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Subject: Wallowa-Whitman National Forest's Travel Management Plan; Baker, Grant, Union, and Wallowa Counties, Oregon – Formal Consultation (13420-2011-F-0046)

Dear Ms. Schwalbach:

This letter transmits the Fish and Wildlife Service's (Service) Biological Opinion (Opinion) for the Wallowa-Whitman National Forest's (Forest) Travel Management Plan, Baker, Grant, Union, and Wallowa Counties, Oregon, and effects to bull trout (*Salvelinus confluentus*) and bull trout critical habitat. This responds to your August 12, 2011, request for initiation of formal consultation with the Service on the Project in accordance with Section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your request was received by our office on August 15, 2011. The Travel Management Plan applies to multiple watersheds across the Forest.

The Forest has analyzed the Travel Management Plan effects on bull trout and bull trout critical habitat. The Forest determined, and the Service agrees, that the impacts associated with the Travel Management Plan ***is likely to adversely affect*** bull trout and bull trout critical habitat.

It is our understanding that the Forest's proposed decisions under the new Travel Management Plan to specifically identify areas across the Forest that are already open to motorized use were not analyzed in the Assessment. The Service recommends that the Forest evaluate those decisions under the new plan to determine if consultation is required under section 7 of the Act to address the effects of motorized use on listed species and critical habitat; unless such use has already been the subject of a completed consultation and those effects are part of the environmental baseline.

A complete administrative record of this consultation is on file at the La Grande Field Office, La Grande, Oregon.

If you have any questions about this Opinion or require more information regarding this consultation, please contact Gretchen Sausen or me at (541) 962-8584.

Sincerely,

Gary S. Miller
Field Supervisor

Enclosure

cc:
Tim Bailey, Oregon Dept. of Fish and Wildlife, La Grande, Oregon
Paul Boehne, Wallowa-Whitman National Forest, Baker City, Oregon
Renee Coxen, National Marine Fisheries Service, La Grande, Oregon
Gretchen Sausen, Fish and Wildlife Service, La Grande, Oregon

# BIOLOGICAL OPINION
# for the
# Wallowa-Whitman National Forest's
# Travel Management Plan
# Baker, Grant, Union, and Wallowa Counties, Oregon

Action Agency: Wallowa-Whitman National Forest

Consultation
Conducted by: U.S. Fish and Wildlife Service
La Grande Field Office
La Grande, Oregon

Date Issued: SEP 19 2011

Issued by: Gary S. Miller
Field Supervisor

File No. : 13420-2011-F-0046 [8330.F0046 (11)]

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## INTRODUCTION

This document transmits the Fish and Wildlife Service's (Service) Biological Opinion (Opinion) for the Wallowa-Whitman National Forest's (Forest) Travel Management Plan, Baker, Grant, Union, and Wallowa Counties, Oregon, and effects to bull trout (*Salvelinus confluentus*) and bull trout critical habitat. This responds to your August 12, 2011, request for initiation of formal consultation with the Service on the Project in accordance with Section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your request was received by our office on August 15, 2011. The Travel Management Plan applies to multiple watersheds across the Forest.

The Forest has analyzed the Travel Management Plan effects on bull trout and bull trout critical habitat. The Forest determined, and the Service agrees, that the impacts associated with the Travel Management Plan ***is likely to adversely affect*** bull trout and bull trout critical habitat.

This document is based on information provided in the August 12, 2011 Assessment, and additional information requested by NMFS and the Service prior to this final Assessment, email correspondence, and other sources of information. A complete administrative record of this consultation is on file at the La Grande Field Office, La Grande, Oregon.

## CONSULTATION HISTORY

The following correspondence and meetings have taken place between the Level 1 team, the Forest, and the Service prior to the issuance of this Opinion.

- On October 21, 2008, the Forest first discussed development of alternatives for this project with the Level 1 Team, through a preliminary phase 1 presentation.

- Fall 2008-Fall 2010, the Service and Level 1 Team received several updates, during Level 1 Meetings and e-mails, about the Forest's planning effort and development of the draft Assessment.

- The Forest submitted, via e-mail, the draft Assessment to the Service and Level 1 Team on September 20, 2010.

- The Service and NMFS sent consolidated comments for the draft assessment to the Forest (and Level 1 Team), on November 8, 2010, for incorporation into the final Assessment.

- On December 10, 2010, the Service received the Forest's final Assessment, with a letter requesting formal consultation on the project.

- On December 13, 2010, the Forest sent edits, via e-mail, on the December 10, 2010 Assessment to the Level 1 Team.

- NMFS and the Service, on January 10, 2011, sent a letter and email to the Forest concerning the final Assessment and requesting additional information/clarification to complete consultation on the project.

- On February 2, 2011, the forest sent an email and official letters to the Level 1 Team (NMFS and the Service) responding to our January 10, 2011 request for additional information. The team discussed the Forest response in a brief Level 1 Team meeting on February 7, 2011.

- Between February 2 and March 10, 2011, several discussions occurred with the Level 1 Team on the GIS data within the Assessment and interpretation of that data.

- On March 10, 2011, the Forest sent the Level 1 Team a final Assessment with edits to tables and interpretation of data in the tables.

- On March 16, 2011 discussion occurred on the final March 10, 2011 Assessment at the Level 1 meeting. Following this discussion some additional edits to the Assessment were incorporated and these edits sent to the Level 1 team on March 17, 2011.

- On April 22, 2011, the Service provided the Forest with a final draft Opinion for their review.

- On May 18, 2011, the Forest sent a letter requesting withdrawal of consultation on this project due to additional modifications to the proposed action.

- On August 15, 2011, the Service received the Forest's revised final Assessment, with a letter requesting formal consultation on the project.

## BIOLOGICAL OPINION

### 1. Description of the Proposed Action

The Forest proposes to designate a system of motorized vehicle routes and types of uses that will revise the current Forest Plan Travel Management. These new designations will establish approved routes and areas for motorized public access to forest lands, provide for motorized recreation opportunities, consider current resource management concerns, attempt to reduce or eliminate existing impacts to forest resources, and recognize "reserved or outstanding rights." The proposed action will authorize this travel management system within the non-wilderness areas of the Forest, excluding the Sled Springs, Bald Angel, Hells Canyon National Recreation Area, and South Fork Burnt River project areas.

Designated routes were selected based on areas of high public interest, whether the routes were currently open or closed (open preferred), ease of maintenance, and resource protection. Route density by 5th field Hydrologic Unit Code (HUC), location of the designated route within Riparian Habitat Conservation Areas (RHCAs) and number of stream channel crossing were used to identify preferred routes. This approach provided the highest level of protection to listed

fish and their habitats.

In general, motor vehicle travel off of designated routes is permitted for 300 feet to and from dispersed camp sites with the exception of designated trails totaling 56.6 miles. Eight roads totaling approximately 11.5 miles (of the 56.6 miles) would not be available to dispersed camping due to cultural resource protection needs.

Firewood retrieval is permitted for 300 feet off routes designated for highway legal vehicles. Firewood retrieval continues to be regulated under the forest wide Firewood EA that does not allow removal of firewood within RHCAs. No other cross-country travel is permitted.

Roads

With the exception of a very few number (approximately 18 miles), motor vehicle use would be permitted on nearly all objective Maintenance Level (ML) 2 through 5 (open) roads. Based on an analysis of resource concerns and public interest, some closed or scheduled to be closed ML 1 roads that were identified as having high public interest and did not conflict with or prevent resource protection would be designated Off Highway Vehicle (OHV) trails. Open routes received priority for proposed designation; however, closed roads that the public indicated have existing use were also considered for designation in order to make logical loops and motor vehicle trail systems.

Site-specific analyses in the future may recommend physical closure of designated roads and at that time they would no longer be a designated motor vehicle route. In general, ML 2 and 3 roads would be available to all OHVs, and ML 2 through 5 roads would be available for highway legal vehicles and street legal motorcycles. No unauthorized roads will become designated routes.

Motor Vehicle Trails

Motor vehicle use would be permitted on all officially designated motor vehicle use trails (including the ML 1 roads described previously), which would be displayed on the designated route map. The trail system is designed for three or four wheeled motor vehicles $\leq$ 50 inches wide and < 800 pounds and for 2-wheeled motor vehicles < 600 pounds. The system has been and would be maintained in a resource sensitive manner with the intent to provide good riding experiences and access. No new trail construction is proposed by this proposed action.

The total miles of trails available for only OHVs or motorcycle use increased in the proposed action. This was a result of converting roads to OHV and motorcycle trails with no new trails being constructed. This also accounts for the increase in miles of motorized trails in RHCAs and stream crossings by motorized trails. The total miles of motorized roads and trails decreased overall (Table 1).

Cross-country Motor Vehicle Use

The proposed action will prohibit motor vehicle cross-country travel and motor vehicle use on any roads not designated for motor vehicle use. With the exception of the 58.8 miles of roads

listed in the table below, off-route access would be permitted for 300 feet on either side of designated motor vehicle roads (not trails) to accommodate access to and from dispersed campsites only. Motor vehicle use beyond those limits would not be permitted. No motor vehicle use for big game retrieval off of designated roads, trails or areas would be permitted.

Implementation Plan

In addition to the implementation strategy element, the following elements are also part of this proposed action.

- If monitoring reveals additional areas where there is public confusion over the actual routes or where use off-route is an issue (based on monitoring on a yearly basis in the field and reports from law enforcement personnel for three years after implementation of the Motor Vehicle Use Monitoring (MVUM) revealing consistent off-route use and/or damage to natural resources is occurring), then open route signing with standardized agency signage would be utilized.

- If off-route use continues for one year following the placement of route signage in resource protection areas or those areas identified above, physical route closure or other adaptive management techniques would be triggered (Assessment), such as disguising access points and placing obstacles in the paths of the problem routes, including user-created routes.

Monitoring Plan

Monitoring of the changes in designated routes (the action being consulted on) for the Travel Management Plan would be achieved through the following:

*Implementation Monitoring of the Administration of the MVUM*: The creation of the MVUM is the result of Travel Management Planning. The MVUM will designate open routes in the twenty HUC 5s that are being consulted on in this proposed action. Where routes are being changed, monitoring will be conducted to determine if the change in route designation is having an effect on listed fish or their habitats. This will also include the changes to dispersed camping access and cross country access.

An Implementation Monitoring Plan is currently being developed for monitoring that will define the specific processes and methods to assess, among other things, the impacts to fish, fish habitat and water quality. This plan will lead to suggested changes, if any, through an annual feedback loop and the yearly Adaptive Management Feedback that is part of the Travel Management Plan. This will also lead to additional site specific recommendations to designate or undesignated routes, adjust stream crossings, decommission roads and trails, and suggest changes in route management level designation.

This yearly assessment will be reported back to NOAA Fisheries and the Service in an annual monitoring report for this action.

Changes to the Existing Roads, Routes and Trails

**Table 1. Summary of the Existing vs. Proposed Action Motorized Route Designations**

| Route Miles, Stream Crossings, and Routes in RHCAs[1] | Existing Condition | Proposed Action | Amount of Change |
|---|---|---|---|
| **Project Action Area Acres (Non-Wilderness)** | **3,120,243** | **3,120,243** | **0** |
| **Action Area Acres Open to Motorized Cross-country Travel** | **900,484** | **0** | **<900,484>** |
| | | | |
| **Grand Total Motorized Route Miles: System** | **6,961** | **3,065** | **< 3,896>** |
| | | | |
| **1. Total Miles of Motorized Roads** | **3,565** | **2,660** | **< 905 >** |
| a. Miles designated as open yearlong | 2,120 | 1,496 | |
| b. Miles designated as open seasonally | 1,445 | 1,165 | |
| | | | |
| **2. Total Miles of Motorized Trails** | **3,692** | **2,943** | **< 749>** |
| a. Miles of designated roads open year round for use of | 2,030 | 1,431 | |
| b. Miles of designated road open seasonally for use of | 1,342 | 1,107 | |
| c. Miles of trail available for use by OHVs < 50 in wide | 320 | 332 | |
| d. Miles of trail available for use by OHVs > 50 in wide | 0 | 49 | |
| e. Miles of trail designated for motorcycle use | 0 | 23 | |
| | | | |
| | | | |
| **3. Total Miles of Routes in RHCAs** | **1,806** | **828** | **< 978 >** |
| a. Total miles of designated OHV trails in RHCAs | 101 | 75 | |
| b. Total miles of designated roads in RHCAs | 1,705 | 753 | |
| | | | |
| **4. Total Stream Crossings by Designated Route** | **13,597** | **5,641** | **<7,956 >** |
| a. Total number of designated OHV trail stream crossings | 698 | 693 | |
| b. Total number of designated road stream crossings | 12,899 | 4,948 | |
| | | | |
| **5. Total Miles of Designated Routes Available to OHVs** | **6,768** | **2,935** | **< 3,833 >** |
| | | | |

[1/] The values in Table 1 represent the total routes, stream crossings and routes in RHCAs for the entire planning area, which includes watersheds that do not contain federally-listed fish or their designated critical habitat.

## *1.1 Conservation Measures*

Conservation measures are part of the proposed action and are intended to minimize or avoid environmental impacts to listed species or critical habitat. Conservation measures for this project are listed below. Key features incorporated in designing route designations in the proposed Travel Management Plan include the following criteria, common to most designated routes within the project area;

- Off route "parking" would be allowed as an integral part of most designated routes, where it is safe to do so, where it does not cause resource damage, and to the extent that all parts of the vehicle are within one vehicle length of the road edge.

- In addition to allowing access to designated camp sites, motorized access would be allowed within 300 feet of most designated system roads and trails for purposes of

dispersed camping, in locations where land slope is less than 30 percent, vegetation types and resource conditions would permit off route travel without causing unacceptable levels of damage. Unacceptable levels of damage may include (but would not be limited to) excessive soil compaction and displacement; physical damage to wet meadows, seeps, springs, bogs and streams; crushed and uprooted vegetation; damage to cultural and archaeological resources; plus disturbance or harassment to fish and wildlife.

- No undesignated crossing of streams, riparian and wetland areas will be allowed.
- Any remaining non-designated and "unauthorized routes" will be closed to motorized use.
- Ongoing maintenance of "designated routes" will be performed as part of annual Roads (Engineering) and Trails (Recreation) route maintenance programs. Maintenance activities will be performed in compliance with existing Programmatic Roads and Trails Maintenance Biological Assessments and Opinions.
- Where possible, designated motor vehicle routes were located out of the RHCAs and designated on the ridge tops.
- Where possible, designated motor vehicle routes were located to limit stream crossing both, perennial and intermittent streams.

