizon is a restrictive clay layer with an abruptic (referring to an abrupt change in texture) boundary with the surface layer, that is natric or natric-like in properties (a type of argillic (clay-based) horizon with distinct structural and chemical features) (the restrictive layer). The second argillic subsoil layer (that is less distinct than the upper argillic horizon) retains moisture through part of the year (the moist clay layer); and

b. Sparse vegetation, with introduced, invasive, non-native plant species cover absent or limited to low to moderate levels.

2. Relatively intact, native Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) vegetation assemblages, represented by native bunchgrasses, shrubs, and forbs, within 820 ft of slickspot peppergrass EOs to protect slick spots and slickspot peppergrass from disturbance from wildfire, slow the invasion of slick spots by non-native species and native harvester ants, and provide the habitats needed by slickspot peppergrass' pollinators.
3. A diversity of native plants whose blooming times overlap to provide pollinator species with flowers for foraging throughout the seasons and to provide nesting and egg-laying sites; appropriate nesting materials; and sheltered, undisturbed places for hibernation and overwintering of pollinator species. For genetic exchange of slickspot peppergrass to occur, pollinators must be able to move freely between slick spots. Alternative pollen and nectar sources (other plant species within the surrounding sagebrush vegetation) are needed to support pollinators during times when slickspot peppergrass is not flowering, when distances between slick spots are large, and in years when slickspot peppergrass is not a prolific flowerer.
4. Sufficient pollinators for successful fruit and seed production, particularly pollinator species of the sphecid and vespid wasp families, species of the bombyliid and tachnid fly families, honeybees, and halictid bee species, most of which are solitary insects that nest outside of slick spots in the surrounding sagebrush-steppe vegetation, both in the ground and within the vegetation.

Activities included in the Program have the potential for effects to all four PBFs of proposed critical habitat, including ground disturbance and the increased spread of non-native plant species. Activities that occur in the vicinity of proposed critical habitat (note: ROW maintenance activities such as mowing and herbicide use are not covered under the Program) will require surveys by a qualified botanist prior to implementation. Additionally, the Agencies will ensure that all equipment is cleaned (weed free) prior to arriving at the project site in order to reduce the potential for introducing or spreading noxious weeds into proposed critical habitat. These BMPs will reduce effects to discountable levels.

Conference Concurrence

Based on the Service's review of the Assessment, we concur with the Agencies' determination that the action outlined in the Assessment and this Package, is not likely to jeopardize the continued existence of slickspot peppergrass critical habitat. This concurrence is based on the high likelihood that impacts to slickspot peppergrass proposed critical habitat can be avoided, and implementation of BMPs will reduce impacts of the Program actions to discountable levels. Although the Act does not require conferencing on proposed critical habitat, the Agencies assessed the effects of the proposed action to slickspot peppergrass critical habitat and requested a conference. Therefore, this section shall serve as our conference concurrence that the proposed action is not likely to adversely affect slickspot peppergrass critical habitat. If slickspot peppergrass critical habitat is designated under the Act during the term of this action and there have been no significant changes that could warrant reanalysis of effects to slickspot peppergrass critical habitat, the Agencies should contact the Service in writing to affirm the validity of the conference concurrence and request it be adopted as a standard concurrence to ensure continued coverage under the Act.

2. BIOLOGICAL OPINION

This section describes the proposed Federal action, including any measures that may avoid or minimize adverse effects to listed species or critical habitat, and the extent of the geographic area affected by the action. The term “action” is defined in the implementing regulations for section 7 as “all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas” (50 CFR 402.02).

2.1 Proposed Action

2.1.1 Action Area

The term “action area” is defined in the regulations as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action” (50 CFR 402.02). An action includes activities or programs “directly or indirectly causing modifications to the land, water, or air” (50 CFR 402.02). In this case, the area where land, water, or air is likely to be affected covers the State of Idaho and includes 79 subbasins (fourth-level hydrological units) that encompass all areas potentially affected directly or indirectly by the activities outlined below in Section 2.1.2.3. Work will occur within the transportation ROWs owned by either ITD or Idaho Counties, or within temporary or permanent easements with private or Federal agencies such as the BLM and USFS. Support activities located outside the transportation facility are not covered by this Opinion and may require additional consultation with the Service.

2.1.2. Description of the Proposed Action

2.1.2.1 Program Procedures

The proposed Program includes routine actions performed by the Agencies within the state of Idaho that have a Federal nexus. The Federal nexus may result from work on Federal lands, Federal funding of the project, or an approval action by FHWA or from a Federal permit action undertaken by the Corps. In the following discussion of the Program Procedures, LHTAC is incorporated by reference and ITD will have oversight of LHTAC projects.

As lead agency for Federal aid project actions involving highway projects, FHWA is responsible for compliance with Section 7 of the Act. In accordance with implementing these regulations, including 50 CFR 402.08, FHWA has delegated authority to ITD to prepare biological evaluations and biological assessments, and to conduct formal and informal consultation with the

Service and NMFS. The delegation of this authority was established in the Memorandum of Understanding (MOU), "Procedures Relating to Section 7 of the Endangered Species Act and Transportation Projects in Idaho," between ITD, FHWA, NMFS, and the Service.

The Corps is responsible for ensuring compliance with Section 7 of the Act for projects that require a Clean Water Act (CWA) Section 404 permit and Section 10 of the Rivers and Harbors Act of 1899 (RHA). The Corps is the lead Federal agency for state-funded projects that require a CWA Section 404 permit and/or Section 10 RHA authorization. The Corps has also designated ITD as a non-Federal representative for Section 7 actions.

The process and procedures established under the existing MOU (or any successive MOU that updates or replaces it) for formal and informal consultation and for "no effect" documentation remain in effect and shall be implemented under this Package. In addition, ITD will conference with the Service on actions that may affect proposed and candidate species or proposed critical habitat. When there is no Federal nexus, either as a result of use of Federal funds, Federal permits, or other means, this Package does not apply.

The project types and descriptions described in the Package are implemented by state forces or Federal aid project contractors and subcontractors on a recurring basis. In most cases, what is described is a typical sequence for conducting the action. Any project deviation with effects measurably different from those evaluated in this document will not be covered under this Opinion.

The Opinion is eligible for use on FHWA and ITD projects statewide. It is also eligible for use on LHTAC-administered projects, provided that LHTAC ensures that all monitoring required in the Assessment and associated Opinion is conducted for all projects that have the potential to adversely affect listed species. In addition, LHTAC must follow the process and procedures detailed below for project review and approval, including requirements for pre-project review by ITD/FHWA and Service/NMFS staff.

2.1.2.2 Program Process

The process that ITD will follow while using this document is:

1. **Confirm listed species and critical habitat.** ITD will coordinate with the Service or use the Service's Information for Planning and Consultation (IPaC) site to determine if Program actions will occur within the range of an listed species or designated critical habitat.
2. **ITD/LHTAC review.** ITD/LHTAC will individually review each action to ensure that all effects to listed species and their designated critical habitats are within the range of effects considered in this Opinion. ITD/LHTAC will determine if the action has an FHWA or Corps Federal nexus and, therefore, must follow the process outlined in this Opinion.
3. **Service/Corps/FHWA review.** ITD will ensure that all actions described within this Opinion will be individually reviewed and approved by the Service. In addition:
   - Corps will receive project Pre-notification Forms for all actions requiring a 404 permit.
   - FHWA will receive project Pre-notification Forms for all Federal aid actions.

4. **Notification:** ITD Headquarters (HQ) shall be copied on all Not Likely to Adversely Affect (NLAA) and Likely to Adversely Affect (LAA) determinations for project Pre-notification Forms submittals.

   a. ITD will initiate the Service's review of all NLAA projects by submitting the Project Pre-notification Form (or through using a Determination Key in IPaC), to the Service with sufficient detail about the action design and construction to ensure the proposed action is consistent with all provisions of this Document. The Service will notify ITD within 30 calendar days if the action is approved or disqualified; and;

   b. FHWA or the Corps will initiate the Service's review of all LAA projects by submitting the Pre-notification Form (or through using a Determination Key in IPaC) to the Service with sufficient detail about the action design and construction to ensure the proposed action is consistent with all provisions of this Document. The Service will notify FHWA/the Corps within 30 calendar days if the project is approved or disqualified.

   Notifications of NLAA and LAA project effects and responses to those by the Service should be submitted electronically.

5. **Site access.** ITD will retain right of access to sites authorized using this document in order to monitor the use and effectiveness of permit conditions. The Service will be allowed access to project sites as requested.

6. **Salvage notice:** If a sick, injured, or dead specimen of a listed species is found, ITD must notify the Service Office of Law Enforcement (208-378-5333). The finder must take care in handling of sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility for carrying out instructions provided by the respective Office of Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

7. **Project Monitoring Forms.** Within 45 days of project completion, ITD will send the appropriate post-project monitoring forms to ITD HQ and the Service.

8. **Annual Coordination.** ITD will submit an annual report to the Service summarizing the previous year's projects constructed under the Package. The report will include: a list of constructed projects, listed species present/encountered, any exceedance of authorized take, lessons learned, and any additional information to improve future outcomes. ITD will hold an annual follow-up meeting.

9. **Failure to provide reporting may trigger reinitiation.** If ITD fails to provide notification of actions for the Service's review, project monitoring reports, or fails to organize the annual coordination meeting, the Service may assume the action has been modified in a way that constitutes a modification of the proposed action in a manner and to an extent not previously considered and may recommend reinitiation of this consultation.

10. **Audits.** ITD, the Service, FHWA, and the Corps may conduct periodic reviews or audits on the use of this Opinion. As referenced above, ITD shall allow the Service, FHWA, or the Corps the opportunity to review any actions while in progress or after completion.

The purpose of this review is to ensure clearance of appropriate project types and BMP effectiveness.

11. **Training.** ITD HQ will provide an annual training opportunity for LHTAC and Districts who wish to use this Opinion. The Service will assist with the training.

2.1.2.3 Program Actions

The following maintenance actions are covered under the Program. Refer to the Assessment (pp. 15-49) for full descriptions of each of these activities.

1. **Roadway Maintenance Actions (Surface Treatments)**
   These actions include roadway maintenance activities designed to maintain or restore the integrity of existing flexible (asphalt and aggregate) pavement systems within the existing roadway prism. The methods are described in the Assessment (pp. 15-17) and include:
   - Chip Seal or Emulsified Asphalt Application (Prime Coat, Tack Coat or Fog Coat)
   - Plant Mix Overlay/Inlay
   - Cement Recycled Asphalt Base Stabilization
   - Cold In-Place Recycling
   - Pavement Markings (Waterborne Paint or Preformed Thermoplastic Retroreflective Pavement Markings)
2. **Bridge Maintenance Actions above the Ordinary High-Water Mark (No In-Water Work)**
   Bridge maintenance actions are designed to maintain or restore existing bridge components that are located entirely above the ordinary high-water mark (OHWM). No in-water construction is allowed under these actions. The methods are described in the Assessment (pp. 18-24) and include:
   - Bridge Deck Hydro-Demolition
   - Patch and Repair Concrete
   - Concrete Overlay (Silica Fume, Latex Modified, or Polyester Polymer)
   - Concrete Waterproofing Systems Membrane (Type C, D and E)
   - Epoxy and Chip Seal Overlay
   - Removing and Replacing Bridge Expansion Joints and/or Bridge Joint Header
   - Cleaning Bearing Seats and/or Replacing Bearing Pads at Abutments
   - Carbon Fiber Reinforced Polymer (CFRP) System
   - Painting Structural Steel
   - Bridge Embankment Restoration

3. **Pile Preservation**

   This action includes cleaning, repairing, and installing a complete preservation system to existing bridge piles located partially or entirely below the OHWM. Existing piles may be steel or reinforced concrete. All materials for the preservation system shall be part of a compatible, complete system supplied by one company. The Contractor's employees assigned to this work shall be trained by a qualified technical representative that is a full-time employee of the company supplying the pile preservation system. Methods used to preserve piles include 1) Pile Wrap with Casing System or 2) Fiberglass Reinforced Plastic (FRP) Jacket System (Epoxy Grout Injection). Both systems form an anticorrosion barrier by displacing water and sealing out oxygen, effectively encapsulating the pile from the elements. Both systems require all work to be performed within a turbidity curtain. A secondary containment and recovery system is required if piles contain lead or heavy metals. Water will be monitored for elevated turbidity and pH levels throughout the duration of the in-water work. The methods used to preserve piles are described in the Assessment (pp. 25-28) and include pile wrap with casing system and fiberglass reinforced plastic jacket system.

4. **Two-Lane Bridge Construction**

   This action includes replacing an existing two-lane bridge with a new single span structure. Existing structures are often supported by two piers and two abutments, which are commonly located below the OHWM of the channel they span. This action allows for up to 300 cubic yards (cy) of riprap below OHWM during bridge construction. However, bio-methods should be considered for bank stabilization before riprap or hard armoring. If existing structures are removed during this action, all fill located above stream bottom elevations shall be removed along with the old structure. The process is described in the Assessment (pp. 29-30) and includes three phases: removing one half of the existing bridge and constructing one half of the new bridge, removing the second half of the existing bridge, and finally constructing the remaining half of the new bridge.

5. **Excavation and Embankment for Roadway Construction (Earthwork)**

   This action allows up to 100,000 cy total earth movement for each project. This total does not include moving the same material multiple times during the same project. The process is described in the Assessment (p. 31) and involves stripping topsoil and vegetation from an area and either removing soil (excavation) or placing compacted soil as directed to construct roadway prism slopes (embankment). The soil may be moved to or from another section on the same project, or it may be imported or wasted off site. Equipment used will include excavators, dozers, scrapers, dump trucks, and compaction equipment. Completed cut or fill prisms will be permanently stabilized by various methods including rock mulch, riprap, or mulch and seeding. Excavation and embankment may include utility relocation and culvert replacement or culvert extensions.

6. **Rock Scaling**

   This action is described in the Assessment (p. 32) and includes removing loose or floating rock from engineered or natural slopes prior to any surface cobbles and boulders becoming a falling rock hazard. The process will protect traffic and adjacent waterways below the slope by installing concrete barriers and fences. Laborers with safety harnesses will tie off from above the slope and, working downward, will pry loose rock with pry bars, hydraulic rams, jack hammers, or blasting equipment. Rock removal by blasting will only be allowed when labor methods are ineffective.

7. **Roadway Widening**

   This action is described in the Assessment (pp. 33-34) and includes constructing additional width to existing roadways to improve traffic flow and increase safety. Widening may include shoulder widening, passing lanes, slow-moving vehicle turnouts and turn bays. Traffic will be maintained on the existing roadway during construction. All work is expected to occur within existing ITD ROWs. In some cases, it may be necessary for ITD to acquire minor additional ROWs to complete the work. When possible, highway widening will occur on the uphill side of the roadway.

8. **Bank Stabilization**

   This action includes employing one or more methods to stabilize the streambank and prevent further bank undercutting resulting in damage to roadway. The selected method will be based on project design criteria and hydrology, geomorphic, and scour factors. Successful methods will address feasibility, sustainability, and environmental effectiveness and will treat the cause of bank erosion rather than the symptoms. The methods are described in the Assessment (pp. 35-39) and include bio-methods, riprap, gabion basket riprap, and mechanically stabilized earth embankment.

   Placing material below the OHWM is prohibited unless permits have been obtained to allow this action. When feasible, the area will be isolated from the active channel to reduce deposition of sediment into waterways.

9. **Ditch Cleaning**
   This action includes regrading existing roadside ditches, removing deposited material to facilitate drainage, and preserving the integrity of the roadway. Traffic is generally maintained on the existing roadway and the activity is accomplished by ITD or contractor maintenance crews. The process is described in the Assessment (p. 40).

10. **Small Structure Repair**

    Water conveyance structures such as bridges, box culverts, stiff leg culverts, and multi-plate culverts commonly require maintenance work to repair scour or debris damage to foundation or structure footings. ITD commonly works to repair, protect, and apply preventative maintenance to these structures when this occurs. The process is described in the Assessment (p. 41).

11. **Culvert Installation and Maintenance**
    Roadway culverts may need to be installed, extended, repaired, replaced, or maintained. These processes are described in the Assessment (pp. 42-44). Replacing existing culverts that are barriers to fish passage are not covered under this Program.

12. **Guardrail Installation**

    The purpose of this activity is to restore or replace metal or concrete guardrail and terminal ends located adjacent to the highway. The activity is performed by either ITD maintenance crews or contractors. Traffic is generally maintained on the existing roadway. All work is performed within the ITD right-of-way. The process is described in the Assessment (p. 45).

13. **Geotechnical Drilling**
Geotechnical investigation is often required on ITD projects. This task commonly consists of geotechnical borings or seismic refraction surveys. ITD primarily uses four methods to retrieve soil and rock samples and to perform in situ testing. The drill method used is determined by the type of soil and rock to be penetrated, groundwater conditions, and type of samples required. The four basic methods of drilling are hollow-stem augers, rotary drilling, percussive air drilling, and core drilling. For drilling operations, a drill rig is positioned over the boring location, hydraulic rams are used to level the rig and a derrick (vertical stationary mast) is raised. The processes are described in the Assessment (p. 46-48).

14. **Pile Installation**

Pile installation may be necessary to support abutments at the ends of structures or to support a barge during work in or above waterways. Piles will be installed by either a pneumatic vibratory pile driver or an impact hammer pile driver. A hammer pile driver may be required due to the rocky substrate. Vibratory pile drivers are often used to install temporary or non-structural piles. A vibratory pile driver installs piling into the ground by applying a rapidly alternating force to the pile. Impact hammer pile drivers are usually necessary for load bearing applications. The pile driver hammer may be suspended from the boom of a crawler crane, supported on a large pile driver frame, or carried on a barge for construction in water. The hammer is guided between two parallel steel members called leads. The process is described in the Assessment (p. 49). Pile installation proposed in live streams outside of temporary cofferdams is not covered by this Opinion and will require a separate biological opinion.

2.1.3 Term of the Action

This Package shall remain in effect for 10 years from the date of issuance. ITD will request consultation with the Service on a new Package at the end of the 10-year term or sooner if reinitiation triggers occur (e.g., a new species is listed or there are significant changes to the proposed action).

2.1.4 Proposed Conservation Measures

The Agencies have identified Best Management Practices (BMPs) designed to avoid, reduce, or eliminate adverse effects to one or more of the following: bull trout, bull trout critical habitat, Snake River physa snail, Bliss Rapids Snail, and northern Idaho ground squirrels. A full list of the BMPs can be found in Appendix A. The Service considers these BMPs essential to limit impacts to species and critical habitats. If any of these BMPs are not implemented, there could be effects of the action that were not considered in this Package, and reinitiation of consultation may be required. The BMPs listed below represent practices that specifically apply to avoiding or reducing impacts to listed species.

1. **BMPs common to all program activities** are fully listed in Appendix A (Section A.1) and are organized by Stormwater Controls, Species-specific BMPs, Personnel Qualifications, and Survey Protocols. Implementation of the BMPs common to all program activities is required for all projects, unless inapplicable to the Program action. These include, but are not limited to:

    - All work will be performed in strict compliance with all applicable Federal, State, and local laws, codes, rules, and regulations and ITD's Standard Drawings and Standard and Supplemental Specifications. If inconsistencies are discovered in the contract's documents, the most restrictive requirement will be followed.
    - All individuals participating in fish capture and removal operations will have the training, knowledge, skills, and ability to ensure safe handling of fish, and to ensure the safety of staff conducting the operations. If electrofishing is proposed as a means of fish capture, the directing biologist will have a minimum of 100 hours electrofishing experience in the field using similar equipment, and any individuals operating electrofishing equipment will have a minimum of 40 hours electrofishing experience under direct supervision (USFWS 2012, entire). A Scientific Collecting Permit issued by the IDFG is required to handle captured fish.
    - All projects require either a Pollution Prevention Plan (PPP) or Stormwater Pollution Prevention Plan (SWPPP). A designated environmental monitor will visit the site at least weekly to examine the application and efficacy of the minimization measures. All SWPPPs or PPPs must comply with erosion and sediment controls and pollution prevention (good housekeeping standards).
    - Species-specific BMPs, personnel qualifications, and survey protocols.

2. **BMPs for ground-disturbing activities** are fully listed in Appendix A (Section A.2) and are organized by General BMPs and Blasting. These include, but are not limited to:

    - Ground disturbing activities are prohibited during precipitation events or when precipitation events are imminent. Precipitation events include any rain or snow accumulations that have potential to discharge to waterways or wetlands.
    - Preserve native vegetation and plant communities when practicable to serve as natural erosion controls.
    - Finished slopes must be stabilized as soon as practical to prevent sediment from entering waterways.
    - Disturbed areas within riparian zones will be reclaimed with riparian vegetation similar to the existing plant communities.
    - Rock and debris will be prevented from reaching adjacent waterways.
    - Blasting is prohibited underwater.

3. **BMPs for work adjacent to aquatic systems above the ordinary high-water mark (OHWM)** are fully listed in Appendix A (Section A.3). These include, but are not limited to:

- Measures will be taken to minimize the potential for bridge debris (e.g., dirt, concrete, etc.) to fall into the river channel while repairing the tops of piers. Measures may include the construction of a platform below the top of the pier or the use of a temporary work bridge (barge) anchored under the pier site.
- In order to minimize the potential for direct impacts to listed fish, all work will be completed from the existing bridge; no equipment or heavy machinery will enter the river channel.

4. **BMPs for work adjacent to aquatic systems below the OHWM** are fully listed in Appendix A (Section A.4) and are organized by general BMPs, water quality/quantity treatment, work area isolation and fish handling, bridge demolition, pile installation, and barges/boats. These include, but are not limited to:

- All work below the OHWM will take place during low flow conditions, unless otherwise infeasible.
- If riprap is required, it will be placed in a manner that will not further constrict the stream channel.
- To minimize in-water noise (e.g., pile cleaning) the Contractor will be required to use the smallest size and lowest impact, hand-held equipment necessary to perform the work.
- When pumping water from local sources for Program actions, ensure that (1) NMFS screening criteria are met (NMFS, entire); (2) redds of listed species and staging or spawning adults will not be disturbed; and (3) pumping maintains 80% or more of average streamflow in affected streams. NMFS approval is required for pumping that exceeds three cubic feet per second (cfs).
- When extending or replacing a culvert in a perennial stream, fish passage will be constructed into the project, if regulatory agencies (Service, NMFS and IDFG) deem it appropriate. Fish passage will be designed in accordance with NMFS's publication, "Anadromous Salmonid Passage Facility Design" (NMFS 2011, entire).
- Identify all contributing and non-contributing impervious areas that are within and contiguous with the project area and explain how runoff from contributing impervious areas will be managed.
- Use permanent stormwater flow control and treatment BMPs to infiltrate, retain, or detain runoff to the maximum extent practicable. Permanent stormwater controls must be sufficient to retain the runoff volume produced from a 24-hour, 95th percentile storm event, or can attain an equal or greater level of water quality benefits as onsite retention from a 24-hour, 95th percentile storm event.
- Both turbidity and pH monitoring will be required for all in-water work where there is potential to discharge harmful levels of sediment or pH elevating pollutants and listed species are present. Both monitors will be placed at the same locations. Turbidity and pH measurements will be taken simultaneously. For quality control purposes, spare turbidity and pH monitoring equipment will be stored onsite.

- Instream work windows established by NMFS and the Service will be used during project construction (see Section 2.2.3.1 below).
- Isolate any work area within the wetted channel from the active stream whenever listed fish are reasonably certain to be present, or if the work area is less than 300 ft upstream from known spawning habitats. However, work area isolation may not always be necessary or practical in certain settings (e.g., dry seasonal streambeds).
- Remove fish from an exclusion area as it is slowly dewatered with methods such as hand or dip-nets, seining, trapping with minnow traps (or gee-minnow traps), or electro-fishing. When electro-fishing, follow NMFS (2000, entire) electro-fishing guidelines.
- No machinery or implements will enter the live stream. Temporary cofferdams will be constructed, if necessary, to dewater existing pier sites during pier removal.
- Impact hammer pile driving will only be allowed within a cofferdam area and not in free-flowing water.
- To minimize sound pressure effects from pile driving, pile locations will be predrilled, unless infeasible.
- All water will be pumped from the cofferdam to allow pile driving to occur only in dry conditions. Pumped water will be filtered through settling basins and not directly returned to the river.
- Impact hammer pile driving will only occur during daylight hours. No impact hammer pile driving activities will occur for at least 12-hours within each 24-hour period giving migratory fish the opportunity to move through the project area without being subjected to impact pile driving noise. The 12-hour period will correspond to the early evening, night-time, and early morning hours when anadromous fish and bull trout generally move through the project area.
- Barges will be lined or have a lip to contain spills. They will be outfitted with spill containment kits to contain 125 percent of the volume of materials aboard.
- Hazardous materials will not be stored on the barge overnight but will be transported and stored off site or in areas where adequate buffer spaces exist to prevent impacts to listed species or their habitats.
- The barge and any boats shall have invasive species permits and be inspected by Idaho Department of Agriculture before use.

2.2 Bull Trout

2.2.1 Status of the Species

This section presents information about the regulatory, biological, and ecological status of bull trout at a rangewide scale that provides context for evaluating the significance of probable effects caused by the proposed action. This section provides information about the bull trout's 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 this Opinion. The proposed and final listing rules contain a physical species description (63 FR 31647; 64 FR 58910). Additional information can be found at https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=E065.

2.2.1.1 Listing Status 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; Jarbidge River in Nevada; Willamette River Basin in Oregon; Pacific Coast drainages of Washington, including Puget Sound; major rivers within the Columbia River Basin in Idaho, Oregon, Washington, and Montana; and Saint Mary-Belly River, east of the Continental Divide in northwestern Montana (Bond 1992, p. 2; Brewin and Brewin 1997, p. 215; Cavender 1978, pp. 165-166; Howell and Buchanan 1992, entire; Leary and Allendorf 1997, pp. 716-719; USFWS 1999, 64 FR 58910).

The final listing rule for the United States coterminous population of the bull trout discusses the consolidation of five DPSs into one listed taxon. The application of the jeopardy standard, in accordance with the requirements of section 7 of the Act relative to this species, established five interim recovery units (RUs) for each of these DPSs for the purposes of consultation and recovery (64 FR 58930).

The final Recovery Plan for the Coterminous Bull Trout Population (bull trout recovery plan) established six RUs (USFWS 2015f, pp. 36-43) (Figure 1). These RUs are needed to ensure a resilient, redundant, and representative distribution of bull trout populations throughout the range of the listed entity.

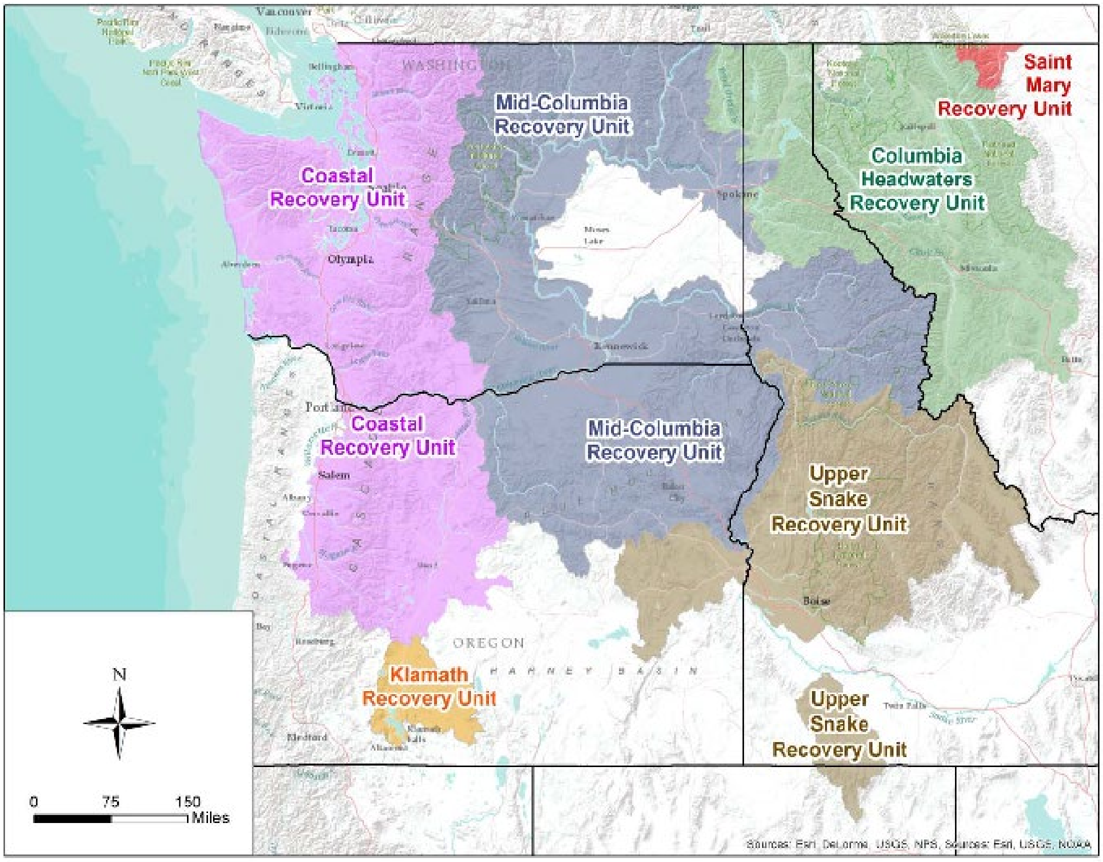

Figure 1: Locations of the six bull trout Recovery Units in the coterminous United States.

2.2.1.2 Reasons for Listing and Threats

Throughout its range, the bull trout is threatened by the combined effects of: (1) habitat degradation, fragmentation, and alterations associated with dewatering; (2) road construction and maintenance; (3) mining; (3) grazing; (4) blockage of migratory corridors by dams or other diversion structures; (5) poor water quality; (6) incidental angler harvest; (7) entrainment (a process by which aquatic organisms are pulled through a diversion or other device) into diversion channels; and (8) 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, p. 150). 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 Service's Science Team Report (Whitesel et al. 2004, entire), the bull trout core areas templates (USFWS 2005b, entire; USFWS 2009b, entire), Conservation Status Assessment (USFWS 2005a, entire), and 5-year reviews (USFWS 2008, entire; USFWS 2015a, entire) have provided additional information about threats and status. The final recovery plan lists other documents and meetings that compiled information about the status of bull trout (USFWS 2015f, p. 3). The 2015 5-year status review also maintains the listing status as threatened based on the information compiled in the final bull trout recovery plan (USFWS 2015f, p. 3) and the Recovery Unit Implementation Plans (RUIPs) (USFWS 2015b; 2015c; 2015d; 2015e; 2015g; 2015h).

When first listed, the status of bull trout and its threats were reported by the Service at subpopulation scales. In 2002 and 2004, the draft recovery plans (USFWS 2002, entire; USFWS 2004a, entire; USFWS 2004b, entire) included detailed information on threats at the RU scale (i.e., similar to subbasin or regional watersheds), thus incorporating the metapopulation concept with core areas and local populations. In the 2008 5-year review, the Service established threats categories (i.e., dams, grazing, agricultural practices, transportation networks, mining, development and urbanization, fisheries management, small populations, limited habitat, and wildfire) (USFWS 2008, entire). In the final recovery plan, threats and recovery actions are described for all 109 core areas for the species, forage/migration and overwintering areas, historical core areas, and research needs areas in each of the six RUs (USFWS 2015f, pp. 10-11). Primary threats are described in three broad categories—Habitat, Demographic, and Nonnative Fish—for all RUs and core areas within the listed range of the species. The 2015 5-year status review references the final recovery plan and the RUIPs and incorporates by reference the threats described therein (USFWS 2015a, entire). Although significant recovery actions have been implemented since the time of listing, the 5-year review concluded that the listing status should remain as “threatened” (USFWS 2015a, entire).

New or Emerging Threats

The bull trout recovery plan describes new or emerging threats, climate change, and other threats (USFWS 2015f, entire). Climate change was not addressed as a known threat when bull trout was listed. The 2015 bull trout recovery plan and RUIPs (USFWS 2015b; 2015c; 2015d; 2015e; 2015g; 2015h) 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 2015f, p. 48). The 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 cold-water habitats (USFWS 2015f, p. vii and pp. 17-20). Mote et al. (2014, pp. 487-513) summarized climate change effects in the Pacific Northwest 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 (Koopman et al. 2009, entire; Poff et al. 2002, entire; Point Reyes Bird Observatory (PRBO) Conservation Science 2011, entire). Lower flows, as a result of smaller snowpack, could reduce habitat, which might adversely affect bull trout reproduction and survival. Warmer water temperatures could lead to physiological stress and could also benefit nonnative fishes that prey on or compete with bull trout. Increases in the number and size of wildfires could also result from climate change (Westerling et al. 2006, p. 940) 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 reduced water availability in certain stream reaches occupied by bull trout (USFWS 2015d, p. B-10). 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 (Rieman et al. 2007, p. 1552). Climate change is expected to reduce the extent of cold water habitat (Isaak et al. 2015, p. 2549, Figure 7), and increase competition with other fish species [lake trout (*Salvelinus namaycush*), brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), and northern pike (*Esox lucius*)] for resources in remaining suitable habitat. Several authors project that brook trout, a fish species that competes for resources with and predates on the bull trout, will continue increasing their range in several areas (an elevation shift in distribution) due to the effects from climate change (Isaak et al. 2014, p. 114; Wenger et al. 2011, p. 998, Figure 2a).

2.2.1.3 Life History and Population Dynamics

Distribution

The historical range of bull trout includes major river basins in the Pacific Northwest at about 41 to 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 (Bond 1992, p. 2; Cavender 1978, pp. 165-166). To the west, the bull trout's range includes Puget Sound, various coastal rivers of British Columbia, Canada, and southeast Alaska (Bond 1992, p. 2). 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 (Brewin and Brewin 1997, entire; Cavender 1978, pp. 165-166).

Reproductive Biology

The iteroparous reproductive strategy (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 were designed specifically for anadromous semelparous salmonids (fishes that spawn once and then die). Dams or other barriers with fish passage facilities, with only one-way upstream passage, may be a factor in isolating bull trout populations if they do not provide a downstream passage route. Additionally, bull trout that migrate to marine waters must pass both upstream and downstream through areas with net fisheries at river mouths. This 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 15 to 30 centimeters (cm; 6 to 12 inches [in.]) total length, and migratory adults commonly reach 61 cm (24 in.) or more (Goetz 1989, p. 30; Pratt 1985, pp. 28-34). The largest verified bull trout is a 14.5-kilogram (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, p. 141). Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989, pp. 15-16; Pratt 1992, pp. 6-7; Rieman and McIntyre 1996, p. 133). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992, p. 1). 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, p. 1; Ratliff and Howell 1992, p. 10). 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 (2002, p. 9) 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 to 12 milligrams/liter (mg/L; in the gravel), with corresponding instream levels of 10 to 11.5 mg/L (Stewart et al. 2007, p. 10). In addition, IGDO concentrations, water velocities in the water column, and especially the intergravel flow rate, are interrelated variables that affect the survival of incubating embryos (Oregon Department of Environmental Quality 1995, Ch. 2 pp. 23-24). Bull trout are particularly sensitive to adequate IGDO levels due to a long incubation period of 220+ days. 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, p. 2). Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. The resident form tends to be smaller than the migratory form at maturity and also produces fewer eggs (Goetz 1989, p. 15). Migratory bull trout spawn in tributary streams where juvenile fish rear one to four years before migrating to either a lake (adfluvial form), river (fluvial form) (Fraley and Shepard 1989, p. 138; Goetz 1989, p. 24), or saltwater (anadromous form) to rear as subadults and to live as adults (Brenkman and Corbett 2005, entire; McPhail and Baxter 1996, p. I; Washington Department of Fish and Wildlife 1997, p. 16). Bull trout normally reach sexual maturity in four to seven years and may live longer than 12 years. They are iteroparous (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, p. 135; Leathe and Graham 1982, p. 95; Pratt 1992, p. 8; Rieman and McIntyre 1996, p. 133).