It is our understanding that the Forest's proposed decisions under the new travel management plan to specifically identify areas across the Forest that are already open to motorized use were not analyzed in the Assessment. The Service recommends that the Forest evaluate those decisions under the new plan to determine if consultation is required under section 7 of the Act to address the effects of motorized use on listed species and critical habitat; unless such use has already been the subject of a completed consultation and those effects are part of the environmental baseline.

### *1.2 Action Area*

The action area is defined 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]. For the purpose of this consultation the action area encompasses the project area. The Wallowa-Whitman National Forest project area for the Travel Management Plan proposed action encompasses all Forest lands outside of the Hell's Canyon National Recreation Area, all designated Wilderness Areas, Municipal Watersheds (La Grande and Baker City), the Bald Angel Area Closure, the Sled Springs Project Area and the South Fork Burnt River Travel Planning Area. This project area encompasses approximately 1.3 million acres of National Forest System lands, in which are presently found;

- 900,484 acres of national forest public lands currently open to year round motorized "cross country" travel.
- 6,961 miles of available/designated motor vehicle routes on National Forest lands

Forest lands within this action area occur within Wallowa, Union, Baker and Grant counties (Oregon) and do not include Bureau of Land Management land nor do they include State or privately owned lands.

The consultation for the Travel Management Plan will be based on the change in route designation from the existing condition to the proposed action. Forest watersheds associated with the proposed Travel Management Plan are noted in Table 2 below.

**Table 2. Listed Fish Species and Critical Habitats by Watershed in the action area**

| **HUC 4 Watersheds**<br>(HUC 5 Watersheds) | **On-Forest Species Presence (P) or Absence(A) On-Forest Designated Critical Habitat (Presence = X)** | | | |
|---|---|---|---|---|
| | **Middle Columbia Steelhead (Threatened)** | **Snake River Steelhead (Threatened)** | **Snake River Chinook Salmon (Threatened)** | **Bull-trout (Threatened)** |
| **A. Brownlee Reservior (17050201)** | | | | |
| 1. Pine Creek | A | A | A | P-X |
| **B. Imnaha River (17060102)** | | | | |
| 1. Middle Imnaha River | A | P-X | A | P-X |
| 2. Upper Big Sheep Creek | A | P-X | A | P-X |
| **C. North Fork John Day (17070202)** | | | | |
| 1. Granite Creek | P-X | A | A | P-X |
| 2. Upper North Fork John Day River | P-X | A | A | P-X |
| **D. Powder River (17050203)** | | | | |
| 1. Eagle Creek | A | A | A | A-X |
| 2. North Powder River | A | A | A | P-X |
| 3. Powder River – Wolf Creek | A | A | A | P-X |
| 4. Upper Powder River | A | A | A | P-X |
| **E. Upper Grande Ronde River (17060104)** | | | | |
| 1. Grande Ronde River – Beaver Creek | A | P-X | P-X | P-X |
| 2. Grande Ronde River – Five Points Creek | A | P-X | A | P-X |
| 3. Grande Ronde River – Indian Creek | A | P-X | P-X | P-X |
| 4. Lower Catherine Creek | A | P-X | P-X | P-X |
| 5. Meadow Creek | A | P-X | P-X | A |
| 6. Upper Catherine Creek | A | P-X | P-X | P-X |
| 7. Upper Grande Ronde River | A | P-X | P-X | P-X |
| **F. Lower Grande Ronde River (170060106)** | | | | |
| 1. Chesnimnus Creek | A | P-X | A | A |
| 2. Grande Ronde River – Mud Creek | A | P-X | P-X | A |
| 3. Lower Joseph Creek | A | P-X | A | A |
| 4. Upper Joseph Creek | A | P-X | A | A |
| | | | | |

**Table 2A. Miles of designated critical habitat by species for each affected watershed**

| | Designated Critical Habitat (miles) | | | |
|---|---|---|---|---|
| Watershed (5th field HUC) | Snake River Steelhead | Snake River Spring Chinook Salmon | Columbia River Basin Bull Trout (DCH on NF Lands) | Mid Columbia River Steelhead |
| Pine Creek | n/a | n/a | 161.03 | n/a |
| Middle Imnaha River | 64.25 | 30.04 | 26.71 | n/a |
| Upper Big Sheep Creek | 64.0 | 36.34 | 50.19 | n/a |
| Granite Creek | n/a | n/a | 57.76 | 17.64 |
| Upper North Fork John Day | n/a | n/a | 58.26 | 23.38 |
| Eagle Creek | n/a | n/a | 62.37 | n/a |
| Powder River Wolfe Creek | n/a | n/a | 20.03 | n/a |
| Upper Powder River | n/a | n/a | 41.69 | n/a |
| Grande Ronde River-Beaver Creek | 119.13 | 14.37 | 14.01 | n/a |
| Grande Ronde River – Five Points Creek | 68.95 | 19.82 | 37.80 | n/a |
| Grande Ronde River – Indian Creek | 84.13 | 29.04 | 44.28 | n/a |
| Lower Catherine Creek | 51.01 | 34.48 | n/a | n/a |
| Meadow Creek | 99.90 | 10.88 | n/a | n/a |
| Upper Catherine Creek | 64.87 | 41.15 | 47.01 | n/a |
| Upper Grande Ronde River | 106.34 | 39.39 | 82.45 | n/a |
| Chesnimnus Creek | 83.70 | n/a | n/a | n/a |
| Upper Joseph Creek | 77.10 | n/a | n/a | n/a |
| Lower Joseph Creek | 73.92 | n/a | n/a | n/a |
| Grande Ronde River – Mud Creek | 116.31 | 18.69 | n/a | n/a |

## 2. Analytical Framework for the Jeopardy and Adverse Modification Determinations

Jeopardy Determination

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 bull trout's range-wide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the bull trout in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the bull trout; (3) the *Effects of the Action*, which determines the direct and indirect

impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the bull trout; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the bull trout.

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

As discussed below under the *Status of the Species*, interim recovery units have been designated for the bull trout for purposes of recovery planning and application of the jeopardy standard. Per Service national policy (Director's March 6, 2006, memorandum), it is important to recognize that the establishment of recovery units does not create a new listed entity. Jeopardy analyses must always consider the impacts of a proposed action on the survival and recovery of the species that is listed. While a proposed Federal action may have significant adverse consequences to one or more recovery units, this would only result in a jeopardy determination if these adverse consequences reduce appreciably the likelihood of both the survival and recovery of the listed entity; in this case, the coterminous U.S. population of the bull trout.

The joint Service and National Marine Fisheries Service (NMFS) *Endangered Species Consultation Handbook* (USFWS and NMFS 1998), which represents national policy of both agencies, further clarifies the use of recovery units in the jeopardy analysis:

> When an action appreciably impairs or precludes the capacity of a recovery unit from providing both the survival and recovery function assigned to it, that action may represent jeopardy to the species. When using this type of analysis, include in the biological opinion a description of how the action affects not only the recovery unit's capability, but the relationship of the recovery unit to both the survival and recovery of the listed species as a whole.

The jeopardy analysis in this Opinion conforms to the above analytical framework. Interim recovery units were defined in the final listing rule for the bull trout for use in completing jeopardy analyses. Pursuant to Service policy, when an action impairs or precludes the capacity of a recovery unit from providing both the survival and recovery function assigned to it, that action may represent jeopardy to the species. When using this type of analysis, the Opinion describes how the action affects not only the recovery unit's capability, but the relationship of the recovery unit to both the survival and recovery of the listed species as a whole.

The jeopardy analysis for the bull trout in this Opinion uses the above approach and considers the relationship of the action area and core area (discussed below under the *Status of the Species* section) to the recovery unit and the relationship of the recovery unit to both the survival and recovery of the bull trout as a whole as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Adverse Modification Determination

This Opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this Opinion relies on four components: (1) the Status of Critical Habitat, which evaluates the range-wide condition of designated critical habitat for the bull trout in terms of primary constituent elements (PCEs), the factors responsible for that condition, and the intended recovery function of the critical habitat overall; (2) the Environmental Baseline, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs and how that will influence the recovery role of affected critical habitat units; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the recovery role of affected critical habitat units.

For purposes of the adverse modification determination, the effects of the proposed Federal action on bull trout critical habitat are evaluated in the context of the range-wide condition of the critical habitat, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the bull trout.

The analysis in this Opinion places an emphasis on using the intended range-wide recovery function of designated bull trout critical habitat, especially in terms of maintaining and/or restoring viable core areas, and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

## 3. Status of the Species/Critical Habitat

### *3.1 Listing Status*

The coterminous United States population of the bull trout was listed as threatened on November 1, 1999 (USFWS 1999). A 5-year review was conducted in 2008 and reaffirmed the species status as threatened (USFWS 2008). The threatened bull trout generally occurs in the Klamath River Basin of south-central Oregon; the Jarbidge River in Nevada; the Willamette River Basin in Oregon; Pacific Coast drainages of Washington, including Puget Sound; major rivers in Idaho, Oregon, Washington, and Montana, within the Columbia River Basin; and the St. Mary-Belly River, east of the Continental Divide in northwestern Montana (Cavender 1978, Bond 1992, Brewin and Brewin 1997, Leary and Allendorf 1997).

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

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

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

Thus, as discussed above under the *Analytical Framework for the Jeopardy and Adverse Modification Determinations*, the Service's jeopardy analysis for the proposed Project will involve consideration of how the Project is likely to affect the Columbia River interim recovery unit for the bull trout based on its uniqueness and significance as described in the DPS final listing rule cited above, which is herein incorporated by reference. However, in accordance with Service national policy, the jeopardy determination is made at the scale of the listed species. In this case, that is the coterminous U.S. population of the bull trout.

### *3.1.1 Current Status and Conservation Needs*

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

A summary of the current status and conservation needs of the bull trout within these units is provided below. A comprehensive discussion of these topics is found in the Service's draft recovery plan for the bull trout (USFWS 2002; 2004a, b).

Generally, the conservation needs of the bull trout are often generally expressed as the need to provide 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 at multiple scales ranging from the coterminous to local populations. The recovery planning process for the bull trout (Service 2002; 2004a, b) has also identified the following conservation needs for the bull trout: (1) maintain and restore multiple, interconnected populations in diverse habitats across the range of each interim recovery unit; (2) preserve the diversity of life-history strategies; (3) maintaining genetic and phenotypic diversity across the range of each interim recovery unit; and (4) establish a positive population trend. Recently, it has also been recognized that bull trout populations need to be protected from catastrophic fires across the range of each interim recovery unit.

Central to the survival and recovery of the bull trout is the maintenance of viable core areas (USFWS 2002, 2004a, b). A core area is defined as a geographic area occupied by one or more local bull trout populations that overlap in their use of rearing, foraging, migratory, and overwintering habitat, and in some cases in their use of spawning habitat. Each of the interim recovery units listed above consists of one or more core areas. About 114 core areas are recognized across the United States range of the bull trout (USFWS 2002; 2004a, b).

Jarbidge River

This interim recovery unit currently contains a single core area with six local populations. Less than 500 resident and migratory adult bull trout, representing about 50 to 125 spawners, are estimated to occur within the core area. The current condition of the bull trout in this interim recovery unit is attributed to the effects of livestock grazing, roads, angler harvest, timber harvest, and the introduction of non-native fishes (USFWS 2004a). The draft bull trout recovery plan (USFWS 2004a) identifies the following conservation needs for this unit: maintain the current distribution of the bull trout within the core area; maintain stable or increasing trends in abundance of both resident and migratory bull trout in the core area; restore and maintain suitable habitat conditions for all life history stages and forms; and conserve genetic diversity and increase natural opportunities for genetic exchange between resident and migratory forms of the bull trout. An estimated 270 to 1,000 spawning fish per year are needed to provide for the persistence and viability of the core area and to support both resident and migratory adult bull trout (USFWS 2004a).

Klamath River

This interim recovery unit currently contains 3 core areas and 12 local populations. The current abundance, distribution, and range of the bull trout in the Klamath River Basin are greatly reduced from historical levels due to habitat loss and degradation caused by reduced water quality, timber harvest, livestock grazing, water diversions, roads, and the introduction of non-native fishes (USFWS 2002). Bull trout populations in this unit face a high risk of extirpation (USFWS 2002). The draft bull trout recovery plan (USFWS 2002) identifies the following conservation needs for this unit: maintain the current distribution of the bull trout and restore distribution in previously occupied areas; maintain stable or increasing trends in bull trout abundance; restore and maintain suitable habitat conditions for all life history stages and

strategies; conserve genetic diversity and provide the opportunity for genetic exchange among appropriate core area populations. Eight to 15 new local populations and an increase in population size from about 3,250 adults currently to 8,250 adults are needed to provide for the persistence and viability of the 3 core areas (USFWS 2002).

Columbia River

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

Coastal-Puget Sound

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

St. Mary-Belly River

This interim recovery unit currently contains 6 core areas and 9 local populations (USFWS 2002). Currently, the bull trout is widely distributed in the St. Mary River drainage and occurs in nearly all of the waters that it inhabited historically. Bull trout are found only in a 1.2-mile reach of the North Fork Belly River within the United States. Redd count surveys of the North Fork Belly River documented an increase from 27 redds in 1995 to 119 redds in 1999. This

increase was attributed primarily to protection from angler harvest (USFWS 2002). The current condition of the bull trout in this interim recovery unit is primarily attributed to the effects of dams, water diversions, roads, mining, and the introduction of non-native fishes (USFWS 2002). The draft bull trout recovery plan (USFWS 2002) identifies the following conservation needs for this unit: maintain the current distribution of the bull trout and restore distribution in previously occupied areas; maintain stable or increasing trends in bull trout abundance; restore and maintain suitable habitat conditions for all life history stages and forms; conserve genetic diversity and provide the opportunity for genetic exchange; and establish good working relations with Canadian interests because local bull trout populations in this unit are comprised mostly of migratory fish, whose habitat is mostly in Canada.

### *3.1.2 Life History*

Bull trout exhibit both resident and migratory life history strategies. Both resident and migratory forms may be found together, and either form may produce offspring exhibiting either resident or migratory behavior (Rieman and McIntyre 1993). 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 (Fraley and Shepard 1989, Goetz 1989). Migratory bull trout spawn in tributary streams where juvenile fish rear 1 to 4 years before migrating to either a lake (adfluvial form), river (fluvial form) (Fraley and Shepard 1989, Goetz 1989), or saltwater (anadromous ) to rear as subadults or to live as adults (Cavender 1978, McPhail and Baxter 1996, WDFW *et al.* 1997). Bull trout normally reach sexual maturity in 4 to 7 years and may live longer than 12 years. They are iteroparous (they spawn more than once in a lifetime), and both repeat- and alternate-year spawning has been reported, although repeat-spawning frequency and post-spawning mortality are not well documented (Leathe and Graham 1982, Fraley and Shepard 1989, Pratt 1992, Rieman and McIntyre 1996).

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

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

### *3.1.3 Habitat Characteristics*

Bull trout have more specific habitat requirements than most other salmonids (Rieman and McIntyre 1993). Habitat components that influence bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing

substrate, and migratory corridors (Fraley and Shepard 1989; Goetz 1989; Hoelscher and Bjornn 1989; Sedell and Everest 1991; Howell and Buchanan 1992; Pratt 1992; Rieman and McIntyre 1993, 1995; Rich 1996; Watson and Hillman 1997). Watson and Hillman (1997) 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), fish should not be expected to simultaneously occupy all available habitats (Rieman *et al.* 1997).

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; Gilpin, *in litt.* 1997; Rieman *et al.* 1997). 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 that 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 very long time (Spruell *et al.* 1999, Rieman and McIntyre 1993).

Cold water temperatures play an important role in determining bull trout habitat, as these fish are primarily found in colder streams (below 59 degrees Fahrenheit), and spawning habitats are generally characterized by temperatures that drop below 48 degrees Fahrenheit in the fall (Fraley and Shepard 1989, Pratt 1992, Rieman and McIntyre 1993).

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, Rieman and McIntyre 1993, Baxter *et al.* 1997, Rieman *et al.* 1997). Optimum incubation temperatures for bull trout eggs range from 35 to 39 degrees Fahrenheit whereas optimum water temperatures for rearing range from about 46 to 50 degrees Fahrenheit (McPhail and Murray 1979, Goetz 1989, Buchanan and Gregory 1997). In Granite Creek, Idaho, Bonneau and Scarnecchia (1996) observed that juvenile bull trout selected the coldest water available in a plunge pool, 46 to 48 degrees Fahrenheit, within a temperature gradient of 46 to 60 degrees Fahrenheit. In a landscape study relating bull trout distribution to maximum water temperatures, Dunham *et al.* (2003) found that the probability of juvenile bull trout occurrence does not become high (i.e., greater than 0.75) until maximum temperatures decline to 52 to 54 degrees Fahrenheit.

Although bull trout are found primarily in cold streams, occasionally these fish are found in larger, warmer river systems throughout the Columbia River basin (Fraley and Shepard 1989; Rieman and McIntyre 1993, 1995; Buchanan and Gregory 1997; Rieman *et al.* 1997). Factors that can influence bull trout ability to survive in warmer rivers include availability and proximity of cold water patches and food productivity (Myrick *et al.* 2002). In Nevada, adult bull trout have been collected at 63 degrees Fahrenheit in the West Fork of the Jarbidge River (S. Werdon, Service, pers. comm. 1998) and have been observed in Dave Creek where maximum daily water temperatures were 62.8 to 63.6 degrees Fahrenheit (Werdon 2000). In the Little Lost River, Idaho, bull trout have been collected in water having temperatures up to 68 degrees Fahrenheit;

however, bull trout made up less than 50 percent of all salmonids when maximum summer water temperature exceeded 59 degrees Fahrenheit and less than 10 percent of all salmonids when temperature exceeded 63 degrees Fahrenheit (Gamett 1999). In the Little Lost River study, most sites that had high densities of bull trout were in an area where primary productivity increased in the streams following a fire (B. Gamett, U. S. Forest Service, pers. comm. 2002).

All life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Fraley and Shepard 1989, Goetz 1989, Hoelscher and Bjornn 1989, Sedell and Everest 1991, Pratt 1992, Thomas 1992, Rich 1996, Sexauer and James 1997, Watson and Hillman 1997). Maintaining bull trout habitat requires stability of stream channels and maintenance of natural flow patterns (Rieman and McIntyre 1993). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997). These areas are sensitive to activities that directly or indirectly affect stream channel stability and alter natural flow patterns. For example, altered stream flow in 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, Pratt 1992, Pratt and Huston 1993). Pratt (1992) indicated that increases in fine sediment reduce egg survival and emergence.

Bull trout typically spawn from August to November during periods of decreasing water temperatures. Preferred spawning habitat consists of low-gradient stream reaches with loose, clean gravel (Fraley and Shepard 1989). Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989, Pratt 1992, Rieman and McIntyre 1996). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992), and after hatching, juveniles remain in the substrate. Time from egg deposition to emergence of fry may surpass 200 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows (Pratt 1992, Ratliff and Howell 1992). Migratory forms of the bull trout appear to develop when habitat conditions allow movement between spawning and rearing streams and larger rivers or lakes where foraging opportunities may be enhanced (Frissell 1993). 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). Parts of this river system have retained habitat conditions that allow free movement between spawning and rearing areas and the mainstem Snake River. Such multiple life history strategies help to maintain the stability and persistence of bull trout populations to environmental changes. Benefits to migratory bull trout include greater growth in the more productive waters of larger streams and lakes, greater fecundity resulting in increased reproductive potential, and dispersing the population across space and time so that spawning streams may be recolonized should local populations suffer a catastrophic loss (Rieman and McIntyre 1993, MBTSG 1998, Frissell 1999). In the absence of the migratory bull trout life form, isolated populations cannot be replenished when disturbance makes local habitats temporarily unsuitable, the range of the species is diminished, and the potential for enhanced reproductive capabilities are lost (Rieman and McIntyre 1993).

### *3.1.4 Diet*

Bull trout are opportunistic feeders, with food habits primarily a function of size and life-history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macrozooplankton, and small fish (Boag 1987, Goetz 1989, Donald and Alger 1993). Adult migratory bull trout feed on various fish species (Leathe and Graham 1982, Fraley and Shepard 1989, Brown 1994, Donald and Alger 1993). In coastal areas of western Washington, bull trout feed on Pacific herring (*Clupea pallasi*), Pacific sand lance (*Ammodytes hexapterus*), and surf smelt (*Hypomesus pretiosus*) in the ocean (WDFW *et al.* 1997).

Bull trout migration and life history strategies are closely related to their feeding and foraging strategies. Optimal foraging theory can be used to describe strategies fish use to choose between alternative sources of food by weighing the benefits and costs of capturing one choice of food over another. For example, prey often occur in concentrated patches of abundance ("patch model"; Gerking 1994). As the predator feeds the prey population is reduced, and it becomes more profitable for the predator to seek a new patch rather than continue feeding on the original one. This can be explained in terms of balancing energy acquired versus energy expended. In the Skagit River system, anadromous bull trout make migrations as long as 121 miles between marine foraging areas in Puget Sound and headwater spawning grounds, foraging on salmon eggs and juvenile salmon along their migratory route (WDFW *et al.* 1997). Anadromous bull trout also use marine waters as migratory corridors to reach seasonal habitats in non-natal watersheds to forage and possibly overwinter (Brenkman, *in litt.*, 2003; Brenkman and Corbett, *in litt.*, 2003; Goetz, *in litt.*, 2003a,b).

A single optimal foraging strategy is not necessarily a consistent feature in the life of a fish, but this foraging strategy can change from one life stage to another. Fish growth depends on the quantity and quality of food that is eaten (Gerking 1994) 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, mysids and small fish (Shepard *et al.* 1984, Boag 1987, Goetz 1989, Donald and Alger 1993). Bull trout that are 4.3 inches long or longer commonly have fish in their diet (Shepard *et al.* 1984), and bull trout of all sizes have been found to eat fish half their length (Beauchamp and Van Tassell 2001).

Migratory bull trout begin growing rapidly once they move to waters with abundant forage that includes fish (Shepard *et al.* 1984, Carl 1985). As these fish mature they become larger bodied predators and are able to travel greater distances (with greater energy expended) in search of prey species of larger size and in greater abundance (with greater energy acquired). In Lake Billy Chinook as bull trout became increasingly piscivorous with increasing size, the prey species changed from mainly smaller bull trout and rainbow trout for bull trout less than 17.7 inches in length to mainly kokanee for bull trout greater in size (Beauchamp and Van Tassell 2001).

Migration allows bull trout to access optimal foraging areas and exploit a wider variety of prey resources. Bull trout likely move to or with a food source. For example, some bull trout in the Wenatchee basin were found to consume large numbers of earthworms during spring runoff in May at the mouth of the Little Wenatchee River where it enters Lake Wenatchee (USFWS 2003,

in prep.). In the Wenatchee River, radio-tagged bull trout moved downstream after spawning to the locations of spawning chinook and sockeye salmon and held for a few days to a few weeks, possibly to prey on dislodged eggs, before establishing an overwintering area downstream or in Lake Wenatchee (USFWS 2003, in prep).

## *3.2 Bull Trout Designated Critical Habitat*

### *3.2.1 Legal Status*

The Service issued a Final rule for bull trout critical habitat for the coterminous United States on October 18, 2010 (USFWS 2010). The bull trout critical habitat designation includes approximately 5730.8 miles of streams for the Mid-Columbia River Recovery Unit. A total of approximately 657.4 stream miles in the Grande Ronde River Critical habitat Unit (CHU) were designated (1,495.5 acres of reservoirs or lakes were also designated critical habitat in the Grande Ronde CHU). The Imnaha River CHU has 177.5 stream miles designated. Pine Creek Critical Habitat Subunit (CHSU), within the Hells Canyon Complex CHU, had 160.8 stream miles designated. Powder River CHU had 184.2 stream miles designated and 2, 216 acres of lakes and reservoirs designated. The John Day CHU had 677 stream miles designated and within this total the NF John Day River CHSU had 244.8 stream miles designated (USFWS 2010).

### *3.2.2 Conservation Role and Description of Critical Habitat*

The conservation role of bull trout critical habitat is to support viable core area populations (USFWS 2005). Core areas reflect the metapopulation structure of the coterminous United States population of the bull trout and are the closest approximation of a biologically functioning unit for the purposes of recovery planning and risk analyses. Critical habitat units generally encompass one or more core areas and may include foraging, migration, and overwintering areas, outside of core areas, that are important to the survival and recovery (i.e., conservation) of the bull trout. Protection of large areas of high-quality habitat, multiple populations and diverse genetic and life-history aspects are necessary to ensure a resilient, redundant, and representative distribution of bull trout populations.

Because there are exclusions associated with the critical habitat designation process that reflect land ownership, designated critical habitat is often fragmented. These individual critical habitat segments are expected to contribute to the ability of the stream to support viable local and core area populations of the bull trout in each critical habitat unit.

The primary function of individual critical habitat units is to maintain and support core areas which (1) contain bull trout populations with the demographic characteristics needed to ensure their persistence and contain the habitat needed to sustain those characteristics (Rieman and McIntyre 1993); (2) provide for persistence of strong local populations, in part, by providing habitat conditions that encourage movement of migratory fish (Rieman and McIntyre 1993; MBTSG 1998); (3) are large enough to incorporate genetic and phenotypic diversity, but small enough to ensure connectivity between populations (Rieman and McIntyre 1993; Hard 1995; Healey and Prince 1995; MBTSG 1998); and (4) are distributed throughout the historic range of

the species to preserve both genetic and phenotypic adaptations (Rieman and McIntyre 1993; Hard 1995; MBTSG 1998; Rieman and Allendorf 2001).

Within designated critical habitat areas, the PCEs for bull trout are those habitat components that are essential for the primary biological needs of foraging, reproducing, rearing of young, dispersal, genetic exchange, or sheltering. The PCEs of bull trout designated critical habitat are as follows:

> (1) Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia;
>
> (2) Migratory 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 with features such as large wood, side channels, pools, undercut banks and substrates to provide a variety of depths, gradients, velocities, structure;
>
> (5) Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade such as that provided by riparian habitat; and local groundwater influence.
>
> (6) Substrates 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 (e.g. less than 12 percent) of fine substrate less than 0.85 mm (0.03 in) in diameter; and minimal embeddedness of these fines in larger substrates are characteristic of these conditions;
>
> (7) A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph;
>
> (8) Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited;
>
> (9) Few or no nonnative predatory (e.g. lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g. brown trout) species present.

Throughout the remainder of this Opinion, the PCEs will be referred to by the corresponding number, as listed above.

Critical habitat includes the stream channels within the designated stream reaches, the shoreline of designated lakes, and the inshore extent of marine nearshore areas, including tidally influenced freshwater heads of estuaries.

In freshwater habitat, critical habitat includes the stream channels within the designated stream reaches, and includes a lateral extent as defined by the ordinary high-water line. In areas where ordinary high-water line has not been defined, the lateral extent will be defined by the bankfull elevation. 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. For designated lakes, the lateral extent of critical habitat is defined by the perimeter of the water body as mapped on standard 1:24,000 scale topographic maps.

In marine habitat, critical habitat includes the inshore extent of marine nearshore areas between mean lower low-water (MLLW) and minus10 meters (m) mean higher high-water (MHHW), including tidally influenced freshwater heads of estuaries. This refers to the area between the average of all lower low-water heights and all the higher high-water heights of the two daily tidal levels. The offshore extent of critical habitat for marine nearshore areas is based on the extent of the photic zone, which is the layer of water in which organisms are exposed to light. Critical habitat extends offshore to the depth of 33 ft. (10 m) relative to the MLLW (75 FR 2270).

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

### *3.2.3 Current Rangewide Condition of Designated Bull Trout Critical Habitat*

The condition of designated bull trout critical habitat varies across its range from poor to good. Although still relatively widely distributed across its historic range, the bull trout occurs in low numbers in many areas, and populations are considered depressed or declining across much of its range (67 FR 71240, 70 FR 56212, 75 FR 2270). This condition reflects the condition of bull trout habitat.

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 PCEs, those which appear to be particularly significant and have resulted in a legacy of degraded habitat conditions are as follows: (1) fragmentation and isolation of local populations due to the proliferation of dams and water diversions that have eliminated habitat, altered water flow and temperature regimes, and impeded migratory movements (Rieman and McIntyre 1993; Dunham and Rieman 1999); (2) degradation of spawning and rearing habitat and upper watershed areas, particularly alterations in sedimentation rates and water temperature, resulting from forest and rangeland practices and intensive development of roads (Fraley and Shepard 1989; MBTSG 1998); (3) the introduction

and spread of nonnative species as a result of fish stocking and facilitated by degraded habitat conditions, particularly for brook trout and lake trout, which compete with bull trout for limited resources and, in the case of brook trout, hybridize with bull trout (Leary *et al.* 1993; Rieman *et al.* 2006); (4) in the Coastal-Puget Sound region where amphidromous bull trout occur, degradation of mainstem river FMO habitat, and the degradation and loss of marine nearshore foraging and migration habitat due to urban and residential development; and (5) degradation of foraging, migration, and overwintering habitat resulting from reduced prey base, roads, agriculture, development and dams.