Bull trout are naturally migratory, which allows them to capitalize on temporally abundant food resources and larger downstream habitats. Resident forms may develop where barriers (either natural or manmade) occur or where foraging, migrating, or overwintering habitats for migratory fish are minimized (Swanberg 1997, entire; Brenkman and Corbett 2005, pp. 1075-1076; Goetz et al. 2004, p. 105; Starcevich et al. 2012, entire; Barrows et al. 2016a, p. 170). 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, pp. 96, 98-106). Some river systems have retained habitat conditions that allow free movement between spawning and rearing areas and the mainstem rivers. Bull trout can migrate between large rivers, lakes, and spawning tributaries in these areas with connectivity. 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 there is connectivity (Ringel et al.2014, pp. 61-64; Nelson and Nelle 2008, pp. 88-93). Such multiple life history strategies help to maintain the stability and persistence of bull trout populations to environmental changes. Benefits of connected habitat to migratory bull trout include: (1) greater growth in the more productive waters of larger streams, lakes, and marine waters; (2) greater fecundity resulting in increased reproductive potential; and (3) dispersing the population across space and time so that spawning streams may be recolonized should local populations suffer a catastrophic loss (Frissell 1999, pp. 861-863; Montana Bull Trout Scientific Group, (MBTSG) 1998, p. 13; Rieman and McIntyre 1993, pp. 2-3). 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, p. 2).

Whitesel et al. (2004, p. 2) noted that although there are multiple resources that contribute to the subject, Spruell et al. (2003, entire) best summarized genetic information on bull trout population structure. Spruell et al. (2003, entire) analyzed 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. They concluded that there is a consistent pattern 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, p. 17). They were characterized as:

i. "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.
ii. "Snake River," which also included the John Day, Umatilla, and Walla Walla rivers. A striking level of divergence was observed between bull trout in the John Day and Deschutes River systems despite their close proximity.
iii. "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, p. 17) noted that within the major assemblages, populations were further subdivided, primarily at the level of major river basins. Taylor et al. (1999, entire) surveyed bull trout populations, primarily from Canada, and found a major divergence between inland and coastal populations. Costello et al. (2003, p. 328) suggested the patterns reflected the existence of two glacial refugia, consistent with the conclusions of Taylor and Costello (2006, p. 1165-1170), Spruell et al. (2003, p. 26), and the biogeographic analysis of Haas and McPhail (2001, entire). Both Taylor et al. (1999, p. 1166) 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 Service identified additional genetic units within the coastal and interior lineages (Ardren et al. 2011, p. 18). Based on a recommendation in the Service's 5-year review of the species' status (USFWS 2008, p. 45), the Service reanalyzed the 27 RUs identified in the 2002 draft bull trout recovery plan (USFWS 2002, p. 48) by utilizing, in part, information from previous genetic studies and new information from additional analysis (Ardren et al. 2011, entire). In this examination, the Service applied relevant factors from the joint Service and NMFS DPS policy (61 FR 4722) and subsequently identified six draft RUs 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 RUs were used to inform designation of critical habitat for bull trout by providing a context for deciding what habitats are essential for recovery (75 FR 63898). These six RUs, which were identified in the final bull trout recovery plan (USFWS 2015f, entire) and described further in the RUIPs (USFWS 2015b; 2015c; 2015d; 2015e; 2015g; 2015h) include: 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 (DeHann and Neibauer 2012, entire).

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, p. 4). Increased habitat fragmentation reduces the amount of available habitat and increases isolation from other populations of the same species (Saunders et al. 1991, entire). Burkey (1989, entire) 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, entire).

Metapopulation concepts of conservation biology theory have been suggested relative to the distribution and characteristics of bull trout, although empirical evidence is relatively scant (Dunham et al. 1999, entire; Rieman and McIntyre 1993, p. 15; Rieman and Dunham 2000, entire). A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meefe and Carroll 1994, pp. 189-190). 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; and long-term, low-rate dispersal patterns among component populations influences the persistence of at least some of the local populations (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 (Dunham and Rieman 1999, p. 645; Rieman and Clayton 1997, pp. 10-12; Rieman and Dunham 2000, p. 55; Spruell et al. 1999, pp. 118-120).

Human-induced factors as well as 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, entire). However, despite the theoretical fit, the relatively recent and brief time period during which bull trout investigations have taken place does 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 or whether the persistence of bull trout in large or closely interconnected habitat patches (Dunham and Rieman 1999, entire) is simply reflective of 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, pp. 5-57). Research does, however, provide genetic evidence for the presence of a metapopulation process for bull trout, at least in the Boise River Basin of Idaho (Whiteley et al. 2003, entire), while Whitesel et al. (2004, pp. 18-21) summarizes metapopulation models and their applicability to bull trout.

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, p. 4). 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, entire; Goetz 1989, pp. 23, 25; Hoelscher and Bjornn 1989, pp. 19, 25; Howell and Buchanan 1992, pp. 30, 32; Pratt 1992, entire; Rich 1996, p. 17; Rieman and McIntyre 1993, pp. 4-6; Rieman and McIntyre 1995, entire; Sedell and Everest 1991, entire; Watson and Hillman 1997, entire). Watson and Hillman (1997, pp. 247-250) concluded that watersheds must have specific physical characteristics to provide the habitat requirements necessary for bull trout to successfully spawn and rear and that these specific characteristics are not necessarily present throughout these watersheds. Because bull trout exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993, pp. 4-6), 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, p. 2). Migrations facilitate gene flow among local populations when individuals from different local populations interbreed or stray to nonnatal streams. Local populations that are extirpated by catastrophic events may also become reestablished by bull trout migrants. However, it is important to note that the genetic structuring of bull trout indicates there is limited gene flow among bull trout populations, which may encourage local adaptation within individual populations, and that reestablishment of extirpated populations may take a long time (Rieman and McIntyre 1993, p. 2; Spruell et al. 1999, entire). 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 under "Diet."

Cold water temperatures play an important role in determining bull trout habitat quality, as these fish are primarily found in colder streams, and spawning habitats are generally characterized by temperatures that drop below 9 °C in the fall (Fraley and Shepard 1989, p. 137; Pratt 1992, p. 5; Rieman and McIntyre 1993, p. 2).

Thermal requirements for bull trout appear to differ at different life stages. Spawning areas are often associated with cold-water springs, groundwater infiltration, and the coldest streams in a given watershed (Pratt 1992, pp. 7-8; Rieman and McIntyre 1993, p. 7). Optimum incubation temperatures for bull trout eggs range from 2 °C to 6 °C, whereas optimum water temperatures for rearing range from about 6 °C to 10 °C (Buchanan and Gregory 1997, p. 4; Goetz 1989, p. 22). In Granite Creek, Idaho, Bonneau and Scarnecchia (1996, entire) observed that juvenile bull trout selected the coldest water available in a plunge pool, 8 °C to 9 °C, within a temperature gradient of 8 °C to 15 °C. In a landscape study relating bull trout distribution to maximum water temperatures, Dunham et al. (2003, p. 900) found that the probability of juvenile bull trout occurrence does not become high (i.e., greater than 0.75) until maximum temperatures decline to 11°C to 12°C.

Although bull trout are found primarily in cold streams, occasionally these fish are found in larger, warmer river systems throughout the Columbia River basin (Buchanan and Gregory 1997, p. 2; Fraley and Shepard 1989, pp. 133, 135; Rieman and McIntyre 1993, pp. 3-4; Rieman and McIntyre 1995, p. 287). Availability and proximity of cold-water patches and food productivity can influence bull trout ability to survive in warmer rivers (Myrick et al. 2002, pp. 6, 13).

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, p. 137; Goetz 1989, p. 19; Hoelscher and Bjornn 1989, p. 38; Pratt 1992, entire; Rich 1996, pp. 4-5; Sedell and Everest 1991, entire; Sexauer and James 1997, entire; Thomas 1992, pp. 4-6; Watson and Hillman 1997, p. 238). Maintaining bull trout habitat requires stable and complex stream channels and stable stream flows (Rieman and McIntyre 1993, pp. 5-6). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997, p. 364). These areas are sensitive to activities that directly or indirectly affect stream channel stability and alter natural flow patterns. For example, altered stream flow in the fall may disrupt bull trout during the spawning period, and channel instability may decrease survival of eggs and young juveniles in the gravel from winter through spring (Fraley and Shepard 1989, p. 141; Pratt 1992, p. 6; Pratt and Huston 1993, p. 70). Pratt (1992, p. 6) 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. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macrozooplankton, and small fish (Boag 1987, p. 58; Donald and Alger 1993, pp. 242-243; Goetz 1989, pp. 33-34). Subadult and adult migratory bull trout generally feed on various fish species (Donald and Alger 1993, pp. 241-243; Fraley and Shepard 1989, pp. 135, 138; Leathe and Graham 1982, pp. 13, 50-56). Bull trout of all sizes other than fry have been found to eat fish half their length (Beauchamp and Van Tassell 2001, p. 204). 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, p. 105; Washington Department of Fish and Wildlife 1997, p. 23).

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 this diversity. There have been recent studies documenting movement patterns in the Columbia River basin that document long distance migrations (Barrows et al. 2016b, entire; Schaller et al. 2014, entire). For example, a data report documented a juvenile bull trout from the Entiat made over a 322-km (200-mi) migration between spawning grounds in the Entiat River to foraging and overwintering areas in Columbia and Yakima River near Prosser Dam. In the Skagit River system, anadromous bull trout similarly make migrations as long as 195 km (121 mi) between marine foraging areas in Puget Sound and headwater spawning grounds, foraging on salmon eggs and juvenile salmon along their migration route (Washington Department of Fish and Wildlife 1997, p. 25). 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, pp. 1078-1079; Goetz et al. 2004, entire).

2.2.1.4 Conservation Needs

The 2015 recovery plan for bull trout established the primary strategy for recovery of bull trout in the coterminous United States: (1) conserve bull trout so that they are geographically widespread across representative habitats and demographically stable in six recovery units; (2) effectively 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) build upon the numerous and ongoing conservation actions implemented on behalf of bull trout since their listing in 1999, and improve our understanding of how various threat factors potentially affect the species; (4) use that information to work cooperatively with our partners to design, fund, prioritize, and implement effective conservation actions in those areas that offer the greatest long-term benefit to sustain bull trout and where recovery can be achieved; and (5) apply adaptive management principles to implementing the bull trout recovery program to account for new information (USFWS 2015a, p. 24).

Information presented in prior draft recovery plans published in 2002 and 2004 (USFWS 2002, 2004a, 2004b) 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 2015f, entire) integrates new information collected since the 1999 listing regarding bull trout life history, distribution, demographics, conservation successes, etc., and integrates and updates previous bull trout recovery planning efforts across the range of the coterminous bull trout listing.

The Service has developed a recovery approach that: (1) focuses on the identification of 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 Act are no longer necessary (USFWS 2015f, pp. 45-46).

To implement the recovery strategy, the bull trout recovery plan establishes 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 2015f, pp. 50-51). The recovery plan defines four categories of recovery actions that, when implemented and effective, should:

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 nonnative fishes and other nonnative taxa on bull trout; and
4. Result in actively working 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 2015f, pp. 50-51).

Bull trout recovery is based on a geographical hierarchical approach. Bull trout are listed as a single 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 2015f, p. 23). 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 2015f, p. 33).

Each of the six recovery units contain multiple bull trout recovery 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 2015f, p. 3, Appendix F). There are also six core areas where bull trout historically occurred but are now extirpated, and one research needs area where bull trout were known to occur historically, but their current presence and use of the area are uncertain (USFWS 2015f, p. 3, Appendix F). Core areas can be further described as complex or simple (USFWS 2015f, pp. 3-4). 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 (FMO) habitat. 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 2015f, p. 73). A local population is considered to be the smallest group of fish 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 may occur between local populations (e.g., those within a core population), but is assumed to be infrequent compared with that among individuals within a local population.

2.2.1.5 Population Units

The final bull trout recovery plan (USFWS 2015f, entire) designates six bull trout recovery units as described above. The Service will address the conservation of these final recovery units in our section 7(a)(2) analysis for proposed Federal actions. The recovery plan (USFWS 2015f, entire), 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 RUIPs (USFWS 2015b; 2015c; 2015d; 2015e; 2015g; 2015h), which identify recovery actions and conservation recommendations needed for each core area, FMO areas, historical core areas, and research needs areas. Each of the following recovery units (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 in this unit 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 2015b, entire). The Coastal RU is located within western Oregon and Washington. The RU is divided into three geographic regions: Puget Sound, Olympic Peninsula, and the Lower Columbia River regions. This RU contains 20 core areas comprising 84 local populations and a single potential local population in the historical Clackamas River core area where bull trout had been extirpated and were reintroduced in 2011. This RU also has four historically occupied core areas that could be re-established (USFWS 2015b, p. A-2; USFWS 2015f, p. 47).

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 2015f, p. A-6). Puget Sound and the Olympic Peninsula currently support the only anadromous local populations of bull trout. This recovery unit also contains 10 shared FMO habitats which allow for the continued natural population dynamics in which the core areas have evolved (USFWS 2015b, p. A-5). There are four core areas within the Coastal RU that have been identified as current population strongholds: Lower Skagit, Upper Skagit, Quinault River, and Lower Deschutes River (USFWS 2015b, p. A-3; USFWS 2015f, p. 79). These are the most stable and abundant bull trout populations in the RU. 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 2015b, p. A-7). The current condition of the bull trout in this RU 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 2015b, pp. A-1-A-25). 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 2015b, p. A33-A34).

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 2015d, entire). The Klamath RU is located in southern Oregon and northwestern California. The Klamath RU is the most significantly imperiled RU, having experienced considerable extirpation and geographic contraction of local populations and declining demographic condition, and natural re-colonization is constrained by dispersal barriers and presence of nonnative brook trout (USFWS 2015f, p. 39). This RU currently contains three core areas and eight local populations (USFWS 2015d, p. B-1; USFWS 2015f, p. 47). Nine historical local populations of bull trout have become extirpated (USFWS 2015d, p. B-1). All three core areas have been isolated from other bull trout populations for the past 10,000 years (USFWS 2015d, p. B-3). The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, habitat degradation and fragmentation, past and present land use practices, agricultural water diversions, nonnative species, and past fisheries management practices (USFWS 2015d, pp. B13-B14). Conservation measures or recovery actions implemented include removing nonnative fish (e.g., brook trout, brown trout, and hybrids), acquiring water rights for in-stream flows, replacing diversion structures, installing fish screens, constructing bypass channels, installing riparian fencing, replacing culverts, and restoring habitat (USFWS 2015d, pp. B10-B11).

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 2015e, entire). The Mid-Columbia RU is located within eastern Washington, eastern Oregon, and portions of central Idaho. The Mid-Columbia RU is divided into four geographic regions: Lower Mid-Columbia, Upper Mid-Columbia, Lower Snake, and Mid-Snake Geographic Regions. This RU contains 24 occupied core areas comprising 142 local populations, 2 historically occupied core areas, 1 research needs area, and 7 FMO habitats (USFWS 2015e, pp. C1-C4; USFWS 2015f, p. 47). The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, agricultural practices (e.g., irrigation, water withdrawals, livestock grazing), fish passage (e.g., dams, culverts), nonnative species, Agencies management practices, and mining (USFWS 2015e, pp. C9-C34). Conservation measures or recovery actions implemented include road removal, channel restoration, mine reclamation, improved grazing management, removal of fish barriers, and in-stream flow requirements (USFWS 2015e, pp. C37-C40).

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 2015c, entire). The Columbia Headwaters RU is located in western Montana, northern Idaho, and the northeastern corner of Washington. The Columbia Headwaters RU is divided into five geographic regions: Upper Clark Fork, Lower Clark Fork, Flathead, Kootenai, and Coeur d'Alene geographic regions (USFWS 2015c, pp. D2-D4). This RU contains 35 bull trout core areas; 15 of which are complex core areas as they represent larger interconnected habitats and 20 simple core areas as they are isolated headwater lakes with single local populations. The 20 simple core areas are each represented by a single local population, many of which may have persisted for thousands of years despite small populations and isolated existence (USFWS 2015c, p. D-1). Fish passage improvements within the RU have reconnected some previously fragmented habitats (USFWS 2015c, p. D-42), while others remain fragmented. Unlike the other RUs in Washington, Idaho, and Oregon, the Columbia Headwaters RU does not have any anadromous fish overlap (USFWS 2015c, p. D-42). Therefore, bull trout within the Columbia Headwaters RU do not benefit from the recovery actions for salmon (USFWS 2015c, p. D-42). The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, mostly historical mining and contamination by heavy metals, expanding populations of nonnative fish predators and competitors, modified in-stream 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 2015c, pp. D10-D25). Conservation measures or recovery actions implemented include habitat improvement, fish passage, and removal of nonnative species (USFWS 2015c, pp. D42-D43).

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 2015h, entire). The Upper Snake RU is located in central Idaho, northern Nevada, and eastern Oregon. The Upper Snake RU is divided into seven geographic regions: Salmon River, Boise River (the South Fork Boise River is part of the action area), Payette River, Little Lost River, Malheur River, Jarbidge River, and Weiser River. This RU contains 22 core areas and 207 local populations (USFWS 2015f, p. 47; USFWS 2015h, pp. E1-E2). The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, dams, mining, Agencies management practices, nonnative species, and agriculture (e.g., water diversions, grazing) (USFWS 2015h, pp. E15-E18). Conservation measures or recovery actions implemented include in-stream habitat restoration, in-stream flow requirements, screening of irrigation diversions, and riparian restoration (USFWS 2015h, pp. E19-E20).

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 2015g, entire). The Saint Mary RU 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 RU contains four core areas and seven local populations (USFWS 2015g, p. F-1) in the U.S. headwaters. The current condition of the bull trout in this RU is attributed primarily to the outdated design and operations of the Saint Mary Diversion operated by the Bureau of Reclamation (e.g., entrainment, fish passage, instream flows), and, to a lesser extent habitat impacts from development and nonnative species (USFWS 2015g, pp. F7-F8). Conservation measures or recovery actions implemented or ongoing are not identified in the

St. Mary RUIP; however, the Service is conducting interagency and tribal coordination to accomplish conservation goals for the bull trout (USFWS 2015g, p. F-9).

2.2.1.6 Federal, State, and Tribal Actions since Listing

Since listing of the 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 affected 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; in-stream flow enhancement to allow effective passage at appropriate seasonal times and prevent channel dewatering; and water quality improvement (decommissioning roads, implementing BMPs 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 conservation actions to be implemented. In several bull trout core areas, it is necessary to continue ongoing fisheries management efforts to suppress the effects of nonnative fish competition, predation, or hybridization (particularly brown trout, brook trout, lake trout, and northern pike) (DeHaan and Godfrey 2009; Fredenberg et al. 2007). A more comprehensive overview of conservation successes from 1999-2013, described for each RU, is found in the Summary of Bull Trout Conservation Successes and Actions since 1999 (available at http://www.fws.gov/pacific/ecoservices/endangered/recovery/documents/USFWS_2013_summary_of_conservation_successes.pdf)

Projects that have undergone section 7 consultation have occurred throughout the range of bull trout. Singly or in aggregate, these projects could affect the species' status. The Service has conducted periodic reviews of prior Federal "consulted-on" actions. A discussion of consulted-on effects in the proposed action area is provided in the environmental baseline section below.

2.2.2 Environmental Baseline of the Action Area

The term "environmental baseline" is defined in the regulations implementing the Act 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 and private actions which are contemporaneous with the consultation in process. The consequences to the 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 (50 CFR 402.02).

2.2.2.1 Status of Bull Trout in the Action Area

The Idaho statewide action area includes portions of the Mid-Columbia, Upper Snake, and Columbia Headwaters recovery units, containing in total 28 core areas and 277 local bull trout populations. There are an estimated 1.13 million bull trout greater than 70mm in Idaho (High et al. 2008, p. 1687). The action area includes spawning and rearing (SR) habitat and foraging, migration, and overwintering (FMO) habitat (see section 2.2.1.5 *Population Units*). Spawning and early rearing habitat is typically found in headwater areas (often road-less and on USFS lands) while main stem rivers provide FMO habitat. Figure 2 shows overlap between areas where bull trout may occur and the location of state and Federal highways and roads. Local roads administered by LHTAC are not shown in Figure 2, but it is assumed that they increase the probability of overlap because of their greater density in the action area.

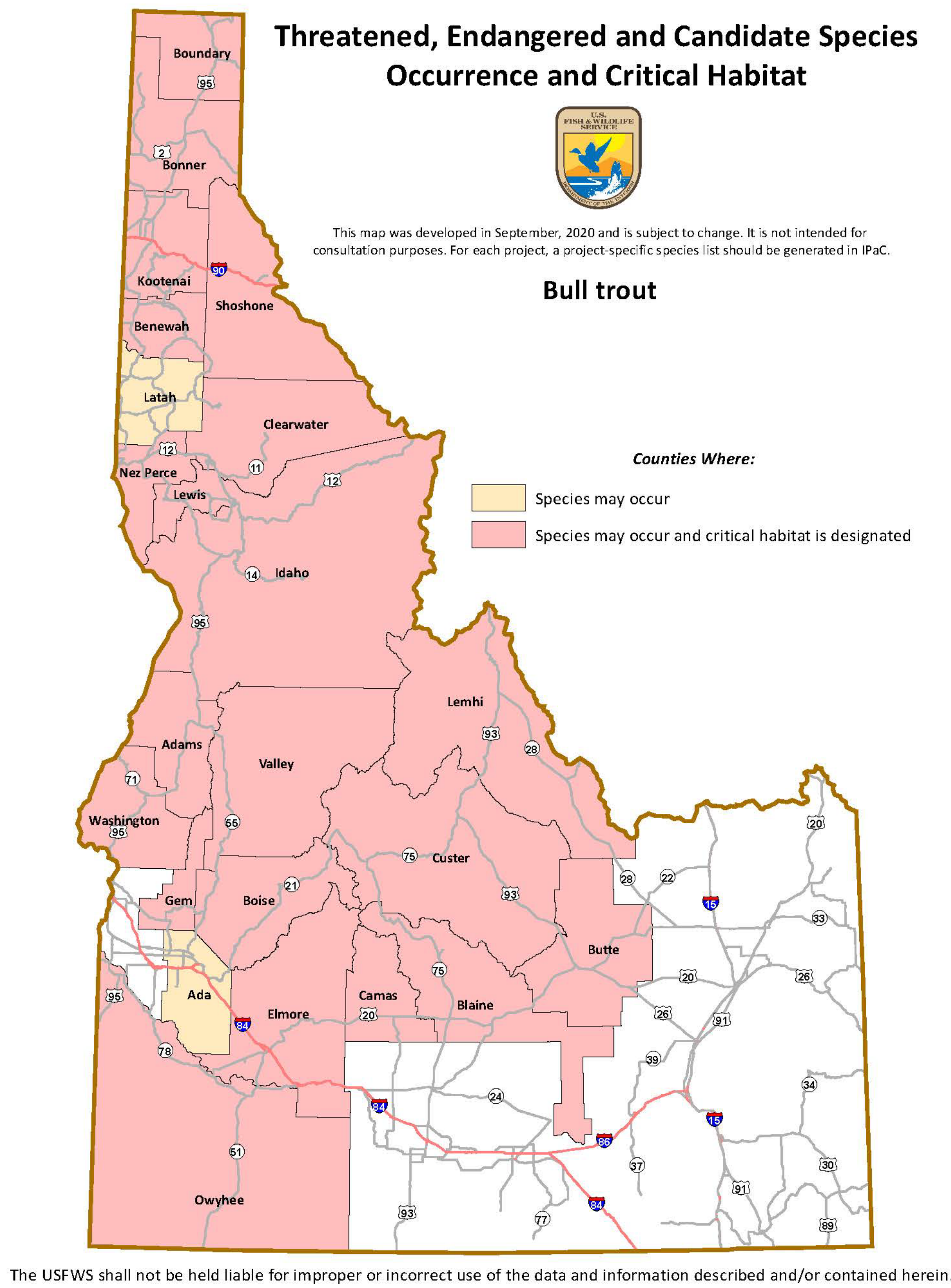

Figure 2: Map showing overlap between areas where bull trout and critical habitat may occur and state or Federal roads and highways. Local roads administered by LHTAC are not shown, but it is assumed that they increase the probability of overlap.

As the proposed Program is programmatic in nature and encompasses a large area across Idaho, the analysis presented in this Opinion will assess bull trout baseline status at the core area level as opposed to the smaller, local population scale. The bull trout recovery plan identified a bull trout core area as the closest approximation of a biologically functioning unit for bull trout (USFWS 2015f, p.71). By definition, a core area includes 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). Core areas contain both spawning and early rearing habitat and foraging, migrating, and overwintering habitat. Core areas constitute the basic unit on which to gauge recovery (USFWS 2015f, p. 71).

Based on our most recent status reviews (USFWS 2008; USFWS 2015a), historical habitat loss and fragmentation, interaction with nonnative species, and fish passage issues are widely regarded as the most significant primary threat factors affecting bull trout. The order of those threats and their potential synergistic effects vary greatly by core area and among local populations and is described in greater detail in the recovery unit implementation plans (RUIPs) for each of the three recovery units in Idaho included in the recovery plan: Mid-Columbia (USFWS 2015e), Upper Snake (USFWS 2015h), and Columbia Headwaters (2015c). In some core areas within their extant range, bull trout experience no major threats and maintain healthy populations throughout most or all available habitat; some bull trout core areas experience limited but significant threats, but still retain strong populations in most available habitat; and some continue to experience severe and systemic threats and harbor relatively small populations that have been reduced to a limited portion of available habitat.

Mid-Columbia Recovery Unit

The Mid-Columbia Recovery Unit contains 24 core areas and 124 local populations distributed in four Geographic Regions across Idaho, Oregon, and Washington. There are 5 core areas in Idaho, located in the Lower Snake and Middle Snake Geographic Regions.

In the Lower Snake Geographic Region, the core areas in Idaho are the South Fork Clearwater River (five local populations), North Fork Clearwater River (12 local populations), Lochsa River (17 local populations), and Selway River (10 local populations). Of these four core areas, only the South Fork Clearwater River has primary threats from upland/riparian land management (legacy impacts from forest practices, roads and mining as well as historical and current impacts from transportation networks); instream impacts (forest practices, mining, roads, and grazing); and non-native fishes (hybridization and competition with brook trout) (USFWS 2015e, p. C-30).

The Middle Snake Geographic Region includes the Pine/Indian/Wildhorse core area with a total of three local populations, but only the Indian Creek and Wildhorse River local populations occur in Idaho. This core area has primary threats from instream impacts (dewatering caused by numerous diversions); connectivity impairment (dewatering, entrainment, and passage barriers from water diversions and impeded connectivity); and non-native fishes (hybridization and competition with brook trout) (USFWS 2015e, p.C-34).

Upper Snake Recovery Unit

The Upper Snake Recovery Unit contains 22 core areas and 206 local populations distributed in seven Geographic Regions: Salmon River, Boise River, Payette River, Little Lost River, Malheur River, Jarbidge River, and Weiser River (USFWS 2015h). With the exception of the Malheur

River Geographic Region (Oregon) with two core areas and eight local populations, all of these local populations occur in Idaho and, therefore, within the action area. While the condition of bull trout populations within many of these core areas is good in that 59 percent have no primary threats, 14 percent have been subject to the combined effects of instream impacts (dewatering, altered flows/water management), 27 percent to connectivity impairment (fish passage issues, entrainment, dewatering, temperature barriers), 14 percent to upland/riparian land management (livestock grazing, forest management practices), and 36 percent to non-native fishes (predation, competition, and hybridization with brook trout) (USFWS 2015b, pp. E-15 – E18). Based on discussions with technical partners and the existing trend data, it is estimated that 13 of the 22 core areas in the Upper Snake Recovery Unit have either stable or increasing trends since 1995 (USFWS 2015b, p. E-20). While populations in many parts of the range are stable or increasing, other areas such as southwest Idaho do not have any or enough information regarding trends. In the Boise River watershed, for example, trends are increasing in the Anderson Ranch Core Area but trends are not known in the Arrowrock Core Area (USFWS 2015b, pp. E-5 – E7). Trends are also unknown in the 5 core areas of the Payette River watershed as well as in the Pahsimeroi core area (USFWS 2015b, pp. E-5 – E-7).

Columbia Headwaters Recovery Unit

The Columbia Headwaters RU is divided into five geographic regions: Upper Clark Fork, Lower Clark Fork, Flathead, Kootenai, and Coeur d'Alene regions (USFWS 2015e). This RU contains 35 bull trout core areas; 15 of which are complex core areas as they represent larger interconnected habitats and 20 simple core areas as they are isolated headwater lakes with single local populations. The statewide action area is located in the Lower Clark Fork, Kootenai, and Coeur d'Alene Lake Geographic Regions.

The Idaho portion of the Lower Clark Fork Geographic Region contains the Priest Lakes (5 local populations) and Lake Pend Oreille (20 local populations) core areas. The Priest Lakes core area has primary threats from upland/riparian management (riparian and instream degradation from legacy forest practices); and non-native fishes (lake trout predation and competition and brook trout hybridization and competition) (USFWS 2015e, pp. D10 - D25). The USFWS 2008 5-year review (USFWS 2008, p. 33) found this core area was at high risk of extirpation. The IDFG trend data indicate that bull trout abundance in this core area is decreasing (Meyer et al. 2014, p. 207).

The Lake Pend Oreille core area has primary threats from upland/riparian land management (e.g., sediment from forest roads, logging and livestock grazing; loss of large woody debris; and pool reduction in FMO habitat and most SR tributaries); instream impacts (e.g., loss of large woody debris; pool reduction; increased sedimentation in some SR tributaries from transportation, flood control, and utility corridors along riparian corridors; and changes in hydrology, sedimentation, and passage issues from historic placer mining); water quality (e.g., high water temperatures in mainstem FMO habitat and lower reaches of most tributaries); connectivity impairment (e.g., FMO habitat is fragmented by Albeni Falls Dam and Box Canyon Dam); small population size (e.g., small population size and fragmentation is severely limiting bull trout survival and recovery in key SR tributaries in the lower drainage); and non-native fishes (e.g., predation by northern pike, smallmouth bass, walleye, brown trout, and lake trout in FMO habitat, and hybridization with brook trout in SR habitat). The USFWS 2008 5-year review (USFWS 2008, p. 33) found this core area was at potential risk of extirpation. The IDFG trend data indicate that bull trout abundance in this core area is stable (Meyer et al. 2014, p. 207).

The Idaho portion of the Kootenai geographic region contains the Kootenai River core area with eight local populations. This core area has primary threats from upland/riparian land management (e.g., forest practices and use and management of transportation corridors); instream impacts (e.g., Libby dam impacts to FMO habitat); and non-native fishes (e.g., competition and hybridization with brook trout). The USFWS 2008 5-year review (USFWS 2008, p. 33) found this core area was at risk of extirpation. The IDFG trend data indicate that bull trout abundance in this core area is stable (Meyer et al. 2014, p. 207).

The Coeur d'Alene Lake geographic region contains the Coeur d'Alene Lake core area with five local populations. This core area has primary threats from poor water quality (e.g., temperature, metals, and dissolved oxygen); small population size (e.g., low population size and lack of replication of stable populations in the St. Joe River limits recovery potential); and non-native fishes (e.g., northern pike and smallmouth bass predation). The 5-year review (USFWS 2008, p. 34) found this core area was at high risk of extirpation, although IDFG trend data indicate that bull trout abundance in this core area is increasing (Meyer et al. 2014, p. 207).

2.2.3 Effects of the Proposed Action

Implementing regulations define "effects of the action" as "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 (50 CFR 402.02).

Table 1 lists categories of projects that would adversely affect fish, as well as categories of projects that are not likely to adversely affect fish. The primary reason that not likely to adversely affect projects in Table 1 have insignificant or discountable effects to listed fish is that each activity occurs in upland locations or in dry, seasonal, non-fish bearing streams. Therefore, bull trout will not be present during project implementation and will not be directly impacted by project activities. There could be effects that occur later in time that result from precipitation events that deliver sediment from construction ground disturbance to downstream fish habitat. However, with implementation of conservation measures (section 2.1.4) to control erosion and sediment from ground disturbance, these potential effects from those activities are expected to be insignificant and discountable. For complete descriptions of all BMPs, see section 2.1.4 Proposed Conservation Measures.

Projects that would adversely affect fish include: (1) bridge maintenance below the OHWM; (2) two-lane bridge construction over water; (3) construction of wide shoulder notches requiring instream work; (4) bank stabilization with riprap, gabion baskets, MSE walls, or bio-methods; (5) small structure repair; (6) culvert installation/replacement, maintenance, or extension in perennial streams; and (7) geotechnical drilling (Table 1).

Table 1: Project actions grouped by effects determinations for listed aquatic species (from Table 11 in the Assessment; prefix number for each action refers to the section where action is described in the Assessment).

Not Likely to Adversely Affect (NLAA) Projects	**Likely to Adversely Affect (LAA) Projects**
2.1 Roadway Maintenance Actions (Surface Treatments)	2.3 Pile Preservation
2.2 Bridge Maintenance Actions ABOVE the Ordinary High-Water Mark	2.4 Two-Lane Bridge Construction
2.3 Pile Preservation	2.7 Roadway Widening
2.4 Two-Lane Bridge Construction	2.8 Bank Stabilization
2.5 Excavation and Embankment for Roadway Construction (Earthwork)	2.10 Small Structure Repair
2.6 Rock Scaling	2.11 Culvert Installation and Maintenance
2.7 Roadway Widening	2.13 Geotechnical Drilling
2.8 Bank Stabilization	2.14 Pile Installation
2.9 Ditch Cleaning	*Note:* All LAA projects assume in-water work in or adjacent to occupied or critical habitat and issuance of COE, IDWR and IDEQ permits. All NLAA projects assume no in-water work in or adjacent to occupied or critical habitat.
2.10 Small Structure Repair	
2.11 Culvert Installation and Maintenance	
2.12 Guardrail Installation	
2.13 Geotechnical Drilling	

The number of projects proposed for implementation under the program are likely to vary each year, but the majority are not likely to adversely affect bull trout or its critical habitat. During 2012 – 2021, an average of 5 projects were completed each year in bull trout habitat, and of the total 44 projects, only 11 involved in water work (Lowe 2022, pers. comm.). Six of these LAA projects were culvert replacements and the other five involved bridge replacements, culvert extension, small structure repair, and geotechnical drilling.

All of these categories of actions, with the exception of geotechnical drilling, include the possibility of fish salvage, and the subsequent risk of injuring or killing fish. The primary instances in which fish handling and removal will occur are during two-lane bridge construction and culvert replacement. However, fish salvage will not be required for most individual projects in many of the categories of actions as fish are unlikely to be present. Fish are seldom removed or handled during bank stabilization actions due to the difficulty of isolating the work area and the low risk of fish mortality from Program actions. Similarly, fish are seldom removed or handled during small structure repair, culvert maintenance, or culvert extension.

The majority of adverse effects from these activities will likely come from non-lethal turbidity plumes affecting individual bull trout, water quality (e.g., increases in suspended sediment, water temperature, and chemical contamination) and habitat (e.g., sediment deposition and streambank alteration). The magnitude of these effects will vary as a result of the nature, extent, and duration of the individual project activities, though the major factors would be whether or not any work occurs in the stream and whether bull trout are present at the time of implementation.

The primary pathways for adverse effects are noise at construction sites, handling of fish by electrofishing and hand netting during salvage activities at temporarily de-watered stream reaches, exposure to reduced water quality, and impact to habitat (e.g., sediment deposition). The discussion of each of these effects pathways follows below.

2.2.3.1 Noise

Noise from heavy equipment operating adjacent to live water may disturb fish in the immediate vicinity causing short-term displacement. Heavy equipment operation for multiple categories of activities, including geotechnical drilling, will create noise, vibration, and potentially water surface disturbance. Heavy equipment operation will only occur away from the stream channel or in de-watered stream channels. Popper et al. (2003, entire) and Wysocki et al. (2007, entire) discussed potential impacts to fish from long-term exposure to anthropogenic sounds, predominately air blasts and aquaculture equipment, respectively. Popper et al. (2003, entire) identified possible effects on fish including temporary and potentially permanent hearing loss (via sensory hair cell damage) and masking of potentially biologically important sounds. Studies evaluated noise levels ranging from 115 to 190 decibels (dB). Wysocki et al. (2007, p. 691) did not identify any adverse impacts on rainbow trout from prolonged exposure to three sound treatments common in aquaculture environments (i.e. 115, 130, and 150 dB). As noted in the Assessment, in the studies identified by Popper et al. (2003, pp. 37-38) that caused ear damage in fishes, all evaluated fish were caged and thus incapable of moving away from the disturbance. Bull trout will not be confined in the project area and thus free to move away from any prolonged noise. Machinery operation adjacent to the stream will be intermittent in all cases.