## 4. Environmental Baseline

Regulations implementing the Act (50§CFR 402.02) define the environmental baseline as the past and present impacts of all federal, state, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area which have undergone Section 7 consultation, and impacts of state and private actions which are contemporaneous with the consultation in progress. The action area is defined at 50 CFR 402 to imply all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

Bull trout environmental baseline in the action area is described below using data compiled and summarized during the comprehensive Bull Trout 5-Year Review process (USFWS 2008), the draft bull trout Recovery Plan chapters (USFWS 2002), the Final Rule designating bull trout critical habitat (USFWS 2005), and other available local information. These data are the most recent and comprehensive in analyzing current bull trout recovery status.

### *4.1 Description of the Subbasins, Watersheds, and Action Area*

The following descriptions are organized by 4th field HUCs and contain descriptions for the 5th field HUCs where the federal action will have an effect on bull trout or their designated critical habitat.

<u>Brownlee Reservoir –17050201</u>

*Pine Creek (1705020106)*

The Pine Creek watershed encompasses 193,665 acres. Fifty-eight percent of the watershed (112,628 acres) is administered by the Wallowa-Whitman National Forest. Precipitation ranges from over 70 in./yr. to 10 in./yr. Streams in this watershed have been disturbed by mining, grazing, timber harvest, and roads. Pine Creek watershed also experiences a higher incidence of high intensity storms leading to flooding.

Bull trout are found in Pine Creek, Middle Fork Pine Creek, West Fork Pine Creek, East Fork Pine Creek, Meadow Creek, Trail Creek, Clear Creek, East Pine Creek, Elk Creek, Big Elk Creek and Aspen Creek. Pine Creek bull trout are not isolated in the headwater streams but do migrate and utilize the reservoir during potions of their life cycle. Anadromous fish have been blocked from accessing Pine Creek since 1964 with the construction of the Hells Canyon Dam.

The Pine Creek watershed has a total of 370 miles of roads (open and closed) for a total road density of 2.64 mi./sq. mi. There are a total of 47 miles of trail in the watershed. Pine Creek watershed has 546 stream crossings (both perennial and intermittent channels) by roads and trails. There are also 67 miles of road and 17 miles of trail located within RHCAs (that would be a minimum of 100 ft. and a maximum of 300 ft.). Pine Creek 5th field HUC watershed provides 161 miles of bull trout designated critical habitat.

Imnaha River -17060102

The Imnaha River watershed encompasses 543,814 acres. Approximately 387,125 acres are administered by the Wallowa-Whitman National Forest. The two 5th field HUCs that are being consulted on are the Middle Imnaha River and Big Sheep Creek. The predominate geology is basalt. Principal soil types include residual soils derived from bedrock and ash or mixed soils. Elevations in this watershed range from 958 feet near the mouth to 9,675 feet. The average annual precipitation ranges from 12in./yr. to 47in./yr. Streams in this watershed have been disturbed by grazing and timber harvest as well as natural disturbances of wildfire and flooding.

*Middle Imnaha River (1706010202)*

Fish bearing streams in the Middle Imnaha River is Grouse Creek (SCH,ST)

The Middle Imnaha River watershed has a total of 127 miles of roads (open and closed) for a total road density of 1.71 mi./sq. mi. There are no trails in the watershed. Middle Imnaha River watershed has 239 stream crossings (both perennial and intermittent channels) by roads. There are also 15 miles of road located within RHCAs (that would be a minimum of 100 ft and a maximum of 300 ft.). The Middle Imnaha River 5th field HUC watershed provides 26.7 miles of bull trout designated critical habitat.

*Upper Big Sheep Creek (1706010207)*

Fish bearing streams in the Upper Big Sheep Creek are Big Sheep Creek (BT, SCH, ST), Carrol Creek, (ST), Lick Creek (BT,SCH,ST), Salt Creek (ST,) Tyee Creek (ST), Mud Springs Creek (ST)

Additional descriptions of the watersheds and stream habitat conditions can be found in the Imnaha Subbasin Multispecies Biological Assessment (2002).

The Upper Big Sheep Creek watershed has a total of 186 miles of roads (open and closed) for a total road density of 2.06 mi./sq. mi. There are three miles of trail in the watershed. Upper Big Sheep Creek watershed has 291 stream crossings (both perennial and intermittent channels) by roads and 15 crossings by trails. There are also 27 miles of road and two miles of trail located within RHCAs (that would be a minimum of 100 ft. and a maximum of 300 ft.). Upper Big Sheep 5th field HUC watershed provides 50.2 miles of bull trout designated critical habitat.

North Fork John Day – 17070202

The North Fork John Day subbasin contributes over 60 percent of the flow to the John Day River. Elevation ranges from 1830 feet to 8300 feet. Forest Service administers about 60 percent of the subbasin. Federally listed fish species include Columbia River bull trout and Middle Columbia River steelhead.

*Granite Creek (1707020293)*

The Granite Creek watershed consists of approximately 94,526 acres of which approximately 41,698 acres are administered by the Wallowa-Whitman National Forest. Bull trout are found in upper Granite Creek, Bull Run Creek, Boundary Creek, Deep Creek. Middle Columbia River steelhead are found in Granite Creek, Bull Run Creek, Boundary Creek and Deep Creek

The Granite Creek watershed has a total of 327 miles of roads (open and closed) for a total road density of 5.36 mi./sq. mi. There are three miles of trail in the watershed. Granite Creek watershed has 284 stream crossings (both perennial and intermittent channels) by roads and three crossing by trails. There are also 72 miles of road and no trails located within RHCAs (that would be a minimum of 100 ft. and a maximum of 300 ft.). Granite Creek 5$^{th}$ field HUC watershed provides 57.8 miles of bull trout designated critical habitat.

*Upper North Fork John Day River (1707020294)*

The Upper North Fork John Day River encompasses approximately 71,464 acres of which approximately 42,894 acres are administered by the Wallowa-Whitman National Forest. Bull Trout are found in upper North Fork John Day River, Crane Creek, Trail Creek, and Onion Creek. Middle Columbia River steelhead are found in the upper North Fork John Day River, Trail Creek, and Onion Creek.

The Upper North Fork John Day River watershed has a total of 164 miles of roads (open and closed) for a total road density of 2.59 mi./sq. mi. There is one mile of trail in the watershed. The Upper North Fork John Day River watershed has 147 stream crossings (both perennial and intermittent channels) by roads and one crossing by trails. There are also 32 miles of road located within RHCAs and no trails (that would be a minimum of 100 ft. and a maximum of 300 ft.) and 0.04 miles of trail located within RHCAs. Upper North Fork John Day River 5$^{th}$ field HUC watershed provides 58.3 miles of bull trout designated critical habitat.

Powder River – 17050203

*Eagle Creek (1705020314)*

The Eagle Creek watershed consists of approximately 123,377 acres and flows into the Powder River. Approximately 85 percent of the watershed is administered by the Wallowa-Whitman National Forest. A significant portion of the watershed is in the Eagle Cap Wilderness. The watershed has been disturbed by timber harvest, irrigation withdrawals, roads, and grazing

There are no federally listed fish within the watershed. Anadromous fish have not had access to the watershed since 1964 with the construction of Hells Canyon Dam. Critical habitat for bull trout has been proposed, primarily as a refounding area for recovery. Extensive sampling for bull trout in the watershed has not found any bull trout.

The Eagle Creek watershed has a total of 443 miles of roads (open and closed) for a total road density of 2.96 mi./sq. mi. There are 11 miles of trail in the watershed. The Eagle Creek watershed has 775 stream crossings (both perennial and intermittent channels) by roads and 14 crossings by trails. There are also 113 miles of road and two miles of trails located within RHCAs (that would be a minimum of 100 ft. and a maximum of 300 ft.). Eagle Creek 5$^{th}$ field HUC watershed provides 62.4 miles of bull trout designated critical habitat.

*North Powder River (1705020305)*

The North Powder River watershed consists of approximately 192,421 acres of which approximately 29,636 acres are administered by the Wallowa-Whitman National Forest. Precipitation averages 30in./yr. The watershed has been disturbed by timber harvest, irrigation withdrawals, roads, and grazing. Bull Trout have been found in Salmon Creek, the upper North Powder River, Anthony Creek, Pine Creek and Rock Creek.

The North Powder River watershed has a total of 186 miles of roads (open and closed) for a total road density of 2.53 mi./sq. mi. The North Powder River watershed has 188 stream crossings (both perennial and intermittent channels) by roads and six by trails. There are also 43 miles of roads and one mile of trails located within RHCAs (that would be a minimum of 100 ft. and a maximum of 300 ft.).

*Powder River-Wolf Creek (1705020306)*

The Powder River – Wolf Creek watershed consists of approximately 107,196 acres of which 61,597 acres are administered by the Wallowa-Whitman National Forest. This watershed drains to the North Powder River. Precipitation averages 30in/yr. The watershed has been disturbed by timber harvest, irrigation withdrawals, roads, and grazing. Wolf Creek is the only stream that contains bull trout in the watershed. No anadromous species are found in the watershed.

The Powder River –Wolf Creek watershed has a total of 142 miles of roads (open and closed) for a total road density of 6.28 mi./sq. mi. There are no trails in the watershed. The Powder River – Wolf Creek watershed has 182 stream crossings (both perennial and intermittent channels) by roads. There are also 27 miles of road located within RHCAs (that would be a minimum of 100 ft. and a maximum of 300 ft.). The Powder River-Wolf Creek 5$^{th}$ field HUC watershed provides 20 miles of bull trout designated critical habitat.

*Upper Powder River (1705020301)*

The Upper Powder River watershed consists of approximately 105,345 acres of which approximately 82,000 acres are administered by the Wallowa-Whitman National Forest. Major tributaries include Deer Creek, Cracker Creek, Phillips Reservoir, McCully Creek, Dean Creek,

Clear Creek, Silver Creek, Union Creek and Bridge Creek. The elevation in this watershed ranges from 4,070 feet to 9,039 feet. The watershed changes from rocky faces and sagebrush meadows to midslope and lower elevation forests of ponderosa pine and Douglas-fir intermixed with other coniferous species. The average precipitation ranges from 16in/yr to 35 in/yr. The geology of the watershed is highly complex with granitics and argillites in addition to basalts and andesitic tuffs. The watershed is geologically very stable.

Fish bearing streams in the watershed are typically Rosgen B type channels with gradients from two to four percent. These streams have been heavily disturbed by placer and dredge mining. The lower reaches of the Power River is a Rosgen C type channel which has been completed disturbed by dredge mining across the entire floodplain. The watershed has experienced wildfires, floods, and disease and insect infestations.

Bull trout are the only listed fish inhabiting the Upper Powder Watershed. Bull trout are known to exist in Lake, Little Cracker, and Silver Creeks and Phillips Reservoir. Historical records indicate bull trout to inhabit Fruit Creek and the Powder River.

The Upper Powder River watershed has a total of 546 miles of roads (open and closed) for a total road density of 4.42 mi./sq. mi. There are 38 miles of trails in the watershed. The North Powder River watershed has 845 stream crossings (both perennial and intermittent channels) by roads and twenty crossings by trails. There are also 126 miles of road and three miles of trail located within RHCAs (that would be a minimum of 100 ft. and a maximum of 300 ft.). The Upper Powder River 5$^{th}$ field HUC watershed provides 41.7 miles of bull trout designated critical habitat.

Upper Grande Ronde River – 17060104

A full description of the Upper Grande Ronde River and its fifth field watershed can be found in the Upper Grande Ronde, Middle Grande Ronde and Catherine Creek Watershed Biological Assessments. These biological assessments contain a description of the watersheds environmental baseline and biological baseline.

*Grande Ronde River-Beaver Creek (1706010408)*

The Grande Ronde River – Beaver Creek Watershed contains bull trout in the Grande Ronde River, Hoodoo Creek (Beaver), and Beaver Creek.

The Grande Ronde River – Beaver Creek watershed has a total of 333 miles of roads (open and closed) for a total road density of 3.81 mi./sq. mi. The Grande Ronde River-Beaver Creek watershed has 486 stream crossings (both perennial and intermittent channels) by roads and six crossings by trails. There are also 57 miles of road and two miles of trails located within RHCAs (that would be a minimum of 100 ft. and a maximum of 300 ft.). The Grande Ronde River-Beaver Creek 5$^{th}$ field HUC watershed provides 14 miles of bull trout designated critical habitat.

*Grande Ronde River – Five Points Creek (1706010404)*

The Grande Ronde River – Five Points Creek watershed contains bull trout at the mouth of Five Points Creek on private land.

The Grande Ronde River – Five Points Creek watershed has a total of 174 miles of roads (open and closed) for a total road density of 3.68 mi./sq. mi. There are twenty one miles of trail in the watershed. The Grande Ronde River-Five Points Creek watershed has 259 stream crossings (both perennial and intermittent channels) by roads and 51 crossings by trails. There are also 27 miles of roads and seven miles of trails located within RHCAs (that would be a minimum of 100 ft. and a maximum of 300 ft.). The Grande Ronde River-Five Points Creek 5$^{th}$ field HUC watershed provides 37.8 miles of bull trout designated critical habitat.

*Grande Ronde River- Indian Creek (1706010409)*

The Grande Ronde River – Indian Creek watershed contains bull trout in Camp Creek, Indian Creek, and potentially in N.F Indian Creek.

The Grande Ronde River – Indian Creek watershed has a total of 137 miles of roads (open and closed) for a total road density of 4.08 mi./sq. mi. There are eight miles of trail in the watershed. The Grande Ronde River-Indian Creek watershed has 236 stream crossings (both perennial and intermittent channels) by roads and 13 crossings by trails. There are also 31 miles of road and thirteen by trails located within RHCAs (that would be a minimum of 100 ft. and a maximum of 300 ft.). The Grande Ronde River-Indian Creek 5$^{th}$ field HUC watershed provides 44.3 miles of bull trout designated critical habitat.

*Upper Catherine Creek (1706010405)*

Upper Catherine Creek watershed contains bull trout in Catherine Creek, N.F. Catherine Creek, S.F. Catherine Creek, Sandpass Creek, and Pole Creek

The Upper Catherine Creek watershed has a total of 206 miles of roads (open and closed) for a total road density of 2.81 mi./sq. mi. There are seven miles of trail in the watershed. The Upper Catherine Creek watershed has 567 stream crossings (both perennial and intermittent channels) by roads and eleven by trails. There are also 55 miles of road and two miles of trail located within RHCAs (that would be a minimum of 100 ft. and a maximum of 300 ft.). Upper Catherine Creek 5$^{th}$ field HUC watershed provides 47 miles of bull trout designated critical habitat.

*Upper Grande Ronde River (1706010401)*

Upper Grande Ronde River watershed contains bull trout are found in the Upper Grande Ronde River, Limber Jim Creek, and Indiana Creek.