The FHWA (2008, p. 4) indicates backhoe, grader, loader, and truck noise production ranging between 80 and 89 dB, and rock drilling noise production ranging 85 to 98 dB, well below noise levels known to have generated adverse effects to surrogate fish species, as discussed above. Therefore, noise related disturbances of Program actions are unlikely to result in injury or death. It is unknown if the expected decibel levels will cause fish to temporarily move away from the disturbance or if fish will remain present. Undisturbed habitat would likely be a short distance away from where heavy equipment disturbances occur, and the disturbances would only occur a few hours a day during equipment operation. We do not anticipate that short-term movements caused by construction equipment or geotechnical drilling noise will result in effects different than those that bull trout typically experience. The expected noise levels and level of disturbance will be minimal and insignificant.

Noise from pile-driving is known to impact fish in the immediate vicinity causing disturbance, short-term displacement, or injury. Pile driving may be necessary for two-lane bridge replacements, retaining walls (MSE walls), and positioning barges for bridge repair work. These project activities will likely occur in FMO habitat where bull trout may only be seasonally present or migrating through the area. For bridge replacement projects, the new structure must be single span, with the new abutments potentially requiring pile driving located above and behind the OHWM elevation on the existing channel side slope ("in the dry"). Hydroacoustic effects are anticipated to be greatly reduced because pile driving will generally not occur in-water. Sound from pile driving in the dry does travel through the substrate via "sound flanking" (WSDOT 2019, p. 7.49); however, pile driving in the dry is not expected to result in sound pressure levels that reach the peak level threshold of 206 dB (determined to be injurious to fish [FHWA 2008, p. 4]). Hydroacoustic monitoring by ITD at the East Fork Salmon River Bridge found that peak levels for all piles driven never reached 206 dB et (Illingworth and Rodkin 2014, p. 11). Sound pressure levels may reach the fish injury threshold of 187 dB in a limited distance within the project area. For example, sound pressure levels from "dry" pile driving load-bearing 14 inch H-piles for ITD's Race Creek Bridge Project were calculated to reach the injury threshold less than 33 feet from the source while the disturbance threshold of 150 dB was calculated to extend up to 187 ft from the source (Assessment, p. 284). However, bull trout are unlikely to be harmed as the sound pressure levels for the injury threshold are unlikely to extend into the river beyond the bank. Although bull trout may be disturbed within a short distance, the sound levels are unlikely to injure or kill bull trout. Thus, in combination with the in-water work window when few if any bull trout are likely to be present, the effects of pile driving above the OHWM will be discountable.

Adverse effects from pile driving in water may include injuries such as loss of hearing, swim bladder rupture or tearing, capillary rupture in skin, neurotrauma, eye hemorrhage, and death (Caltrans 2015, p. 3-5). Potential disturbance or behavioral effects include avoidance of the impact area, delays in migration, or difficulty in locating food resources (Caltrans 2015, pp. 3-6) but these behavioral effects are unlikely to result in actual harm. However, any proposed projects which include load-bearing pile driving in the water outside of cofferdams or below the OHWM are not included in the programmatic assessment or this accompanying Opinion and must be consulted separately (Assessment, p. 49). Non-load bearing sheet piles may be employed during construction of cofferdams but will be driven with vibratory hammers to minimize the duration and pressure levels of sound effects to discountable levels.

To minimize the potential for adverse effects, all pile driving work will take place in dewatered work areas. Caltrans (2015, p. 2-25) reports that "Coffer dams that have been dewatered down to the mudline substantially reduce underwater pile driving sound. This is the best isolation that can be provided." In addition, work will only occur in NMFS, USFWS[2], or IDFG approved in-water work windows when bull trout numbers are likely reduced or not present. Where applicable, other measures that may be used to minimize effects to fish from pile driving include the use of vibratory hammers, smaller sized piles, piling caps, and limiting the and number of pile strikes per day. Conducting pile driving only during daylight hours minimizes exposure as bull trout are most likely to move through the action area during the night from dusk to dawn (Homel and Budy 2008, p. 876). Sound effects from pile-driving are thus expected to be non-lethal and limited to disturbance of bull trout that may be present in the limited vicinity while pile driving activities are occurring in dewatered or dry areas.

Blasting may be used during the rock scaling project action., Blasting may disturb, injure, or kill fish through elevated sound pressure levels depending on the blasting location relative to the occurrence of listed fish. However, under this Opinion, in-water blasting is not permitted, thereby greatly reducing potential effects. Rock removal by blasting will only be allowed when labor methods are ineffective. The Contractor must submit a blasting plan to the Engineer for approval including type and height of rock fall barriers to prevent debris from entering waterway, drilling and blasting patterns, timing and duration, and anticipated noise effects. For these reasons, and primarily because there will be no blasting allowed in-water, effects due to blasting are considered insignificant; blasting is not likely to adversely affect bull trout.

2.2.3.2 Fish Handling and Salvage

Fish Handling/Salvage

Fish handling and salvage may be required when instream work areas need to be isolated or dewatered and fish do not move out of the work area on their own. Dewatering will primarily be necessary for two-lane bridge replacements and culvert replacements. Fish may be herded out of the work area or may be removed from an exclusion area as it is slowly dewatered using methods such as hand or dip-nets, seining, trapping with minnow traps (or gee-minnow traps), or electrofishing. If fish handling is required, it will be done by either electrofishing before de-watering or hand-netting or trapping during or after dewatering. Qualified personnel with appropriate training and experience will conduct all fish handling (see section 2.1.4 proposed conservation measures); however, there still remains a risk for bull trout injury or mortality with these activities.

Electrofishing

The effects of electrofishing on juvenile steelhead, spring/summer Chinook salmon, and juvenile, subadult, and adult bull trout will consist of exposure to an electric field, capture by netting, impingement on block nets, and handling associated with transferring the fish back to the river (described above). Most of the studies on the effects of electrofishing have been conducted on adult fish greater than 12 inches in length (Dalbey et al. 1996, p. 567). The few studies that have been conducted on juvenile salmonids indicate that spinal injury rates are substantially lower

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[2] Approved or recommended in-water work windows may vary across the range of bull trout. The default windows used for the analysis in this Opinion are most common, with July 15 – August 15 in SR habitat and July 15 – August 31 in FMO habitat. These windows are advised by the Service for ITD general use in pre-project planning for activity timelines. The approved or recommended in-water work windows may vary for a specific location, particularly in anadromous areas of Idaho, and should be confirmed with the local USFWS office during ITD submission of the pre-project form as described in the PBA.

than they are for large fish. Smaller fish intercept a smaller head-to-tail potential than larger fish (Sharber and Carothers 1988, p. 117) and may be subject to lower injury rates (Dalbey et al. 1996, p. 563; Thompson et al. 1997, p. 151). McMichael et al. (1998, p. 898) found a 5.1% injury rate for juvenile middle Columbia River steelhead captured by electrofishing in the Yakima River subbasin; while Ainslie et al. (1998, p. 908) reported injury rates of 15% for direct current applications on juvenile rainbow trout. The incidence and severity of electrofishing damage is partly related to the type of equipment used and the waveform produced (Sharber and Carothers 1988, pp. 119-121; Dalbey et al. 1996, entire; Dwyer and White 1997, entire). Continuous direct current or low-frequency (equal or less than 30 Hz) pulsed direct current (PDC) have been recommended for electrofishing because lower spinal injury rates occur with these waveforms (Ainslie et al. 1998, p. 916). In low conductivity waters in Idaho, examination of brook trout removed during 3-pass electrofishing at PDC frequencies of 30 hertz (Hz) or 60 Hz found no difference in the number or severity of spinal injuries, with spinal compressions and misalignments observed in 4% of the brook trout captured at each frequency (Chiaramonte et al. 2019, p. 6). Few studies have examined the long-term effects of electrofishing on salmonid survival and growth (Ainslie et al. 1998, entire; Dalbey et al. 1996, entire). Monitoring of injuries to captive rainbow trout exposed to PDC during a hatchery study documented a mortality rate of 1.1 percent, and shocking-induced bruise injuries healed in 92 percent of the fish within 57 days (Schill and Elle 2000, p. 730). Overall, these studies indicate that although the fish may suffer injuries and may grow at slower rates or not at all, few die as a result and most recover. The IDFG assessed the impacts of electrofishing on trout during removal sampling across 162 stream reaches, and with an estimated mean population mortality of 0.34% (range 0.02 - 2.78%), concluded effects were not significant at the population scale (Elle and Schill 1999, p. 29). Based on review of IDFG annual section 6 reports provided to the Service, the observed bull trout mortality rate is less than 1.0 percent of the total number of bull trout encountered during electrofishing conducted under Idaho's fisheries management plan and scientific collection permit program from 2010 to 2018.

Although McMichael et al. (1998, p. 898) indicated apparent electrofishing injury rates for wild salmonids were only 5%, a review of other studies suggests an injury rate of 25% (Nielson 1998, entire) to account for variable site conditions and experience levels. Under the Program, electrofishing will be conducted by qualified personnel with appropriate training and experience, who will follow standard guidelines (NMFS 2000, entire) and BMPs (Appendix A) that will minimize the levels of stress and mortality related to electrofishing. Field crews will be trained in observing fish for signs of stress and shown how to adjust electrofishing equipment to minimize that stress. Therefore, we will estimate an injury rate of 25% of the total number of fish electrofished. However, ITD anticipates the number of bull trout and other listed fish that may be injured or killed by electrofishing will be very low; monitoring reports document only one listed fish (i.e., steelhead) identified during fish handling/salvage for one project (of only two projects were fish were encountered) during 10 years of implementation of activities under the previous programmatic consultation (USFWS 2010, entire).

Netting/Trapping

At some project sites requiring de-watering of a stream reach, fish will be removed from the stream reach by netting or trapping if they do not move out of the work isolation area on their own. Capturing and handling fish causes stress, though fish typically recover fairly rapidly from the process. Stressed fish may experience increased plasma levels of cortisol and glucose

(Assessment, p. 287). Even short-term, low intensity handling may cause reduced predatory avoidance for up to 24 hours (Olla et al. 1995, p. 393). Differences in water temperatures (between the river and wherever the fish are held), dissolved oxygen conditions, the amount of time that fish are held out of the water, and physical trauma are the primary contributing factors that lead to stress and death from handling. Stress on salmonids increases rapidly from handling if the water temperature exceeds 64.4 °F or dissolved oxygen is below saturation. Fish can experience trauma if care is not taken when transferring them to holding tanks. All handled fish will be held in five-gallon buckets filled with stream water for a period only long enough to transport fish to an appropriate release site immediately upstream of the individual project sites. Buckets will be placed into the water and slowly inverted to allow captured fish to move into the selected release sites. Alternatively, netted fish may be placed back in the water upstream of the project site without delay or handling. Handling fish in this manner is likely to minimize the potential stress fish experience.

Individuals will be adversely affected by hand-netting and trapping despite measures to limit impacts to listed salmonids. Program monitoring reports show only one listed fish (i.e., steelhead) was identified during fish handling/salvage for one project during 10 years of Program implementation (Assessment, p. 286), so the anticipated number of bull trout adversely affected by this action will be low.

Estimating Bull Trout Densities

Expected effects from stream dewatering and the capture, handling, transport, and release of bull trout include: (1) stranding or impinging fish; (2) disruption of normal behavior or movements; and (3) short-term stress, injury, and occasional mortality. However, the number of fish expected to be handled during the ten-year term of the Program is very low. While project activities are unlikely to occur near or in bull trout spawning areas (most spawning occurs in roadless areas), the Service-advised default in-water work window is July 15 to August 15 in spawning and rearing designated habitat. This work window is designed to reduce impacts to redds and juvenile bull trout as this period is too early for most spawning activities and age-0 juveniles are no longer located in spawning gravels. ITD culvert replacements in spawning and rearing habitat are likely to be rare, and those few are likely to be located downstream of spawning areas, as most spawning occurs in roadless tributaries. Most SR habitat is located on land managed by USFS or BLM, and any culvert replacements proposed as aquatic organism passage (AOP) structures for roads in occupied or critical habitat may be covered by Federal nexus under the existing programmatic opinion for those Federal agencies (USFWS 2012, entire). Together, location of SR habitat and in-water work windows will reduce the likelihood for adverse effects to the most vulnerable life history stages. However, adult and subadult bull trout may be present year-round within FMO habitat. The USFWS-advised generic in-water work window of July 15 to August 31 in FMO habitat will reduce, but not eliminate, the potential for exposure of bull trout to dewatering and fish handling.

The Assessment (p. 287) cites previous ITD post-construction reports that show that between 2010 and 2020, fish were handled during implementation of only two projects: Kid Creek Culvert Replacement in 2014 and West Fork Potlatch Bridge Replacement in 2020. During the Kid Creek project 80 to 100 unidentified trout and sucker species 2 – 4 in. in length were netted and released downstream (no listed fish were positively identified). During the West Fork Potlatch River project, 122 fish were handled, including one listed steelhead (Assessment, page 286). This information indicates that the probability of capturing and handling listed species during fish salvage is very low, with only one listed fish captured and identified during 10 years of Program implementation.

Estimating bull trout density is important for estimating the number of individual bull trout that may be affected by fish salvage operations. The challenge of developing reliable estimates of bull trout densities is complicated by high variability and the use of different metrics in the published literature. For example, bull trout densities have been reported in terms of area, such as per 100 square meters, as well as linear measurements, per 100 meters or ever per mile. Some of the biological factors influencing bull trout densities are subpopulation demographics, life histories, and spatial and temporal variables related to seasonal availability of forage and high-quality habitat. The Service assumes that lower densities of bull trout occur in FMO habitat, while higher densities of bull trout occur in SR habitat. In addition, adults and some subadult bull trout would be using FMO habitat, while younger age class fish would remain in the spawning and rearing areas and would not be utilizing FMO habitat. In bull trout habitat only occupied by resident life history forms, all age classes may be present.

In this Opinion, the Service is following the bull trout density estimates and assumptions provided in the USFWS biological opinion for fish passage restoration activities in Idaho and Nevada (USFWS 2012, pp. 55-58) and the USFWS biological opinion for the Pine bridge replacement (USFWS 2018b, pp. 66-67). These are efforts with similar methods and effects as this programmatic consultation for in-water work associated with culvert replacements with AOPs on fish bearing streams and installation of cofferdams. We understand that bull trout densities will vary across subbasins, core areas, and within local populations, but providing specific density data for each stream where a project may occur is not feasible within this consultation; therefore, we will follow the estimates provided in USFWS (2012, entire; 2018b, entire) and use the same assumptions for fish salvage projects.

Estimates per project rounded up to the nearest whole number:

- 6 fish could be captured and handled during electrofishing activities.
- 2 fish could be injured or killed due to electrofishing.
- 1 fish could be killed due to impingement on block nets.
- 1 fish could be killed due to stream dewatering and stranding in the substrate.
- 2 bull trout could be captured and handled at coffer dams.

Assumptions include:

- Density of 10 bull trout/100 meters.
- Average dewatered stream length of 53 meters.
- 3.5 percent block net impingement mortality rate.
- 95 percent capture rate with electroshocking.
- 70 percent capture rate with seine and dip nets.
- 25 percent electroshocking injury/mortality rate (Nielsen 1998).
- 5 percent stranded fish rate.

Even though the Service understands that projects may be completed in unoccupied bull trout habitat, due to the absence of priority-based criteria to govern the selection of culvert sites, it is possible that every project completed under this programmatic could occur within occupied habitat. Therefore, the Service assumes that each project may occur in an occupied stream reach and may affect a bull trout subpopulation. It is also likely that bull trout densities will not conform to the assumed 10 bull trout/100 meters; in some streams these numbers may be much higher, and others it may be lower.

Prior to dewatering the stream, fish salvage may occur to remove fish from the soon to be dewatered work area. Block nets will be installed upstream and downstream of each site to prevent fish from moving back into the work area. Typically, installation of the block nets, capture and relocation of bull trout, diversion of the streamflow around the project area, and removal of the block nets will occur all in the same day. Although bull trout will have a general avoidance response to the work area, they may be startled and, in trying to move away from the disturbance, become entangled in the block nets causing injury or death. The Service assumes that personnel will be available while block nets are in place to remove bull trout promptly, thus minimizing effects of impingement.

- Using block net impingement mortality estimates (3.5 percent of population density) and the average estimated density of 10 bull trout/100 meter, it is estimated that one bull trout per project completed under the Program could be killed from being impinged on a block net.

Seines and dip nets may be used by an action agency to capture and remove any fish trapped between the block nets in the portion of the stream to be dewatered. The use of seines and dip nets are expected to capture approximately 70 percent of the fish within the section of stream to be dewatered but their use is not mandatory and depending on the size of the stream their use may not be feasible.

- If seines and dip nets are used, the Service predicts that if may result in capture and handling of 4 bull trout per project. We arrived at this number by the following: (10 fish/100 meters) x (53 meters dewatered area per project) x (0.70 bull trout capture rate).

To estimate the number of bull trout that may be handled by electroshocking, the Service does not assume seining and dip netting occur and the primary method (or only method) of clearing fish from the construction area will be by electrofishing. The capture and handling of bull trout through electroshocking is a short-duration activity occurring intermittently over one day. The Service assumes, based on review of the literature provided in Elle and Schill 2004 (entire), that an estimated 96 percent of the fish will be captured. As reported in Elle and Schill 2004 (p. 2, 96) percent represents general (3 pass) capture efficiencies in Idaho. The Service also estimates that up to 25 percent of fish exposed to electrical current could be injured, based on literature review conducted by Nielson (1998, entire). Although the risk of electroshocking injuries increases with the size of the fish, we assumed no age/size-based differences in injury rates.

All bull trout within the electroshocked stream reach will be exposed to electrical current, which is estimated, given the 10 bull trout/100 meters, to be 6 fish per site exposed to electrical current and potentially captured (due to rounding of 95 percent capture rates), with up to 2 bull trout potentially injured or killed.

The Service understands, however, that more than 6 bull trout could be collected during clearing operations depending on site characteristics, condition of habitat, and subpopulation characteristics, and that, based on the best available information, up to 25 percent of electroshocked bull trout could be harmed during the process.

Bull trout that are collected during electroshocking efforts will be released away from the project site at suitable locations and where they will not likely be in danger of subsequent impingement on nets. Fish that are forced to new habitat may be released into habitat already occupied by bull trout or other resident fish and may have to compete for available habitat and niches. As a result of being moved, bull trout may suffer from increased competition, loss of cover, stress, and subsequent reduced feeding efficiencies. These behavioral effects may be resolved very quickly if habitat space is readily available, or fish may be forced to seek out appropriate habitat.

Overall, the injurious effects of relocation are expected to be temporary (less than a day), sublethal, and bull trout are expected to adjust to their new habitat quickly. However, adverse behavioral effects to bull trout are likely to occur from being relocated to different habitat

During stream dewatering a small percentage (up to 5 percent)-of bull trout may avoid being captured and relocated, and thus may die from being stranded in the dewatered work area. The Service estimates that the proposed capture methods will remove approximately 95 percent of the fish prior to stream dewatering.

- The Service-estimates that up to one bull trout may be stranded per project.

The location and number of projects that may be implemented each year under the program are not known. We will base our estimate on projects implemented under the previous programmatic consultation, when during 2012 – 2021, on average each year 5 projects were implemented in bull trout habitat, with one involving in water work. In consideration of variable funding cycles and infrastructure needs, the Service conservatively estimates on average 2 projects per year will require in-water work with fish salvage in bull trout habitat and result in adverse effects during the proposed action. Thus, a total of 20 projects are likely to result in the incidental take of bull trout and will be used in the exempted take analysis in the accompanying incidental take statement appended to this Opinion.

Given these considerations, fish handling and salvage are likely to adversely affect individual bull trout, but the number of fish affected will be low; effects at the local population and core area levels will be insignificant. Over the long term, bull trout movements and access may be improved by culvert replacements, which will be designed to allow fish passage for all fish-bearing streams (Assessment, p. 369), thus increasing the extent of available habitat.

2.2.3.5 Water Quality-related Effects on Fish

Reductions in water quality from Program actions could affect juvenile salmon and steelhead and adult and subadult bull trout. The proposed actions could degrade water quality through additions of suspended sediment to the water column, increases in stream temperatures, or chemical contamination. All near-stream ground disturbing activities and in-stream work have the potential to create increased levels of suspended sediment in the water column. Water quality may also be adversely affected by increases in temperature caused by clearing riparian vegetation. Chemical contamination could occur any time heavy construction equipment is being used within or adjacent to the stream channel, or from stormwater runoff from new hardened surfaces (e.g., passing lanes and turnouts).

Suspended Sediment

Fish exposed to elevated turbidity levels may be temporarily displaced from preferred habitat or could potentially exhibit sublethal responses such as gill flaring, coughing, avoidance, and increases in blood sugar levels, indicating some level of stress (Bisson and Bilby 1982, p. 372;

Berg and Northcote 1985, p. 1410; Servizi and Martens 1987, p. 254). The magnitude of these stress responses is generally higher when turbidity is increased and particle size decreased (Bisson and Bilby 1982, p. 372; Servizi and Martens 1987, p. 254; Gregory and Northcote 1993, p. 233). The most critical aspects of sediment-related effects are timing, duration, intensity and frequency of exposure (Bash et al. 2001, p. 11). Depending on the level of these parameters, turbidity can cause lethal, sublethal, and behavioral effects in juvenile and adult salmonids (Newcombe and Jensen 1996, entire). Turbidity and fine sediments can alter trophic levels, reduce substrate oxygen, smother redds, and damage gills, among other deleterious effects (Spence et al. 1996, entire). Although turbidity may cause stress, Gregory and Northcote (1993, p. 238) have shown that moderate levels of turbidity at 35 to 150 nephelometric turbidity units (NTUs) accelerate foraging rates among juvenile Chinook salmon, a response likely due to reduced vulnerability to predators due to a camouflaging effect.

BMPs included as part of the proposed action are intended to prevent the majority of sediment from being delivered to stream habitat but cannot prevent all sediment due to the nature of the in-channel work. Adult and subadult bull trout may experience short-term adverse effects as a result. Substrate may inadvertently fall from excavation equipment buckets or accidentally be pushed over road or bank edges while working in close proximity to the stream channel during site preparation or during structure repair, replacement, or installation (e.g., culverts, bridges). Rain events during and following construction activities may also result in mobilization of disturbed soils resulting in stream delivery and turbidity. Rewatering of de-watered stream reaches may mobilize sediment in areas disturbed by project activity, such as removal of old bridge piers and abutments.

However, BMPs included in the proposed action will minimize the risk of sediment entering streams. BMPs to reduce the likelihood and intensity of sediment plumes include sediment barriers between ground disturbance and the stream channel and dewatering of streams and in-water work windows in cases where in-stream project activity is unavoidable. Sediment barriers will be placed around potentially disturbed sites where needed to prevent sediment from entering a stream directly or indirectly. An adequate supply of erosion control materials (e.g., fiber wattles or silt fences) will be on site to respond to emergencies and unforeseen problems. No machinery will enter live water. For bridge replacements, a barrier will be placed between the old bridge pier and live water to catch any falling debris during removal of the pier. Ground disturbance will not occur during or immediately after rain events or when precipitation events are imminent. Disturbances are thus likely to be of short duration because only small amounts of sediment will infrequently and inadvertently be introduced to the stream channel. Furthermore, turbidity will be monitored during project construction in order not to exceed Idaho State Water Quality Standards. Turbidity measurements will be taken 100 ft above and below discharge points or as directed by appropriate resource agency or ITD personnel. State Water Quality Standards require that turbidity not exceed background levels by more than 50 NTUs instantaneously or more than 25 NTUs for more than 10 consecutive days; however, this level of turbidity may still adversely affect bull trout.

Many studies report the effects of suspended sediment on fish rather than turbidity (Newcombe and Jensen 1996, entire). Turbidity and suspended sediment are correlated, but this correlation can vary by watershed and even within the same watershed (Henley et al. 2000, entire). Although the relationship between suspended sediment and turbidity in all streams within the action area is not known, a regression equation developed by Dodds and Whiles (2004. p. 357)[3] was used to estimate the suspended sediment concentration associated with 50 NTUs. This equation yields a suspended sediment concentration of 173 mg/l.

According to Newcombe and Jensen (1996, entire), salmonids exposed to suspended sediment concentrations of 173 mg/l for one hour are likely to be negatively impacted as expressed by minor physiological stress, increased coughing, increased respiration, and reduced feeding rate. Therefore, we expect that adult and subadult bull trout within 600 ft (i.e., the expected extent of significant suspended sediment/turbidity (USFWS 2012, p. 52) downstream of instream work to be adversely affected by increases in suspended sediment/turbidity. Monitoring to ensure that State Water Quality Standards are met will minimize but not eliminate the potential for adverse effects.

Temperature

The proposed action has the potential to reduce streamside shade through the removal of vegetation. Large reductions in shade can increase the amount of solar radiation reaching the stream surface and lead to increases in steam temperatures. Elevated water temperatures may adversely affect salmonid physiology, growth, and development, alter life history patterns, induce disease, and may exacerbate competitive predator-prey interactions (Spence et al. 1996, entire). As described in the proposed action, individual projects will be designed to preserve existing vegetation. In instances where riparian shrubs are removed during construction, vegetation will be replanted. Because actions completed under this programmatic consultation will occur on existing state and local highways, riparian vegetation removal is expected to be minimal and have insignificant effects on stream shade and temperatures at both the local population and core area levels.

Chemical Contamination

Use of construction equipment and heavy machinery adjacent to stream channels poses the risk of an accidental spill of fuel, lubricants, hydraulic fluid, or similar contaminants into the riparian zone, or directly into the water. If these contaminants enter the water, these substances could adversely affect habitat, injure or kill aquatic food organisms, or directly impact bull trout. Petroleum-based contaminants such as fuel, oil, and some hydraulic fluids contain poly-cyclic aromatic hydrocarbons, which can cause chronic sublethal effects to aquatic organisms (Eisler 1987, entire). Ethylene glycol, the primary ingredient in antifreeze, has been shown to result in sub lethal effects to rainbow trout at concentrations of 20,400 mg/L (Staples 2001, p. 380). Brake fluid is also a mixture of glycols and glycol ethers and has about the same toxicity as antifreeze. Although all projects will require heavy machinery, equipment will not enter flowing water, which limits the potential for chemical contamination to occur. Furthermore, multiple BMPs will be implemented aimed at minimizing the risk of fuel or oil leakage into the stream. A spill prevention and contingency plan will be prepared by the construction contractor and approved by ITD for each project prior to implementation. All staging, fueling, and storage areas will be

[3] Dodds and Whiles (2004) conducted a regression analysis using data from 622 water quality stations located throughout the U.S. The resulting equation has an r squared value of 0.89. The equation is $\log_{10} \text{TSS (mg/L)} = 0.606 + 0.960*(\log_{10} \text{NTU})$, where TSS equals Total Suspended Solids.

located away from aquatic areas. Fuel spill and equipment leak contingencies and prevention BMPs should be sufficient to minimize the risk of negative impacts to bull trout and their habitat from toxic contamination related to accidental spills.

The proposed action would create a limited amount of additional pollutant-generating, impervious surfaces, such as passing lanes and turnouts. The proposed action does not include activities that would result in effects such as increased growth or roads that would accommodate new and/or increased traffic. Storm water runoff from highway systems can deliver a variety of chemical and sediment pollutants to streams from rain. Research has shown that dissolved copper and other metals found in storm water runoff from roadways (such as derived from the copper in vehicle brake pads) can impair salmonid olfactory senses (Nason et al. 2012, p. 735). Accordingly, it is likely that listed salmonids would be adversely impacted by water quality changes due to storm water runoff, spills, other contaminant events and increased turbidity. The potential for exposure of adult and subadult bull trout to pollutants will vary depending on the time of year and instream flows. Bull trout in the action area may encounter project-related storm water outfall mixing zones when they pass through the project area to move upstream or when they forage or reside in FMO habitats. The risk from exposure is greatest during low flow periods when water quality tends to be poor and temperatures are higher; however, storm water discharge is least likely during this time of year due to lower rainfall. Therefore, although some storm water may be discharged during summer months, most would occur during other times of the year when flows are higher and water temperatures are lower, thus limiting, but not eliminating, potential exposure and adverse effects.

Pile preservation treatments conducted below the OHWM may have adverse effects to listed salmonids through increases in suspended sediment/turbidity, elevated pH levels, and the potential introduction of lead, cadmium, and chromium. However, these treatments will include installation of turbidity curtains and turbidity and pH monitoring. In addition, the Contractor will test the piles for lead and heavy metals prior to cleaning. If present, the Contractor will submit a Lead and Heavy Metal Debris Containment and Recovery Plan that will include the use of an underwater vacuum to collect contaminated material. The Lead and Heavy Metal Debris Containment and Recovery Plan is in addition to the turbidity curtain installation. The Contractor will collect and dispose of waste material containing lead, chromium, and cadmium in strict compliance with all applicable Federal, State and local laws, codes, rules and regulations. These BMPs will minimize but not eliminate the potential for adverse effects to bull trout when pile preservation treatments are conducted in occupied habitat.

2.2.3.6 Habitat-related Effects on Bull Trout

Implementation of Program actions may adversely affect habitat conditions within the action area, affecting habitat suitability for spawning, rearing, and migrating bull trout. Near and in-stream ground disturbance is likely to increase in-channel sediment deposition, and excavation at project sites and bank stabilization may alter streambank conditions.

Sediment Deposition

The pathways for sediment introduction to the stream channel were described in the suspended sediment discussion above. The same suite of BMPs proposed to reduce the potential for suspended sediment will likewise minimize the potential for in-channel sediment deposition. The potential effects of sediment deposition on habitat, and subsequently on individual bull trout, include smothering of redds and spawning gravels, changes to primary and secondary productivity, and reduction of available cover for juveniles.

Egg-to-emergence survival and size of alevins is negatively affected by fine sediment intrusion into spawning gravel (Young et al. 1991, p. 343). Fine sediment deposition in spawning gravel reduces the oxygen supply rate to redds (Wu 2000, p. 1596). However, female bull trout displace fine sediment when they dig redds, cleaning out the gravel and increasing permeability and interstitial flow (Kondolf et al. 1993, entire). Given the small level of sediment likely to be introduced to streams from project activities with proposed sediment control BMPs, the process of digging a redd will likely displace most of this sediment. Furthermore, it is extremely unlikely that redds will be present within any work site during the work period due to the proposed instream work windows. Thus, sedimentation is not expected to adversely affect incubating eggs or alevins. However, post-construction rains and instream flows may result in the discharge of fines into spawning and rearing areas until disturbed areas are fully stabilized, so program actions will have short-term adverse effects to substrates.

Fine sediment deposition also has the potential to adversely affect primary and secondary productivity (Spence et al. 1996, p. 86.; Suttle et al. 2004, p. 971) found that increases in fine sediment concentration led to a change from aquatic insects available to salmonids (i.e., surface grazers and predators) to unavailable burrowing species. However, due to the BMPs included in the proposed action to minimize sediment delivery to streams, it is expected that any effects to primary production will be insignificant.

Finally, fine sediment delivery to streams can reduce cover for juvenile salmonids (Bjornn and Reiser 1991, p. 132). Fine sediment can fill pools as well as interstitial spaces in rocks and gravels used by fish for thermal cover and for predator avoidance (Waters 1995, entire). We expect that juvenile cover will be adversely affected in the short term within the affected individual 600 ft stream reaches but that habitat quality will then recover as fine sediments are flushed downstream during high flows after project completion. Any loss of habitat that occurs from sediment deposition caused by the proposed action would likely be temporary and confined to the project area, and thus would not have any long-term effects on bull trout. Fish are expected to seek alternate habitat in adjacent areas during this temporary loss of habitat from program-related sediment deposition. Furthermore, it is expected that project-related sediments introduced into the stream channel will be a much smaller amount than the annual sediment budget of a watershed, such that sediment impacts from the Program will be unmeasurable at the watershed or core area scale.

Streambank Alteration

Under the Program, bank stabilization projects involving riprap, gabion baskets, or MSE walls extending down into the stream channel could alter the habitat value of streambanks, permanently reducing the amount of habitat available for bull trout. Bridge replacement projects under this Program may also involve the placement of riprap along streambanks. The placement of riprap, gabion baskets, and MSE walls can cause adverse effects to stream morphology, fish habitat, and fish populations (Schmetterling et al. 2001, entire; Garland et al. 2002, p. 1285-1286). Riprap fails to provide the intricate habitat requirements for all age classes or species that are provided by naturally vegetated banks. Streambanks with riprap often have fewer undercut banks, less low-overhead cover, and are less likely than natural streambanks to deliver large woody debris to streams (Schmetterling et al. 2001, p. 6). All these effects can simplify habitat and render it less productive for aquatic organisms. Riprap may also reduce stream sinuosity, thereby increasing gradient and potentially causing channel incision and floodplain abandonment where finer substrates are present. Garland et al. (2002, p. 1285-1286) reported that salmonids were less likely to be present and abundance was lower at locations where banks had riprap modifications compared to natural banks.

Under the Program, the proposed placement of most riprap or other bank stabilizations will replace or repair existing embankments, thus limiting the net impact on salmonid habitat. Several BMPs will further limit potential adverse effects on habitat. For bridge replacement projects, no more than 300 cy of riprap can be placed below the OHWM, and the riprap will be placed in a manner that will not further constrict the stream channel from existing conditions. For bank stabilization projects, installation will be limited to the areas identified as most highly erodible, with highest shear stress, or at greatest risk of mass-failure, and will only be acceptable where necessary to prevent failure of a culvert, road, or bridge foundation. For each project, riprap or other bank stabilization structures will extend for no more than 300 linear ft in length below OHWM. No more than four bank armoring projects per sub basin (4th field HUC) shall be approved annually under the Program. Placement of riprap armor will occur in a way that does not significantly constrict the channel or restrict natural hydraulics. The installation of riprap and other bank stabilization structures will negatively impact small amounts of habitat. However, most projects will be in areas with existing armoring treatments and would therefore not have any new adverse effect on habitat.

Due to the poor aquatic-habitat value of riprap and the local and cumulative effects of riprap use on river morphology, bio-methods (e.g., engineered log jams, vegetated riprap) will be considered for bank stabilization before riprap or hard armoring. If project activities result in a net increase (area) in riprap above OHWM or unvegetated riprap below OHWM, beyond what is necessary for scour protection of structures (e.g., bridges, culverts, roads), “offsetting” measures will be employed. Offsetting measures may include removing the same quantity (length) of riprap or hard armoring along awaterway within the same subbasin or other measures that benefit the impacted species. All offsetting measures must be developed in coordination with NMFS and USFWS, on a case-by-case basis. Offsetting is not required when replacing existing riprap below the OHWM.

The BMPs described above and the use of bio-methods for bank stabilization will minimize, but not eliminate, adverse effects from bank stabilization to bull trout habitat; however, these effects will be localized and insignificant at the population and core levels.

2.2.3.1 Summary of Effects to Bull Trout

For the reasons detailed in the above sections, minor and insignificant effects to bull trout are expected from heavy equipment noise and blasting (during rock scaling) and pile driving in the dry streambed. Similarly, any project-related effects to bull trout through changes in stream temperature are expected to be insignificant.

Adverse effects are expected from hand-netting and electro-fishing during fish handling/salvage; in-water or near-shore work (including pile preservation) and new hardened surfaces (e.g., turn outs or passing lanes) that impact water quality through elevated levels of suspended sediment or the delivery of contaminants; and in-stream or near-shore activities that impact bull trout habitat through sediment deposition or bank alteration (e.g., riprap). Best management practices included in Appendix A will minimize but not eliminate these effects.

It should be noted that due to the programmatic nature of the proposed action, we lack site specificity regarding potential effects to the bull trout and its proposed and designated critical habitat. We will be able to better address potential effects during the pre-project review process where the Agencies provide site-specific information for each proposed Program action. The Service can then ensure consistency with the analyses and conclusions included in this Opinion. If the pre-project review identifies that a Program action is not consistent with our Opinion, then that action will need to undergo separate section 7 consultation.

2.2.4 Cumulative Effects

The implementing regulations for section 7 define cumulative effects to include the effects of future State or private activities that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). 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.

U.S. Census data estimates that the population of Idaho increased 14.0% between 2010 and 2019 (https://www.census.gov/quickfacts/fact/table/ID/PST045219#). Thus, the Service assumes that future private and state actions will continue within the action area, increasing as population density rises. As the human population in the action area continues to grow, demand for agricultural, commercial, or residential development is also likely to grow. The effects of new development caused by that demand are likely to reduce the conservation value of the habitat within a watershed, but we cannot quantify the magnitude of their impacts on bull trout populations. However, within the action area, FHWA, COE, and the Service are not aware of any future private or state activities. Therefore, we do not expect cumulative effects to appreciably alter the existing baseline condition in the action area during the ten-year lifetime of the project.

2.2.5 Conclusion

After reviewing the current status of bull trout, the environmental baseline in the action area, effects of the proposed action, and cumulative effects, it is the Service’s biological opinion that the proposed action is not likely to jeopardize the continued existence of bull trout. The Service’s rationale for this conclusion is presented below.

The Service concludes that adverse effects to bull trout are likely to occur from in-water sediment effects, sound effects, and fish removal and handling. The adverse effects will be limited to short-term disturbance, feeding rate reduction, and physiological distress to adult and subadult bull trout resulting in take in the form of harm from in-water sediment effects in the immediate vicinity of project activities. Sound effects from structural pile-driving above the OHWM with impact hammers may disturb individual adult or sub-adult bull trout, but the effects are discountable due to BMPs (Appendix A). Fish removal and handling during dewatering activities may injure or kill a small number of adult or juvenile bull trout. These anticipated effects will be minimized by the BMPs incorporated into the Program, including in-water work windows. Because Program-administered roads and activities are generally located in FMO habitat, eggs, alevins, or fry are not expected to be affected by the Program. Adverse effects are likely temporary, local, and limited to low numbers of bull trout and small amounts of habitat in the immediate vicinity of an activity. Program activities will not increase the severity of any primary threat identified in the respective RUIPs for core areas nor preclude recovery of bull trout in the action area. Culvert replacements in occupied habitat will have a beneficial effect and may assist in the effective management of the primary threat to fish passage in several core areas. The Service expects that the numbers, distribution, and reproduction of bull trout in each local population, core area, and recovery unit included in the action area will not be significantly changed as a result of this project. Therefore, it is the Service's biological opinion that the proposed action will not jeopardize the coterminous population of bull trout.

2.2.6 Incidental Take Statement

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species, respectively, without specific exemption. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct." Harm is defined by the Service as an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

Incidental take is defined as take that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (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 an Incidental Take Statement (ITS).

2.2.6.1 Form and Amount or Extent of Take Anticipated

Incidental take of bull trout juveniles and adults is expected under the proposed Project, primarily from sediment and turbidity, and fish salvage and handling during bank stabilization, two-lane bridge construction involving in-water work, and culvert installation/replacements.

Bull trout occur throughout the action area; however, it is difficult for us to anticipate the exact number of individual bull trout that will be harmed, injured, or killed as a result of Program activities. Therefore, to address take associated with sediment, turbidity, and pile-driving, we will use the amount of habitat affected as a surrogate. We anticipate that all adult and subadult bull trout in the immediate vicinity of in-stream Program activities and downstream 600 ft (i.e., the assumed extent of downstream sediment effects from each of these activity sites) will be subject to take in the form of harm from direct exposure to the increased levels of suspended sediment, turbidity, and deposited sediment (resulting from relevant work types in Table 1 including, but not limited to, bank stabilization, culvert replacement, or re-watering of work areas). Incidental take of bull trout associated with project construction is only anticipated to occur during in-water work windows recommended for specific locations and established by IDFG, ITD, and/or the Services. The Service expects no direct lethal take of bull trout associated with project construction activities, and none is authorized. Conservation measures and BMPs incorporated into the Program are expected to reduce the level of anticipated take.

Bull trout present in the action area may be injured or killed in the process of salvage activities during collecting and removing fish prior to implementing program construction activities. In-water work windows will reduce, but not eliminate, the likelihood that bull trout may be present. Although very few listed fish have been encountered during culvert replacements or coffer dam construction under Program activities in the past, it is difficult to estimate how many bull trout may be present during fish salvage and dewatering at these sites. In order to address take during fish-salvage activities that are conducted prior to activities such as culvert replacements and bridge maintenance/replacements on fish-bearing streams, we will use the estimates and assumptions developed by the Service for determining take for similar actions under the programmatic opinion for aquatic organism passage projects on Federal lands in Idaho (see Section 2.2.3.2 *Fish Salvage and Handling*). The Service estimates that during each fish-salvage activity in SR habitat, up to six bull trout will be subject to take through capture and handling. Additionally, four bull trout are expected to be injured or killed during each fish-salvage activity: two bull trout injured or killed from electrofishing (25% injury rate); one bull trout killed from impingement on block nets; and one bull trout killed due to stranding in the dewatered area. This take is expected to occur only during and immediately following fish-salvage operations. It is important to note the injury or death of four bull trout per fish-salvage activity is a liberal estimate as the mortality rate for block net impingement is only 3.5 percent and the mortality rate for fish being stranded is only 5 percent. Although we have accounted for the injury or death of bull trout from the use of block nets and as a result of stranding, it is unlikely that a bull trout will die by block net impingement and a bull trout will die from stranding at every replacement project due to these low mortality rates. Moreover, the restrictions of in-water work windows will reduce the number of bull trout likely to be encountered and handled in FMO habitat. In-water work windows in FMO habitat will prohibit activities after August 31st when bull trout may be returning from spawning, overwintering, or migrating to other overwintering habitat. Therefore, we expect projects that occur in FMO habitat to have fewer bull trout at risk of disturbance, injury, or harm compared to the estimated six bull trout captured and handled and four bull trout injured or killed in spawning and rearing habitat. We anticipate an average of two projects involving fish salvage, and that encounter bull trout, may be implemented each year under the 10-year Program. The maximum incidental take exempted during fish salvage under the program is calculated as follows:

- Capture and handling: 6 bull trout/project x 2 projects/year = 12 bull trout/year x 10 years = 120 bull trout.
- Injured or killed: 4 bull trout/project x 2 projects/year = 8 bull trout/year x 10 years = 80 bull trout.

Take of bull trout due to construction effects will be sublethal, episodic and short term, and will not persist after construction is complete. Authorized take will be exceeded if:

- Any individual Program activity results in suspended sediment exposure (concentration and duration) that exceeds 50 NTUs instantaneous over background at a location that is 600 ft downstream of in-stream construction sites, takes more than two hours to dissipate, or reaches 25 NTUs above baseline background for more than 10 consecutive days.
- There is more than 300 ft of bank stabilization (i.e., riprap or gabion baskets) work for any single project or if there are more than four bank stabilization projects per 4 Field HUC per year.
- Instream work occurs outside of agreed upon in-water work windows.

- Program construction activities result in any bull trout mortality.

Authorized take of bull trout during fish salvage prior to implementing construction activities would be exceeded if:

- Salvage occurs outside of agreed upon in-water work windows for the project.
- More than six bull trout are captured and handled, two bull trout are injured or killed during electrofishing, one bull trout killed due to impingement on block nets, and one bull trout killed due to stranding per fish-salvage activity, per year.
- More than an average of 2 projects per year, or 20 projects total, that require fish salvage and encounter bull trout.

If incidental take anticipated by this document is exceeded, the Agencies will immediately contact the Service to determine if consultation should be reinitiated.

2.2.6.2 Effect of the Take

In the accompanying Opinion and the rationale summarized in section 2.2.5 Conclusion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of bull trout across its range.

Program actions are expected to result in harm, injury, and death of bull trout within the action area. Bull trout may experience harm from direct exposure to increased levels of suspended sediment, turbidity, and deposited sediment during project activities and injury or death during salvage efforts. All bull trout within 600 ft of sediment sources and exposed to herbicide runoff are expected to experience adverse effects. Salvage efforts will require capturing and handling of fish, electroshocking, and dewatering. The Service anticipates six bull trout to be injured during capture and handling and an additional four bull trout to be injured or killed: two bull trout injured or killed from electrical shock, one bull trout killed from impingement on block nets, and one bull trout killed due to stranding in the dewatered area. The Service expects 12 individual bull trout to be disturbed during capture and handling procedures and 8 individual bull trout to be injured or killed annually. In total, 200 bull trout could be disturbed, injured, or killed during the 10-year Program. Importantly, the action area is throughout the State of Idaho and activities will take place across ten years, which will disperse impacts spatially and temporally. Thus, the Service doesn't expect impacts to be concentrated to specific local populations or within a single bull trout core area. The Service expects adverse effects to bull trout to result in reductions in population numbers and distribution of individuals; however, the Service does not expect these impacts to jeopardize the continued existence of bull trout across its range.

2.2.6.3 Reasonable and Prudent Measures

The Service finds that compliance with the proposed action outlined in the Assessment, including proposed conservation measures, is essential to minimizing the impacts of incidental take of the bull trout. If the proposed action, including conservation measures, is not implemented as described in the Assessment and this Opinion, there may be effects of the action that were not considered in this Opinion, and reinitiation of consultation may be warranted.

The Service also finds that the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of the take of bull trout reasonably certain to be caused by the proposed action.

1. Minimize the potential for disruption and harm of bull trout from Program implementation.

2.2.6.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Agencies must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. During stream bank stabilization, culvert installation/replacement, and two-lane bridge construction, coordinate with regional IDFG fisheries managers to consider alignment with local management plans to optimize fish habitat and minimize or prevent spread of invasive species including non-native brook trout into occupied bull trout habitat.

2.2.6.5 Reporting and Monitoring Requirement

In order to monitor the impacts of incidental take, the Federal agency or any applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement per 50 CFR 402.14 (i)(3).

1. As part of the process for implementing the Program, the Agencies are required to provide the appropriate post-Project Monitoring Forms to the Service within 45 days of project completion. For Program actions completed within bull trout habitats as described above in this Opinion, the Agencies will include the results of any pre-project bull trout surveys or monitoring. In addition, the Agencies will describe which BMPs were implemented to avoid impacting bull trout.
2. Disposition of Individuals Taken: In the course of implementing the Program actions addressed in this Opinion, if dead, injured, or sick listed species are detected and/or salvaged, the Service's Ecological Services' office in Boise, Idaho shall be notified within three working days by phone (208-378-5243) or by electronic mail (fw1idahoconsultationrequests@fws.gov). Notification should include the date, time, and precise location of the detection, a photograph, and the species involved and shall distinguish between injured and killed animals.

2.2.7 Conservation Recommendations for Bull Trout

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

The Service hereby makes the following conservation recommendations:

1. To better assess sediment effects on bull trout from future instream projects, take suspended sediment samples at the turbidity monitoring stations established for the project. Although turbidity and suspended sediment concentration are correlated, the relationship varies between individual streams and watersheds. Measuring suspended

sediment will assist in making stream-specific correlations between suspended sediment concentrations and turbidity.

2. Continue to promote recovery of bull trout in the action area by identifying habitat restoration opportunities and implementing these actions in the near-term.
3. Restrict washout of concrete trucks and equipment to locations that will minimize the risk of introducing wastewater to bull trout habitat.

2.3 Bull Trout Critical Habitat

2.3.1 Status of Critical Habitat

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

2.3.1.1 Legal Status

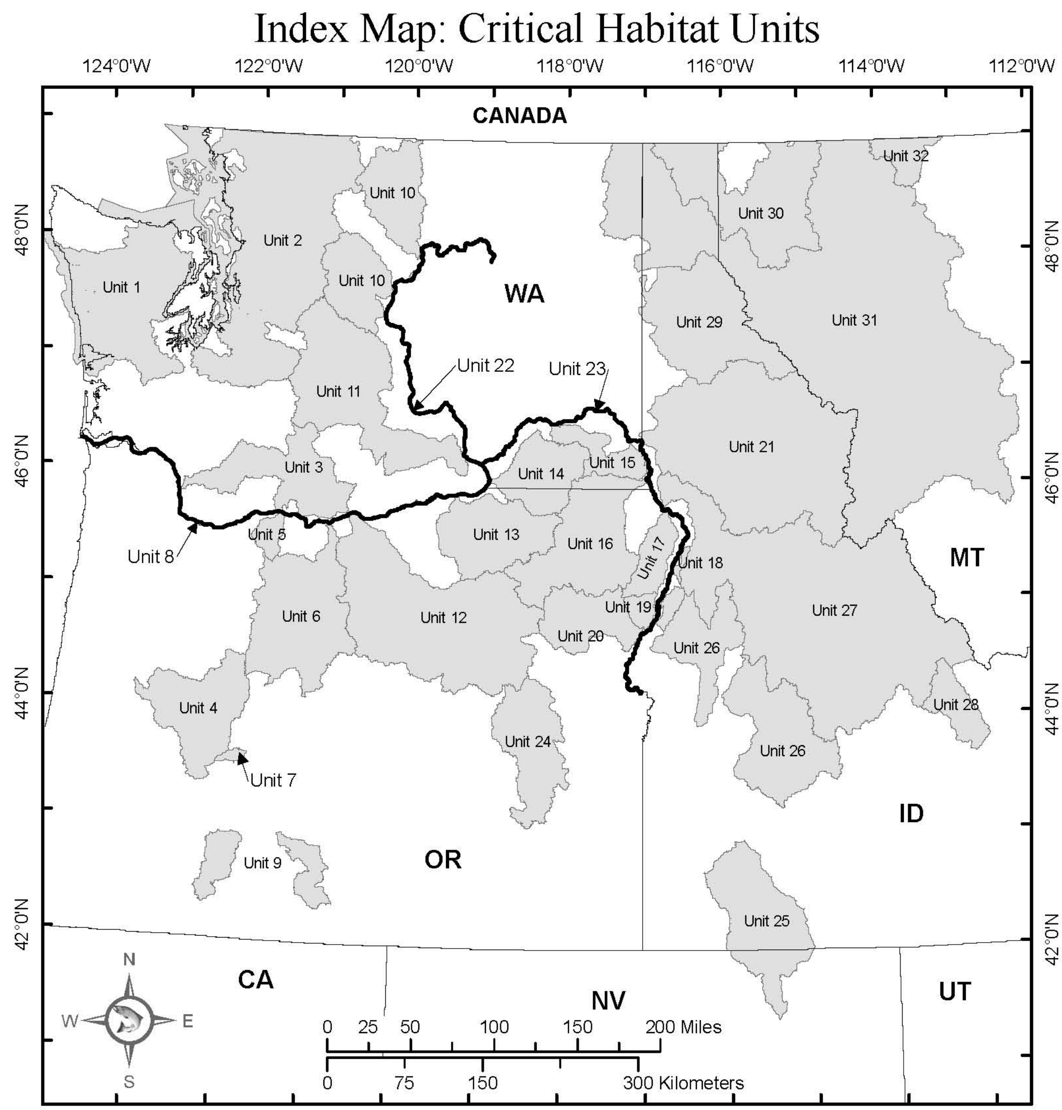
The Service published a final critical habitat designation for the coterminous United States population of the bull trout on October 18, 2010 (75 FR 63898); the rule became effective on November 17, 2010. Critical habitat is defined as the specific geographic area(s) that contains features essential 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. Designated critical habitat units (CHUs) for the bull trout are identified in Figure 3. A justification document that describes occupancy and the rationale for why these habitat areas are essential for the conservation of bull trout was developed to support the rule and is available on our website (https://www.fws.gov/pacific/bulltrout/crithab/Jusitfication%20Docs.html).

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

Table 2: Stream/shoreline distance and reservoir/lake area designated as bull trout critical habitat by state.

State	Stream/ Shoreline Miles	Stream/ Shoreline Kilometers	Reservoir/ Lake Acres	Reservoir/ Lake Hectares
Idaho	8,771.6	14,116.5	170,217.5	68,884.9
Montana	3,056.5	4,918.9	221,470.7	89,626.4
Nevada	71.8	115.6	-	-
Oregon	2,835.9	4,563.9	30,255.5	12,244.0

State	Stream/ Shoreline Miles	Stream/ Shoreline Kilometers	Reservoir/ Lake Acres	Reservoir/ Lake Hectares
Oregon/Idaho	107.7	173.3	-	-
Washington	3,793.3	6,104.8	66,308.1	26,834.0
Washington (marine)	753.8	1,213.2	-	-
Washington/Idaho	37.2	59.9	-	-
Washington/Oregon	301.3	484.8	-	-
Total	**19,729.0**	**31,750.8**	**488,251.7**	**197,589.2**



1	Olympic Peninsula	11	Yakima River	22	Mainstem Upper Columbia River
2	Puget Sound	12	John Day River	23	Mainstem Snake River
3	Lower Columbia River Basins	13	Umatilla River	24	Malheur River Basin
4	Upper Willamette River	14	Walla Walla River Basin	25	Jarbidge River
5	Hood River	15	Lower Snake River Basins	26	Southwest Idaho River Basins
6	Lower Deschutes River	16	Grande Ronde River	27	Salmon River Basin
7	Odell Lake	17	Imnaha River	28	Little Lost River
8	Mainstem Lower Columbia River	18	Sheep / Granite Creeks	29	Coeur d'Alene River Basin
9	Klamath River Basin	19	Hells Canyon Complex	30	Kootenai River Basin
10	Upper Columbia River Basins	20	Powder River Basin	31	Clark Fork River Basin
		21	Clearwater River	32	Saint Mary River Basin

Figure 3: Index map of bull trout designated critical habitat units.

This rule also identifies and designates as critical habitat approximately 1,323.7 km (822.5 miles) of streams/shorelines and 6,758.8 ha (16,701.3 ac) of lakes/reservoirs of unoccupied habitat to address bull trout conservation needs in specific geographic areas in several areas not occupied at the time of listing. These unoccupied areas were determined by the Service to be essential for restoring functioning migratory bull trout populations based on currently available scientific information. These unoccupied areas often include lower 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 critical habitat rule continues to exclude some critical habitat segments based on a careful balancing of the benefits of inclusion versus the benefits of exclusion. Critical habitat does not include: (1) waters adjacent to non-Federal lands covered by legally operative incidental take permits for habitat conservation plans issued under section 10(a)(1)(B) of the Act, in which bull trout is a covered species on or before the publication of this final rule; (2) waters within or adjacent to Tribal lands subject to certain commitments to conserve bull trout or a conservation program that provides aquatic resource protection and restoration through collaborative efforts, and where the Tribes indicated that inclusion would impair their relationship with the Service; or (3) waters where impacts to national security have been identified (75 FR 63898). Excluded areas are approximately 10 percent of the stream/shoreline miles and 4 percent of the lakes and reservoir acreage of designated critical habitat. Each excluded area is identified in the relevant CHU text, as identified in paragraphs (e)(8) through (e)(41) of the final rule. Fewer than 3,220 stream kilometers (2,000 miles) and 8,100 hectares (20,000 ac) of lake and reservoir surface area were excluded from the designation of critical habitat. It is important to note that the exclusion of waterbodies from designated critical habitat does not negate or diminish their importance for bull trout conservation, nor reduce authorities that protect the species under the Act. Because exclusions reflect the often complex pattern of land ownership, designated critical habitat is often fragmented and interspersed with excluded stream segments.

2.3.1.2 Conservation Role and Description of Critical Habitat

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

As shown in Figure 3, 32 CHUs within the geographical area occupied by the species at the time of listing are designated under the final rule. Twenty-nine of the CHUs contain all of the physical or biological features (PBFs) identified in this final rule and support multiple life-history requirements. Three of the mainstem river units in the Columbia and Snake River basins contain most of the physical or biological features necessary to support the bull trout's particular use of that habitat, other than those associated with PBFs 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, p. 19); (2) provide for persistence of strong local populations, in part, by providing habitat conditions that encourage movement of migratory fish (MBTSG 1998, pp. 48-49; Rieman and McIntyre 1993, pp. 22-23); (3) are large enough to incorporate genetic and phenotypic diversity, but small enough to ensure connectivity between populations (Hard 1995, pp. 314-315; Healey and Prince 1995, p. 182; MBTSG 1998, pp. 48-49; Rieman and McIntyre 1993, pp. 22-23); and (4) are distributed throughout the historical range of the species to preserve both genetic and phenotypic adaptations (Hard 1995, pp. 321-322; MBTSG 1998, pp. 13-16; Rieman and Allendorf 2001, p. 763; Rieman and McIntyre 1993, p. 23).

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, outside of core areas, contain PBFs that are critical to adult and subadult foraging, migration, and overwintering.

Physical or Biological Features for Bull Trout Critical Habitat

Within the designated critical habitat areas, the PBFs for bull trout are those 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 PBFs 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 to 15 ^{0}C (36 to 59 ^{0}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 historical and seasonal ranges or, if flows are controlled, minimal flow departures from a natural hydrograph.
8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.

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

PBF 9 addresses the presence of nonnative predatory or competitive fish species. Although this PBF 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.

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

Critical habitat designated within each CHU includes the stream channels within the designated stream reaches and has a lateral extent as defined by the bankfull elevation on one bank to the bankfull elevation on the opposite bank. Bankfull elevation is the level at which water begins to leave the channel and move into the floodplain and is reached at a discharge that generally has a recurrence interval of 1 to 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 Service assumes in many cases this is the full-pool level of the waterbody. In areas where only one side of the waterbody is designated (where only one side is excluded), the mid-line of the waterbody represents the lateral extent of critical habitat.

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

Adjacent shoreline riparian areas, bluffs, and uplands within CHUs are not designated as critical habitat. However, it should be recognized that the quality of marine and freshwater habitat along streams, lakes, and shorelines is intrinsically related to the character of these adjacent features, and that human activities that occur outside of the designated critical habitat 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 PBFs that relate to the ability of the area to at least periodically support the species. Activities that may destroy or adversely modify critical habitat are those that alter the PBFs to such an extent that the conservation value of critical habitat is appreciably reduced (75 FR 63898). The Service’s evaluation must be conducted at the scale of the entire critical habitat area designated, unless otherwise stated in the final critical habitat rule (USFWS and NMFS 1998, pp. 4-39). Thus, 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).

2.3.1.3 Current Critical Habitat Condition Rangewide

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

There is widespread agreement in the scientific literature that many factors related to human activities have impacted bull trout and their habitat and continue to do so. Among the many factors that contribute to degraded PBFs, those which appear to be particularly significant and have resulted in a legacy of degraded habitat conditions are as follows:

1. Fragmentation and isolation of local populations due to the proliferation of dams and water diversions that have eliminated habitat, altered water flow and temperature regimes, and impeded migratory movements (Dunham and Rieman 1999, p. 652; Rieman and McIntyre 1993, p. 7);
2. Degradation of spawning and rearing habitat and upper watershed areas, particularly alterations in sedimentation rates and water temperature, resulting from forest and rangeland practices and intensive development of roads (Fraley and Shepard 1989, p. 141; MBTSG 1998, pp. ii - v, 20-45);
3. The introduction and spread of nonnative fish species, particularly brook trout and lake trout, as a result of fish stocking and degraded habitat conditions, which compete with bull trout for limited resources and, in the case of brook trout, hybridize with bull trout (Leary et al. 1993, p. 857; Rieman et al. 2006, pp. 73-76);
4. In the Coastal-Puget Sound region where amphidromous bull trout occur, degradation of mainstem river FMO habitat, and the degradation and loss of marine nearshore foraging and migration habitat due to urban and residential development; and
5. Degradation of overwintering habitat resulting from reduced prey base, roads, agriculture, development, and dams.

2.3.1.4 Effects of Climate Change on Bull Trout Critical Habitat

One objective of the final rule was to identify and protect those habitats that provide resiliency for bull trout use in the face of climate change. Over a period of decades, climate change may directly threaten the integrity of the essential physical or biological features described in PBFs 1, 2, 3, 5, 7, 8, and 9. Protecting bull trout strongholds and cold water refugia from disturbance and ensuring connectivity among populations were important considerations in addressing this potential impact. Additionally, climate change may exacerbate habitat degradation impacts both physically (e.g., decreased base flows, increased water temperatures) and biologically (e.g., increased competition with non-native fishes). For more discussion regarding impacts of climate change, see the status of the species and environmental baseline sections for bull trout (see 2.2.1 and 2.2.2 of this Opinion).

2.3.1.5 Consulted on Effects to Critical Habitat

The Service has formally consulted on the effects to bull trout critical habitat throughout its range. Section 7 consultations include actions that continue to degrade the environmental baseline 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 an analysis of prior consulted-on effects in the action area, see the environmental baseline section 2.2.2.

2.3.2 Environmental Baseline of the Action Area

Refer to section 2.2.2 of this Opinion for a complete definition of the term “environmental baseline”.

2.3.2.1 Status of Bull Trout Critical Habitat in the Action Area

The action area includes 8,771.6 miles of streams and 170,217.4 ac of lakes and reservoirs designated as critical habitat in Idaho (75 FR 63898). Most of the critical habitat occurs on Federal lands managed by USFS or BLM. Across the action area, streams may provide spawning and rearing (SR) critical habitat or foraging, migration, and overwintering (FMO) critical habitat, depending on site specific stream characteristics and local bull trout population life history expressions. Figure 2 (above) shows overlap between areas where bull trout critical habitat may occur and the location of state and Federal highways and roads. Local roads administered by LHTAC are not shown in Figure 2, but it is assumed that they increase the probability of overlap because of their greater density in the action area.

As the proposed Program is programmatic in nature and encompasses a large area across Idaho, the analysis presented in this Opinion will assess baseline status at the critical habitat unit scale. The action area encompasses the following 10 critical habitat units. See USFWS (2010) for detailed descriptions of each critical habitat unit (CHU) or critical habitat subunit (CHSU), justification for designation as critical habitat, and documentation of occupancy by bull trout.

Coeur d’Alene River Basin (CHU 29)

Located in Kootenai, Shoshone, Benewah, Bonner, and Latah Counties in Idaho, the Coeur d’Alene River Basin CHU includes the entire Coeur d’Alene Lake basin in northern Idaho. A total of 510.5 miles of streams and 31,152.1 ac of lake surface area are designated as critical habitat. There are no subunits within the Coeur d'Alene River Basin CHU. This unit provides spawning, rearing, foraging, migratory, connecting, and overwintering habitat.

Clark Fork River Basin (CHU 31)

The Clark Fork River Basin CHU includes the northeastern corner of Washington (Pend Oreille County), the panhandle portion of northern Idaho (Boundary, Bonner, and Kootenai Counties), and most of western Montana (Lincoln, Flathead, Sanders, Lake, Mineral, Missoula, Powell, Lewis and Clark, Ravalli, Granite, and Deer Lodge Counties). This unit includes 12 CHSUs, organized primarily on the basis of major watersheds: Lake Pend Oreille, Pend Oreille River, and lower Priest River (Lake Pend Oreille); Priest Lakes and Upper Priest River (Priest Lakes); Lower Clark Fork River; Middle Clark Fork River; Upper Clark Fork River; Flathead Lake, Flathead River, and Headwater Lakes (Flathead); Swan River and Lakes (Swan); Hungry Horse Reservoir, South Fork Flathead River, and Headwater Lakes (South Fork Flathead); Bitterroot River; Blackfoot River; Clearwater River and Lakes; and Rock Creek. The Clark Fork River Basin CHU includes 3,328.1 miles of streams and 295,586.6 ac of lakes and reservoirs designated as critical habitat. The subunits within this unit provide spawning, rearing, foraging, migratory, connecting, and overwintering habitat.

Kootenai River Basin (CHU 30)

The Kootenai River Basin CHU is located in the northwestern corner of Montana and the northeastern tip of the Idaho panhandle and includes the Kootenai River watershed upstream and downstream of Libby Dam. The Kootenai River flows in a horseshoe configuration, entering the United States from British Columbia, Canada, and then traversing across northwest Montana and the northern Idaho panhandle before returning to British Columbia from Idaho where it eventually joins the upper Columbia River drainage. The Kootenai River Basin CHU includes two CHSUs: the downstream Kootenai River CHSU in Boundary County, Idaho, and Lincoln County, Montana, and the upstream Lake Koocanusa CHSU in Lincoln County, Montana. The entire Kootenai River Basin CHU includes 324.7 miles of streams and 29,873.0 ac of lake and reservoir surface area designated as critical habitat. The subunits within this unit provide spawning, rearing, foraging, migratory, connecting, and overwintering habitat

Clearwater River (CHU 21)

The Clearwater River CHU is located east of Lewiston, Idaho, and extends from the Snake River confluence at Lewiston on the west to headwaters in the Bitterroot Mountains along the Idaho–Montana border on the east in Nez Perce, Latah, Lewis, Clearwater, Idaho, and Shoshone Counties. In the Clearwater River CHU, 1,679.0 miles of streams and 16,610.1 ac of lake and reservoir surface area are designated as critical habitat. The subunits within this unit provide spawning, rearing, foraging, migratory, connecting, and overwintering habitat.

Salmon River Basin (CHU 27)

The Salmon River basin extends across central Idaho from the Snake River to the Montana–Idaho border. The Salmon River Basin CHU extends across portions of Adams, Blaine, Custer, Idaho, Lemhi, Nez Perce, and Valley Counties in Idaho. There are 10 CHSUs: Little-Lower Salmon River, Opal Lake, Lake Creek, South Fork Salmon River, Middle Salmon–Panther River, Middle Fork Salmon River, Middle Salmon Chamberlain River, Upper Salmon River, Lemhi River, and Pahsimeroi River. The Salmon River Basin CHU includes 4,583.5 miles of streams and 4,160.6 ac of lakes and reservoirs designated as critical habitat. The subunits within this unit provide spawning, rearing, foraging, migratory, connecting, and overwintering habitat.

Hells Canyon Complex Unit (CHU 19)

The Hells Canyon Complex is located in Adams County, Idaho, and Baker County, Oregon. This CHU contains 234.6 miles of streams designated as critical habitat. The subunits within this unit provide spawning, rearing, foraging, migratory, connecting, and overwintering habitat.

Southwest Idaho River Basins (CHU 26)

The Southwest Idaho River Basins CHU is located in southwest Idaho in the following counties: Adams, Boise, Camas, Canyon, Elmore, Gem, Valley, and Washington. This unit includes eight CHSUs: Anderson Ranch, Arrowrock Reservoir, South Fork Payette River, Deadwood River, Middle Fork Payette River, North Fork Payette River, Squaw Creek, and Weiser River. The Southwest Idaho River Basins CHU includes approximately 1,335.9 miles of streams and 10,651.5 ac of lake and reservoir surface area designated as critical habitat. The subunits within this unit provide spawning, rearing, foraging, migratory, connecting, and overwintering habitat.

Little Lost River (CHU28)

Located within Butte, Custer, and Lemhi Counties in east-central Idaho, near the town of Arco, Idaho, designated critical habitat in the Little Lost River CHU includes 55.4 miles of streams. This unit provides spawning, rearing, foraging, migratory, connecting, and overwintering habitat.

Sheep and Granite Creeks (CHU 18)

This CHU is located within Adams and Idaho Counties in Idaho, approximately 13.0 miles east of Riggins, Idaho. In the Sheep and Granite Creeks CHU, 29.7 miles of streams are designated as critical habitat. This unit provides spawning, rearing, foraging, migratory, and overwintering habitat.

Jarbidge River (CHU 25)

The Jarbidge River CHU encompasses the Jarbidge and Bruneau River basins, which drain into the Snake River within C.J. Strike Reservoir upstream of Grand View, Idaho. The Jarbidge River CHU is located approximately 70 miles north of Elko within Owyhee County in southwestern Idaho and Elko County in northeastern Nevada. The Jarbidge River CHU includes 152.4 miles of streams designated as critical habitat. The Jarbidge River CHU contains six local populations of resident and migratory bull trout and provides spawning, rearing, foraging, migratory, connecting, and overwintering habitat.

2.3.3 Effects of the Proposed Action

See introductory paragraph of section 2.2.3 *Effects of the Proposed Action* for definition of "effects of the action".

In this section, the proposed project effects to critical habitat are determined by analyzing the effects to each of the physical and biological features (PBFs) of critical habitat. We analyze the expected impacts from the proposed action at the stream and watershed scales.

Each individual project, completed as proposed, including full application of the BMPs (Appendix A) for construction and site restoration, is likely to have the following effects on critical habitat PBFs. The particular suite of effects caused by each project will vary, depending on the scope of the project and whether its construction footprint extends into aquatic areas. Similarly, the intensity of each effect, in terms of change in the PBF from baseline condition, and severity of each effect, measured as recovery time, will vary somewhat between projects because of differences in the scope of the work. However, no project is likely to have any effect on PBFs that is greater than the full range of effects summarized here.

It is likely that the function of most PBFs that are impaired at the site or reach level by the construction impact of a transportation or restoration project completed under this Opinion will only be impaired for a period of hours to months and will affect an individual project action area that includes 300 linear ft or less of bank impact. However, some impacts related to modification of riparian vegetation, floodplain alteration, bank or channel hardening, and stormwater discharge may require longer recovery times, or persist for the life of the project. Those impacts will continue to affect the quality and function of PBFs under certain weather conditions (e.g., measurable precipitation after a long dry period) and streamflow levels (e.g., higher than bankfull elevation).

However, adverse environmental baseline conditions that had been caused by preexisting transportation infrastructure and its operation and maintenance (e.g., obstructed fish passage) are likely to be substantially improved or eliminated. For those few projects that require two or more years of work to complete, some adverse effects will last proportionally longer, and effects related to runoff from the construction site may be exacerbated by winter precipitation.

This number of projects anticipated is small compared to the total number of watersheds in the Critical Habitat Units encompassing the action area, but the intensity of those project effects appears far smaller when considered as a function of their local footprint. The streamside footprint that will be physically disturbed by the full program each year corresponds to the area where almost all direct construction impacts will occur except for pile driving and sediment deposition. The linear extent of these impacts on the quality and function of critical habitat will be limited primarily by the received level and duration of the exposure.

There will be no in-water work during implementation of the not likely to adversely affect activities shown in Table 1. Because these projects will occur in dry seasonal, non-fish bearing streams, adverse effects to the PBFs of critical habitat are not expected. There could be effects resulting from precipitation events that deliver sediment from construction ground disturbance to downstream critical habitat. However, with implementation of BMPs to control erosion and sediment from ground disturbance, these potential effects are expected to be insignificant.

The likely to adversely affect projects in Table 1 (bank stabilization, two-lane bridge construction and pile driving, culvert installation/replacement, and geotechnical drilling) may occur in designated bull trout critical habitat and have adverse effects to the PBFs of critical habitat in the project area, as described below.

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

Constant temperatures above 61 °F (16 °C) are not tolerated by bull trout, but bull trout may migrate through these higher temperature habitats by utilizing areas of thermal refuge, such as a confluence with a cold-water tributary, deep pools, or locations with surface and groundwater exchanges (Poole et al. 2001, p.24). Temperatures in some waterbodies within the action area may be at the high end of the range that bull trout are found. Therefore, continued groundwater flows from these underground sources are important to the continued use of these waterbodies by bull trout.

Vegetation removal and impervious surfaces decrease water infiltration, resulting in decreased groundwater recharge and loss of subsurface flow from the river. Given the degraded nature of the baseline in many stream systems within the action area, existing cold-water sources provide refugia or critical "stepping stones" to upstream habitat (Torgersen et al. 2012, entire). As these "stepping stones" are degraded, the ability of the waterbodies to support migratory bull trout is reduced. However, because Program actions are local, small in scope, and limited in duration, projects that measurably affect base flows or flow durations are not anticipated. Therefore, effects to PBF #1 will be insignificant.

PBF 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.

No permanent physical impediments to migration are expected to result from activities associated with the proposed Project. However, increases in water temperature dould be considered an impediment to use of a migratory corridor. The final listing rule for bull trout (64 FR 58910) documented steady and substantial declines in abundance in stream reaches where water temperature ranged from 59 °F to 68 °F (15 °C to 20 °C). Temperatures in the waterbodies within the action area vary, with some already at the high end of the range for water temperatures suitable for bull trout.

Project components such as removal of upland vegetation and addition of new impervious surface increase runoff and decrease infiltration. Reduced infiltration inhibits groundwater recharge and results in decreased baseflows. Low baseflows and reduced groundwater recharge (as a cold-water source) can lead to warming of the surface water. However, projects that measurably and adversely affect base flows or flow durations are not anticipated. Therefore, it is unlikely that the proposed action will measurably affect PBF #2 due to changes in flows resulting in insignificant effects to PBF 2.

Additionally, although riparian habitat may also be removed due to the proposed action, we anticipate that the impacts to temperature will be localized and difficult to detect due to the limited amount of vegetation that may be removed within a 4^{th}-field HUC watershed.

Temporary impacts to migration may also occur due to increased sediment during and after construction. Sediment may be generated over several days, especially during and following the removal of coffer dams and other structures. These effects are expected to adversely affect the function of PBF #2; however, these effects would be temporary and local. Work area isolation and fish salvage may also temporarily impede bull trout migration and adversely affect PBF #2.

Sublethal noise from pile driving may also disrupt bull trout migration but is unlikely to have adverse effects to PBF #2 because BMPs require that pile driving only occur during in-water work windows and during daylight hours. Few bull trout are expected to be present or migrating during these work windows but those that may be will mainly migrate during the night (Homel and Budy 2008, p. 876) and are unlikely to be present when pile driving occurs.