The Upper Grande Ronde River watershed has a total of 692 miles of roads (open and closed) for a total road density of 4.02 mi./sq. mi. There are 55 miles of trail in the watershed. The Upper

Grande Ronde River watershed has 1,465 stream crossings (both perennial and intermittent channels) by roads and 97 crossings by trails. There are also 168 miles of road and 12 miles of trails located within RHCAs (that would be a minimum of 100 ft. and a maximum of 300 ft.). The Upper Grande Ronde River 5th field HUC watershed provides 82.4 miles of bull trout designated critical habitat.

## *4.2 Status of the Species and Critical Habitat in the Action Area*

### *4.2.1 Bull Trout in the Grande Ronde River Basin*

The Grande Ronde River Critical Habitat Unit (CHU) is located in northeast Oregon and southeast Washington and includes the mainstem Grande Ronde River from its headwaters to the confluence with the Snake River. The unit is divided into a Grande Ronde critical habitat subunit and a Little Minam critical habitat subunit. The Grande Ronde subunit includes large portions of Union and Wallowa Counties and a small portion of Umatilla County in Oregon as well as about a third of Asotin County and small portions of Columbia, and Garfield counties in Washington. The Little Minam subunit is located entirely within the Eagle Cap Wilderness on the western edge of the Wallowa subbasin, in both Union and Wallowa Counties.

Two wilderness areas are designated within the Grande Ronde River CHU. The Eagle Cap Wilderness is located in the Wallowa-Whitman National Forest, encompasses 361,446 acres, and includes most of the Minam, upper Wallowa and Lostine river drainages as well as Bear Creek and Hurricane Creek and a small portion of Catherine Creek. Federal Wild and Scenic River status is designated for the Lostine and Minam rivers and Oregon State Scenic Waterway status is designated to the Minam and Wallowa rivers. The Grande Ronde River, with its headwaters in the Wallowa-Whitman National Forest, is designated as a Federal Wild and Scenic River and a State Scenic Waterway from the confluence with the Wallowa River to the Washington border. The Wenaha-Tucannon Wilderness is located in the Umatilla National Forest, encompasses 177,465 acres and includes most of the Wenaha River drainage. The Wenaha River is designated as a Federal Wild and Scenic River.

The Grande Ronde Critical Habitat Sub-Unit contains at least ten local populations in the Grande Ronde River Basin CHU and within the greater Mid-Columbia Recovery Unit (Table 3). These include: 1) Upper Grande Ronde; 2) Catherine; 3) Indian; and 4) Minam/Deer; 5) Lostine/Bear; 6) Upper Hurricane; 7) N.F. Wenaha; 8) S.F. Wenaha; 9) Butte and WF Butte; and 10) Lookingglass. The Little Minam critical habitat subunit includes the Little Minam River, a tributary to the Minam River. This subunit encompasses tributaries containing one local population located above a barrier falls at approximately km 9 (mi. 5.6) as well as the Little Minam River below the barrier to the confluence with the Minam River.

The Grande Ronde River CHU includes the Grande Ronde core area and the Little Minam core area. The Grande Ronde core area includes large portions of Union and Wallowa Counties and a small portion of Umatilla County in Oregon, as well as about one-third of Asotin County and small portions of Columbia and Garfield Counties in Washington.

The designated critical habitat described below is our best assessment of stream or river reaches essential for conservation of bull trout for the Grande Ronde River Basin Critical Habitat Unit, and is based on the best scientific and commercial information available. These stream reaches are believed to be essential for the conservation of the species because they currently support bull trout populations (occupied habitat) and/or provide high quality habitat to potentially expand bull trout distribution and are considered to be essential for recovery of bull trout in the Mid-Columbia Recovery Unit.

The factors that were considered important in the selection of stream or river reaches include current occupation by bull trout, presence of suitable life history requirements (i.e., PCE's, primary constituent elements), historical distribution, opportunity for genetic diversity, distribution across representative habitats, sufficient habitat to support population viability, multiple local populations in an area for conserving population units, and connectivity.

The entire occupied area of the Grande Ronde Basin Critical Habitat Unit (CHU) is essential to the recovery unit because it is a bull trout stronghold within the Mid-Columbia Recovery Unit and within the states of Oregon and Washington. The Grande Ronde basin Core area contains ten populations that contain many healthy populations. The Little Minam Core area contains one healthy resident population. In total, these eleven populations are spread over a large geographical area with multiple age classes, containing both resident and fluvial fish. This bull trout stronghold also has: an anadromous prey base; connectivity with the Snake River; bull trout are generally distributed throughout the habitat; and habitat conditions vary; but in several of the populations including the Wenaha, Lostine, Lookingglass, and Little Minam populations there are excellent habitat conditions (many designated as wild and scenic rivers and/or located within or near wilderness).

The extent to which these local populations are genetically distinct is unknown; they were delineated based primarily on known geographic, physical, and thermal barriers between spawning populations.

**Table 3. Bull Trout local populations in the Grande Ronde River**

| Local Population | Life History Forms Currently Present | Risk Status (Ratliff and Howell 1992) |
|---|---|---|
| Upper Grande Ronde River | Resident | Moderate |
| Catherine Creek | Fluvial & Resident | Moderate |
| Indian Creek | Resident | Moderate |
| Minam River/Deer Creek | Resident & Fluvial | Minam R: Low<br>Deer Ck: Special Concern |
| Little Minam River | Resident | Low |
| Lostine River/Bear Creek | Resident & Fluvial | Lostine: Moderate<br>Bear Ck: Special Concern |
| Upper Hurricane Creek | Resident | Special Concern |

| | | |
|---|---|---|
| N.F. Wenaha River | Resident & Fluvial | Low |
| S.F. Wenaha River | Resident & Fluvial | Low |
| Butte and W.F. Butte | Resident & Fluvial | Low |
| Lookingglass Creek | Resident & Fluvial | Moderate |

Catherine Creek Population

Bull trout in Catherine Creek have been observed throughout the mainstem and in North Fork Catherine Creek, South Fork Catherine Creek, Middle Fork Catherine Creek, Sand Pass Creek, Collins Creek, and Pole Creek (USFWS 2002). Catherine Creek has been designated as critical habitat from its confluence with the Grande Ronde River upstream (including main-stem Catherine Creek, N.F., S.F., M.F., Collins Creek, Sand Pass Creek, and Pole Creek) (Service 2010). Bull trout critical habitat (considered foraging, migratory, and overwintering [FMO] habitat) begins at the confluence with the Grande Ronde River and Catherine Creek upstream to the junction of North Fork and South Fork Catherine Creek. Spawning and rearing critical habitat continues upstream from the confluence of North Fork and South Fork Catherine Creek upstream to the headwaters (N.F., S.F., and M.F Catherine Creek, Collins Creek, Sand Pass Creek, and Pole Creek). Bull trout have been observed throughout the mainstem of Catherine Creek and migratory fluvial fish are present (USFWS 2004c; Buchanan *et al.* 1997; P. Boehne, USFS, pers. comm. 2009).

ODFW biologists have surveyed 1.3 miles of bull trout spawning habitat on North Fork Catherine Creek from 1998 to 2006, 2008, and 2010. No bull trout spawning surveys were conducted in 2007 or 2009 on Catherine Creek. Bull trout redds per mile were highest in 1998 with 25.4 redds per mile and dropped to a low of 1.5 redds per mile in 2003 and 2008 (Figure 1). Bull Trout redds per mile on North Fork Catherine Creek increased to 8.5 in 2010, which is the same as documented in 1999, and 2005 (ODFW 2007; ODFW 2010).

Twenty years ago, large bull trout were caught in the town of Union (prior to current restrictions on catch of bull trout). N.F. Catherine Creek in the 1990's had documented large fluvial bull trout, which would have migrated through the town of Union. Bull trout data have been collected at the downstream migrant traps and smolt trap at River Mile (RM) 20 (the town of Union is at about RM 17-18). Juvenile movement has been documented to occur every month between January-November at the above site, with the peaks occurring in Jan-February, May-June, and September-November. Migration of adults at the weir has been documented to occur from mid-April to mid-July and in October and November. The peak adult fluvial migration appears to be at the end of June (Zakel, ODFW, personal communication, 2006).

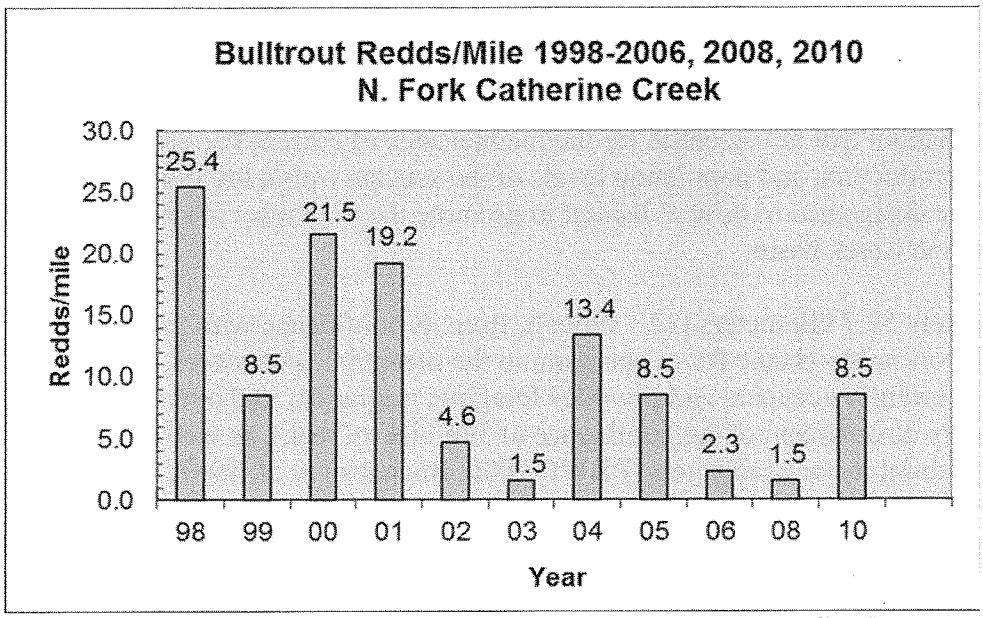


**Figure 1. Bull Trout Redds per Mile on North Fork Catherine Creek (1998-2006, 2008, 2010; surveys were not conducted in 2007 and 2009)**

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) has documented numbers of adult bull trout collected at the weir from 2002 to 2010. The range has been 1-31, with the lowest number (1) being recorded in 2006 and the highest number (31) in 2010. The earliest sample date for bull trout captured at the weir has been March 26, 2007 and the latest date recorded was August 19, 2009. In 2008, one fluvial bull trout was captured on July 14$^{th}$. In 2010, the first bull trout caught at the weir was sampled on April 12, 2010, and the last fish sampled was collected on July 9, 2010.

Indian Creek Population

Bull trout have been observed in the mainstem of Indian Creek and in the East Fork of Indian Creek and Camp Creek (Buchanan *et al.* 1997). All known holding and rearing areas are on National Forest lands in the headwaters of the drainage. Presumably spawning also occurs in these headwater tributaries. Historically, fish were probably distributed throughout the mainstem of Indian Creek and connected to the Grande Ronde River. However, habitat in the lower reaches of Indian Creek is degraded in several places during the summer due to high water temperature, partially due to irrigation withdrawal, and there are no recent reports of bull trout in these reaches. Ratliff and Howell (1992) considered bull trout in Indian Creek at moderate risk of extinction. No information is available on the abundance of bull trout in Indian Creek. Standard redd counts or creel surveys are not conducted on a regular basis. No information has been collected on the size of these fish at spawning, age at maturation, sex ratio, fecundity, time of emergence, and survival rates. It is likely that bull trout in this population exhibit a resident life history form.

*4.2.2 Pine Creek CHSU and Pine Creek Local Populations*

The following streams are essential for the conservation of bull trout in the Pine Creek basin. These streams provide habitat that are essential for the maintenance of current known distribution, rates of reproduction, and population levels of the species within the Pine Creek Basin: Many areas were designated as critical habitat to promote the migratory life history expression within the Pine Creek basin.

Pine Creek (approximately 52.7 kilometers [32.7 miles]), from its confluence with the west bank of Hells Canyon Reservoir on the Snake River upstream to the perennial headwaters, is critical habitat. Pine Creek is currently occupied and provides foraging, migration, and overwintering habitat (FMO) (generally downstream of the confluence of Jim Fiske Creek), as well as spawning and rearing habitat in the headwaters (PBWC 2000; Buchanan *et al.* 1997; Chandler *et al.* 2001). Telemetry studies indicate that bull trout from Hells Canyon Reservoir have migrated upstream into Pine Creek (J. Chandler, Idaho Power Company, *in litt.* 2000). One of five bull trout radio-tagged in August 1998 from Pine Creek moved upstream into East Fork Pine Creek (Chandler *et al.* 2001) which shows potential movement from lower Pine Creek into the upper watersheds of Pine Creek.

In the Pine Creek basin, bull trout occur in: upper Pine Creek, which includes West Fork Pine Creek, Middle Fork Pine Creek, and East Fork Pine Creek; Clear Creek; which includes upper Clear Creek, Trail Creek, and Meadow Creek; East Pine Creek; and Elk Creek, which includes the entire length of Elk Creek, Big Elk Creek, Aspen Creek, and Cabin Creek (Buchanan *et al.* 1997). Although bull trout were noted in a creel report from Lake Fork Creek in 1965, extensive sampling of the stream since 1990 collected brook trout, but did not detect bull trout (other than the bull trout observed there during the study by Idaho Power Company). The length distribution of bull trout surveyed from various streams in the Pine Creek basin during 1994 (Buchanan *et al.* 1997), and the limited pre- and post-spawning movements exhibited by radio-tagged fish (Chandler *et al.* 2001) suggest that most bull trout in the basin are resident fish. However, the movement of radio-tagged bull trout from Hells Canyon Reservoir to Pine Creek suggests that migratory fish persist in the basin. ODFW has been conducting spawning surveys in Pine system from 1999 to 2010. Sixty bull trout redds for 7.7 miles of survey were documented in 2010 in the Pine Creek Basin (including Pine, EF Pine, Clear, Elk, Meadow, and Aspen Creeks). Pine Basin had 7.8 redds/mile in 2010. The highest redds per mile were documented in 2001 and 2004, 13.3 and 13.4 redds/mile. The lowest redds per mile in Pine Creek basin were documented in 1999 and 2008, 5.8 and 6.2 redds/mile. Redd count data for Pine Creek tributary streams data for 1999 to 2010 is displayed below in Figure 2.