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

The removal of riparian vegetation and the impacts to the substrate from increased fine sediment during and post-construction could decrease the invertebrate forage base for juvenile bull trout. However, considering the limited vegetation removal per proposed action and temporary nature of the impacts to sediment, we expect that the reduction in invertebrate forage base will not measurably affect the function of PBF #3, and will therefore be insignificant.

The aquatic action area contains forage fish (e.g., juvenile salmonids, sculpins, and other small fishes) for subadult and adult bull trout. These forage fish could be negatively impacted by the increased turbidity and disturbance in a similar fashion as bull trout. However, as with bull trout, these impacts are expected to be local, sublethal, and temporary. The sublethal effects to forage fish (e.g., reduced health, displacement from optimal habitats, etc.) may make them temporarily more vulnerable to predation from bull trout. We, therefore, anticipate the effects to PBF #3 due to sediment and disturbance will be insignificant.

PBF 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.

The proposed action would result in the removal of riparian vegetation, including trees, due to construction adjacent to critical habitat. Loss of riparian vegetation precludes recruitment of large woody debris. Bridge scour actions may also result in additional use of hardened features, including riprap within the flowing channel. Filling of scour holes with riprap or other material will reduce the number of deep pools available to bull trout. Bank hardening is also likely to be placed adjacent to culverts and bridges. Bank hardening will preclude the reestablishment of large trees, simplifying the stream channel. We anticipate that the proposed riparian vegetation removal and banking and streambed hardening will measurably affect stream function. Therefore, adverse effects to PBF #4 are expected in bull trout critical habitat at the local scale within the action area.

BMPs include prioritizing the use of bio-methods for bank stabilization, which will minimize but not eliminate adverse effects to PBF #4. Most bank armoring projects will be in areas with existing armoring treatments and will not create new adverse impacts on habitat. Any remaining effects will be local; for each project, riprap, or other bank stabilization, structures will extend for no more than 300 linear ft below OHWM. No more than four bank armoring projects per sub basin (4th field HUC) will be approved annually.

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

Project elements such as loss of riparian vegetation and addition of new impervious surface are known to increase runoff and decrease infiltration. As noted above, reduced infiltration inhibits groundwater recharge, subsurface water exchange, and results in decreased baseflows. Reductions in baseflow, loss of shade from riparian vegetation, and reduced groundwater recharge and subsurface flows (as cold-water sources) can lead to warming of the surface water in the critical habitat within the action area. In addition, as water moves downstream through developed watersheds, heat accumulates unless there are downstream conditions (i.e., riparian vegetation) present to allow the accumulated heat to dissipate out of the system (Poole and Berman 2001, p. 797). Project impacts may lead to slight localized temperature increases in the action area during low stream flows and when air temperatures are higher (e.g., summer). Additionally, discharge from springs and seeps into waterbodies within the action area may be disrupted and/or reduced due to the construction of new impervious surfaces, further affecting water temperature. However, the proposed action will not result in measurable changes to instream flows, including baseflows, reducing the likelihood that changes in stream temperature would occur as a result of the proposed action.

Additionally, although some streamside shade could be reduced due to the removal of riparian vegetation, water temperature is not expected to be affected within any bull trout critical habitat unit, core area, or local population given the localized and relatively small loss of riparian shade that may be removed.

BMPs, such as post-construction enhancement and revegetation of riparian zones, help to minimize these impacts. Effects to PBF #5 are anticipated to be insignificant.

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

The increased turbidity caused by Program actions such as culvert replacement may increase the percent of fines in the substrate within critical habitat in the action area. Although all instream work will incorporate timing windows to reduce impacts to spawning and rearing areas, post-construction rains and instream flows may result in the discharge of fines into spawning and rearing areas until disturbed areas are fully stabilized. Some Program actions (Table 1) are therefore anticipated to have adverse effects to PBF #6 at the local scale.

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

Project components, such as removal of vegetation and addition of new impervious surfaces (e.g., passing lanes) are known to increase runoff and decrease infiltration. Increased runoff results in increased peak flows of surface water, and reduced infiltration inhibits groundwater recharge and subsurface flow with the river and decreases base flow. However, projects that cause or contribute to bed or bank scour or erosion (channel instability) and measurably and adversely affect base flows or flow durations are not anticipated. Therefore, we do not anticipate that Program actions will adversely affect PBF #7; effects will be insignificant.

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

The short-term, adverse effects to water quality from increased turbidity and sediment associated with instream construction and post-construction are likely to occur. Water quality is expected to be negatively affected due to increased runoff from new impervious surfaces (e.g., passing lanes). The water quality impacts from some, but not all stormwater discharges, are likely to contain metals and other contaminants, even if treated, and may degrade water quality within the mixing zone up to 300 ft downstream of stormwater outfalls. Measurable effects from degraded water quality are expected to PBF #8 within the action area due to the concentration of contaminants in the discharge and/or the cumulative concentration within the waterbody. In addition, pile preservation treatments conducted below the OHWM have the potential to cause elevated suspended sediment/turbidity and pH levels, as well as the introduction of lead and heavy metals during pile cleaning. BMPs will minimize but not eliminate the potential for these effects. Therefore, adverse effects to PBF #8 due to changes in local water quality are expected as a result of the proposed action.

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

The proposed action will not introduce any predatory, interbreeding, or competitive non-native species and, therefore, will have no effect on PBF #9.

2.3.4 Summary of Effects to Bull Trout Critical Habitat

Effects from proposed Program actions to PBFs 1 (springs, seeps, and ground water sources), 3 (abundant food base), 5 (water temperatures), and 7 (natural hydrograph) are expected to be insignificant or very unlikely to occur. Adverse effects may potentially occur to PBFs 2 (migratory habitat), 4 (complex aquatic environments), 6 (substrates), and 8 (water quality). Proposed Program actions will have no effect on PBF 9 (non-native predatory, inbreeding, or competitive species).

Due to the programmatic nature of the proposed action, the Service cannot predict exactly where (in terms of specific critical habitat segments) these effects may occur. We do expect that adverse effects, when they occur, will be short in duration and limited in scope as discussed above in the sections addressing effects to the species. The BMPs and conservation measures are expected to further reduce the magnitude of those effects. We will be able to better address potential effects during the pre-project review process where the Agencies provide site-specific information for each proposed Program action. The Service can then ensure consistency with the analyses and conclusions included in this Opinion. If the pre-project review identifies that a Program action is not consistent with our Opinion, then that action will need to undergo a separate section 7 consultation.

Because the action area for individual projects is small, the intensity and severity of the effects described is relatively low, and their frequency in a given watershed is very low. Any adverse effects to PBF conditions and conservation value of critical habitat at the site level or reach level are likely to quickly return to baseline critical habitat conditions. Projects completed under the proposed Program are also reasonably certain to lead to some degree of ecological recovery within each project area, including the establishment or restoration of environmental conditions associated with functional aquatic habitat and high conservation value. Each action may partially or fully correct improper or inadequate engineering designs in ways that will help to restore lost habitat, improve water quality, reduce upstream and downstream channel impacts, improve floodplain connectivity, and reduce the risk of structural failure. Improved fish passage through culverts and more functional floodplain connectivity may have long-term beneficial effects.

2.3.5 Cumulative Effects

Cumulative effects for critical habitat are essentially the same as for the species. See section 2.2.4 *Cumulative Effects* for bull trout.

2.3.6 Conclusions

After reviewing the current status of the designated critical habitat for bull trout, the environmental baseline for the action area, the effects of the proposed action, and any cumulative effects, it is the Service's biological opinion that the proposed action is not likely to result in destruction or adverse modification of designated critical habitat for bull trout. The Service's rationale is presented below.

Although PBFs 2, 4, 6, and 8 of designated bull trout critical habitat may be adversely affected by the Program, we expect these effects to be limited to the local project area in both duration and spatial extent. We also expect the BMPs and conservation measures incorporated into the Program to minimize effects. Because Program-administered roads are generally located in FMO habitat, few Program activities of the proposed action are anticipated in bull trout spawning and rearing habitat, and it is anticipated the number of Program activities potentially impacting critical habitat will be small. Impacts to any local critical habitat segments will not affect the functioning of any Critical Habitat Units in the action area. Therefore, we conclude that the Program will not destroy or adversely modify designated critical habitat for bull trout. The Service expects critical habitat within the action area and the larger bull trout range would continue to support bull trout and maintain its intended conservation role for the species.

2.3.7 Conservation Recommendations for Bull Trout Critical Habitat

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 listed species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery programs, or to develop new information on listed species.

The Service hereby makes the following conservation recommendations:

1. To better assess sediment effects on water quality and PBF 8 from future instream projects, take suspended sediment samples at the turbidity monitoring stations established for the project. Although turbidity and suspended sediment concentration are correlated, the relationship varies between individual streams and watersheds. Measuring suspended sediment will assist in making stream-specific correlations between suspended sediment concentrations and turbidity.
2. Continue to promote recovery of bull trout in the action area by identifying critical habitat restoration opportunities and implementing these actions in the near-term.
3. Where practicable, use native species for revegetating disturbed sites.

2.4 Snake River Physa Snail

2.4.1 Status of the Species

The Snake River physa was listed as endangered December 14, 1992, effective January 13, 1993 (57 FR 59244). Critical habitat for this species has not been designated. The recovery plan for the Snake River physa described the target recovery area for the species from river mile (RM) 553 to 675 (USFWS 1995, pp. 9, 30). In the most recent 5-year review, the Service concluded that the Snake River physa should remain listed as endangered (USFWS 2018c, entire). Primary factors threatening Snake River physa, both at the time of listing and currently, include hydroelectric dam development, water withdrawals for agriculture and small hydroelectric projects, peak loading of existing hydroelectric water projects, water pollution, and exotic species invasions (e.g., New Zealand mudsnail [*Potamopyrgus antipodarum*]).

2.4.1.1 Species Description

The Snake River physa snail is a small freshwater pulmonate snail found only in the mainstem of the Snake River in Idaho. The shells of adult Snake River physa snails are approximately 7 millimeters long with 3 to 3.5 whorls, amber to brown in color, and somewhat transparent (USFWS 1995, p. 8). Like all *Physa* species, the shells of this species are sinistral (left-handed); when the shell is placed with the spire up and the aperture towards the viewer, the aperture is on the left. The aperture whorl is inflated relative to most other *Physa* species in the Snake River. This species has a limited distribution within the Snake River on gravel to boulder substrate in habitats with low-to-moderate current, typically in deeper portions of the river.

2.4.1.2 Life History

Very little is known about the life history of the Snake River physa snail. This species existed in the Pleistocene-Holocene lakes and rivers of northern Utah and southeastern Idaho and is thought to have persisted for at least 3.5 million years in the Snake River (Taylor 1988, p. 72). Taylor had described this species as occurring in deep river habitats dominated by rapids and boulders, but studies conducted in 2006 by the Bureau of Reclamation below Minidoka Dam (Kerans and Gates 2008, pp. 8-16) recovered the species from river and pool (below spillway) habitats with moderate water velocity. Later collections of this snail downstream of C.J. Strike Reservoir (Keebaugh 2009, entire; Winslow et al. 2011, entire) were consistent with the habitats in the Minidoka area. Snails collected from the river were typically found in deeper areas of runs and glides where the gravel to boulder substrates were mostly free of fine sediments. The Snake River physa has only rarely been recorded from reservoirs (Keebaugh 2009, entire). Snake River physa have been found in water temperatures above 22 °C (71.6 °F) but have not been found in the cool-water springs that flow into the Snake River (USFWS 2014a, p. 5).

Based on the life histories of other species within the Physidae family, the Snake River physa likely lives for up to or just over one year. The likely diet is aquatic macrophytes, benthic diatoms (diatom films that primarily grow on rock surfaces, also called periphyton), bacterial films, and/or detritus (Dillon 2000, pp. 66-70).

2.4.1.3 Population Dynamics

Nothing is known of the Snake River physa's population size or natural population dynamics. Like other species in Physidae, the Snake River physa is likely univoltine, with a generation of snails persisting and reproducing over a single year. No demographic studies have been conducted. The highest density population appears to be in the river reach between Minidoka Dam and Milner Reservoir. Although a lower density population occurred downstream of C.J. Strike Reservoir, it is unknown whether this population is still extant and recent surveys conducted by Idaho Power Company (IPC) have failed to locate it (IPC 2018, pp. 2-3).

2.4.1.4 Status and Distribution

Fossil evidence indicates that the Snake River physa existed in the Pleistocene-Holocene lakes and rivers of northern Utah and southeastern Idaho, and as such, is a relict species from Lake Bonneville, Lake Thatcher, the Bear River, and other lakes and watersheds that were once connected to these water bodies (Frest 1991, pp. 8-9; Link et al. 1999, entire).

The currently confirmed range of the Snake River physa is restricted to 307 river miles or less in the Snake River in southern Idaho from RM 675 at Minidoka Dam downstream to RM 368 near Ontario, Oregon (USFWS 2014b, pp. 5-6). The species' highest abundance and densities currently occur in the 11.5-mile river segment downstream of Minidoka Dam (i.e., Minidoka reach, RM 662-675); within this reach, Gates and Kerans (2010, p. 20) reported Snake River physa from 19.7% of their samples, with relatively high-density samples ranging from 30 to 64 individuals per square meter. Historically, Snake River physa was considerably less common outside the Minidoka reach, with only 4.3% of 787 inspected samples containing live animals and those positive samples most typically not exceeding 4 individuals per sq m (Keebaugh 2009, entire).

Since 2010, numerous additional surveys for the Snake River physa have occurred both within and outside the Minidoka reach (USFWS 2018c, p. 2). The species continues to be regularly found within the Minidoka reach, although densities have fluctuated in recent years. For example, within the Minidoka reach, the percentage of survey plots at the Jackson Bridge survey site containing the species have ranged from 7.5 to 37.5%. At the Minidoka Dam spillway survey site, the species was not detected in 2012, 2014, or 2015, while 3 and 26 individuals were found in 2013 and 2016 respectively (USFWS 2018c, p. 2).

The species has not been found outside the Minidoka reach in the remaining 475 km (295 mi) of its range since 2002, the last time a live specimen was collected outside of the Minidoka reach (Keebaugh 2009, entire). Recent surveys outside of the Minidoka reach have produced other Physidae species, but no live Snake River physa have been found. Several of these survey events targeted suitable habitat locations that had positive detections prior to 2002. Since 2010, IPC and others have collected more than 500 samples downstream of the Minidoka reach targeting Snake River physa as part of hydropower relicensing, compliance, and other biological assessment studies; while IPC's efforts between 2010 and 2018 produced 8,698 individuals from the Physidae family, none were positively identified as Snake River physa and most were *P. gyrina* (IPC 2018, p. 6). Surveys by U.S. Bureau of Reclamation, the Service, and IPC below American Falls Dam (RM 708-715) in 2011 and 2021 also found no Snake River physa.

2.4.1.5 Conservation Needs

The Service (1995) published a final, approved recovery plan for the Snake River physa. Based on this recovery plan, viable subpopulations/colonies of Snake River physa must become established and be protected in lotic (riverine) habitats on the mainstem Snake River from RM 553 to 675 on rock/boulder substrates in deep water at the margins of rapids with good water quality (average water temperature below 18 °C (64.4 °F) with dissolved oxygen concentrations greater than 6 mg/l and pH levels of 6.5 to 9.0). River flows need to be managed, to the extent possible, to mimic a large river with natural flows and high water quality.

Existing threats to the Snake River physa include the operation of existing dams, water quality degradation, climate change, pollution control regulations, lack of state (Idaho) invertebrate species regulations, small population size, habitat fragmentation, and loss of connectivity. Most of these threats (i.e., operation of existing dams, water quality degradation, climate change, pollution control regulations, lack of state (Idaho) invertebrate species regulations) are ongoing and have not changed significantly since the 2018 5-year status review for the species (USFWS 2018c, p. 4).

2.4.2 Environmental Baseline of the Action Area

Refer to section 2.2.2 of this Opinion for a complete definition of the term “environmental baseline”.

2.4.2.1 Status of Snake River Physa Snail in the Action Area

The Snake River physa’s range is the mainstem Snake River from Minidoka Dam to approximately Ontario, Oregon, but the species has not been found outside the approximately 11.5-mile Minidoka reach since 2002. The Program may affect the Snake River physa throughout its range if actions occur where snails are present. Specifically, any action that occurs within the Snake River or ITD ROWs near the Snake River, or has the potential to impact the Snake River or its tributaries, may affect the species. This area is encompassed by ITD District 3 (Elmore and Owyhee Counties) and District 4 (Cassia, Elmore, Gooding, Jerome, Minidoka, and Twin Falls Counties).

Action Area

The action area includes the full range of the species (Figure 3).

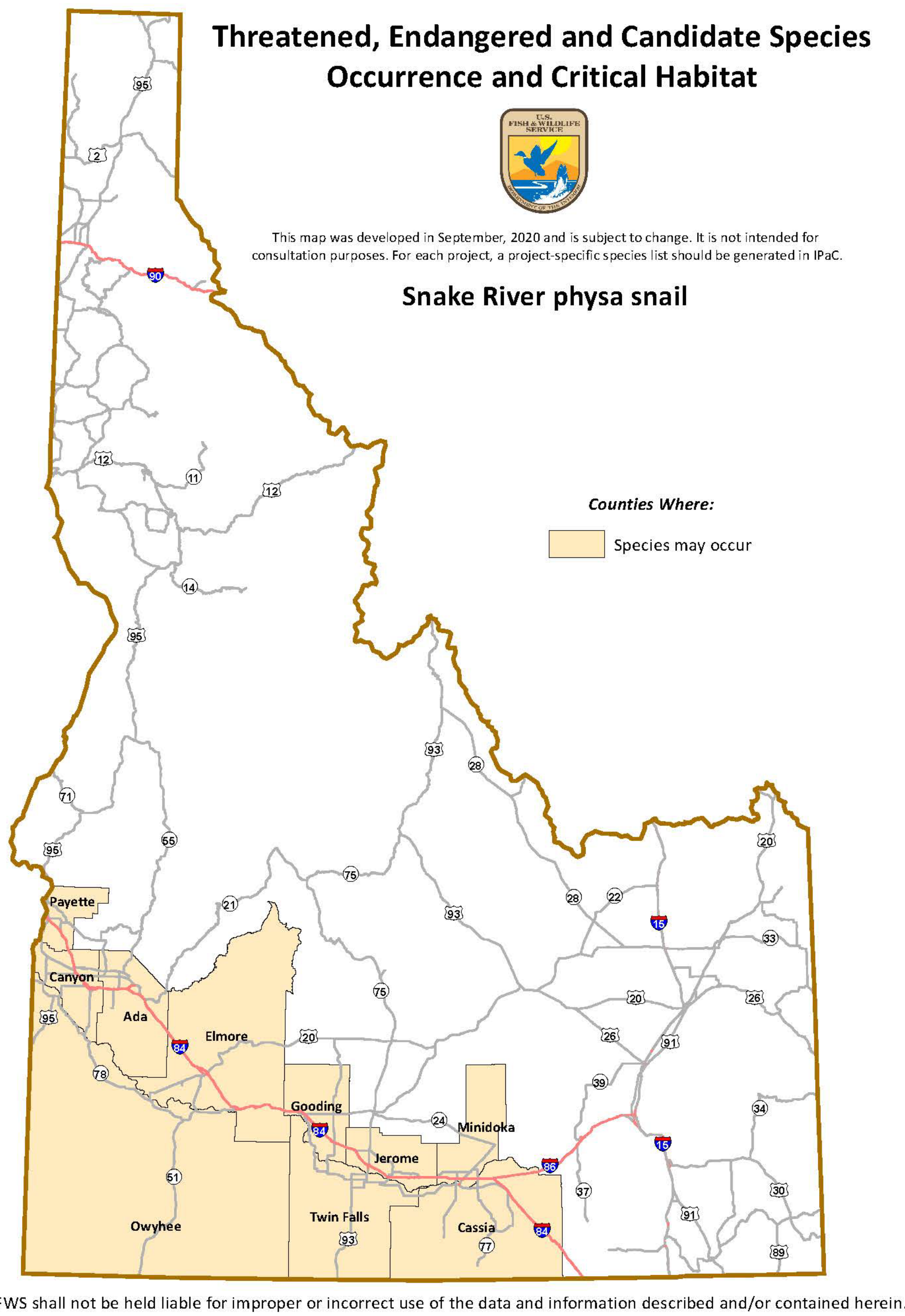


Figure 4: Map showing overlap between areas where Snake River physa may occur and state or Federal roads and highways. Local roads administered by LHTAC are not shown, but it is assumed that they increase the probability of overlap.

2.4.3 Effects of the Proposed Action

Implementing regulations define "effects of the action" as "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 (50 CFR 402.02).

It should be noted that due to the programmatic nature of the proposed action, site specificity regarding potential effects to the Snake River physa is lacking. The ITD/LHTAC will provide site-specific information for each Program action during the pre-project review process. Site-specific information will be evaluated by the Service to better address potential effects prior to project implementation. Specific program actions in the Minidoka Reach (Minidoka Dam downstream to the Interstate 84 bridges west of exit 216 [RM 662-675]) will require a separate formal consultation for this species.

See Table 1 in Section 2.2.3 for the full list of Program actions grouped by effects determinations for listed aquatic species. The primary reason that "not likely to adversely affect" projects in Table 1 (above) have insignificant or discountable effects to listed snails is that each activity occurs in upland locations or in dry, seasonal streams that are not Snake River physa habitat. Therefore, Snake River physa will not be present during project implementation and will not be directly impacted by these project activities. There could be effects that occur later in time resulting from precipitation events that deliver sediment from Program activities such as ground disturbance to downstream snail habitat. However, with implementation of BMPs (section 2.1.4) to control erosion and sediment from ground disturbance, the effects from these activities are not expected to reach downstream habitats occupied by this species and are therefore expected to be insignificant. For complete descriptions of all BMPs, see Appendix A.

Projects that may adversely affect snails if conducted in occupied habitat include: (1) pile preservation conducted below the OHWM; (2) two-lane bridge construction over water; (3) road widening; (4) bank stabilization; (5) small structure repair; (6) culvert installation, maintenance, or extension in perennial streams; (7) geotechnical drilling; and (8) pile installation. These activities could result in erosion and sediment delivery to the Snake River, or its tributaries. These effects can degrade or inundate habitat used by snails during all life history phases, could reduce food abundance, and could cause snail mortality. In addition, there would likely be effects on water quality (e.g., increases in suspended sediment and chemical contamination) and potential effects on habitat (e.g., sediment deposition and streambank alteration). Bank stabilization actions (e.g., riprap, gabion baskets, bio-methods) and bridge maintenance conducted below the OHWM, and geotechnical drilling may also crush and kill snails. The magnitude of these effects will vary as a result of the nature, extent, and duration of the individual project activities, though the major factors would be whether or not any work occurs in-stream and whether Snake River physa are present at the time of implementation. Activities associated with pile preservation (containment and suction removal of contaminants) could remove resident snails (suction) and remove them to contaminant discard materials. The primary pathways for adverse effects to snails are noise at project sites, direct impacts to individuals (such as crushing, desiccation, and suction removal), exposure to reduced water quality, and impacts to habitat (e.g., sediment deposition). The discussion of each of these effects pathways follows below.

2.4.3.1 Noise

Disturbances associated with construction-related sound levels are difficult to quantify with regard to the associated adverse effects to the Snake River physa. The most intense effects are expected from pile driving. The BMPs require the use of de-watered coffer dams for pile driving, which, according to Caltrans (2020, p. 82) provides underwater sound attenuation that is at least as great as that provided by air bubble curtains. Vibratory hammers for pile driving will also be used in suitable stream substrates. According to Caltrans (2020, p. 43): “Vibratory hammers produce less peak sound pressure than impact hammers and are often employed as an avoidance and minimization measure in the initial placement of the pile by reducing the overall number of strikes necessary to drive the pile to the final elevation. There are no established injury criteria for vibratory pile driving, and resource agencies agree that vibratory pile driving results in reduced adverse effects on fish as compared to impulse pile driving.” Effects to snails could not be determined; almost no information exists on the detection of sound and vibration by aquatic invertebrates (Hawkins et al. 2015, p. 50-51). However, based on the effects of noise on fish species (overview in Popper et al. 2014, p. 17-21), it is reasonable to assume that snails occurring within 10 ft of the pile driving site could easily be killed or injured by barometric trauma (barotrauma) to soft organs from elevated sound pressure levels. Some of these effects will be dampened since all pile driving will occur within de-watered coffer dams or vibratory hammers will be used. The effects of project-related sound pressure levels are expected to quickly decrease in severity within 10 ft of the targeted objects and are not anticipated to have prolonged or lasting impacts on the species. Program-related sound pressure levels are likely to interfere with foraging and reproduction within 10 ft, but given the low densities of snails likely to occur within this zone of disturbance, any effects will be insignificant at the population-level.

Blasting may be used during rock scaling, and depending on the blasting location relative to the occurrence of Snake River physa, may disturb, injure, or kill snails through elevated sound pressure levels and barotrauma. However, in-water blasting is not permitted, thereby greatly reducing potential effects. Furthermore, rock removal by blasting will only be allowed when labor methods are ineffective. The Contractor must submit a blasting plan to the Engineer for approval including drilling and blasting patterns, timing and duration, and anticipated noise effects. For these reasons, and primarily because there will be no blasting allowed in-water, effects to snails due to blasting are considered insignificant; blasting is not likely to adversely affect Snake River physa.

2.4.3.2 Direct Impacts to Individual Snails

Snails (and potentially eggs) may be injured or killed during Program actions including pile preservation, bank stabilization, installation of coffer dams, deconstruction/construction of two-lane bridges, dewatering cofferdams, and pile-driving (described above).

Bank stabilization using riprap, gabion baskets, MSE walls, or bio-methods will involve excavation and placement of fill below the OHWM. If these activities occur in occupied habitat, snails and eggs may be crushed and killed. Similar effects are expected from placement of riprap around bridge abutments for scour protection.

If coffer dams are used in occupied Snake River physa habitat, any snails enclosed within these coffer dams are expected to die during coffer dam installation, dewatering, and during the work activities occurring within the coffer dams (e.g., pile driving, heavy machinery use, etc.).

Bridge repair work conducted below the OHWM involving pile preservation treatments (i.e., cleaning piles and debris removal and pile wraps and pier casing) will crush and kill snails and eggs if they are present when this work is done. Similarly, debris from above OHWM from bridge maintenance or replacement that falls into the water body may crush and kill snails and eggs. Contaminant containment and removal during pile preservation activities could remove any resident Snake River physa via suction and deposit them with discarded contaminant material.

Water Quality-related Effects

Suspended Sediment - In-water work or work conducted above the OHWM in occupied snail habitat may result in increases of suspended sediment and have the potential to adversely affect snails. Sediment effects are not likely to be acute, but effects of sediment are not well understood regarding Snake River physa. Elevated levels of suspended sediments may occur within the Snake River seasonally and during higher-than-normal run-off events, and snails can likely cope with moderate levels of turbidity or short durations of high turbidity. Outside of areas that may be contained within a coffer dam, suspended sediments are unlikely to reach levels that are excessive relative to conditions periodically encountered by the species (elevated seasonal run-off) and those areas are likely to be highly localized; in the Kootenai River, which is similar to the Snake River, sediments typically settle out within 900 to 1200 ft downstream of in-water work activities (Assessment, p. 91). In addition, the BMP to monitor and limit turbidity in order to ensure compliance with Idaho State Water Quality Standards helps minimize exposure of Snake River physa to excessive levels of suspended sediments for prolonged periods of time.

Chemical Contamination. Use of construction equipment and heavy machinery adjacent to stream channels poses the risk of accidental spills of fuel, lubricants, hydraulic fluid, or similar contaminants into the riparian zone or directly into the water. If these contaminants enter the water, these substances could adversely affect habitat, injure or kill aquatic food organisms, or directly impact snails. Petroleum-based contaminants such as fuel, oil, and some hydraulic fluids contain poly-cyclic aromatic hydrocarbons, which can cause chronic sublethal effects to aquatic organisms (Dupuis and Ucan-Marin 2015, pp. 21-31). For projects requiring heavy machinery, equipment will not enter flowing water, which limits the potential for chemical contamination to occur. Furthermore, there are multiple BMPs aimed at minimizing the risk of fuel or oil leakage into the stream. A spill prevention and contingency plan will be prepared by the construction contractor and approved by ITD for each project prior to implementation. All staging, fueling, and storage areas will be located away from aquatic areas. Fuel spill and equipment leak contingencies and described preventions should be sufficient to minimize risk to snails and snail habitat from toxic contamination to insignificant levels.

The proposed action would create a limited amount of additional pollutant-generating impervious surfaces, such as passing lanes and turnouts. The proposed action does not include activities that would result in effects such as roads that would accommodate new and/or increased traffic. Stormwater runoff from highway systems can deliver a variety of chemical and sediment pollutants to streams from rain (Hwang et al. 2016, p. 16-17; Jartun et al. 2008, entire)). Dissolved copper, for example, is found in stormwater runoff from roadways (derived from the copper in vehicle brake pads, Hwang et al. 2016, pp. 9-11) and can be toxic to Snake River physa, depending on concentration and exposure (Besser et al. 2016, pp. 324-330). However, the number of projects generating new impervious surfaces is anticipated to be small, thereby limiting the extent of adverse effects from contaminants in stormwater runoff.

Pile preservation treatments may have adverse effects to snails through increases in suspended sediment/turbidity, elevated pH levels, and the potential introduction of lead, cadmium, and chromium. However, these treatments will include installation of turbidity curtains and turbidity and pH monitoring. In addition, the Contractor will test the piles for lead and heavy metals prior to cleaning. If present, the Contractor will submit a Lead and Heavy Metal Debris Containment and Recovery Plan that will include the use of an underwater vacuum to collect contaminated material. The Lead and Heavy Metal Debris Containment and Recovery Plan is in addition to the turbidity curtain installation. The Contractor will collect and dispose of waste material containing lead, chromium and cadmium in strict compliance with all applicable Federal, State and local laws, codes, rules and regulations. Containment and removal of toxic debris during pile preservation will have the following adverse effects to any resident Snake River physa: (1) Installation and securing turbidity curtains may require anchoring which may also kill and harm snails and their eggs through crushing; (2) Use of underwater vacuums to capture and remove toxic debris from the work area may capture and transport resident Snake River physa and/or their eggs to the contaminants collection point, resulting in their mortality. These BMPs will minimize but not eliminate the potential for adverse effects to snails when conducted in occupied habitat.

Habitat-related Effects on Snails

Implementation of Program actions may adversely affect habitat conditions within the action area, affecting habitat suitability for snails. Near and in-stream ground disturbance is likely to increase in-channel sediment deposition and excavation at project sites, and installation of riprap or gabion baskets may alter streambank conditions.

Sediment Deposition. The pathways for sediment introduction to the stream channel were described in the suspended sediment discussion above. The potential effects of sediment deposition on snails include negative impacts to suitable cobble habitat and burying snails and eggs. In the long-term, it is anticipated that high-flow events will flush most of this sediment from the cobble habitat utilized by snails. In the short-term, deposited sediments will likely adversely affect and kill an undetermined number of snails within the sediment plume, an assumed 900 to 1200 ft downstream of in-water work activities based on measurements in the Kootenai River (Assessment, p. 91). The same suite of BMPs proposed to reduce the potential for suspended sediment (e.g., water quality monitoring, erosion control measures) will likewise minimize the potential for in-channel sediment deposition.

2.4.3.1 Summary of Effects

Project actions involving in-water work or work below the OHWM may have adverse effects to snails and their habitats. These activities include bank stabilization actions (e.g., riprap, gabion baskets, bio-methods), culvert installation/maintenance/extension, coffer dam use, drilling, contaminant containment and remediation, and pile installation. In-water work or work below the OHWM could result in the direct mortality of snails and eggs through crushing, desiccation, or barotrauma. Contaminant containment and recovery actions could inadvertently collect and kill

Snake River physa. Effects such as reduced water quality (e.g., increased suspended sediment, increased stormwater runoff, and chemical contaminants such as fuel, oil, or concrete washout water) and the modification of habitats (e.g., physical modification of existing habitat and increased erosion and sediment delivery to the Snake River, its tributaries, or adjacent cold water springs complexes) may also adversely affect snails. We expect the implementation of BMPs to reduce the magnitude and severity of these potential impacts to snails but not to a level of insignificance.

It should be noted that, although we can assume the effects identified could occur wherever Snake River physa are present, due to the programmatic nature of the proposed action, the presence or number of snails within the area of a specific Program action is uncertain. We will be able to better address potential effects during the pre-project review process where the Agencies provide site-specific information for each proposed Program action. The Service can then ensure consistency with the analyses and conclusions included in this Opinion. If the pre-project review identifies that a Project action is not consistent with our Opinion, that action will need to undergo a separate section 7 consultation.

2.4.4 Cumulative Effects

The implementing regulations for section 7 define cumulative effects to include the effects of future State or private activities that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). 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.

Local government and private irrigation diversions from Milner Pool are anticipated to range from less than 44 to approximately 89 percent of the total water removed from the river channel at that location. These withdrawals have adverse effects on water quantity and quality downstream from Milner Dam both from removal of water from the river and from the return of water to the river that has been degraded (e.g., irrigation returns). It is anticipated that these cumulative impacts to water quality and quantity downstream from Milner Dam will persist into the future and that water quality could become more degraded as this region undergoes continuing development.

Throughout the Snake River physa range, State, local, and private activities will continue to negatively affect snail habitats. These activities include destruction or modification of spring habitats that provide sources of good water quality at various locations along the Snake River; reduced water quality in the Snake River due to agriculture and urban uses (e.g., runoff of pesticides, fertilizers, municipal water treatment systems and urban centers, toxicant spills, and other sources of pollutants); withdrawal of water for irrigation; and residential and commercial development projects.

Aquifer springs provide recharge to the Snake River at numerous locations along its length and within the range and recovery area of the Snake River physa in the action area. These springs provide large volumes of cold water of relatively high quality throughout the year. Nonetheless, water quantity and quality from these springs show signs of decline. Much of this is likely due to agricultural practices, particularly water withdrawals due to groundwater pumping for irrigation, and leeching of agricultural chemicals and animal wastes into the aquifer. Aquifer recharge programs and other steps are currently being taken to slow or stop aquifer depletion. However, depletion and eutrophication are expected to continue as the human population and water demands continue to grow in southern Idaho. These factors will likely result in the continued degradation of habitats in the Snake River, which will continue to limit available habitat for the Snake River physa.

2.4.5 Conclusion

After reviewing the current status of Snake River physa snail, the environmental baseline in the action area, effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of Snake River physa snail. The Service's rationale for this conclusion is presented below. The cumulative effects that threaten the species throughout its range do not pose an imminent risk of extinction or endangerment to the species as a whole nor to its populations. Most of these adverse effects are chronic and/or increasing over time but not likely to result in extirpation of those populations over the duration of this Opinion.

The presence of Snake River physa is thought to be reduced to a narrow portion of the action area, with no individuals found outside of the Minidoka reach since 2002. Therefore, many of the projects that occur under this Opinion are likely to occur outside of occupied habitat, although the assumed range of the species is larger. While the Service expects the proposed action may result in the death and/or injury of Snake River physa individuals, any impacts with likely be limited in duration and spatial extent. Implementing the associated BMPs, impacts to the Snake River physa are expected to occur only in the action area of the specific Program activity, and only for the extent of the activity. The adverse effects are not expected to appreciably reduce the likelihood of survival and recovery of the Snake River physa range-wide in terms of numbers, distribution, or reproduction of the species.

2.4.6 Incidental Take Statement

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species, respectively, without specific exemption. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct." Harm is defined by the Service as an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

Incidental take is defined as take that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (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 an Incidental Take Statement (ITS).

2.4.6.1 Form and Amount or Extent of Take Anticipated

Project actions involving in-water work or work below the OHWM may directly harm or kill individual Snake River physa, while projects near occupied waterways may impact snails or their habitat through increased erosion and sedimentation, habitat destruction/modification, and decreased water quality. Due to the limited known occupied range of the species, specific program actions in the Minidoka Reach (Minidoka Dam downstream to the bridges on Interstate 84 west of exit 216 [RM 662-675]) are not covered under this incidental take permit and will require a separate formal consultation for this species. Outside of the Minidoka Reach, the Service expects that there will be few Program actions that will impact the Snake River physa during the timeline of this Opinion due to the likely patchy distribution (if the species is present). In addition, the BMPs incorporated into this Program are designed to reduce impacts to the Snake River physa.