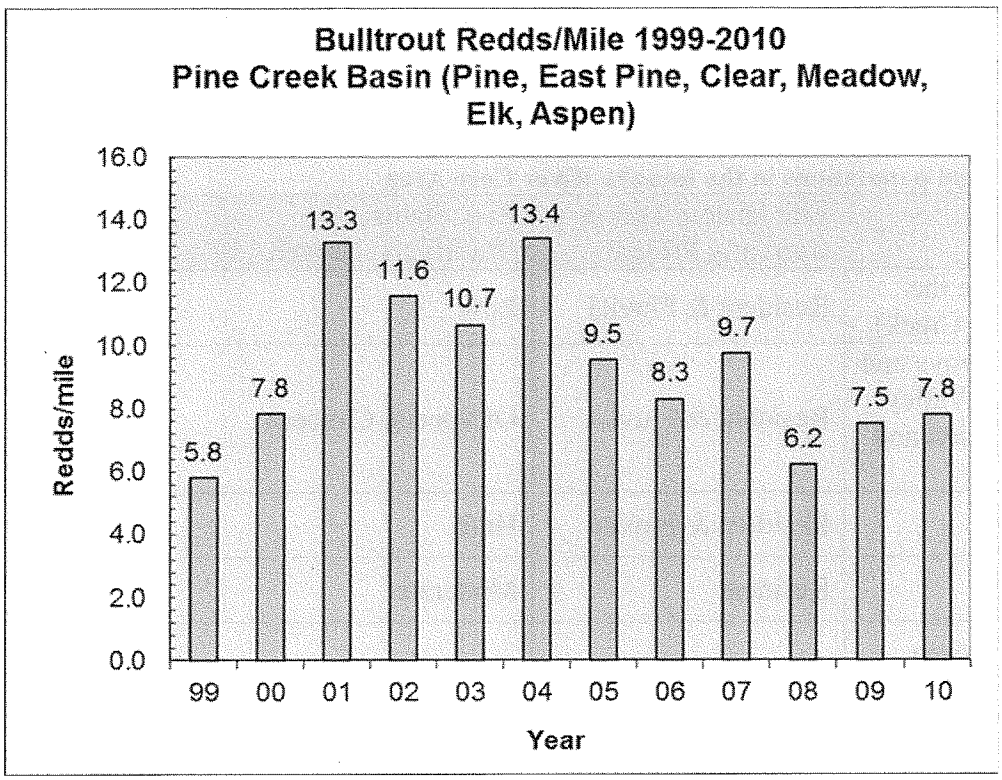


**Figure 2. 1999-2010 Bull Trout Redds per Mile in Pine Creek Basin**

*4.2.3 Imnaha CHU and Imnaha River Local Populations*

The entire occupied area of the Imnaha River Basin CHU and the Imnaha River Core Area are essential to the recovery unit because the Imnaha River CHU/Core Area is a bull trout stronghold within the Columbia basin and within the state of Oregon. The Imnaha River Core area contains four populations that are generally healthy; especially the Imnaha River population which was rated at low risk of extinction by Buchanan *et al.* (1997). These four populations are spread over a large geographical area with multiple age classes, containing both resident and fluvial fish. This bull trout stronghold also has an anadromous prey base; connectivity with the Snake River; wide distribution throughout the habitat; and overall, excellent habitat conditions. Primary spawning activity on the Imnaha River has been documented to occur in the headwaters, which lie within wilderness, and contain higher elevation, coldwater habitat that should help ameliorate future climate change effects on bull trout in the Columbia River Basin.

The four local populations in the Imnaha River core area (Table 4) are located in: 1) mainstem Imnaha; 2) Big Sheep Creek and tributary streams (Big Sheep Creek is considered to be one local population above and below the Wallowa Valley Irrigation Canal); 3) Little Sheep Creek and tributary streams; and 4) McCully Creek (USFWS 2002). Cook and Hudson (2008) describe five populations which include the above populations and in addition they divide Big Sheep above the diversion and below into two populations.

The extent to which these local populations are genetically distinct is unknown; they were delineated based primarily on known geographic, physical, and thermal barriers between spawning populations.

**Table 4. Bull Trout local populations in the Imnaha River Core Area**

| Local Population | Life History Forms Currently Present | Risk Status (Ratliff and Howell 1992) |
|---|---|---|
| Imnaha River (above the mouth of Big Sheep Creek) | Resident & Fluvial | Low |
| Big Sheep Creek (above and below the Wallowa Valley Improvement diversion and in the canal) | Resident & Fluvial | Of Special Concern |
| Little Sheep Creek | Resident & Fluvial | High |
| McCully Creek | Resident | Moderate |
| Imnaha River Core Area | | |

One hundred and thirty three total bull trout redds for 19.4 miles of survey were documented in 2010 on the Imnaha River (from Indian Crossing to Blue Hole and upstream). The following data for the Imnaha River compares consistently surveyed index areas on the Imnaha River (17.5 miles) from 2001 to 2010 (Figure 3). The ten-year average from 2001 to 2010 was 193 redds for the Imnaha River system. Total redd numbers on the Imnaha ranged from 101-262 within that period. The highest bull trout redd counts for the Imnaha River from 2001 to 2010 was recorded in the Upper Imnaha from Blue Hole to Cliff Creek, including Upper Imnaha tributaries.

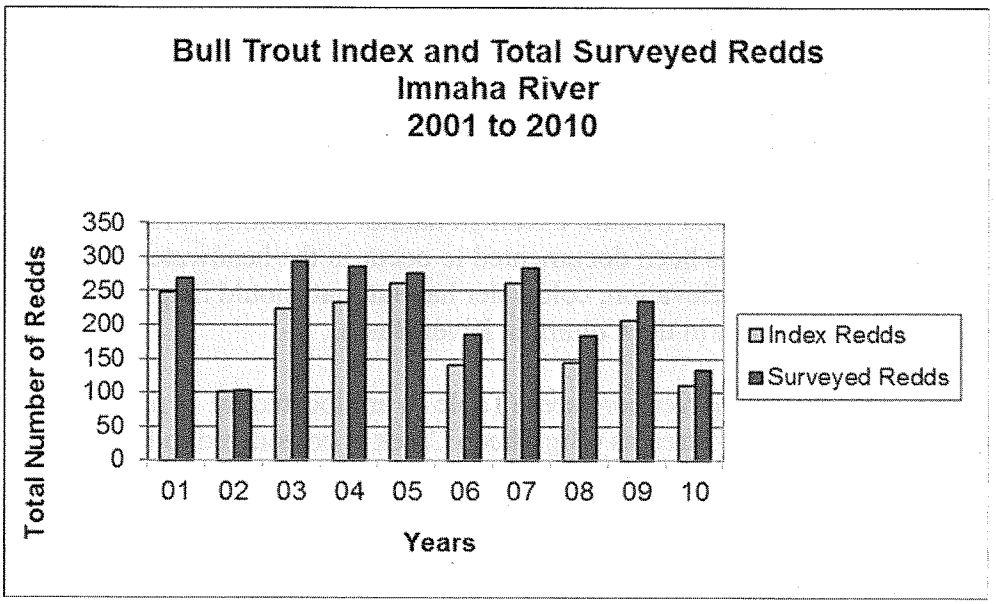


**Figure 3. Comparison of bull trout surveyed redds and index redds (comparable miles) documented from 2001 to 2010 on the Imnaha River.**

Twenty total bull trout redds for 9.6 miles of survey were documented in 2010 on Big Sheep Creek and Lick Creek. The following data for Big Sheep Creek compares consistently surveyed index areas on Big Sheep and Lick Creek (7.6 miles) from 2000 to 2010 (Figure 4). The eleven-year average from 2000 to 2010 was 18 redds for the Big Sheep system. Total redd numbers within the Big Sheep system ranged from 8-34 within that period. Redd surveys for bull trout in the Big Sheep system have been limited in miles of survey and in frequency.

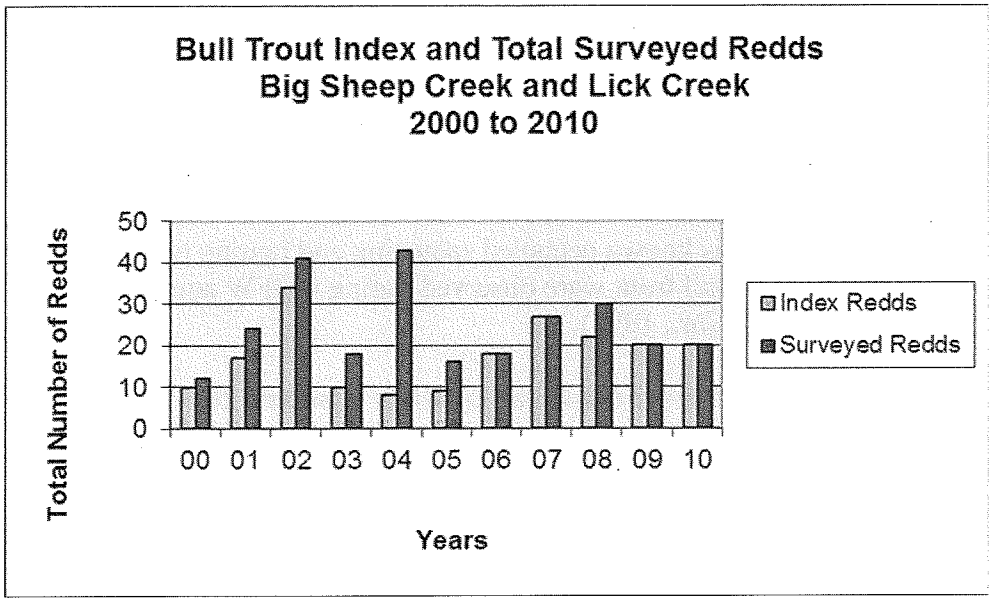


**Figure 4. Comparison of bull trout surveyed redds and index redds (comparable miles) documented from 2000 to 2010 on Big Sheep and Lick Creeks.**

The local bull trout populations in Big Sheep and Lick Creek appear to be relatively stable for the survey period (2000-2010), with a downward trend in the Imnaha population in 2010. If you subtract the resident cliff creek population from the Upper Imnaha redd counts, there is a significant downward trend in both 2009 and 2010 (Sausen 2011).

*4.2.4 John Day River CHU and North Fork John Day CHSU*

The John Day River Basin CHU in the John Day River Basin in eastern Oregon includes portions of the mainstem John Day River, North Fork John Day River, Middle Fork John Day River and their tributary streams within Wheeler, Grant, and Umatilla Counties in Oregon. Four critical habitat subunits (CHSUs) are defined for the John Day River unit: Lower Mainstem John Day River, Upper Mainstem John Day River, North Fork John Day River, and Middle Fork John Day River. Bull trout in the John Day Basin exhibit both resident and fluvial life histories. The latter three generally correspond to core areas. A total of twelve local populations are found in this CHU. Research is needed to evaluate the status of the populations in this CHU. All critical habitat designations are essential to the long-term conservation of the species. The Confederated Tribes of the Warm Springs owns lands in this CHU.

The North Fork John Day River and its tributary, the Middle Fork John Day River, flow into the mainstem John Day River with no major physical barriers between them, except for barriers as a

consequence of low flow and high stream temperatures during summer that may limit the seasonal distribution of individuals. Seven local bull trout populations have been identified in the North Fork John Day River subunit: (1) the upper John Day River local population complex, including Crawfish, Baldy, Cunningham, Trail, Onion, and Crane Creeks, as well as the North Fork John Day River upstream of Granite Creek; (2) upper Granite Creek, including Bull Run, Deep, and Boundary Creeks and the upper mainstem Granite Creek; (3) Boulder Creek; (4) Clear/Lightning Creek, including Salmon Creek; (5) Clear Creek below the Pete Mann ditch, including Lightning Creek below the ditch; (6) Desolation Creek, including South Fork Desolation Creek below the falls and North Fork Desolation Creek; and (7) South Fork Desolation Creek above the falls.

The North Fork John Day River, from its confluence with the John Day River upstream 138.7 km (86.2 mi) to Granite Creek, is occupied FMO habitat (USFWS 2002). From Granite Creek upstream 40.0 km (24.9 mi) to its source is known occupied spawning and rearing habitat (Buchanan *et al.* 1997; USFWS 2002). Bull trout were observed during ODFW aquatic inventories in 1991 and 1993 (ODFW, *in litt.*, 1997).

Granite Creek, from the confluence with North Fork John Day River upstream 26.2 km (16.3 mi) to its source, is known historic spawning and rearing habitat (prior to 1990 in Buchanan *et al.* 1997). It currently provides FMO habitat for local bull trout populations in tributaries to Granite Creek. A bull trout radio tagged in the mainstem John Day River near Spray in April of 2000 was located in July 2000 at km 6.01 in Granite Creek (Hemmingsen *et al.* 2001a).

*4.2.5 Powder River CHU*

The Powder River CHU is located within Baker, Union, and Wallowa Counties in northeastern Oregon. This unit is thought to contain up to nine resident bull trout local populations, which are small and highly fragmented. Bull trout in the Powder River basin are part of the Hells Canyon complex and represent the southern range of the Middle Columbia/Snake River Recovery Unit. Little is known about the status of bull trout in this CHU.

Bull trout in the Powder River Basin are believed to be resident (USFWS 2002). There may have been a fluvial life history historically, but there is no documentation. Access to the Snake River was blocked for bull trout in the upper Powder Basin in 1932, with the construction of Thief Valley Dam on the mainstem Powder River. Bull trout in Eagle Creek may have had access to the Snake River. A twelve inch bull trout was caught during net sampling in Brownlee Reservoir in 1959 (Buchanan *et al.* 1997).

Bull trout in the Powder River basin are part of the Hells Canyon complex and represent the southern range of the Middle Columbia/Snake River Recovery Unit. The draft revised recovery plan (USFWS 2002) identified nine local populations in the Powder River Basin, although another local population (in Rock Creek) was added during the 2008 core area assessments (PBCAA 2008). All are located in headwater streams draining the Elkhorn Mountain Range and persist in areas where the habitat is still suitable.

The role of the Powder River basin habitat to the Middle Columbia/Snake River Recovery Unit is unknown. Redd surveys were conducted from 1996 through 1999, in three Powder Basin streams, but the length of record is not sufficient to determine trend. The populations have not been assessed since 1999. Results of snorkel and electrofishing surveys in Silver Creek in 1999, resulted in a population estimate of 885 bull trout 150 millimeters (5.1 inches) fork length or greater (Hemmingsen *et al.* 2001b).

Bull trout are found in the following *fifth field* (sixth field) watersheds on the Wallowa-Whitman National Forest within the Powder River basin.