Given these considerations, the amount of take in the form of harm, injury, or mortality is expected to be low. Quantifying take is difficult because the exact location of Program actions is not known, and the number of snails at any given site is also unknown. The Service anticipates incidental take of Snake River physa will be difficult to detect for the following reasons: 1) The species is of small body size, so finding dead or impaired specimens is unlikely; 2) Snake River physa harmed, injured, or killed by the proposed action will be washed away from the action area; and 3) losses may be masked by seasonal or inter-annual fluctuations in population size. Additionally, given the variation in population size between Snake River physa populations and the lack of knowledge regarding specific locations of activities associated with this Program, the Service cannot provide a supported estimate of the actual number of Snake River physa that are likely to be incidentally taken from the proposed action. We will therefore use the amount of affected habitat as a surrogate for anticipated take. We predict that all snails within the immediate vicinity of or within the sediment plume, an assumed 900 to 1200 ft downstream of any in-channel activities (in-water or work below the OHWM or bank stabilization work) based on measurements in the Kootenai River (Assessment, p. 91), will be harmed from elevated suspended and deposited sediment. Similarly, we predict that all snails within the immediate vicinity will be harmed, injured, or killed or be harmed from reduced water quality if the linear extent of work below the OHWM exceeds 300 linear ft or if there are more than two projects per year with work below the OHWM in any subbasin (4th field HUC) occupied by Snake River physa.

Authorized take would be exceeded and reinitiation would be triggered if:

1. The downstream extent of elevated suspended or deposited sediment extends beyond 1200 ft downstream of any Program activity or exceeds the limits specified in the Project BMPs (an increase over background turbidity greater than 50 NTU instantaneously or 25 NTU over ten consecutive days).
2. Work below the OHWM in any one Program activity exceeds 300 linear ft, or
3. More than two projects per year with work below the OHWM occur in any single subbasin occupied by Snake River physa.

If incidental take anticipated by this document is exceeded, the Agencies will immediately contact the Service to determine if consultation should be reinitiated.

2.4.6.2 Effect of the Take

In the accompanying Opinion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of Snake River physa across its range. The Snake River physa is documented to occur in the Snake River basin of southern Idaho from as far upstream as Minidoka Dam (RM 675) and as far downstream as Ontario (RM 368), Oregon, and estimated densities throughout its range vary widely; the highest densities documented occur in the approximately 11.5-mile reach below Minidoka Dam. Specific program actions in the Minidoka Reach (Minidoka Dam downstream to the bridges on Interstate 84 west of exit 216 [RM 662-675]) will require a separate formal consultation for this species. No individual has been found below this reach since 2002 and any populations in the remaining range, if extant, are likely patchy. Due to their limited distribution, it is not certain that snails will be present in the vicinity of any given Program action within the range of the species, other than within the Minidoka Reach. However, the Service will base our analysis on the assumption that snails could be present. It is anticipated that the amount of habitat that will be lost or impacted as a result of the proposed Program represents a small amount of occupied and available habitats. Further, the number of individuals expected to be killed as a result of the Program is small relative to total population numbers for the species. Given the relatively small area expected to be impacted within the area known or potentially occupied by the species, it is unlikely that the loss of snails present in the area of a Program action would have an appreciable effect on survival and recovery of the Snake River physa. In addition, it is likely that populations within the Project area could recover following completion of individual Program actions when instream habitat and water quality returns to pre-Program conditions. As such, take in the form of mortality and harm may occur, which could temporarily alter the distribution and numbers of Snake River physa. However, proposed Project actions are not expected to jeopardize overall numbers, distribution, or reproduction over the long term or to the extent that they would influence continued persistence or recovery of the Snake River physa.

2.4.6.2 Reasonable and Prudent Measures

The Service finds that compliance with the proposed action outlined in the Assessment, including proposed conservation measures, is essential to minimizing the impacts of incidental take of the Snake River physa snail. If the proposed action, including conservation measures, is not implemented as described in the Assessment and this Opinion, there may be effects of the action that were not considered in this Opinion, and reinitiation of consultation may be warranted.

The Service also finds that the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of the take of Snake River physa snail reasonably certain to be caused by the proposed action.

1. Initiate early consultation and review of any Program actions that cross or lie adjacent to the Snake River, within the range of the Snake River physa.
2. Minimize take/disturbance of/to Snake River physa and/or Snake River physa habitat from Project implementation.
3. Minimize the duration of adverse effects from any Program actions.

2.4.6.3 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Agencies must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1a. Prior to conducting any in-water work, bank stabilization work, bridge construction, geotechnical investigation, or work below the OHWM within the Minidoka Reach, (Minidoka Dam downstream to the bridges on Interstate 84, west of exit 216 [RM 662-675]), contact the Service for a separate formal consultation on the Snake River physa.

2a. Prior to dewatering or any alterations in water levels or flow, a ramping plan that specifies allowed rates of dewatering/rewatering or water level/flow changes should be developed with the Service to reduce impacts to any Snake River physa present in the area. If the project will require a reduction of river flow or stage, the Project proponent will work with the Service and agencies that controls the river flow/stage to develop an appropriate ramping plan or utilize an existing ramping plan.

2b. As needed during dewatering, identify for contractors where pump water from the dewatered area will be disposed. All necessary measures (e.g., settling ponds) will be taken to ensure no sediment from pump water will reach Snake River physa habitat.

2c. If barges, boats, coffer dams, or temporary work bridges are/become necessary for project completion, the Agencies shall consult with the Service prior to their installation and use.

3. Keep in-water work of shortest practicable duration. This includes any associated reductions in river stage, flow, or discharge for the purpose of accessing substrates below the OHWM or other action activities.

2.4.6.4 Reporting and Monitoring Requirement

In order to monitor the impacts of incidental take, the Agencies or any applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement per 50 CFR 402.14 (i)(3).

1. As part of the process for implementing the Program, ITD is required to provide appropriate post-Project Monitoring Forms to the Service within 45 days of project completion. The ITD will also host an annual coordination meeting to review the projects implemented under the Program during the previous year.
2. During project implementation, the Agencies shall promptly notify the Service of any emergency or unanticipated situations arising from or during Project activities that may be detrimental to the Snake River physa.

2.4.7 Conservation Recommendations for Snake River Physa Snail

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

The Service hereby makes the following conservation recommendations:

1. Conduct work in the dry during naturally low water conditions whenever possible.
2. Design projects to avoid/minimize in-water work, especially in the Minidoka reach (RM 662-675).

3. Survey for Snake River physa within and downstream of any activity footprint in the mainstem Snake River within the range of the species.
4. During construction, direct precipitation runoff from bridges and roads to shore/abutment area and contain within roadside catchment basins above flood stage elevation to prevent road-associated pollutants from entering waterways.
5. If a project involves work near or below the OHWM within the range of the Snake River Physa, monitor turbidity upstream, at, and at multiple locations downstream of the project footprint throughout the entirety of the action to determine the extent and duration of elevated sediment due to the project.

2.5 Bliss Rapids Snail

2.5.1 Status of the Species

The Bliss Rapids snail was listed as a threatened species on December 14, 1992, effective January 13, 1993 (57 FR 59244). Critical habitat for this species has not been designated. The recovery area for this species includes the Snake River and tributary cold-water spring complexes between RM 547 and 585 (USFWS 1995, pp. 10-11). On December 26, 2006, the Service received a petition from the Governor of Idaho and the Idaho Power Company to delist the Bliss Rapids snail. On September 16, 2009, we published a 12-month finding concluding that delisting the Bliss Rapids was not warranted (74 FR 47536) and the most recent 5-year review supported the species' threatened status (USFWS 2018d, entire).

Primary factors affecting the Bliss Rapids snail include ground water depletion and impaired surface and aquifer water quality. Hydropower operations and invasive species, such as the New Zealand mudsnail, are also known to threaten the Bliss Rapids snail but are currently regarded as secondary threats relative to habitat and water quality impairment.

2.5.1.1 Species Description

The shells of adult Bliss Rapids snails are 0.08 to 0.16 inches long with 3.5 to 4.5 whorls and are clear to white when empty (Hershler et al. 1994, p. 235). The species can occur in two different color morphs, the colorless or "pale" form, or the orange-red or "orange" form (Hershler et al. 1994, p. 240). It is not known what controls these color forms, but some populations do contain more than one color form.

This species typically occurs on the lateral and underside of gravel- to boulder-sized substrate in moderate currents in the main stem of the Snake River, as well as within numerous springs and spring tributaries that empty into the Snake River (Frest and Johannes 1992, p. 35; Hershler et al. 1994, p. 237). The species has not been found in impounded reaches of the Snake River (Frest and Johannes 1992, p. 23; Richards et al. 2006, p. 35) nor in river habitats upstream of Upper Salmon Falls Dam (RM 581.5). However, spring populations are present from approximately RM 568 to 617.

2.5.1.2 Life History

The Bliss Rapids snail is typically found on the sides and undersides of clean cobbles in pools, eddies, runs, and riffles, though it may occasionally be found on submerged woody debris (Hershler et al. 1994, p. 237) where it grazes on periphyton (benthic diatom mats) (Richards et al. 2004, p. 119). This species is restricted to spring-influenced bodies of water within and associated with the Snake River from King Hill (RM 546) to Devil’s Corral Springs (RM 617). The snail's distribution within the Snake River includes reaches that are unimpounded and the reach receives significant quantities (estimated 5,000 cfs) of recharge from the Snake River Plain Aquifer (Clark, G. M. and Ott 1996, p. 555; Clark, G. M. et al. 1998, pg. 9). It is also found in spring pools or pools with evident spring influence (Hopper 2006, in litt.). With few exceptions, the Bliss Rapids snail has not been found in sediment-laden or whitewater habitats; it is typically found on clean gravel to boulder substrates in habitats with low to moderately swift currents (Hershler et al. 1994, p. 237).

The Bliss Rapids snail forages primarily on periphyton. Richards (2004a, p. 119) described the Bliss Rapids snail as a “bulldozer” type grazer, moving slowly over substrates and consuming most, if not all, available diatoms. The dominant diatoms identified in his controlled field experiments consisted of the diatom genera *Achananthes* sp., *Cocconeis* sp., *Navicula* sp., *Gomphonema* sp., and *Rhoicosphenia* sp., although the species composition of these and others varied greatly between seasons and location. At least one species of periphytic green algae was also present (*Oocystis* sp.). Richards (2004a, entire) suggested that the Bliss Rapids snail appeared to be a better competitor (relative to the New Zealand mudsnail) in late successional diatom communities, such as the stable spring habitats where they are often found in greater abundance than the mudsnail.

Previous observations have suggested that the Bliss Rapids snail is more abundant in shallower habitats, but most sampling has been in shallow habitat since deeper river habitat is more difficult to access. Clark (2009, pp. 11-39) used a quantile regression model that modeled a 50% decline in snail abundance for each 10 ft of depth (e.g., snail density at 10 ft was approximately 50% less than that at shoreline. Richards et al. (2009b, entire) concluded that greater than 50% of the river population could reside in the first 5-ft depth zone of the Snake River.

The Bliss Rapids snail is dioecious (has separate sexes). Fertilization is internal and eggs are laid within capsules on rock or other hard substrates (Hershler et al. 1994, p. 239). Individual, life-time fecundity is not known, but deposition of 5 to 12 eggs per cluster have been observed in laboratory conditions (Richards et al. 2009a, p. 119). Reproductive phenology probably differs between habitats and has not been rigorously studied in the wild. Hershler et al. (1994, p. 239) stated that reproduction occurred from December through March. However, a more thorough investigation by Richards (2004a, pp. 129-131) suggested a bimodal phenology with spring and fall reproductive peaks but with some recruitment occurring throughout the year.

The seasonal and inter-annual population densities of Bliss Rapids snails can be highly variable. The greatest abundance values for Bliss Rapids snails are in spring habitats, where they frequently reach localized densities up to thousands per sq m (Richards et al. 2006, p. 3; Richards and Arrington 2009, entire). This is most likely due to the stable environmental conditions of these aquifer springs, which provide steady flows of consistent temperature and high-water quality throughout the year. Despite the high densities reached within springs, Bliss Rapids snails may be absent from springs or absent from portions of springs with otherwise uniform water quality conditions. The reasons for this patchy distribution are uncertain but may be attributable to factors such as habitat quality, competition from species such as the New Zealand mudsnail (Richards 2004b, entire), elevated water velocity, or historical events that had eliminated Bliss Rapids snails in the past (e.g., construction of fish farms at spring sources, spring diversion, etc.).

By contrast, river-dwelling populations are subjected to highly variable river dynamics where flows and temperatures can vary greatly over the course of the year. Compared to springs in which water temperatures range between 57.2 to 62.6 °F, river temperatures typically fluctuate between 41 to 78.8 °F, and river flows within the species' range can range from less than 4,000 cfs to greater than 30,000 cfs throughout the course of a year. These river processes likely play a major role in structuring and/or limiting snail populations within the Snake River (Dodds 2002, entire; USEPA 2002, entire) by killing or relocating snails and by greatly altering the benthic habitat (Dodds 2002, p. 171; Liu and Hershler 2009, p. 1296; Palmer and Poff 1997, p. 171). While Bliss Rapids snails may reach moderate densities (10s to 100s per sq m) at some river locations, they are more frequently found at low densities (≤10 per sq m) (Richards and Arrington 2009, entire; Richards et al. 2009b, entire) if they are present. While declines in river volume due to a natural hydrograph are typically less abrupt than load-following, they are of much greater magnitude, and hence it is logical to assume these natural events play an important role in limiting snail populations within the river.

2.5.1.3 Population Dynamics

A genetic analysis of the Bliss Rapids snail based on specimens collected from throughout its range indicated that spring populations were largely or entirely sedentary, with little to no movement between springs (Liu and Hershler 2009, p. 1294). Most spring populations were highly differentiated from one another as determined by DNA microsatellite groupings. By contrast, river populations exhibited no clear groupings, suggesting that they are genetically mixed and without genetic barriers, or they have not been isolated long enough to establish unique genetic differentiation. This pattern supports the suggestion made that the river-dwelling population(s) of the Bliss Rapids snail exist in either a continuous river population (Liu and Hershler 2009, p. 1295) or as a metapopulation(s) (Richards et al. 2009a, p. 12) in which small, semi-isolated populations (within the river) provide and/or receive recruits from one another to maintain a loosely connected population.

2.5.1.4 Status and Distribution

Although the Bliss Rapids snail is documented to occur in an estimated 22-mile reach of the mainstem middle Snake River, the species reaches its highest densities in springs and creeks derived from the Eastern Snake Plain Aquifer (ESPA) that emerge along the north bank of the middle Snake River from RM 546-604. Populations located in the upstream portion of the distribution are typically restricted to springs and spring creeks, as this reach of the mainstem Snake River is water quality limited. Downstream of Lower Salmon Falls Dam (RM 573), the species becomes a periodic occupant of the river, although densities are typically lower than in the springs. The reaches of the Snake River containing Bliss Rapids snail are highly influenced by ESPA spring discharge and lie outside of the influence of reservoirs where fine sediments dominate the benthic substrate. The genetic analysis of Liu and Hershler (Liu and Hershler 2009, pp. 1294-1296) illustrated a greater level of genetic diversity in snails occurring within the Snake

River relative to those collected from springs, which typically showed reduced genetic diversity. This supported the idea that many of these springs are genetically isolated from one another, whereas the river-dwelling populations are genetically mixed (USFWS 2018d).

Studies by the IPC found the species to be more common and abundant within the Snake River (RM 546 to 572) than previously thought, although in a patchy distribution with highly variable abundance (Bean 2006, entire; Richards and Arrington 2009, entire). Most, if not all, of the river range of the species is in reaches (Lower Salmon Falls and Bliss) where recent records show an estimated 5,000 cfs of water entering the Snake River from cold springs derived from the ESPA (see 2.5.1.2 above). This large spring influence, along with the steep, unimpounded character of the river in these reaches, improves water quality (temperature, dissolved oxygen, and other parameters) and helps maintain suitable Bliss Rapids snail habitat (low-sediment cobble to boulder) that likely contributes to the species' presence in these reaches (Hershler et al. 1994, p. 237). It is noteworthy that the species becomes absent below King Hill, where the river loses gradient, begins to meander, and becomes more sediment-laden and lake-like (lentic). Although Bliss Rapids snail numbers are typically lower within the Snake River than in adjacent spring habitats, the large amount of potential habitat within the river suggests that the population(s) within the river is/are low-density but larger in terms of number of individuals compared to the smaller isolated, typically high-density spring populations (Richards and Arrington 2009, entire). These river reaches comprise the majority of the species' designated recovery area.

The species' range upstream of Upper Salmon Falls Reservoir (RM 585-617) is restricted to aquifer-fed spring tributaries where water quality is relatively high and human disturbance is less direct. Within these springs, populations of snails may occupy substantial portions of a tributary (e.g., Box Canyon Springs Creek, where they are scattered throughout the 1.1 mile of stream habitat) or may be restricted to habitats of only several sq m (e.g., Niagara Springs). Spring development for domestic and agricultural use has altered or degraded a large amount of these habitats in this portion of the species' range (Clark et al. 1998, entire), often restricting populations of the Bliss Rapids snail to spring source areas (Hershler et al. 1994, p. 237).

It is difficult to estimate the density and relative abundance of Bliss Rapids snail colonies. The species is documented to reach high densities in cold-water springs and tributaries in the Hagerman reach of the middle Snake River, whereas colonies in the mainstem Snake River tend to have lower densities (Stephenson and Bean 2003, pp. 13-15). Bliss Rapids snail densities in Banbury Springs averaged approximately 32.53 snails per sq ft on three habitat types (vegetation, edge, and run habitat as defined by Richards et al. 2001). Densities greater than 790 snails per sq ft have been documented at the outlet of Banbury Springs (Morgan Lake outlet) (Richards et al. 2004, p. 30). To account for the high variability in snail densities and their patchy distribution, researchers have used predictive models to give more accurate estimates of population size in a given area (Richards 2004a, entire). In the most robust study to date, predictive models estimated between 200,000 and 240,000 Bliss Rapids snails in a study area measuring 58.1 sq ft in Banbury Springs, the largest known colony (Richards 2004a, p. 51). Due to data limitations, this model has not been used to extrapolate population estimates to other spring complexes, tributary streams, or mainstem Snake River colonies. However, with few exceptions (i.e., Thousand Springs and Box Canyon), Bliss Rapids snail colonies in these areas are much smaller in areal extent than the colony at Banbury Springs; some occupy only a few sq ft.

IPC monitoring efforts, begun in 2010, have shown that monitored river populations vary between years. With the exception of one river reach, none of these monitored river populations have shown a 5-year increase in abundance (as prescribed in the recovery plan). The one population that demonstrated a 5-year increase in abundance underwent a significant decline in its sixth year (USFWS 2018d, p. 31).

The nine regularly monitored springs also show substantial inter-annual variation, with most showing a slight downward trend. One spring population has been extirpated since the last 5-year review, and three spring populations have become extirpated since the time of listing in 1992 (USFWS 2018d, p. 7).

2.5.1.5 Conservation Needs

While some of the original threats to the species at the time of listing no longer exist (proposed hydroelectric dams), other threats persist and/or are increasing. Spring discharges from the ESPA continue to decline, with two springs, Box Canyon and Briggs, having declined by approximately 15 cfs (6%) and 10 cfs (9%), respectively, over the observed period of record and are illustrative of declining spring discharges throughout the species' range. Spring water quality has also shown signs of deterioration, with nitrate and phosphorus levels increasing at monitored springs (Johnson 2020, entire). While regulatory efforts to stabilize the ESPA have been implemented, it will require many years if not decades to determine if these efforts will be effective. Therefore, existing regulatory mechanisms that oversee ESPA groundwater management may not be adequate to reverse the declining water quantity and quality in these cold-water springs (USFWS 2018d, p. 31).

In addition, activities such as aquifer recharge have the potential to further reduce water quality at occupied springs. While we do not know the critical thresholds of nutrients and other contaminants for the Bliss Rapids snail, many such contaminants are known to adversely affect other aquatic invertebrates. Degraded water quality could have both acute and chronic toxic effects on snails as well as effects on habitat, such as increased growth of aquatic macrophytes, which can lead to sedimentation and habitat loss. Land use changes, primarily increased agriculture, are likely the drivers for both aquifer depletion and water quality degradation (USFWS 2018d, p. 32).

Based on current climate change projections, it is almost certain that predicted changes in temperature and precipitation will affect the water resources required by the Bliss Rapids snail. What is less certain, however, is how state or Federal water managers and/or the public will alter their water use or management to address these changes. This makes predicting how climate change will affect the Bliss Rapids snail highly uncertain. Additionally, threats to the ESPA (the water source upon which the species depends) have increased since the species listing; spring discharge has decreased while water contaminants (nitrates) are increasing (USFWS 2018d, p. 32), and this is likely to continue into the future.

While spring and river habitats are not under immediate threat of development or modification, there are periodic proposals to develop or modify springs. Many if not most of the known, occupied springs lie on private lands, and the Service is periodically approached with proposals to cap or otherwise modify these springs, such as capping spring discharge at its source and piping it directly to a beneficial use (e.g., fish farm). Developments such as this have the potential to wipe out genetically unique, isolated populations of Bliss Rapids snail. Depending on the developer, the source of funding (e.g., non-Federal), or the need for Federal or state permits, it is plausible the Service may not receive notification of such proposals and development may proceed without protections or implementing conservation practices.

2.5.2 Environmental Baseline of the Action Area

Refer to section 2.2.2 of this Opinion for a complete definition of the term "environmental baseline".

2.5.2.1 Status of Bliss Rapids Snail in the Action Area

The Bliss Rapids snail is present in the Snake River (RM 546 to 572), although with a patchy distribution and variable abundance. The species reaches its highest densities in the isolated springs and creeks derived from the ESPA. Degraded water quality and decreasing spring discharge in the area are likely affecting both the spring and river populations. Clark et al. (1998, p. 17) found the largest amounts of pesticides to be present in wells adjacent to agricultural areas around the Snake River between Burley and Hagerman, which are also the locations with the highest frequencies and concentrations of nitrates. Nitrate concentrations showed significant increases at several major springs, most with populations of the Bliss Rapids snail, from 1994 through 1999 (Baldwin et al. 2000, Fig. 18, pp. 22-23). The effects of these contaminants on the Bliss Rapids snail are not known, but in numerous wells these nitrate values have been recorded to exceed human health standards (Neely 2005, p. 27), and the presence of nitrates and other contaminants (Carlson and Atlakson 2006, pp. 3-5; Holloway et al. 2004, pp. 4-6; Johnson 2020, entire) illustrate the direct pathway from agricultural areas to the sensitive habitats of the Bliss Rapids snail and other sensitive species.

Agriculture water quality issues within the action area are not restricted to aquifer-spring sources but are widespread in surface water sources and conveyances (e.g., streams, irrigation return canals, Clark et al. 1998, p. 17). For that reason, the effects of water quality degradation within the Snake River and some tributaries must be considered on the river-dwelling populations of the Bliss Rapids snail. State programs to meet Total Maximum Daily Load (TMDL) requirements have met with some success, but some portions of the Snake River, including those adjacent to and upstream of known Bliss Rapids snail populations, have not met TMDL standards. In addition, TMDL criteria for the middle Snake River have only been established for a limited number of contaminants (total phosphorous, total suspended solids) and do not include other nutrients, pesticides, or consider the synergistic effects of these contaminants with one another (e.g, Hoagland and Drenner 1991, pp. 1-29). Such agricultural contaminants, either through ground water or irrigation returns, are regarded as nonpoint source pollutants and are not subject to regulation under the Clean Water Act.

Additionally, aquaculture facilities make up a significant amount of non-consumptive water use in the middle Snake River region and use an estimated 2,500 cfs of groundwater before releasing that water into the Snake River. This use contributes wastes from fish food, fish metabolism, and processing (Clark et al. 1998, p. 9) as well residual antibiotic and antiseptic compounds to the Snake River (EPA 2002, pp. 4-19). While many of these facilities are permitted by the Environmental Protection Agency under the National Pollutant Discharge Elimination System (NPDES), those facilities producing less than 20,000 pounds of fish (dry weight) per year are exempt from NPDES requirements and are not Federally regulated.

The action area is encompassed by ITD District 3 (Elmore County) and District 4 (Elmore, Gooding, Jerome, and Twin Falls Counties). Within these counties, Bliss Rapids snail may be locally common or abundant in springs, creeks, the Snake River, or pools and tributaries associated with the Snake River. The species is endemic to springs and spring creeks in Gooding, Jerome, and Elmore Counties as well as portions of the Snake River in these counties and Twin Falls County (Figure 4).

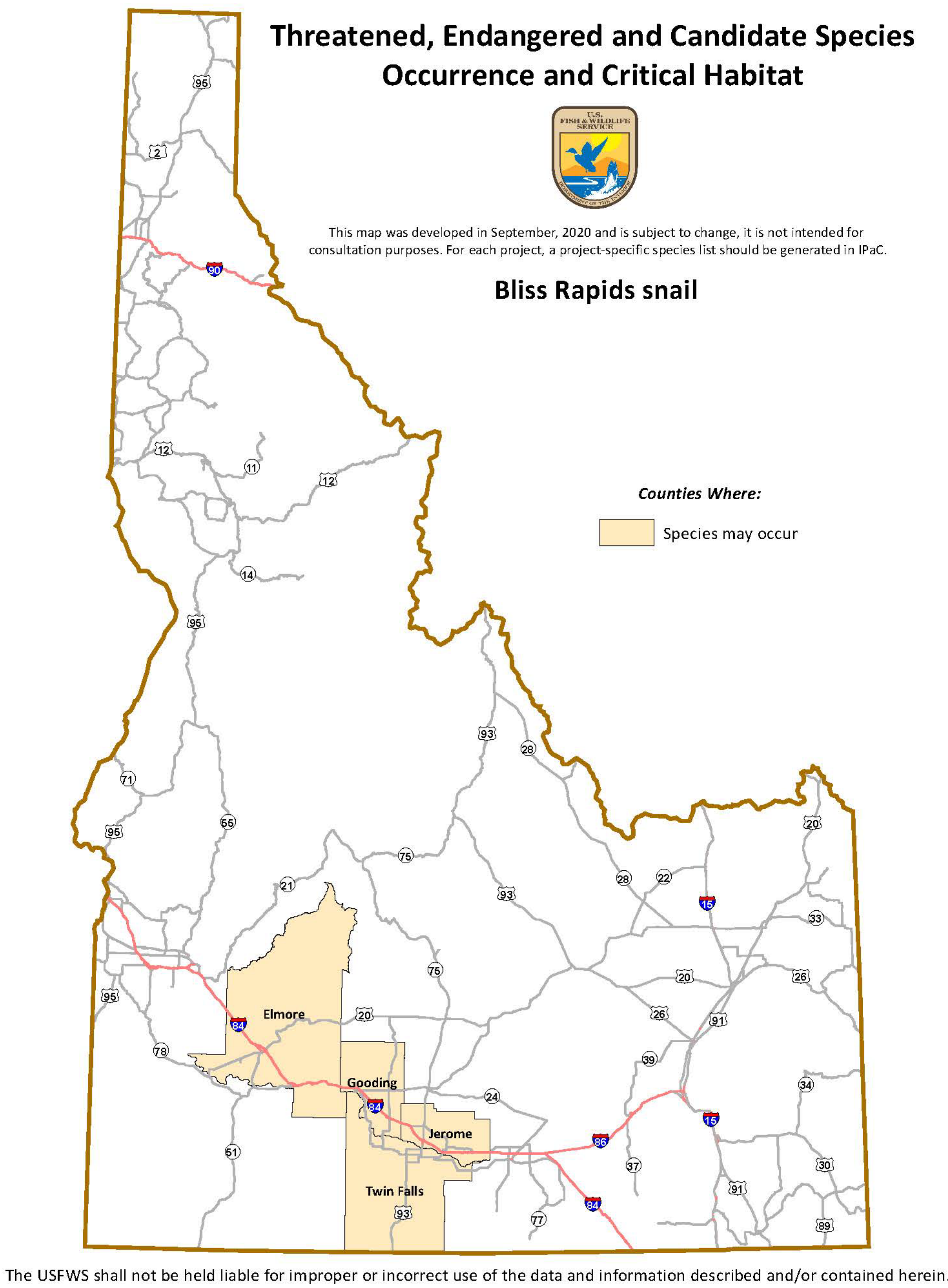


Figure 5: Map showing overlap between areas where Bliss Rapids snail may occur and state or Federal roads and highways. Local roads administered by LHTAC are not shown, but it is assumed that they increase the probability of overlap.

2.5.3 Effects of the Proposed Action

Implementing regulations define "effects of the action" as "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 (50 CFR 402.02).

It should be noted that due to the programmatic nature of the proposed action, site specificity regarding potential effects to the Bliss Rapids snail is lacking. The ITD/LHTAC will provide site-specific information for each Program action during the pre-project review process. Site-specific information will be evaluated by the Service to better address potential effects prior to project implementation.

See Table 1 in Section 2.2.3 for the full list of Program actions grouped by effects determinations for listed aquatic species. The primary reason that "not likely to adversely affect" projects in Table 1 have insignificant or discountable effects to listed snails is that each activity occurs in upland locations or in dry, seasonal streams that are not Bliss Rapids snail habitat. Therefore, Bliss Rapids snails will not be present during project implementation and will not be directly impacted by these project activities. There could be effects that occur later in time resulting from precipitation events that deliver sediment from Program activities such as ground disturbance to downstream snail habitat. However, with implementation of BMPs (section 2.1.4) to control erosion and sediment from ground disturbance, these potential effects from those activities are not expected to reach downstream habitats occupied by this species and are therefore expected to be insignificant. For complete descriptions of all BMPs, see Appendix A.

Projects that may adversely affect snails if conducted in occupied habitat include: (1) pile preservation conducted below the OHWM; (2) two-lane bridge construction over water; (3) road widening; (4) bank stabilization; (5) small structure repair; (6) culvert installation, maintenance, or extension in perennial streams; (7) geotechnical drilling; and (8) pile installation. These activities could result in erosion and sediment delivery to the Snake River, its tributaries or adjacent cold water springs complexes. These effects can degrade or inundate habitat used by snails during all life history phases, could reduce food abundance, and could cause snail mortality. In addition, there would likely be effects on water quality (e.g., increases in suspended sediment and chemical contamination) and potential effects on habitat (e.g., sediment deposition and streambank alteration). Bank stabilization actions (e.g., riprap, gabion baskets, bio-methods) and bridge maintenance conducted below the OHWM, and geotechnical drilling may also crush and kill snails. The magnitude of these effects will vary as a result of the nature, extent, and duration of the individual project activities, though the major factors would be whether or not any work occurs in-stream and whether Bliss Rapids snails are present at the time of implementation. Activities associated with pile preservation (containment and suction removal of contaminants) could remove resident snails (suction) and deposit them to contaminant discard materials. The primary pathways for adverse effects to snails are noise at project sites, direct impacts to individuals (such as crushing and desiccation from habitat dewatering), exposure to reduced water quality, and impacts to habitat (e.g., sediment deposition, habitat dewatering). The discussion of each of these effects pathways follows below.

2.5.3.1 Noise

Disturbances associated with construction-related sound levels are difficult to quantify with regard to the associated adverse effects to the Bliss Rapids snail. The most intense effects are expected from pile driving. The BMPs require the use of de-watered coffer dams for pile driving, which according Caltrans (2020, p. 82) provides underwater sound attenuation that is at least as great as that provided by air bubble curtains. Vibratory hammers for pile driving will also be used in suitable stream substrates. According to Caltrans (2020, p. 43): “Vibratory hammers produce less peak sound pressure than impact hammers and are often employed as an avoidance and minimization measure in the initial placement of the pile by reducing the overall number of strikes necessary to drive the pile to the final elevation. There are no established injury criteria for vibratory pile driving, and resource agencies agree that vibratory pile driving results in reduced adverse effects on fish as compared to impulse pile driving Effects to snails could not be determined; almost no information exists on the detection of sound and vibration by aquatic invertebrates (Hawkins et al. 2015, p. 50-51). However, based on the effects of noise on fish species (overview in Popper et al. 2014, p. 17-21), it is reasonable to assume that snails occurring within 10 ft of the pile driving site could easily be killed or injured by barometric trauma (barotrauma) to soft organs from elevated sound pressure levels. Some of these effects will be dampened since all pile driving will occur within de-watered coffer dams or vibratory hammers will be used. The effects of project-related sound pressure levels are expected to quickly decrease in severity within 10 ft of the targeted objects and are not anticipated to have prolonged or lasting impacts on the species. Program-related sound pressure levels are likely to interfere with foraging and reproduction within 10 ft, but given the low densities of snails likely to occur within this zone of disturbance, any adverse effects will be insignificant at the population-level.

Blasting may be used during rock scaling, and depending on the blasting location relative to the occurrence of Bliss Rapids snails, may disturb, injure, or kill snails through elevated sound pressure levels and barotrauma. However, in-water blasting is not permitted, thereby greatly reducing potential effects. Furthermore, rock removal by blasting will only be allowed when labor methods are ineffective. The Contractor must submit a blasting plan to the Engineer for approval including: drilling and blasting patterns, timing and duration, and anticipated noise effects. For these reasons, and primarily because there will be no blasting allowed in-water, effects to snails due to blasting are considered insignificant; blasting is not likely to adversely affect Bliss Rapids snails.

2.5.3.2 Direct Impacts to Individual Snails

Snails (and potentially eggs) may be injured or killed during Program actions, including pile preservation, bank stabilization, installation of coffer dams, dewatering within cofferdams, deconstruction/construction of two-lane bridges, and pile-driving (described above).

Bank stabilization using riprap, gabion baskets, MSE walls, or bio-methods will involve excavation and placement of fill below the OHWM. If these activities occur in occupied habitat, snails and eggs may be crushed and killed. Similar effects are expected from placement of riprap around bridge abutments for scour protection.

If coffer dams are used in occupied Snake River physa or Bliss Rapids snail habitat, any snails enclosed within these coffer dams are expected to die during coffer dam installation, dewatering, and during the work activities occurring within the coffer dams (e.g., pile driving, heavy machinery use, etc.).

Bridge repair work conducted below the OHWM involving pile preservation treatments (i.e., cleaning piles and debris removal and pile wraps and pier casing) will crush and kill snails and eggs if they are present when this work is done. Similarly, debris from above OHWM from bridge maintenance or replacement that falls into the water body may crush and kill snails and eggs. Contaminant containment and removal during pile preservation activities could remove any resident Bliss Rapids snails via suction and deposit them with discarded contaminant material.

2.5.3.3 Water Quality-related Effects

Suspended Sediment. In-water work or work conducted above the OHWM in occupied snail habitat may result in increases of suspended sediment that are likely to adversely affect snails. Sediment effects are not likely to be acute, but effects of sediment are not well understood regarding Bliss Rapids snail. Elevated levels of suspended sediments may occur within the Snake River seasonally and during higher-than-normal run-off events, and snails can likely cope with moderate levels of turbidity or short durations of high turbidity. Outside of areas that may be contained within a coffer dam, suspended sediments are unlikely to reach levels that are excessive relative to conditions periodically encountered by the species (elevated seasonal run-off) and those areas are likely to be highly localized; in the Kootenai River, which is similar to the Snake River, sediments typically settle out within 900 to 1200 ft downstream of in-water work activities (Assessment, p. 91). In addition, the BMP to monitor turbidity in order to ensure compliance with Idaho State Water Quality Standards provide assurances that helps minimize exposure of Bliss Rapids snails to excessive levels of suspended sediments for prolonged periods of time. Hence, adverse effects due to suspended sediments are anticipated to reach no more than levels of disturbance.

Suspended sediments are anticipated to cause some level of short-term adverse effect to Bliss Rapids snails living in both river and spring habitats. However, due to typically rapid water exchange in Bliss Rapids snail habitat, these sediments are not expected to persist in the area for an extended duration, or, if they do, they will settle out in areas already dominated by sediments and not occupied by Bliss Rapids snails. Transport and deposition of suspended sediments reach elevated levels in this portion of the Snake River seasonally and those originating from Program actions are expected to be too short in duration to result in long-term impacts to the population. Thus, there will be some low-level disturbance to the river-dwelling populations of Bliss Rapids snail, but this is not anticipated to be long in duration, nor to result in elevated amounts of mortality to Bliss Rapids snails.