*Upper Powder River* (Cracker Creek, Deer Creek, Phillips Reservoir)
*Powder River/Rock Creek* (Upper Salmon, Lower Salmon, Muddy Creek)
*North Powder River* (Lower Anthony Creek, Upper Anthony Creek, Upper North Powder River)
*Wolf Creek* (Upper Wolf Creek)
*Powder River/Eagle* (Upper Eagle Creek, West Eagle Creek, Eagle Creek/Bennett Creek, East Fork Eagle Creek, Eagle Creek/Paddy Creek, Little Eagle Creek, Lower Eagle Creek)

Eagle Creek from the confluence with the Powder River upstream to the perennial headwaters is designated as critical habitat. The lower river below the East Fork Eagle Creek confluence provides 34.0 km (21.1 mi) of FMO habitat. There is 26.9 km (16.7 mi) of spawning and rearing habitat upstream of the confluence with East Fork Eagle Creek. Eagle Creek has numerous historical (1940s–1980s) records and recent (1990s) angler reports of bull trout. However, 1991 and 1994 surveys failed to locate any bull trout in Eagle Creek (Buchanan *et al.* 1997). Both habitat conditions and water quality are considered to be excellent in the headwaters of Eagle Creek, especially within the Eagle Cap Wilderness, and could support bull trout spawning (Buchanan *et al.* 1997). Reestablishing a local population of bull trout in the Eagle Creek watershed is necessary for recovery of bull trout in the Powder River Basin (USFWS 2002).

East Fork Eagle Creek from the confluence with Eagle Creek upstream 24.2 km (15.0 mi) to its source is potential spawning and rearing habitat. The stream has historical (1965–1967) records of bull trout, but current occupancy is unknown (Buchanan *et al.* 1997). Habitat conditions and water quality in the headwaters are considered to be excellent and could support bull trout spawning and rearing (Buchanan *et al.* 1997).

West Fork Eagle Creek from the confluence with Eagle Creek upstream 15.1 km (9.4 mi) to its source is potential spawning and rearing habitat. The stream has historical (1965–1967) records of bull trout, but current occupancy is unknown (Buchanan *et al.* 1997). Habitat conditions and water quality in the headwaters are considered to be excellent and could support bull trout spawning and rearing (Buchanan *et al.* 1997).

Refer to the Bull Trout Critical Habitat Final Rule for additional details on stream miles of bull trout habitat within the Powder CHU (USFWS 2010).

### *4.2.6 Designated Bull trout Critical Habitat*

The nine PCEs, described previously for designated bull trout critical habitat, across the 14 bull trout watersheds with national forest lands, within the project area (Pine, Middle Imnaha, Upper Big Sheep, Granite Creek, Upper North Fork John Day, Eagle Creek, North Powder River, Powder River-Wolf Creek, Upper Powder River, Grande Ronde River-Beaver, Grande Ronde River-Five Points Creek, Grande Ronde River-Indian Creek, Upper Catherine Creek, and Upper Grande Ronde River) report PCE 4 (complex habitat) and PCE 9 (non-native fish) in Proper Functioning Condition (PFC); except for Pine, Powder-Wolf , Upper Powder, and Eagle watersheds, which are FAR for PCE 9 (Assessment; Pine, Indian, Wildhorse Core Area Assessment 2008; and Powder Basin Core Area Assessment [PBCAA] 2008). PCE 1 (springs and seeps), PCE 3 (prey base), PCE 6 (substrate), PCE 7 (natural hydrograph), and PCE 8 (water quality and quantity) are all Functioning at Risk (FAR) for all watersheds. PCE 2 (migratory habitat) and PCE 5 (temperature) are Functioning at Unacceptable Risk (FUR) for all watersheds. (Refer to Appendix A and Appendix B1-B5).

## ***4.3 Factors Affecting Species Environment within the Action Area***

This section describes factors affecting the species' environment and/or critical habitat in the action area. The environmental baseline includes all Federal, State, tribal, local, and private actions already affecting the species and/or critical habitat or that will occur contemporaneously with the proposed action. Unrelated Federal actions affecting the same species or critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are other beneficial actions.

### *4.3.1 Grande Ronde River Basin Bull Trout Populations*

Ratliff and Howell (1992) listed habitat degradation, passage barriers, over harvest, and hybridization and competition with nonnative brook trout as possible suppressing factors for bull trout populations in the Grande Ronde River Basin. Agricultural practices, mining, timber harvest, and road construction in the upper Grande Ronde River watershed have resulted in the alteration and degradation of instream habitats, and have been implicated in stream channel simplification and reduced frequency of large, deep pools (McIntosh *et al.* 1994). Irrigation diversions and water withdrawals have created passage barriers and reduced streamflows, which often results in elevated water temperatures. Brook trout are present in a number of upper elevation streams where bull trout spawn and rear. Gunckel *et al.* (2002) studied two eastern Oregon streams and documented the ability of brook trout to out-compete bull trout and to replace bull trout through hybridization. Furthermore, once brook trout are introduced, they are difficult to eradicate from a watershed and will likely impact bull trout well into the future.

McIntosh *et al.* (1994) compared historic and current stream habitat conditions in the lower 19 miles of Catherine Creek. Results indicated that from 1934 to 1992 pool frequency decreased by 67 percent in Catherine Creek.

Specific passage barriers identified in the draft Grande Ronde River recovery plan include fish weirs (*e.g.*, upper Grande Ronde River, Lookingglass Creek, and Lostine River) and hatchery

intakes (*e.g.,* Wallowa and Lookingglass fish hatcheries, Big Canyon satellite facility, and satellite facilities in the Lostine River, and upper Grande Ronde River). It also identified several possible thermal barriers from warm water temperatures (*e.g.,* upper Grande Ronde River, Bear Creek watershed, Lostine River, and Hurricane Creek below the Consolidated/Moonshine Ditch diversion dam).

### *4.3.2 Hells Canyon Complex*

Currently, habitat fragmentation and degradation are likely the most limiting factors for bull trout throughout the Hells Canyon Complex Recovery Unit. In the Snake River, large dams of the Hells Canyon Complex lack fish passage and have isolated bull trout among three basins, the Pine Creek and Indian Creek watersheds, Wildhorse River, and Powder River. Dams, irrigation diversions, and road crossings have formed impassable barriers to fish movement within the basins, further fragmenting habitats and isolating bull trout. Land management activities that degrade aquatic and riparian habitats by altering stream flows and riparian vegetation, such as water diversions, past and current mining operations, timber harvest and road construction, and improper grazing practices, have negatively affected bull trout in several areas of the recovery unit. Bull trout are also subject to negative interactions with nonnative brook trout in streams where the species occur together.

### *4.3.3 Imnaha River-Lower Snake Basins*

Within the Imnaha-Snake Rivers Recovery Unit, historical and current land use activities have impacted bull trout local populations. There has been a combination of human-induced factors that have affected bull trout including forest management practices, irrigation withdrawals, livestock grazing, past bull trout harvest, and introduction of non-native species. Lasting effects from some, but not all, of these activities may still act to limit bull trout production in the Imnaha, Sheep Creek, and Granite Creek Core Areas.

### *4.3.4 John Day River Basin*

Two overriding factors have influenced fish habitat in the John Day River basin. Past, recent, and current land use practices (primarily forestry, mining, agriculture, and livestock grazing) are responsible for altering, at the landscape level, the storage, movement and character of water resources over entire areas of the John Day River subbasin and its tributary system. These prevalent land uses, in combination with the resulting altered hydrologic responses, are translated into stream channel instability in many area streams. Degraded fish habitat conditions, due to a variety of causes, are identified as occurring in approximately 966 kilometers (600 miles) of stream. Erosion and sedimentation which reduce pool habitat, alter hydrographs, and cause loss of instream habitat elements are prevalent factors in the decline of bull trout and other salmonids. Key symptoms of this habitat degradation are stream dewatering, high summer water temperatures, substrate embeddedness, streambank instability, and high road densities throughout much of the basin.

### *4.3.5 Powder River Basin Bull Trout Populations*

Habitat fragmentation and degradation are likely the most limiting factors for bull trout throughout the draft Hells Canyon Complex Recovery Unit. In the Snake River, large dams of the Hells Canyon Complex lack fish passage and have isolated bull trout among three basins, the Pine Creek and Indian Creek watersheds, Wildhorse River, and Powder River. Dams, irrigation diversions, and road crossings have formed impassable barriers to fish movement within the basins, further fragmenting habitats and isolating bull trout. Land management activities that degrade aquatic and riparian habitats by altering stream flows and riparian vegetation, such as water diversions, past and current mining operations, timber harvest and road construction, and improper grazing practices, have negatively affected bull trout in several areas of the recovery unit. Bull trout are also subject to negative interactions with nonnative brook trout in streams where the species occur together.

Thief Valley Dam and Mason Dam were constructed by the U.S. Bureau of Reclamation on the Powder River in 1932 and 1968, respectively, for irrigation water supply and flood control (USFWS 2002). Both dams are impassible fish barriers and are operated by irrigation districts. Thief Valley Dam restricted access of migratory fish to the lower 113 kilometers (70 miles) of the Powder River basin, where Eagle Creek is the primary tributary in which bull trout historically occurred (USFWS 2002).

## 5. Effects of the Proposed Action

Effects of the action are defined as "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" (50 CFR 402.02). The Service's effects analysis is based on information provided in the Assessment, as well as our assessment of baseline conditions and expected changes from the proposed action.

The effects determinations in this Opinion for bull trout and designated critical habitat were made using methods for evaluating current aquatic conditions, the environmental baseline, and predicting the effects of the proposed action on bull trout and bull trout critical habitat. The effects of the Travel Management Plan are expressed in terms of the expected effect on aquatic habitat, including the PCEs, in the project area. The completed bull trout matrix, showing current conditions and effects of the action on specific habitat parameters, was included in the Assessment and attached to this Opinion (Appendix A). A simplistic summary of common examples of mechanisms and types of effects that roads and trails (routes) can have on bull trout is displayed in Appendix C.

The analysis of potential effects from motorized travel evaluates effects in the change of designation of motorized routes that "may affect" aquatic habitats and/or listed fish species at landscape scales throughout the Project Area and more specifically in the 20 HUC 5 watersheds listed in Table 2. The changes in designated motorized routes in the proposed project have been analyzed by the Forest for their potential effects on fisheries indicators for stream and riparian habitat elements within the context of Forest Plan direction, for ESA-listed fish species and their designated critical habitat. These changes in designations will authorize motorized uses for

existing forest system routes. Those routes not designated in the Motor Vehicle Use Map (MVUM) will be closed to motorized use. The physical reclamation of legacy effects associated with the newly designated and non-designated routes will occur outside of the current Proposed Action, as part of future project specific NEPA analysis and Section 7 consultations. This Travel Management Plan proposed action does not authorize physical reclamation actions (road decommissioning, culvert removal or replacement, and surface drainage improvement).

Effects Analysis Methodology

Analysis for potential effects to fisheries and habitat resulting from the change in designations of motorized routes considers Riparian Management Objectives (RMOs) within the Forest Plan as amended by PACFISH and INFISH. These amendments and their consultations provided specific Endangered Species Act direction and policy for management actions that will strive to attain defined RMOs and goals within Forest watersheds and streams.

Riparian management goals are to attain typical stream and riparian habitat conditions for ecologically healthy and properly functioning watersheds, by specifying objectives for the following habitat elements, also align with the ESA Section 7 consultations for evaluating potential changes in primary constituent elements contained within the matrix of Diagnostic Pathways and Indicators, including:

- Water quality (including spawning gravels and stream sediment levels)
- Stream channel integrity (including width/depth ratios, bank stability, and overhanging vegetative cover)
- In-stream flows (for the maintenance of fisheries life history stages and habitat)
- Natural timing and variability of water table elevations within floodplains
- The diversity and productivity of riparian plant communities
- The quantity and quality of riparian vegetation, for proper stream functions and conditions
- Aquatic habitats that support native species of fish, plants, vertebrates and invertebrates that comprise viable and diverse associations of biotic communities
- Pool frequency, in relation to stream channel width ratios (usually five to seven times width)
- Water Temperature limits, dependent upon season and fish species life history stages
- Large woody debris accumulations that provide stream habitat structure, diversity, and natural bed-load retention for fish spawning and food (insect) production.
- Stream bank stability, especially in non-forested streams dependent upon bank vegetation
- Lower bank angles, for maintaining diverse fisheries hiding and escape habitat
- Channel width/depth ratios that represent stable, productive and proper functioning streams that are function in association with their floodplains

In order to develop a simplified and consistent methodology for analyzing effects from the changes in use designation of various types of motorized routes for all of these elements, three "primary indicators" were selected for use in comparing and evaluating the actions proposed in comparison to the Environment Baseline, or Existing Condition. These "indicators" serve to assess the changes in designation of motorized routes for the proposed action.

| | |
|---|---|
| Change in Use Designation by HUC 5 | (Quantified by changes in total motorized routes [miles]) |
| Changes in Motorized Routes in RHCA Designation by HUC 5 | (Quantified by changes in miles of designated routes within RHCAs) |
| Changes in Designated Motorized Route Stream Crossings by HUC 5 | (Quantified by changes in number of designated stream crossings) |

### *5.1 Direct and Indirect Effects to the Species*

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

The direct and indirect effects associated with roads, motorized routes, and types of uses on streams and riparian habitats are extensively illustrated in a variety of sources including Furniss *et al.* 1991; Baxter *et al.* 1999; Gucinski *et al.* 2001; Luce *et al.* 2001; Angermeier *et al.* 2004; Fausch *et al.* 2006; Ouren *et al.* 2007; Welsh 2008; and USDA-SDTDC 2008. These sources provide numerous examples for various types of potential effects to stream and riparian habitats resulting from roads and other motorized routes, along with recommendations and techniques for their mitigation.

Roads primarily influence salmonid stream habitat by obstructing fish passage and degrading spawning, incubation, and juvenile rearing habitat (Furniss *et. al.*1991). At the landscape scale, increasing road densities and their attendant effects lower fish abundance (Lee *et al.* 1997) or occurrence (Dunham and Rieman 1999). McCaffery *et al.* (2007) documented effects of road decommissioning on stream habitat. In this study, the authors reported that in watersheds that had higher total road density, roads in use, and road stream crossings exhibited higher percentages of fine sediment compared with those watersheds that had lower levels of road influence.