Chemical Contamination. Use of construction equipment and heavy machinery adjacent to stream channels poses the risk of accidental spills of fuel, lubricants, hydraulic fluid, or similar contaminants into the riparian zone, or directly into the water. If these contaminants enter the water, these substances could adversely affect habitat, injure or kill aquatic food organisms, or directly impact listed snails. Petroleum-based contaminants such as fuel, oil, and some hydraulic fluids contain poly-cyclic aromatic hydrocarbons, which can cause chronic sublethal effects to aquatic organisms (Dupuis and Ucan-Marin 2015, pp. 21-31). For projects requiring heavy machinery, equipment will not enter flowing water, which limits the potential for chemical contamination to occur. Furthermore, there are multiple BMPs aimed at minimizing the risk of fuel or oil leakage into the stream. A spill prevention and contingency plan will be prepared by the construction contractor and approved by ITD for each project prior to implementation. All staging, fueling, and storage areas will be located away from aquatic areas. Fuel spill and equipment leak contingencies and described preventions should be sufficient to reduce the risk of negative impacts to snails and snail habitat from toxic contamination to insignificant levels.

The proposed action would create a limited amount of additional pollutant-generating, impervious surfaces, such as passing lanes and turnouts. The proposed action does not include activities that would result in effects, such as increased growth or roads that would accommodate new and/or increased traffic. Stormwater runoff from highway systems can deliver a variety of chemical and sediment pollutants to streams from rain (Hwang et al. 2016, p. 16-17; Jartun et al. 2008, entire). Dissolved copper, for example, is found in stormwater runoff from roadways (derived from the copper in vehicle brake pads, Hwang et al. 2016, pp. 9-11) and can be toxic to Bliss Rapids snails, depending on concentration and exposure (Besser et al. 2016, pp. 324-330). However, the number of projects generating new impervious surfaces is anticipated to be small, thereby limiting the extent of adverse effects from contaminants in stormwater runoff.

Pile preservation treatments may have adverse effects to snails through increases in suspended sediment/turbidity, elevated pH levels, and the potential introduction of lead, cadmium, and chromium. However, these treatments will include installation of turbidity curtains and turbidity and pH monitoring. In addition, the Contractor will test the piles for lead and heavy metals prior to cleaning. If present, the Contractor will submit a Lead and Heavy Metal Debris Containment and Recovery Plan that will include the use of an underwater vacuum to collect contaminated material. The Lead and Heavy Metal Debris Containment and Recovery Plan is in addition to the turbidity curtain installation. The Contractor will collect and dispose of waste material containing lead, chromium and cadmium in strict compliance with all applicable Federal, State and local laws, codes, rules and regulations. These BMPs will minimize but not eliminate the potential for adverse effects to snails when conducted in occupied habitat.

2.5.3.4 Habitat-related Effects on Snails

Implementation of Program actions may adversely affect habitat conditions within the action area, affecting habitat suitability for snails. Near and in-stream ground disturbance is likely to increase in-channel sediment deposition; and excavation at project sites and installation of riprap or gabion baskets may alter streambank conditions.

Sediment Deposition. The pathways for sediment introduction to the stream channel were described in the suspended sediment discussion above. The potential effects of sediment deposition on snails include negative impacts to suitable cobble habitat and burying snails and eggs. In the long-term, it is anticipated that high-flow events will flush most of this sediment from the cobble habitat utilized by snails. In the short-term, deposited sediments will likely adversely affect and kill an undetermined number of snails in the Snake River within the sediment plume, an assumed 900 to 1200 ft downstream of in-water work activities based on measurements in the Kootenai River (Assessment, p. 91). The same suite of BMPs proposed to reduce the potential for suspended sediment (e.g., water quality monitoring, erosion control measures) will likewise minimize the potential for in-channel sediment deposition.

2.5.3.5 Summary of Effects

Project actions involving in-water work or work below the OHWM may have adverse effects to snails and their habitats. These activities include bank stabilization actions (e.g., riprap, gabion baskets, bio-methods), culvert installation/maintenance/extension, coffer dam use, drilling, contaminant containment and remediation, and pile installation. In-water work or work below the OHWM could result in the direct mortality of snails and eggs through crushing, desiccation, or barotrauma. Contaminant containment and recovery actions could inadvertently collect and kill Bliss Rapids snail. Effects such as reduced water quality (e.g., increased suspended sediment, increased stormwater runoff, and chemical contaminants such as fuel, oil, or concrete washout water), and the modification of habitats (e.g., physical modification of existing habitat and increased erosion and sediment delivery to the Snake River, its tributaries, or adjacent cold water springs complexes) may also adversely affect snails. In addition, any Program action that requires temporary or prolonged modification of water discharge to a water body has the potential to adversely affect the Bliss Rapids snail. This includes the actions of a second or third party (e.g., Idaho Power Company, Bureau of Reclamation, private water managers) when such parties are involved in regulating water discharge to meet the needs of the Agencies (e.g., periodic inspections of the Shoestring Bridge, Gooding and Twin Falls Counties). We expect the implementation of BMPs to reduce the magnitude and severity of these potential impacts to snails, but not to a level of insignificance.

It should be noted that, although we can assume the effects identified could occur where Bliss Rapids snails are present, due to the programmatic nature of the proposed action, the presence or number of snails within the area of a specific Program action is uncertain. We will be able to better address potential effects during the pre-project review process where the Agencies provide site-specific information for each proposed Program action. The Service can then ensure consistency with the analyses and conclusions included in this Opinion. If the pre-project review identifies that a Project action is not consistent with our Opinion, that action will need to undergo a separate section 7 consultation.

2.5.4 Cumulative Effects

The implementing regulations for section 7 define cumulative effects to include the effects of future State or private activities that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). 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.

Some of the most pertinent cumulative impacts to the Bliss Rapids snail lie on lands adjacent to the Snake River corridor but affect the water resources that are critical to the continued survival of the snail. As discussed above, the ESPA likely represents the most important single resource for the conservation of the Bliss Rapids snail, but it is heavily influenced by human use. Aquifer depletion and contamination are global problems (Foster and Chilton 2003, p. 1957; Loague and Corwin 2005, pp. 1-2) that threaten human welfare as well as biological diversity (Deacon et al. 2007, p. 688). While most of these impacts to the ESPA do not occur within the action area, the resulting impacts affect water resources in the action area via a direct pathway. As illustrated in Kjelstrom (1992, pp. 1-2), groundwater pumping has resulted in declines of spring discharges over the past 60 years. While aquifer recharge has been suggested as a partial solution to over-pumping, this may be overstated and may also increase the level or risk or aquifer contamination (Foster and Chilton 2003, pp. 1959-1961, 1967-1970). The presence of increasing concentrations of nitrate and other contaminants at ESPA-derived springs, including some with populations of Bliss Rapids snail, illustrate the pathway from agricultural areas to Bliss Rapids snail habitats.

Most, if not all, of these issues or programs (e.g., aquifer recharge) are derived from private, local, or state initiatives and have little to no Federal oversight. As such, aquifer management and nonpoint source pollutant issues will likely continue to provide challenges into the future.

2.5.5 Conclusion

After reviewing the current status of Bliss Rapids snail, the environmental baseline in the action area, effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of Bliss Rapids snail. The Service's rationale for this conclusion is presented below.

While the Service expects the proposed action may result in the death and/or injury of Bliss Rapids snails, any impacts will likely be limited in duration and spatial extent (e.g., noise, direct mortality, sedimentation). The species occurs at numerous isolated ESPA-derived springs and creeks, as well as in portions of the Snake River. Through implementation of the associated BMPs, it is unlikely that any Program activity would impact a large proportion of the Bliss Rapids snail populations due to the range and distribution of populations. Additionally, based on previous observations in both spring and river habitat (e.g., high/low flow, habitat modification and destruction, etc.), the species has shown an ability to persist through local disturbance events and rebound in population size given adequate time and a return to pre-disturbance conditions (USFWS 2018d, p. 7). The effects of Program activities on Bliss Rapids snail, as discussed above, are limited to the action area and should cease impacting the species with the completion of the activity. Therefore, if a population is impacted by Project activities, populations are likely to recover to pre-project levels after completion of the Program activity.

The cumulative effects that threaten the species throughout its range do not pose an imminent risk of extinction or endangerment to the species as a whole nor to most of its populations. Most of the cumulative effects (e.g., decreasing spring flow, impaired water quality) are chronic and/or increasing over time but not likely to result in extirpation of those populations over the duration of this Opinion.

The adverse effects are not expected to appreciably reduce the likelihood of survival and recovery of the Bliss Rapids snail range-wide in terms of numbers, distribution, or reproduction of the species. No critical habitat has been designated for this species; therefore, none will be affected.

2.5.6 Incidental Take Statement

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species, respectively, without specific exemption. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct." Harm is defined by the Service as an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

Incidental take is defined as take that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (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 an Incidental Take Statement (ITS).

2.5.6.1 Form and Amount or Extent of Take Anticipated

Project actions involving in-water work or work below the OHWM may directly harm or kill individual Bliss Rapids snails, while projects near occupied waterways may impact snails or their habitat through increased erosion and sedimentation, habitat destruction/modification, and decreased water quality. However, because of the limited distribution of populations in ESPA-derived springs and creeks and the likely patchy distribution of the species in the Snake River, the Service expects that there will be few Program actions that will impact Bliss Rapids snail during the timeline of this Opinion. In addition, the BMPs incorporated into this Program are designed to reduce impacts to the Bliss Rapids snail if a project occurs within or near a population. Given these considerations, the amount of take in the form of harm, injury, or mortality is expected to be low. Quantifying take is difficult because the exact location of Program actions is not known and the number of snails at any given site is also unknown. The Service anticipates incidental take of Bliss Rapids snail will be difficult to detect for the following reason(s): 1) The species is of small body size, so finding dead or impaired specimens is unlikely; 2) Bliss Rapids snails harmed, injured, or killed by the proposed action will be buried or washed downstream away from the point of disturbance/impact; and 3) losses may be masked by seasonal or inter-annual fluctuations in population size. Additionally, given the variation in population size between Bliss Rapids snail populations and the lack of knowledge regarding the specific locations of activities associated with this Program, the Service cannot provide a supported estimate of the actual number of Bliss Rapids snails that are likely to be incidentally taken from the proposed action. We will therefore use the amount of affected habitat as a surrogate for anticipated take. We predict that all snails within the immediate vicinity of or within the sediment plume, an assumed 900 to 1200 ft downstream of any in-channel activities (in-water or work below the OHWM or bank stabilization work) based on measurements in the Kootenai River (Assessment, p. 91), will be harmed from elevated suspended and deposited sediment. Similarly, we predict that all snails within the immediate vicinity will be harmed, injured, or killed, or be harmed from reduced water quality if the linear extent of work below the OHWM exceeds 300 linear ft in length or if there are more than two projects per year with work below the OHWM in any subbasin (4^{th} field HUC) occupied by Bliss Rapids snail.

Authorized take would be exceeded and reinitiation would be triggered if:

1. The downstream extent of elevated suspended or deposited sediment from a Program activity exceeds 1200 ft downstream of any Program activity or exceeds the limits specified in the Project BMPs (an increase over background turbidity greater than 50 NTU instantaneously or 25 NTU over ten consecutive days).
2. Work below the OHWM in any one Program activity exceeds 300 linear ft; or

3. More than two projects per year with work below the OHWM occur in any single subbasin occupied by Bliss Rapids snail.

If incidental take anticipated by this document is exceeded, the Agencies will immediately contact the Service to determine if consultation should be reinitiated.

2.5.6.2 Effect of the Take

In the accompanying Opinion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of Bliss Rapids snail across its range. As stated above, incidental take as a result of this proposed action will be through crushing or desiccation of Bliss Rapids snails and their eggs or through effects to habitat (e.g., disturbance or dewatering of occupied habitat) or resources such as periphyton (food). Estimated densities of Bliss Rapids snails throughout its range vary widely. It is not certain that snails will be present in the vicinity of any given Program action within the range of the species; the Service will base our analysis on the assumption that snails could be present. Although there are no full population estimates for the species, Richards et al. (2009b, p. 3) estimated mean populations between 1.8 and 13.7 million in two reaches of the Snake River. Given the scattered distribution of Bliss Rapids snail populations throughout approximately 71 RM of the Snake River and the known locations of spring and creek populations, plus the implementation of BMPs, it is unlikely that the loss of snails present in the area of a Project action would have an appreciable effect on survival and recovery of the Bliss Rapids snail. Additionally, based on the likely small footprint of Program actions within the range of the species, the amount of habitat that will be lost or impacted as a result of the proposed Program represents a small amount of total occupied and available habitats. It is likely that populations within the Program area could recover following completion of individual Program actions, as long as habitat and water quality returns to pre-Program conditions. As such, take in the form of mortality and harm may occur, which could temporarily alter the distribution and numbers of Bliss Rapids snail. However, proposed Program actions are not expected to jeopardize or appreciably diminish overall numbers, distribution, or reproduction over the long term or to the extent that they would influence continued persistence or recovery of the Bliss Rapids snail.

2.5.6.3 Reasonable and Prudent Measures

The Service finds that compliance with the proposed action outlined in the Assessment, including proposed conservation measures, is essential to minimizing the impacts of incidental take of the Bliss Rapids snail. If the proposed action, including conservation measures, is not implemented as described in the Assessment and this Opinion, there may be effects of the action that were not considered in this Opinion, and reinitiation of consultation may be warranted.

The Service also finds that the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of the take of Bliss Rapids snail reasonably certain to be caused by the proposed action.

1. Initiate early consultation and review of any Program actions that cross or lie adjacent to the Snake River or its tributaries (including springs), within the range of the Bliss Rapids snail.
2. Minimize the risk/disturbance of/to take of Bliss Rapids snail/habitat from Program implementation.

3. Minimize the duration of adverse effects from any Program actions.

2.5.6.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Agencies must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. Prior to conducting any in-water work, bank stabilization work, bridge construction, or work below the OHWM in potential Bliss Rapids snail habitat, contact the Service for additional specific information on the distribution of the Bliss Rapids snail.

2a. Prior to dewatering or any alterations in water levels or flow, a ramping plan that specifies allowed rates of dewatering/rewatering or water level/flow changes should be developed with the Service to reduce impacts to any Bliss Rapids snail present in the area. If the project will require a reduction of river flow or stage, the Project proponent will work with the Service and agencies that controls the river flow/stage to develop an appropriate ramping plan or utilize an existing ramping plan.

2b. As needed during dewatering, identify for contractors where pump water from the dewatered area will be disposed. All necessary measures (e.g., settling ponds) will be taken to ensure no sediment from pump water will reach Bliss Rapids snail habitat.

2c. If barges, boats, or temporary work bridges are/become necessary for project completion, the Agencies shall consult with the Service prior to their installation and use.

3. Keep in-water work of shortest practicable duration. This includes any associated reductions in river stage, flow, or discharge for the purpose of accessing substrates below the OHWM or other action activities.

2.5.6.5 Reporting and Monitoring Requirement

In order to monitor the impacts of incidental take, the Agencies or any applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement per 50 CFR 402.14 (i)(3).

1. As part of the process for implementing the Program, ITD is required to provide appropriate post-Project Monitoring Forms to the Service within 45 days of project completion. ITD will also host an annual coordination meeting to review the projects implemented under the Program during the previous year.
2. During project implementation, the Agencies shall promptly notify the Service of any emergency or unanticipated situations arising from or during Project activities that may be detrimental to the Bliss Rapids snail or extend the Project’s duration.

2.5.7 Conservation Recommendations for Bliss Rapids Snail

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

The Service hereby makes the following conservation recommendations:

1. Conduct work in the dry during naturally low water conditions whenever possible.
2. Design projects to avoid in-water work, especially in the vicinity of ESPA-derived springs and creeks within the Bliss Rapid snail range.
3. Survey for Bliss Rapid snails within and downstream of any activity footprint in ESPA-derived springs and creeks/rivers and the mainstem Snake River within the range of the species.
4. During construction, direct precipitation runoff from Program bridges, roads, and culverts to catchment basins away from water bodies and above flood stage elevation to contain road-related contaminants away from streams, rivers, and pools.
5. If a project involves work near or below the OHWM within the range of the Bliss Rapids snail, monitor turbidity upstream, at, and at multiple locations downstream of the project footprint throughout the entirety of the action to determine the extent and duration of elevated sediment due to the project.

2.6 Northern Idaho Ground Squirrel

2.6.1 Status of the Species

The northern Idaho ground squirrel (NIDGS) was listed as threatened under the Act on April 5, 2000 (65 FR 17780). On July 28, 2003, the Service approved a Recovery Plan (USFWS 2003, entire) that provides direction for recovery of the species, including population sizes and criteria for a minimum of viable metapopulations. The five-year review identifies 13 existing and potential metapopulation sites (USFWS 2017b, entire). The exact boundaries of these sites are considered somewhat fluid and will be revised as new surveys, habitat, and population information becomes available. The metapopulation sites include lands administered by the USFS, the Idaho Department of Lands, and private landowners. To date, one Habitat Conservation Plan and one Safe Harbor Agreement with private landowners have been completed and renewed for this species (USFWS 2007; 2009c; 2019, entire).

Section 4 of the Act and regulations promulgated to implement the listing provisions of the Act (50 CFR part 424) set forth the procedures for adding species to the Federal list. A species may be determined to be endangered or threatened due to one or more of the five factors described in section 4(a)(1) of the Act. All five factors apply to the NIDGS: the present or threatened destruction, modification, or curtailment of its habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; disease or predation, the inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence.

2.6.1.1 Species Description

The NIDGS belongs to the small-eared group of true ground squirrels. Yensen (1991, p. 583) described the NIDGS as taxonomically distinct from the southern Idaho subspecies (*Urocitellus brunneus endemicus*) based on morphology, fur, and apparent life-history differences, including biogeographical evidence of separation. The NIDGS occurs only in west central Idaho in Adams and Valley Counties. It has a reddish-brown back with faint light spots and a cream-colored belly. The back of the legs, top of the nose, and underside of the base of the tail are all reddish brown. The NIDGS have ear pinnae that project slightly above the crown of the head (Yensen and Sherman 2003, p. 3). The NIDGS can be distinguished from the other subspecies, the southern Idaho ground squirrel and other small-eared ground squirrels, by its smaller size and rustier fur color.

Recent work suggests that southern Idaho ground squirrels may be descended from NIDGS, and the NIDGS population in Round Valley may be the common link between the two subspecies (Hoisington 2007, pp. 100-101). Hoisington (2007, entire) used the cohesion species concept to test whether genetic and ecological data support species level classification of the two subspecies of Idaho ground squirrel. Her results support not only the subspecies distinction but also support raising the two subspecies to species status (Hoisington 2007, pp. 99-104).

2.6.1.2 Life History

The NIDGS occupies dry (or xeric) meadows surrounded by ponderosa pine (*Pinus ponderosa*) or Douglas-fir (*Pseudotsuga menziesii*) (Yensen et al. 1991, p. 595). Xeric meadows have shallow soils (Dyni and Yensen 1996, p. 99). However, NIDGS sites need to be deep enough to accommodate nest burrows greater than 3.3 ft deep (Yensen et al. 1991, p. 98; Yensen and Sherman 2003, p. 3); dry vegetation sites with shallow soils of less than 19.5 inches depth above bedrock are used for auxiliary burrow systems (Yensen et al. 1991, p. 95). The NIDGS often dig burrows under logs, rocks, and other objects.

Although Columbian ground squirrels (*Spermophilus columbianus*) overlap in distribution with the NIDGS (Dyni and Yensen 1996, p. 99), Columbian ground squirrels prefer moister areas with deeper soils. Sherman and Yensen (1994, pp. 8, 11) reported that the segregation of the two species is due to competitive exclusion as opposed to differing habitat requirements. The NIDGS emerges in late March or early April and is active above ground until late July or early August (Yensen et al. 1991, p. 593). Emergence during this period begins with adult males, followed by adult females, and then yearlings. The NIDGS becomes reproductively active within the first two weeks of emergence (Yensen and Sherman 1997, p. 3). Females and males are sexually mature the first spring after birth. Females produce one litter of two to seven pups per year, depending on fitness. Males and females do not live together or near their mates, and females do not cooperate with close kin to defend burrows or rear young (Yensen and Sherman 1997, p. 4).

Females that survive the first winter live, on average, nearly twice as long as males (3.2 years for females and 1.7 years for males); estimates of maximum longevity indicate that males may live up to five years and females up to greater than seven years (Sherman and Runge 2002, p. 2821). Males normally die at a younger age than females, typically from mortality associated with reproductive behavior. During the mating period, males move considerable distances in search of receptive females and often fight with other males for copulations, thereby exposing themselves to predation by raptors such as prairie falcons (*Falco maxicanus*), goshawks (*Accipiter gentilis*), and red-tailed hawks (*Buteo jamaicensis*). Significantly more males die or disappear during the two-week mating period than during the rest of the 12-to-15 week period of above-ground activity (Sherman and Yensen 1994, p. 2). Seasonal torpor or hibernation generally occurs in early to mid-July for adult males and females, and late July to early August for juveniles (Yensen 1991, p. 593).

2.6.1.3 Population Dynamics

As a result of the factors described in the Life History section, and due to the small sizes of the remaining population sites, the NIDGS may have little resilience to naturally occurring events. Small populations are often vulnerable to climatic fluctuations and catastrophic events (Mangel and Tier 1994, pp. 607-614). In 1993, Gavin et al. (1999, entire) developed a population viability simulation program using recruitment and death values recorded over eight years from an intensively studied NIDGS population site. This model determined that 99 of 100 population sites could become extinct in less than 20 years. A 1999 population model developed by the U.S. Geological Survey-Patuxent Wildlife Research Center, predicted that existing populations could become extinct within seven years if no conservation measures were taken.

In a metapopulation system, such as that of NIDGS, the extinction and re-colonization of local populations is perceived to be a natural occurrence. Some local populations may be larger and more robust than others because of the availability of suitable resources such as well-drained soils, above-ground structure for cover, and diverse and nutritious food sources. These productive sites are often referred to as “source populations.” Areas that harbor less resource value may support small populations during periods of ideal climatic conditions but may not remain viable when climatic conditions further reduce the resource value. These sites are referred to as “sink populations” in that most of the animals that occur there arrive via dispersal from source sites (Meffe and Carroll 1994, pp. 186-189). In general, larger local populations have a greater ability to persist through intermittent fluctuations in climate and food resources and can serve populations, through dispersal, of less viable populations or can re-colonize local populations that have gone extinct (Meffe and Carroll 1994, pp. 187-188). A necessity for this process to work is the connectivity among local populations, a characteristic that is now lacking across substantial portions of the NIDGS range. Sink populations, although potentially intermittently occupied, are valuable to the metapopulation as well. They can contribute genetic diversity and can serve as a bridge between other source populations that would otherwise lack connection.

For several years, population sites with the largest numbers of NIDGS have been closely monitored by researchers. These sites occur within the Payette National Forest (Slaughter Gulch campground) and the privately-owned OX Ranch. The two population sites on the OX Ranch (Squirrel Manor and Squirrel Valley) have been monitored for the longest period of time. Sherman and Gavin (1999, pp. 5-7) and Sherman and Runge (2002, p. 2819) documented the decline of the Squirrel Valley population from 272 individuals in 1987 to 10 in 1999. The Squirrel Manor had a population decline from 250 individuals in 1996 to fewer than 50 individuals in 1999. Each of four other population sites monitored between 1998 and 1999 declined markedly. The declines in 1999 may have been largely due to cold, spring conditions (Sherman and Gavin 1999, p. 2), whereas the longer-term declines may be related to declining habitat conditions.

Since 1999, Idaho Fish and Game (IDFG) has detected a generally increasing trend in NIDGS populations (Evans Mack and Bond 2008, p. 9). Of the monitored populations, only the Cold Springs population appears to be at or below the levels recorded in 1999, all other populations have increased. In addition to a general trend of an increasing number of NIDGS, new populations, or populations formerly believed to be extirpated, have been documented. Specifically, the Lost Valley Campground and Tree Farm populations were either repopulated or redetected in 2000 and 2001, respectively. New populations were detected at the Lick Creek lookout in 2006 and at four individual sites in 2008. The overall population estimate for 2012 was 2,036 squirrels; this estimate represents an approximately 35 percent increase over the 2011 population estimate and a marked increase from population estimates from 1999 (Wagner, B. and Evans Mack 2012, p. iii). The most recent population estimate from 2021 is 3,514 NIDGS, with an adjustment index to account for detection probability (IDFG 2021, p. i). In general, NIDGS abundance remains stable with some indication that distribution has contracted slightly.

2.6.1.4 Status and Distribution

The NIDGS is found only in Adams and Valley counties of western Idaho. It has the smallest geographic range of any squirrel subspecies and one of the smallest mammal ranges in North America (Gill and Yensen 1992, p. 155). Its present range is north of Council, Idaho, with one location in Round Valley, and covers an area of about 230,000 ac. Known occupied northern Idaho ground squirrel habitat comprises an estimated total of 2,295 ac of which 1,085 ac is privately owned, 1,025 ac is Federally owned, and 185 ac are State administered lands (Burak 2011). The NIDGS are known to occur at 53 of 60 known sites, with a population estimate of 3,514 squirrels, at elevations ranging from 1,312 to 7,565 fet (Evans Mack 2006, p. ii; IDFG 2021, p. i; Wagner, B. and Evans Mack 2012, p. iii). Historically, its range probably was much larger and extended southeast to Round Valley near Cascade, Idaho.

2.6.1.5 Conservation Needs

A final Recovery Plan (Plan) for NIDGS was developed and released by the Service on July 28, 2003 (USFWS 2003, entire). The goal of this Plan is to increase the population size and establish a sufficient number of viable metapopulations of the NIDGS, so the subspecies can be delisted. Due to the restricted geographic range and low numbers, the Plan aims to increase and stabilize NIDGS populations. The only historical population level recorded was in 1985 when it was estimated to be approximately 5,000 individuals (Yensen 1985, p. 12). This estimate was made for populations judged to be in decline; hence, it is thought that the recovery target needs to be higher than this historical estimate (USFWS 2003, p. v). The plan states that the recovery target for the species is based on an effective population size of 5,000 minimum of 10 metapopulations. Delisting may be considered when four recovery criteria identified in the Plan have been met:

1. Of the 17 potential metapopulations that have been identified within the probable historical distribution, there must be at least 10 metapopulations, each maintaining an average effective population size of greater than 500 individuals for 5 consecutive years.
2. The area occupied by a minimum of 10 potential metapopulations must be protected. In order for an area to be deemed protected, it must be: (a) owned or managed by a government agency with appropriate management standard in place; (b) managed by a conservation organization that identifies maintenance of the subspecies as the primary objective area; or (c) on private lands with a long-term conservation easement of covenant that commits present and future landowners to the perpetuation of the subspecies.
3. Site-specific management plans have been completed for the continued ecological management of habitats for a minimum of 10 potential metapopulation sites.
4. A post-delisting monitoring plan covering a minimum of 10 potential metapopulation sites as been completed and is ready for implementation.

2.6.2 Environmental Baseline of the Action Area

Refer to section 3.2 of this Opinion for a complete definition of the term “environmental baseline”.

2.6.2.1 Status of Northern Idaho Ground Squirrel in the Action Area

Northern Idaho ground squirrels are known to exist only in Adams and Valley Counties of western Idaho. Figure 6 shows overlap between areas where the northern Idaho ground squirrel may occur and the location of state and Federal roads and highways. Figure 7 shows the NIDGS population locations and roads that are covered under this Program. Approximately 19.3 miles of roads intersect with NIDGS population locations.

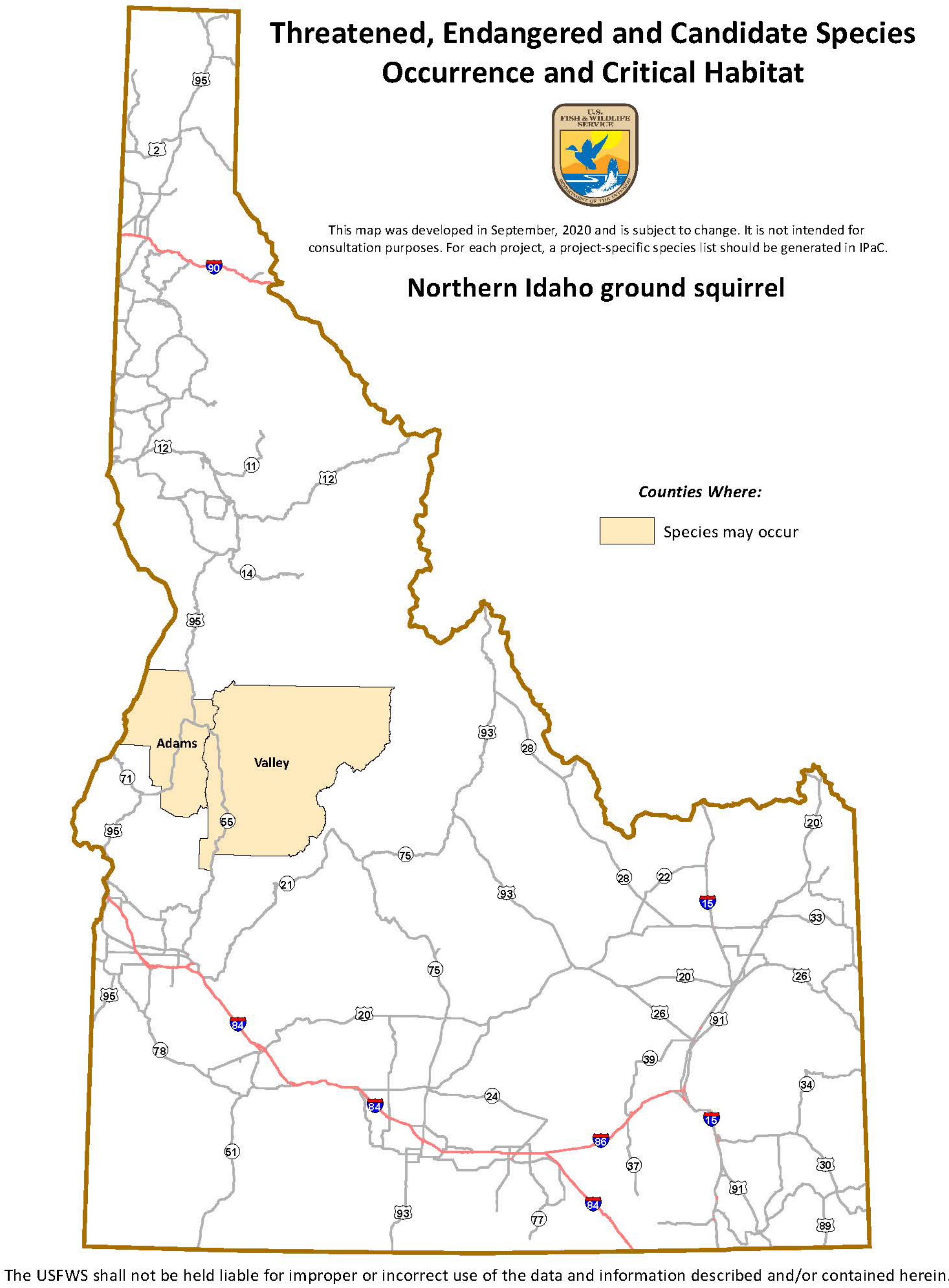


Figure 6: Map showing overlap between areas where northern Idaho ground squirrel may occur and state or Federal roads and highways. Local roads administered by LHTAC are not shown, but it is assumed that they increase the probability of overlap.

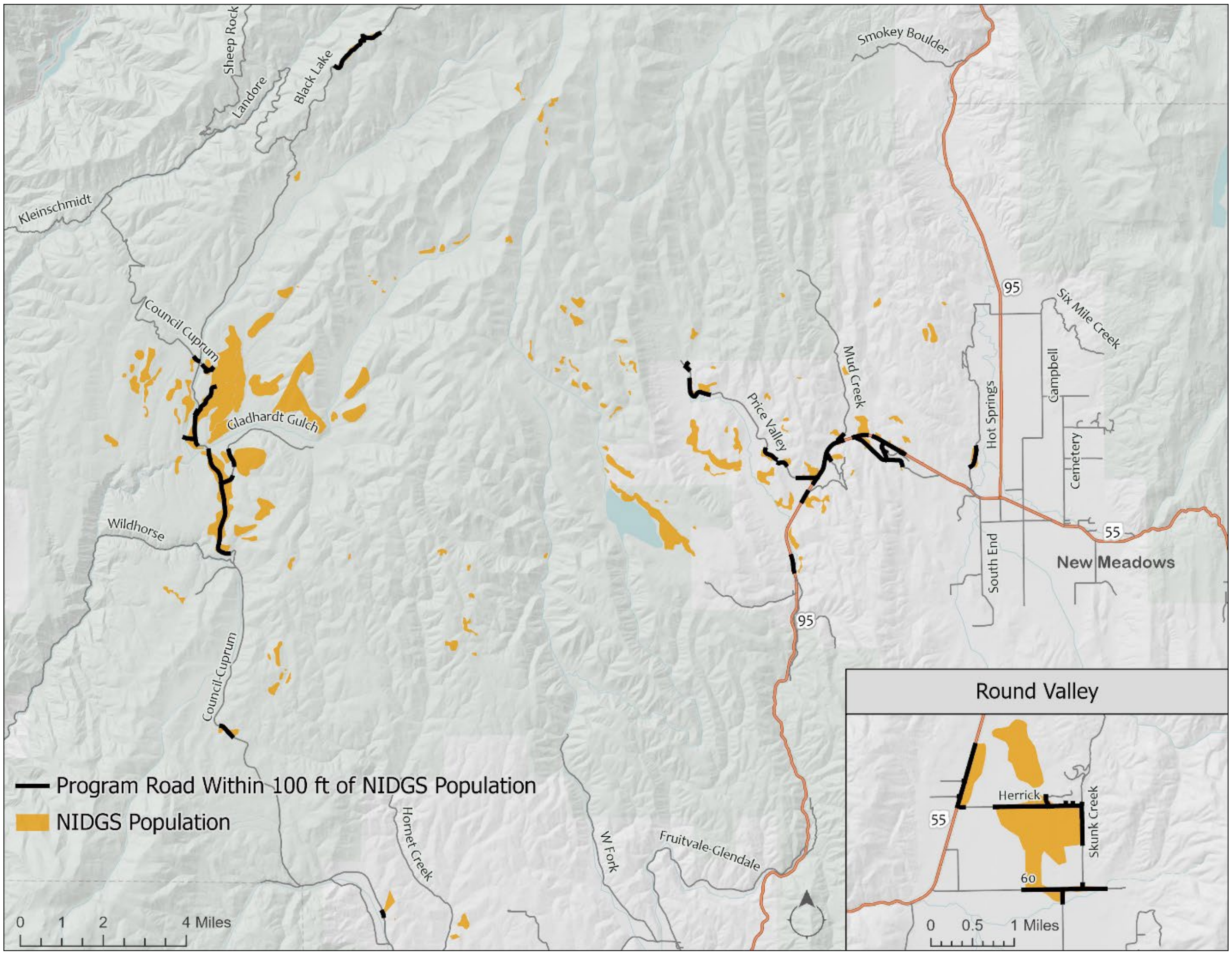


Figure 7: Map depicting 2019 NIDGS populations and intersections with roads covered under this Program.

In 1985, the total NIDGS population was estimated to be 5,000 squirrels scattered among 18 known population sites (Yensen 1985, p. 12). In 2002, two years after listing, the population estimate for the northern Idaho ground squirrel was 450 to 500 individuals (Haak 2002, p. 10). In 2010, NIDGS occupied 56 sites, an increase of 34 sites compared to the 22 sites detected in 2002 (Evans Mack 2010). Modeled population results, combined with squirrels detected on surveys, estimate the minimum pre-pup population was 1,560 in 2010, down slightly from the 1,618 estimated in 2009 (Evans Mack and Bond 2010, p. 14; Evans Mack 2010, p. 6). The decrease in population from 2009 to 2010 is attributed to fewer sites surveyed in 2010 as opposed to a true population decrease. The 2016 total NIDGS population was estimated at 2,659 individuals, 3,590 individuals if adjusted for detection probability (Wagner, B. and Evans Mack 2016, p. 7). Current population sizes are comparable to 2016. In 2020, total population size for NIDGS was 2,528 squirrels with a potential population size of 3,539 individuals (Wagner, B. and Evans Mack, D. 2021, pp. 8-12). The most recent population estimate from 2021 is 3,514 NIDGS, with an adjustment index to account for detection probability (IDFG 2021, p. i).

The available new information assessed in the 5-year review indicates that the primary threat at listing continues to be the major threat – meadow invasion by conifers (Burak 2011, p. 10;

USFWS 2017b, p. 1). The NIDGS rely on meadow habitat connected within a matrix of ponderosa pine and/or Douglas fir forests. Logging and fire suppression have led to increased dense stands of trees lacking an understory. This has reduced the amount of suitable habitat, while at the same time isolating populations and reducing connectivity opportunities. Other threats include loss of habitat due to land use changes, illegal recreational shooting (i.e., plinking), predation, inadequacy of existing regulatory information regarding private land development, competition with Columbian ground squirrels, and small populations and reduced resilience to naturally occurring events. Mortality of NIDGS from vehicles on roads has occurred near occupied sites on USFS and County roadways, and U.S. 95, although total mortality has not been quantified (Burak 2011, p. 11). Given that threats remain, recovery criteria have not been met, but the population has shown a long-term positive trend (Burak 2011, entire).

Action Area

Refer to section 2.1.1 of this Opinion for a complete description of the Action Area.

2.6.3 Effects of the Proposed Action

Implementing regulations define "effects of the action" as "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 (50 CFR 402.02).

Program activities will be completed in order to maintain roads in safe and properly functioning conditions. Program activities that have the potential to adversely affect NIDGS include: excavation and embankment for roadway maintenance, roadway widening, bank stabilization, and geotechnical drilling. These types of projects that occur near occupied NIDGS colonies can directly impact individuals by increasing the risk of injury or death because of vehicle collisions as well as disturbance through human presence as well as noise and vibrations from equipment use. Furthermore, Program activities may inadvertently destroy burrows that are undocumented or misidentified during pre-work surveys.

Additional impacts to NIDGS include habitat fragmentation and destruction, thereby making habitat inaccessible to individuals where roads function as a barrier to movement. Avoidance behavior can result if substantial amounts of suitable habitat are unavailable to the species. Further, such habitat loss can fragment populations into smaller subpopulations through loss of connectivity between populations, which can lead to demography fluctuations, inbreeding, loss of genetic variability, and local population extinctions (65 FR 17779).

The Service estimates approximately 19.3 miles of Program-administered roads (15.5 miles of local roads and 3.7 miles of state and Federal highways), buffered by 100 ft on each side of the center line, intersect with the most recent analysis of NIDGS occupied habitat (IDFG 2021, entire). This is likely an overestimation as not all 19.3 miles of roads are expected to have work completed on them each year, and the 100-ft buffer is a conservative estimate of actual ROW widths that could be impacted by Program activities. Additionally, Program actions may also occur after late August when NIDGS are underground in torpor.

Program activities that include disturbance outside of the existing ROW (e.g., working beyond the existing roadway, replacing culverts, further widening, etc.) and within occupied NIDGS habitat or potentially suitable habitats will be subject to the following BMPs (Appendix A), which are designed to avoid or minimize adverse effects to the species to insignificant levels. If work outside of the ROW will result in adverse effects to NIDGS, then a separate consultation will be required.

General

- At locations determined to be occupied, no ground disturbing activities will be allowed after pups have emerged and before adults retreat below ground to hibernate. This window occurs early June through first week of July at lower elevations and is adjusted accordingly for higher elevations.
- Conduct clearance surveys to designate parking and staging areas. At locations determined to be occupied by the Northern Idaho ground squirrel, restrict indiscriminate parking of vehicles and heavy machinery.
- Minimize the destruction of plant communities important for the conservation of the NIDGS.
- Where revegetation of areas disturbed by project actions is required, use native plants important for NIDGS forage whenever feasible.
- Based on the results of pre-project surveys and monitoring, adjust project actions to avoid impacts to NIDGS. Examples of appropriate adjustments include stopping construction work if NIDGS are present during their above ground period (April through early August), restricting work to daylight hours only, or delineating NIDGS burrow systems to ensure that ground disturbing work does not occur in their vicinity.

Personnel Qualifications and Survey Protocols

- Surveys shall be conducted by individuals with knowledge of the life history and ecology of the species.
- Prior to conduction surveys, coordinate with ITD and USFWS to ensure the most current protocols are followed.

2.6.3.1 Summary of Effects

Adverse effects to NIDGS are likely to occur as a result of road maintenance activities which could result in the injury or death of squirrels. Road maintenance activities near occupied NIDGS colonies could kill or injury squirrels attempting to cross roads or if burrows are accidentally crushed by heavy equipment. If squirrels are killed or injured, squirrel numbers, reproduction, and distribution would be affected. Furthermore, if roads intersect or divide colonies, then dispersal, immigration, and emigration may be impeded or reduced.

However, road mortality could occur where NIDGS are present. Although it is challenging to quantify the number of squirrels that could die along haul routes, any injury or loss of individuals will reduce population sizes, genetic diversity, and reproduction potential. Road maintenance activities may occur along 19.3 miles of roads, buffered by 100 ft on each side of the center line, that intersect occupied NIDGS habitat; therefore, five squirrels are at risk of injury or death from Program activities over the next 10 years.

2.6.4 Cumulative Effects

The implementing regulations for section 7 define cumulative effects to include the effects of future State or private activities that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). 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.

The predominant ongoing activities on non-Federal lands that are reasonably certain to affect NIDGS and their habitat include timber harvest, livestock grazing, road construction, recreation, fire suppression, and residential development. Land uses also include limited amounts of cultivation and irrigation of hay fields and pastures, water diversions and water-right allocations, and residential development.

State and private land timber harvest and related road construction activities within Idaho are regulated by the Idaho Forests Practice Act (IFPA), under the Idaho Department of Lands (IDL). Activities that are implemented pursuant to the IFPA that may not provide adequate protection for NIDGS and their habitat include: road construction and maintenance, timber harvest, and fire management. Conversely, forest management that reduces tree stocking and increases openings could have a beneficial effect on the species. There is one known NIDGS colony on State land and several private tracts where these actions are reasonably certain to affect ground squirrels.

There are pathways for both adverse and beneficial effects on ground squirrels from livestock grazing. State lands leased for grazing are currently operated under BMPs established under Grazing Management Plans, overseen by the IDL. Grazing BMPs as identified in the Idaho State Agricultural Pollution Abatement Plan (State Plan) are not mandatory but recommended for private lands. Because compliance with the State Plan is not required on private lands, no monitoring plan is in place to evaluate potential impacts to Act listed species or designated critical habitat. The IDL does perform monitoring of larger tracts of leased lands to ensure compliance with established grazing management plans. However, smaller, more isolated blocks of leased land are often not monitored for compliance and managed according to lands surrounding them (private or Federal). Grazing management plans as currently required by IDL are authorized for ten-year terms, leading to an inability to incorporate new and more ecologically friendly practices as these practices evolve. State management plan BMPs typically revolve around season of use and animal unit months (AUMs), not focusing on riparian area monitoring and protection. Given the limited controls on grazing under state oversight, it is unlikely that management would be carried out to assure adverse effects on ground squirrels would be avoided and minimized.

As with timber management and grazing, recreation and fire management on non-Federal lands does not come with assurances of protection of listed species. The general nature of impacts of these activities on ground squirrels is described above. It is reasonably certain that adverse effects on the species could result from these activities. A number of ground squirrel colonies are located on private lands that are presently managed for agricultural uses and could be subject to use of pesticides and herbicides. There is also the potential from the development of parts of these properties for residential use, and subsequent loss of NIDGS habitat.

The Act provides options for non-Federal entities to develop conservation agreements and Habitat Conservation Plans that address management and development effects on candidate, proposed, and listed species, so NIDGS may benefit from these actions carried out under private/Federal agreements.

2.6.5 Conclusion

After reviewing the current status of NIDGS, the environmental baseline in the action area, effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of NIDGS. The Service's rationale for this conclusion is presented below.

The proposed Program is expected to adversely affect NIDGS via two-lane bridge construction, excavation and embankment for roadway construction, roadway widening, bank stabilization, and geotechnical drilling. These Program actions could result in the injury or death of squirrels if they try to crossroads while vehicles are present or if undocumented burrows are accidentally crushed by heavy equipment.

Program actions may occur on up to 19.3 miles of roads within occupied NIDGS habitat. This is likely an overestimation, because Program actions are unlikely to occur on all roads annually, and Program actions may occur after late August, early September when NIDGS are underground in torpor.

Other Program activities not listed above are expected to have insignificant effects on NIDGS and their habitat. Direct modifications to NIDGS habitat are expected to be limited and impacts to the extant populations would likely be minor. Additionally, proposed BMPs are expected to reduce impacts to NIDGS habitat from other Program actions not listed to insignificant levels.

Although the Program actions may have adverse effects on a small number of individual NIDGS, these effects are not likely to cause a measurable response in NIDGS populations. The Program will not reduce the reproduction, status, distribution, or genetics of NIDGS to a point where the likelihood of its survival and recovery is appreciably reduced.

2.6.6 Incidental Take Statement

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of listed fish and wildlife species, respectively, without specific exemption. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct." Harm is defined by the Service as an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering" (50 CFR 17.3).

Incidental take is defined as take that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (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 an Incidental Take Statement.

2.6.6.1 Form and Amount or Extent of Take Anticipated

Based on the effects analysis above, the Service expects incidental take of NIDGS is reasonably certain to occur during road maintenance activities, including excavation and embankment for roadway construction, roadway widening, bank stabilization, and geotechnical drilling. While BMPs incorporated into the Program are expected to minimize risk to NIDGS, the Service anticipates that take in the form of death or injury to individual NIDGS and disturbance of individual squirrels are reasonably certain to occur as a result of Program implementation. Calculation of the amount of incidental take that may occur is complicated by the annual variation in the potential numbers of NIDGS that may inhabit an area and uncertainty about exactly where Program activities will occur.

In the 2010 Programmatic Opinion, the Service expected take to occur in two areas that equaled approximately eight miles of Program-administered roads and predicted that two NIDGS may be killed during the ten-year period of Program implementation (USFWS 2010, p. 83). With the addition of LHTAC-administered roads to this Program (approximately 15.5 miles), a total of approximately 19.3 miles of Program-administered roads intersect with NIDGS populations, which is 2.4 times more roads available for maintenance within occupied habitat. Under this Program and based on previous predictions, the Service predicts that 4.8 (rounded to 5) individuals may be killed during the next ten-year period of Program implementation.

Program activities near any NIDGS-occupied sites will likely result in temporary disturbance of individual squirrels during their active season (April through early August). The effect of such disturbance, including noise and vibrations, will be a temporary alteration in an individual NIDGS's activity pattern (e.g., increased sheltering and decreased feeding). The amount of take in the form of disturbance resulting from the Program is difficult to quantify due to the large number of variables involved in the interaction; however, Program activities will likely only result in temporary, short-term disturbance to NIDGS. We will use the amount of potentially affected area as a surrogate for take in the form of disturbance. We assume that all squirrels within an impact zone 100 ft on either side roads located in NIDGS habitat may be subject to disturbance from Program activities. Program roads within 100 ft of NIDGS populations, which is based on a conservative estimate of ROW widths.

Authorized take will be exceeded if Program activities result in the death of more than five individuals during the ten-year implementation period or if squirrels are adversely affected outside of the 100-ft buffered impact zones as described above. If the incidental take anticipated by this document is exceeded, all such activities will cease and the Agencies will immediately contact the Service to determine if consultation should be reinitiated.

2.6.6.2 Effect of the Take

In the accompanying Opinion, the Service determined that the level of anticipated take is not likely to jeopardize the continued existence of NIDGS across its range. The Service expects take of NIDGS in the form of injury and death to occur from Program actions. The most up to date estimate for NIDGS adjusted abundance is 3,514 individuals (IDFG 2021, p. i). The Service expects five squirrels to be injured or killed during road maintenance activities over the ten-year period of the Opinion based on the estimated 19.3 miles of roads that intersect occupied NIDGS habitat and may have maintenance occur each year. This number is likely an overestimation for the amount of impacts to NIDGS (i.e., it is unlikely that all 19.3 miles of roads will receive treatments in a year, that all roads will receive treatment annually, and that squirrels will be above ground during all road maintenance activities). The loss of five squirrels over 10 years is only 0.001 percent of the current population estimate. Population trends suggest colonies are remaining stable and have shown increasing trends over the past 12 years. Although losing any number of NIDGS will reduce the population size and reproductive potential, losing 0.001 percent of the population will have insignificant effects on recovery and continued survival of the species into the future. Additionally, based on BMPs, an increasing population trend, and low estimates of annual take, the Service does not expect Program actions to affect the future recovery of NIDGS.

2.6.6.3 Reasonable and Prudent Measures

The Service finds that compliance with the proposed action outlined in the Assessment, including proposed conservation measures, is essential to minimizing the impacts of incidental take of the NIDGS. If the proposed action, including conservation measures, is not implemented as described in the Assessment and this Opinion, there may be effects of the action that were not considered in this Opinion, and reinitiation of consultation may be warranted. The Service believes the measures proposed by the Agencies are sufficient to minimize potential impacts to the listed species caused by the proposed action.

2.6.6.4 Reporting and Monitoring Requirement

In order to monitor the impacts of incidental take, the Federal agency or any applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement per 50 CFR 402.14 (i)(3).

1. As part of the process for implementing the Program, the Agencies are required to provide appropriate post Project Monitoring Forms to the Service within 45 days of project completion. For Program actions completed within NIDGS populations as described above in this Opinion, the Agencies will include the results of any pre-project NIDGS surveys or monitoring. In addition, the Agencies will describe what BMPs were implemented to avoid impacting NIDGS.
2. Disposition of Individuals Taken: In the course of implementing the proposed action addressed in this Opinion and the monitoring and reporting requirements addressed in this ITS, if dead, injured, or sick listed species are detected and/or salvaged, the

Service's Ecological Services' office in Boise, Idaho shall be notified within three working days by phone (208-378-5243) or by electronic mail (fw1idahoconsultationrequests@fws.gov). Notification should include the date, time, and precise location of the detection, a photograph, and the species involved and shall distinguish between injured and killed animals.

2.6.7 Conservation Recommendations for NIDGS

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 listed species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery programs, or to develop new information on listed species.

The Service hereby makes the following conservation recommendations:

1. Work with the Service and IDFG to develop specific measures for minimizing impacts to NIDGS from Program implementation.
2. Develop revegetation plans for restoring NIDGS habitat in appropriate areas under Agency jurisdiction.

3. REINITIATION NOTICE

This concludes formal consultation on the Programmatic Idaho Transportation Department Statewide Federal Aid, State, and Maintenance Actions Program. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if:

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

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5. APPENDICES

5.1 Appendix A – Best Management Practices

A.1 Best Management Practices Common to All Project

Implementation of BMPs listed below is required for all projects, unless a qualified individual has determined that the species or habitat is not present within the project area, including materials and waste areas, OR project actions will have *no effect* to species or habitat.

All work will be performed in strict compliance with all applicable Federal, State and local laws, codes, rules and regulations and ITD's Standard Drawings and Standard and Supplemental Specifications. If inconsistencies are discovered in the contract's documents, the most restrictive requirement will be followed.

Stormwater Controls

All projects require either a Pollution Prevention Plan (PPP) or Stormwater Pollution Prevention Plan (SWPPP) and will include the BMP's listed below. A designated environmental monitor will visit the site at least weekly to examine the application and efficacy of the effects-minimization measures.

Water quality BMPs for in-water work are included in Section A.4 - Best Management Practices for Work Below the Ordinary High-Water Mark (OHWM).

Erosion and Sediment Controls

- All BMPs will be installed according to ITD's Best Management Practices Manual.
- All temporary BMPs installed on the project will be identified on ITD's Qualified Products List (QPL) as "Biodegradable" unless a biodegradable option is unavailable.
- Sandbags will be canvas or other approved non-synthetic material capable of decomposing under ambient soil conditions into carbon dioxide, water, and other naturally occurring materials within a period relevant to the product's expected service life.
- Perimeter control BMPs will be installed prior to any ground disturbing activities to prevent sediment from entering waterways.
- Stormwater Plan Sheets will include the following:
- Temporary and permanent BMPs
    - Location of on-site staging areas, off-site material, waste, borrow or equipment storage or staging areas

- Location of all hazardous materials storage areas
- Location of spill kits
- Identify any industrial stormwater discharges other than from project construction
- Waters of the United States including wetlands
- Storm sewer inlets

Pollution Prevention – Good Housekeeping Standards

- Identify Hazardous or Toxic Waste or other Pollutants of Concern and BMPs used to treat the identified pollutants of concern. Examples includes: paints, solvents, petroleum-based products, wood preservatives, additives, curing compounds and acids.
- Provide spill response and cleanup kits on all projects and make all appropriate staff aware of their locations.
- All Program actions shall follow the Idaho Hazardous Materials/WMD Incident Command and Response Support Plan and ITD Incident Management Plan. In addition, a project specific Spill Plan shall be provided by the Contractor and should be included in the SWPPP.
- To the greatest extent possible, all staging, fueling and storage areas will be located away from and adequately buffered from aquatic areas.
- During CRABS operations, the Contractor will ensure that quick lime (CaO) or pulverized CRABS material does not enter any adjacent waterways or wetlands.
- When not in use, construction equipment will be stored away from concentrated flows of stormwater, drainage courses, inlets and bridge drains.
- Park equipment over plastic sheeting or equivalent where possible. Plastic is not a substitute for drip pans or absorbent pads.
- Equipment shall not have damaged hoses, fittings, lines, or tanks that have the potential to release pollutants into any waterway.

Species-Specific BMPs, Personnel Qualifications, and Survey Protocols*

*Bull trout BMPs, Personnel Qualification and Protocols are Section A.4 - Work Below the OHWM.

General BMPs

- If adverse effects are unavoidable for those species with NLAA determinations, the action is not covered under the PBA and formal Section 7 consultation will be required.
- When activities take place in suitable habitat, species surveys will be conducted by a qualified biologist/botanist. Surveys will be conducted as described in the "Determination of Effects" section of the PBA for reach respective species or as otherwise described in this Appendix. For Monarch butterfly, surveys for milkweed and

flowering nectar sources will be conducted. Surveys will include staging areas, material sources and waste sites.

- To ensure BMPs are being implemented as described, a biologist/botanist will be onsite during project activities that have the potential to adversely affect listed species or their habitats. Activities that have the potential to adversely affect listed species will be determined by ITD/LHTAC environmental staff prior to construction.
- Occurrences or suitable habitat locations within the project's limits will be documented on the project Pre-notification Form. If surveys are conducted after contract has been awarded, but prior to construction, occurrences or suitable habitat will be documented on the Construction Monitoring Form.
- Areas with known listed plants or suitable habitat will be marked on the ground with stakes and flagging to ensure these areas are avoided for equipment staging and project activities.

Grizzly Bear

- Where possible, identify and implement opportunities to accommodate grizzly bear connectivity on all projects, including when installing new culverts or constructing new bridges.
- Document known resident and transient grizzly bears on the project Pre-notification Form.
- Food, garbage, carcasses, and other attractants must be stored in bear-resistant containers or removed from the project area daily.
- For all projects that occur within or adjacent to USFS-administered lands, discuss with the USFS regarding appropriate conservation measures to minimize impacts to grizzly bears during project construction activities.
- All work will be conducted during daylight hours only.
- Limit number of trips by vehicle in grizzly bear habitat to only what is necessary to complete work.
- Communicate with USFWS/IDFG or adjacent landowners of grizzly bear activity in the area and notify USFWS and IDFG if a grizzly bear enters the project area.

Canada Lynx

- Where possible, identify and implement opportunities to accommodate Canada lynx connectivity when installing new culverts or constructing new bridges.
- Document known resident and transient lynx on the project Pre-notification Form.
- Road improvements that may increase traffic speed or volume in lynx habitat will be evaluated and documented on the project Pre-notification Form.

- When activities take place in suitable Canada Lynx habitat ITD/LHTAC will coordinate with USFWS to avoid or minimize reduction of snowshoe hare habitat. Avoidance/minimization measures will be documented on the Pre-notification Form.

Northern Idaho Ground Squirrel

- At locations determined to be occupied, no ground disturbing activities will be allowed after pups have emerged and before adults retreat below ground to hibernate. This window occurs early June through first week of July at lower elevations and is adjusted accordingly for higher elevations.
- Conduct clearance surveys to designate parking and staging areas. At locations determined to be occupied by the Northern Idaho ground squirrel, restrict indiscriminate parking of vehicles and heavy machinery.
- Minimize the destruction of plant communities important for the conservation of the NIDGS.
- Where revegetation of areas disturbed by project actions is required, use native plants important for NIDGS forage whenever feasible.
- Based on the results of pre-project surveys and monitoring, adjust project actions to avoid impacts to NIDGS. Examples of appropriate adjustments include stopping construction work if NIDGS are present during their above ground period (April through early August), restricting work to daylight hours only, or delineating NIDGS burrow systems to ensure that ground disturbing work does not occur in their vicinity.

Personnel Qualifications

- Surveys shall be conducted by individuals with knowledge of the life history and ecology of the species.

Survey Protocols

- Prior to conduction surveys, coordinate with ITD and USFWS to ensure the most current protocols are followed.
- Surveys shall be conducted at the time of year when the species is active and there is the greatest opportunity for positive identification. In some instances, a survey may incorporate a live-trapping component because the species may be present in very low densities over a large area (captured individuals should have hair clipped from the dorsal portion of the rump and saved as a voucher specimen for future verification).
- Surveys conducted before the species emergence in spring or after all aboveground activities have ceased in late summer may not be considered sufficient. The exception here would be where the individual conducting the survey has a demonstrated proficiency in burrow identification and other NIDGS sign identification.
- Surveys shall be conducted by walking or otherwise closely scrutinizing potential habitat looking for diagnostic sign such as burrows, scat, tracks, feeding residue, and other signs.

- Known populations range in size from 1-100 squirrels. Because of their low densities, squirrels may not be seen during a "quick" one-time only survey. Therefore, several visits may be necessary.
- Any new sites shall be mapped and immediately reported to the IDFG NIDGS Coordinator and USFWS (IFWO).
- Reviewing vegetation and soil maps should be used in assisting persons to focus their surveys efforts for the species. However, this should not be a means by which to disqualify an area without substantial field verification/surveys to locate squirrels.
- Surveys shall be conducted at the time of year when the species is active and there is the greatest opportunity for positive identification. In some instances, a survey may incorporate a live-trapping component because the species may be present in very low densities over a large area (captured individuals should have hair clipped from the dorsal portion of the rump and saved as a voucher specimen for future verification).
- Surveys conducted before the species emergence in spring or after all aboveground activities have ceased in late summer may not be considered sufficient. The exception here would be where the individual conducting the survey has a demonstrated proficiency in burrow identification and other NIDGS sign identification.
- Surveys shall be conducted by walking or otherwise closely scrutinizing potential habitat looking for diagnostic sign such as burrows, scat, tracks, feeding residue, and other signs.
- Known populations range in size from 1-100 squirrels. Because of their low densities, squirrels may not be seen during a "quick" one-time only survey. Therefore, each site should be visited at least 2 times if resources allow.
- Any new sites shall be marked with GPS at the locations they were detected and immediately reported to the IDFG NIDGS Coordinator and USFWS (IFWO).

Yellow-billed cuckoo

- Personnel Qualifications: Individuals conducting surveys for Yellow-billed cuckoo must have verifiable experience in the design and implementation of ornithological research, including conducting surveys at a minimum of 5 different sites for a minimum of 40 hours, identifying the species in the field under the supervision of a USFWS 10(a)1(A) permitted yellow-billed cuckoo biologist, during which time at least 5 yellow-billed cuckoo adults were positively identified. An individual site is defined as a distinct 1-2 mile segment of an individual river system. Different river systems may be counted towards the qualification. Experience conducting surveys of the Eastern DPS of the yellow-billed cuckoo or similar Cuculid species (mangrove cuckoo or black-billed cuckoo, for example) under the supervision of a species expert may count towards partial fulfillment of this qualification, USFWS (2015).

  Yellow-billedCuckoo_MinQuals_20150512.pdf (fws.gov)
- Survey Protocols: For conducting presence/absence surveys for the Yellow-billed cuckoo, follow the protocols detailed in: "A Natural History Summary and Survey

Protocol for the Western Distinct Population Segment of the Yellow-billed Cuckoo", Halterman et al. (2015).

YBCU_SurveyProtocol_FINAL_DRAFT_22Apr2015.pdf (fws.gov)

Spalding Catchfly, Macfarlane's four-o'clock, Ute Ladies' tresses, Slickspot peppergrass, Whitebark pine

- Personnel Qualifications: Individuals conducting surveys for listed plants must have: (1) knowledge of plant taxonomy and natural community ecology, (2) familiarity with natural communities of Idaho, including sensitive natural communities, (3) experience conducting presence/absence surveys for the plant species covered in this document, (4) experience analyzing the impacts of projects on the plant species covered in this document (California Department of Fish and Wildlife [CDFW] 2018).
- Survey Protocols: For conducting presence/absence surveys for plants covered in this document, follow the protocols detailed in: "Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities", CDFW (2018). https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18959

Monarch butterfly

- Personnel Qualifications: When ground disturbing activities take place in Monarch butterfly suitable habitat, milkweed and flowering nectar plant surveys will be conducted by a qualified botanist. Botanist qualifications are described above for all plant species.
- Survey Protocols: See Survey Protocols for plant species above.

A.2 Best Management Practices for Ground-Disturbing Activities

General BMPs for Ground-disturbing Activities

- Ground disturbing activities are prohibited during precipitation events or when precipitation events are imminent. Precipitation events include any rain or snow accumulations that have potential to discharge to waterways or wetlands.
- Preserve native vegetation and plant communities when practicable to serve as natural erosion controls.
- All erodible material (temporary or permanent stockpiles) will be located outside of the 100-year floodplain or greater than 300 ft from fish-bearing streams.
- Finished slopes must be stabilized as soon as practical to prevent sediment from entering waterways.

- If shrub removal is required, it will be done in such a way that the root mass is left in place for stabilization purposes.
- Disturbed areas within riparian zones will be reclaimed with riparian vegetation similar to the existing plant communities.
- Do not locate construction staging areas, waste areas, etc. where significant adverse impact on existing vegetation may occur.
- Clearly flag, or fence vegetation buffer zones to protect riparian corridors and natural drainage paths.
- To preserve riparian areas, minimize the number and width of stream crossings and cross at direct rather than oblique angles.

BMPS for Blasting Activities

- The Contractor must submit a blasting plan to the Engineer for approval including: type and height of rock fall barriers, drilling and blasting patterns, timing and duration and anticipated noise effects.
- Rock and debris will be prevented from reaching adjacent waterways.
- Blasting is prohibited underwater.

A.3 Best Management Practices for Work Adjacent to Aquatic Systems Above the Ordinary High-water Mark (OHWM)

General BMPs

- Bridge rehabilitation activities are prohibited during precipitation events or when precipitation events are imminent.
- During deck work all bridge drains and joints will be sealed to minimize the potential for introducing residual materials to the aquatic system.
- In order to minimize the potential for introducing bridge debris (e.g., dirt, concrete, etc.) to the aquatic system, measures will be taken to minimize the potential for debris to fall into the river channel while repairing the tops of piers. Measures may include the construction of a platform below the top of the pier or the use of a temporary work bridge (barge) anchored under the pier site.
- Use potable water for hydro-demolition activities, when feasible. However, when necessary, water may be pumped from other sources if the following conditions are met: (1) The source does not exceed IDEQ water quality thresholds for turbidity, pH or other chemicals that are toxic to aquatic organisms; (2) The Contractor obtains required permits from IDWR; and (3) Minimum streams flows recommended by IDFG are not exceeded.

- When pumping water from local sources for project actions, ensure that (1) NMFS screening criteria are met (NMFS 2011 or the most recent version); (2) redds of listed species and staging or spawning adults will not be disturbed; and (3) pumping maintains 80% or more of average streamflow in affected streams. NMFS approval is required for pumping that exceeds 3 cfs. NMFS (2011 or most recent version). Anadromous Salmonid Passage Facility Design (noaa.gov)
- Runoff water and residual material from hydro-demolition or any other bridge maintenance activities that have the potential to generate wastewater or residual material will be collected using a vacuum and disposed of off-site in an approved location.
- In order to minimize the potential for direct impacts to listed fish, all work will be completed from the existing bridge; no equipment or heavy machinery will enter the river channel.

A.4 Best Management Practices for Work Below the Ordinary High-water Mark (OHWM)

The following BMPs are required when working within waterways where listed species or their habitat is present.

General BMPs for Work Below the OHWM

- Where possible, identify and implement opportunities to accommodate wildlife when installing new culverts or constructing new bridges.
- Work below ordinary high water of a stream or in a wetland will require consultation with the COE, IDWR, and IDEQ at a minimum.
- All work below the OHWM will take place during low flow conditions, unless otherwise infeasible.
- If riprap is required, bio-methods should be considered before hard armoring methods (riprap, gabion or MSE wall).
- Riprap will be placed in a manner that will not further constrict the stream channel.
- To minimize in-water noise (e.g., pile cleaning) the Contractor will be required to use the smallest size and lowest impact, hand-held equipment necessary to perform the work.
- When pumping water from local sources for project actions, ensure that (1) NMFS screening criteria are met (NMFS 2011, or the most recent version); (2) redds of listed species and staging or spawning adults will not be disturbed; and (3) pumping maintains 80% or more of average streamflow in affected streams. NMFS approval is required for pumping that exceeds 3 cfs.
- When extending or replacing a culvert in a perennial stream, fish passage will be constructed into the project, if regulatory agencies (USFWS, NMFS and IDFG) deem it appropriate. Fish passage will be designed in accordance with NOAA's publication,

"Anadromous Salmonid Passage Facility Design" (2011, or the most recent version). Anadromous Salmonid Passage Facility Design (noaa.gov)

- Culvert liners shall not be used in streams with listed fish species

Bridge Demolition

- No machinery or implements will enter the live stream. Temporary cofferdams will be constructed, if necessary, to dewater existing pier sites during pier removal.
- If a stinger is chosen to remove piers, a sandbag barrier, or similar barrier, would be placed between the pier and live water to catch any debris before it would potentially fall into live water.
- If a wet-blade concrete saw is chosen, a catch basin would be constructed at the site to collect cutting water/slurry. A shop vacuum would be used to collect the slurry for off-site disposal.
- If a dry-blade concrete saw is chosen, an enclosed containment structure would be constructed around the site to trap airborne dust particles, and a shop vacuum or other device would be used to collect the dust for off-site disposal.

Pile Installation

- Impact hammer pile driving will only be allowed within a cofferdam area and not in free-flowing water.
- Pneumatic vibratory pile drivers will be required when sheet pile is used to isolate the work area.
- To minimize sound pressure effects from pile driving, pile locations will be predrilled, unless infeasible.
- Pneumatic vibratory hammers will be used to install piles, unless impact hammer pile drivers are necessary due to substrate or load bearing determinations.
- All water will be pumped from the cofferdam to allow pile driving to occur only in dry conditions. Pumped water will be filtered through settling basins and not directly returned to the river.
- Impact hammer pile driving will only occur during daylight hours. No impact hammer pile driving activities will occur for at least 12-hours within each 24-hour period giving migratory fish the opportunity to move through the project area without being subjected to impact pile driving noise. The 12-hour period will correspond to the early evening, night-time, and early morning hours when anadromous fish and bull trout generally move through the project area.

- Pile installation proposed in live streams outside of temporary cofferdams is not covered by this PBA and will require a full Biological Assessment.

Barges and Boats

- Barges will be lined or have a lip to contain spills. They will be outfitted with spill containment kits to contain 125 percent of the volume of materials aboard.
- Barges/boats shall be completely fueled upon arrival. If it is necessary to refuel the boats/barges in the water, absorbent pads, socks, floatation booms, or similar BMPs will be available to contain spills in the water.
- Hazardous materials will not be stored on the barge overnight, but will be transported and stored at off site or in areas where adequate buffer spaces exist to prevent impacts to listed species or their habitats.
- Both the barge and any boats shall have invasive species permits and will have been inspected by Idaho Department of Agriculture before use.

Water Quality/Quantity Treatment

- Turbidity monitoring will be required for all in-water work that has potential to discharge harmful levels of sediment or pollutants. Water quality samples will be collected and NTU measurements will included on the ITD-0290 - Construction Monitoring Form.
- Identify all contributing and non-contributing impervious areas that are within and contiguous with the project area and explain how runoff from contributing impervious areas will be managed.
- Use permanent stormwater flow control and treatment BMPs to infiltrate, retain, or detain runoff to the maximum extent practicable. Permanent stormwater controls must be sufficient to retain the runoff volume produced from a 24-hour, 95th percentile storm event, or can attain an equal or greater level of water quality benefits as onsite retention from a 24-hour, 95th percentile storm event. Additionally, when it is necessary to discharge ***treated*** stormwater directly into surface water or a wetland, the following requirements apply:
    - Apply one or more primary treatment practices found in the ITD BMP Manual, Chapter 5.
    - Maintain natural drainage patterns to the maximum extent practicable.
    - To the maximum extent practicable, ensure that water quality treatment for contributing impervious area runoff is completed before commingling with offsite runoff for conveyance.
    - Prevent erosion of the flow path from the project to the receiving water and, if necessary, provide a discharge facility made entirely of manufactured elements (e.g., pipes, ditches, discharge facility protection) that extends at least to the OHWM.

- *Monitoring:* Both turbidity and pH monitoring will be required for all in-water work where there is potential to discharge harmful levels of sediment or pH elevating pollutants and listed species are present. Both monitors will be placed at the same locations. Turbidity and pH measurements will be taken simultaneously. Measurements will be taken 100 ft above and below discharge points, or as directed by appropriate resource agency or ITD personnel. For quality control purposes, spare turbidity and pH monitoring equipment will be stored onsite.
- *Turbidity:* Monitors will be placed upstream of the project area, and downstream of the project area at distances specified by the appropriate resource agency or ITD. If construction results in an increase over background turbidity greater than 50 NTU instantaneously or 25 NTU over ten consecutive days, construction shall be ceased until levels return to below 25 NTU.
- *pH:* Monitors will be placed upstream of the project area, within the turbidity curtain and downstream of the project area at distances specified by the appropriate resource agency or ITD. As per IDAPA Idaho Code 58.01.02.250.01.a - Surface Water Quality Criteria for Aquatic Life Use Designations, the pH values for surface waters must remain between 6.5 and 9.0. For any pH values over 9.0, construction shall be ceased until pH levels return to values less than 9.0.

  Daily reports will be compiled and included with the ITD-0290 - Construction Monitoring Form. Reports will include the following minimum information:
  - Current construction activity
  - Brief weather conditions (precipitation if any)
  - Sampling location
  - Date
  - Time
  - Turbidity results in NTUs
  - pH values

Personnel Qualifications and Protocols for Fish Handling

Personnel Qualifications: All individuals participating in fish capture and removal operations will have the training, knowledge, skills, and ability to ensure safe handling of fish, and to ensure the safety of staff conducting the operations. If electrofishing is proposed as a means of fish capture, the directing biologist will have a minimum of 100 hours electrofishing experience in the field using similar equipment, and any individuals operating electrofishing equipment will have a minimum of 40 hours electrofishing experience under direct supervision (USFWS 2012). A Scientific Collecting Permit issued by IDFG is required to handle captured fish.

https://www.fws.gov/wafwo/pdf/FishExclusionProtocolsandStandards6222012%20DR.pdf.

Protocols for Work Area Isolation and Fish Handling

- When appropriate, ITD will contact the NMFS and USFWS to determine if fish removal is necessary.
- Remove fish from an exclusion area as it is slowly dewatered with methods such as hand or dip-nets, seining, trapping with minnow traps (or gee-minnow traps) or electro-fishing. When electro-fishing follow NMFS (2000) electro-fishing guidelines.
- Instream work windows established by NMFS and USFWS will be used during project construction (see Section 2.2.3.1 above for work windows). The work window will be documented under the construction timeframe identified on the ITD-0289- Project Pre-notification Form. For specific questions on work windows, contact NMFS (salmon and steelhead) or USFWS (bull trout and Kootenai River white sturgeon).
- Isolate any work area within the wetted channel from the active stream whenever listed fish are reasonably certain to be present, or if the work area is less than 300 ft upstream from known spawning habitats. However, work area isolation may not always be necessary or practical in certain settings (e.g., dry seasonal streambeds).
- Methods to isolate work may include: Aqua-barriers, sandbags, concrete barriers or culverts placed within the active channel. These structures will either divert water to a portion of the channel away from active construction or dam the channel and completely dewater the work area in order to pass all the water through the work site in a culvert or by pump. All in-stream structures will be temporary and shall be removed once construction is complete.
- Methods to isolate, capture, and move/relocate fish will comply with: "Recommended Fish Exclusion, Capture, Handling, and Electroshocking Protocols and Standards", USFWS (2012). https://www.fws.gov/wafwo/pdf/FishExclusionProtocolsandStandards6222012%20DR.pdf).