Increased fine-sediment in stream gravel, a common consequence of road-derived sediments entering streams, has been linked to decreased fry emergence, decreased juvenile densities, loss of winter carrying capacity, and increased predation of fishes. Roads can act as barriers to migration, lead to water temperature changes, and alter stream flow regimes (Gucinski *et al.* 2001). Macroinvertebrate communities also respond negatively to fine sediments, thus influencing food availability for juvenile fish. In addition, excessive sediment delivery can decrease depth and number of pools thereby reducing the physical space available in the streams for rearing and overwintering of juvenile fish. If the riparian zone is compromised, then temperature, shade, and large wood would be altered, further affecting juvenile rearing habitat (Furniss *et al.* 1991). Roads can also affect water quality through applied road chemicals and toxic spills, and the likelihood of toxic spills reaching streams has increased with the many roads

paralleling them (Furniss *et al.* 1991, Rhodes *et al.* 1994).

It is our understanding that the Forest's proposed decisions under the new travel management plan to specifically identify areas across the Forest that are already open to motorized use were not analyzed in the Assessment. Therefore, the analysis of direct and indirect effects is an evaluation of the change only, not the specific details of the ongoing effects to listed fish species associated with the open roads density, location, and condition and use across the forest.

New designations of official system routes and uses proposed by the proposed action will result in major reductions of motorized uses on current road and trail mileages, plus a proportionate reduction in the effects these uses are creating, as well as effects to RHCAs. These new designations will result in the following reductions of all types of effects to habitat elements resulting from reduced motorized uses throughout the landscape of the Project Area. These "reduction" values are based on the figures in Table 1; where for example, you have a total of 6,961 miles of total routes in the existing condition (baseline) and the proposed action reduces that amount by 3,896 miles (a reduction of 56 %) to the total routes in the proposed action of 3,065 miles (which is 44 % of the existing condition). The proposed action will be:

- A 54 percent reduction in total motorized routes (miles) within the project areas
- A 59 percent reduction in motorized route stream crossings
- A 100 percent elimination of cross-country travel
- A 54 percent reduction in total motorized routes (miles) within RHCAs

Effects of Changes in Motorized Route Designation

The changes in designation of motorized vehicle use routes for those HUC 5s determined to have a potential effect on listed fish are displayed in Table 5. The changes in route designation reflect the change from the existing condition to the preferred alternative. The change in route designation miles are a combination of designated routes for full size vehicles and OHVs and motorcycles. This results in a net change in route designation for the HUC 5 watershed. The increase in route designation (shown in the table as positive (+) change) is three (3) of the HUC 5 watersheds are a result of OHV and motorcycle routes being added. In two (2) of the three (3) HUC 5 watersheds where there is an increase in designated routes, these routes are primarily out of the RHCAs and on or near ridge tops.

Table 5a, 5b, and 5c (Tables 10, 10A, and 10B in the Assessment) were developed in order to provide the basis for analysis of effects for the three "indicators". The Wallowa-Whitman National Forest is consulting on the changes proposed in the preferred alternative from the existing condition. The interpretation of the tables should be made on the changes that are being proposed, which is the last column of the tables.

The three tables display the changes for the three indicators combining designated roads and trails into a single "route" element. The assumption is that OHV routes will have similar effects as motorized roads on fish, fish habitat and water quality.

**Table 5a. Changes in Use Designation by 5th Field HUC (with bull trout on NF lands).**

| Watershed Name | Existing Condition | | Proposed Action | | Consultation Changes | | Net Change in Route Designation Miles |
|---|---|---|---|---|---|---|---|
| | Open Route Miles | Closed Route Miles | Open Route Miles | Closed Designated Open Miles | Current closed – Designated Open Miles | Current Open – Not Designated Miles | |
| Brownlee Reservior | | | | | | | |
| Pine Creek | 226 | 144 | 147 | 1 | 1 | 79 | -78 |
| Imnaha River | | | | | | | |
| Middle Imnaha River | 59 | 68 | 50 | 3 | 3 | 9 | -6 |
| Upper Big Sheep Creek | 101 | 88 | 98 | 13 | 13 | 3 | +10 |
| North Fork John Day | | | | | | | |
| Granite Creek | 112 | 218 | 77 | 15 | 15 | 35 | -20 |
| Upper NF John Day River | 70 | 95 | 62 | 0 | 0 | 8 | -8 |
| Powder River | | | | | | | |
| Eagle Creek | 201 | 253 | 170 | 10 | 10 | 31 | -21 |
| North Powder River | 67 | 119 | 64 | 8 | 8 | 3 | +5 |
| Powder River – Wolf Creek | 43 | 99 | 43 | 13 | 13 | 0 | +13 |
| Upper Powder River | 276 | 308 | 209 | 23 | 23 | 67 | -44 |
| Upper Grande Ronde River | | | | | | | |
| Grande Ronde River-Beaver Creek | 112 | 228 | 82 | 18 | 18 | 30 | -12 |
| Grande Ronde River – Five Points Creek | 136 | 59 | 61 | 2 | 2 | 75 | -73 |
| Grande Ronde River – Indian Creek | 102 | 43 | 54 | 5 | 5 | 48 | -43 |
| Upper Catherine Creek | 94 | 119 | 82 | 4 | 4 | 12 | -8 |
| Upper Grande Ronde River | 329 | 418 | 255 | 35 | 35 | 74 | -39 |

## Consultation Changes Calculations

Proposed Action: Open Route Miles = Currently open miles designated open under the Proposed Action

Proposed Action: Closed Designated Open Miles = Currently closed miles designated open under Proposed Action

Consultation Changes: Current Open Not Designated Open Miles = (Existing Condition Open Miles) – (Proposed Action Open Miles)

Consultation Changes: Net Change in Designated Route Miles = (Consultation Changes: Current Closed Designated Open Miles) – (Consultation Changes: Current Open Not Designated Miles)

The numbers from the first four columns in this table were generated from GIS applications.

All numbers have been rounded up to whole numbers in this table.

For example, Pine Creek currently has 226 miles of open routes in the existing condition (baseline). In the proposed action, only 147 miles of these currently open routes were designated for a reduction of 79 miles. This reduction of 79 miles is considered a change from the existing condition which is to be consulted on (found in the consultation changes column under "Currently Open - Not Designated Miles"). A GIS query determined that there was 1 mile of currently closed route (of the 144 total) in the existing condition that will be designated as open in the proposed action. In the Pine Creek HUC 5 this is the only currently closed route that will be designated open. This change from the existing condition is to be consulted on (found in the consultation change column under "Current closed - Designated Open Miles"). Under the Consultation Changes columns, the designated open miles were given a positive value (+) because those miles were added to the system from the existing condition. The not designated miles were given a negative value (-) because they reduce open route miles from the existing condition. When the positive change in miles (+1) is added to the reduction in miles (-79) you get a net change in designated routes (-78) that is being consulted on.

Effects of Changes in Designated Motorized Routes within Riparian Habitat Conservation Areas

*Indirect Effects*

Primary indirect effects to habitat elements affected by changes in the designated routes within RHCAs would include:

- Riparian Vegetation: Ongoing elimination of vegetation and/or re-growth will result in reduction of riparian vegetation within 828 miles affected by motorized routes within Project Area RHCAs. However, since on-forest stream bottoms are typically narrow and bounded by steep hillsides, though these route miles exist within 300 feet of a stream, they are often above the 100 year "floodplain" and not directly affecting riparian habitat.

- Water Quality: In these situations, while there would likely be no measureable effects to adjacent stream habitat during most periods of the year, indirect (chronic) effects on water quality and stream sedimentation would likely continue due to collected runoff travelling down ditches and designated routes into adjacent streams, especially during

periods of snow melt and precipitation. In locations where routes exist within the 100 year floodplain, these indirect effects would be more pronounced, due to reduced buffer zone distances and vegetation filtering.

*Direct Effects*

Primary direct effects to habitat elements affected by changes in the designated routes within RHCAs would include:

- Stream sedimentation and spawning: Routes that cross riparian or wetland areas and lead to a stream crossing often concentrate and eventually discharge overland runoff and sediment into adjacent streams as a point source. These direct effects increase stream sedimentation over natural levels and thereby reduce downstream fish spawning success. These situations exist in locations throughout the forest and would continue to occur on both designated and non-designated routes until problem areas are identified and mitigation measures implemented. Non-designated routes within RHCAs would likely experience a gradual stabilization and general improvement over baseline conditions, as a result of no traffic and natural vegetative re-growth. There would be a reduction (54 %) in the total miles of routes within RHCAs and a reduction in the number of total stream crossings by designated route by 59 percent (Table 1) over the project area.

- Large Woody Debris Accumulation: Recreational activities associated with motorized routes within RHCAs also affect attainment of RMOs due to the cutting of firewood. As noted within the PACFISH/INFISH guidelines, standards for maintenance of large woody debris "within one tree height" of a stream (typically 30 to 50 feet for Spruce/Fir/Lodge Pole, and 50 to 100 feet for Ponderosa pine communities.) Firewood cutting within RHCAs can result in a gradual long term decline in the accumulation of large woody debris that provides stream habitat structure, diversity, and natural bed-load retention for fish spawning and food (insect) production gravels, in both stream channels and adjacent floodplains. However, previous consultations for Ongoing Activities have required that firewood permits for "fuel-wood" do not allow cutting within 300 feet of streams, lakes, ponds and wet/boggy areas. Therefore, adverse effects from "fuel-wood" cutting would be limited to illegal situations where enforcement actions are required or, to those situations where casual-use firewood may still be cut for campfires as part of dispersed camping activities. Dispersed camping within RHCA's could therefore continue to affect accumulations of large woody debris, however, they would be limited in geographic scope and there would be a very minimal effect.

- Pool quality: Pool quality and freshwater rearing habitat are not anticipated to be measurably affected by the changes in designated motorized routes within RHCAs.

- Freshwater Spawning: Changes in baseline conditions for fisheries spawning, water quality, water quantity, stream sedimentation and substrate quality are not anticipated to be measurably affected by changes in route designations within RHCAs, due to the relatively small amount of RHCAs directly affected by routes.

- Freshwater migration: The degree to which streams adjacent to designated routes are free of artificial obstructions, have suitable water quality, riparian vegetation, safe passage, cover and shelter are not anticipated to be measurably affected by designations of motorized uses on routes already existing within RHCAs. The reduction (54 %) in existing motorized route miles within RHCAs will create a major opportunity for riparian habitat improvement, through mitigation and/or rehabilitation of existing impacts in those areas. These opportunities will be evaluated and consulted on in future project-level actions.

- Water Quality: Potential direct effects to water quality within RHCAs could arise due to spills or direct contact from petroleum resulting from interrelated and interconnected activities associated with motorized uses. The most likely risks would be associated with accidents and/or potential spills during refueling of vehicles or camping equipment, especially in areas close to water. In these locations, surface runoff during precipitation events could transport spilled material and/or contaminated soils to the stream. Drainage of surface contamination on routes within RHCAs that lead to stream crossings would pose the greatest risks for potential contamination, over time. Reports of petroleum spills or surface contamination would be responded to with measures that would depend on the severity of the situation; varying from containment to possibly even removal of contaminated soils and vegetation, dependent upon the procedures required for resolution of each situation. The risk to listed fish and their designated critical habitat from a petroleum spill or petroleum products being transported to the surface waters is low.

- Road and Trail Maintenance: The effects of ongoing Road and Trail maintenance programs have already been consulted upon by existing Programmatic Biological Assessments and Biological Opinions for these activities. These consultations included protective criteria and mitigation measures for annual road and trail maintenance program activities. This action will not have any effect on maintenance activities.

**Table 5b. Changes in Motorized Route Miles in RHCA Designation by 5th field HUC (with bull trout on NF lands).**

| Watershed Name | Existing Condition | | Preferred Alternative | | Consultation Changes | | Net Change in Routes Designated In RHCAs Miles |
|---|---|---|---|---|---|---|---|
| | Open Routes In RHCAs Miles | Closed Routes In RHCAs Miles | Open Route in RHCA Miles | Closed Designated Open In RHCAs Miles | Current closed – Designated Open RHCA Miles | Current Open – Not Designated Open RHCA Miles | |
| Pine Creek | 56 | 28 | 34.6 | 0.2 | 0.2 | 21.4 | -21.2 |
| Middle Imnaha River | 6 | 9 | 6.2 | 0.5 | 0.5 | 0.2 | +0.3 |
| Upper Big Sheep Creek | 18 | 11 | 16.2 | 2.3 | 2.3 | 1.8 | +0.5 |
| Granite Creek | 37 | 35 | 27.9 | 0.9 | 0.9 | 9.1 | -8.2 |
| Upper NF John Day | 20 | 12 | 17.2 | 0 | 0 | 2.8 | -2.8 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| River | | | | | | | |
| Eagle Creek | 63 | 52 | 57.5 | 2.0 | 2.0 | 5.5 | -3.5 |
| North Powder River | 20 | 24 | 16.5 | 1.9 | 1.9 | 3.5 | -1.6 |
| Powder River –Wolf Creek | 7 | 20 | 6.8 | 4.0 | 4.0 | 0.2 | +3.8 |
| Upper Powder River | 68 | 61 | 53.3 | 2.2 | 2.2 | 14.7 | -12.5 |
| Grande RR-Beaver Creek | 19 | 40 | 14.7 | 5.2 | 5.2 | 4.3 | +0.9 |
| Grande RR – Five Points Creek | 27 | 7 | 10.8 | 0.8 | 0.8 | 16.2 | -16.2 |
| Grande RR – Indian Creek | 23 | 10 | 12.6 | 0.6 | 0.6 | 10.4 | -9.6 |
| Upper Catherine Creek | 27 | 30 | 24.0 | 2.6 | 2.6 | 3.0 | -0.4 |
| Upper Grande Ronde River | 89 | 91 | 76.8 | 8.5 | 8.5 | 12.2 | -3.7 |

**Consultation Changes Calculations**

Proposed Action: Open Routes in RHCAs (Miles) = Currently open routes in RHCAs (miles) designated open under the Proposed Action

Proposed Action: Closed Designated Open in RHCAs (Miles) = Currently closed routes (miles) designated open under Proposed Action

Consultation Changes: Current Open Not Designated Open in RHCAs (Miles) = (Existing Condition Open routes in RHCAs [miles]) – (Proposed Action Open Routes in RHCAs [miles])

Consultation Changes: Net Change in Routes Designated in RHCAs (Miles) = (Consultation Changes: Current Closed Designated Open RHCA [miles]) – (Consultation Changes: Current Open Not Designated Open RHCA [miles])

All numbers have been rounded up to the nearest tenth in this table.

The values in Table 5b are calculated in the same manner as was described for Table 5a using the Pine Creek HUC as the example.

Effects of Changes in Designated Route Stream Crossings

In 2002, the Forest conducted an Aquatic Organism Passage inventory. This inventory showed crossings for all fish species on the forest including fords, bridges and culverts. It did not inventory cross drain culverts or fords outside of fish bearing streams. This action will not correct these passage problems. The analysis is for crossings across the project area showing the general passage problems for each species and the pathway of sediment delivery that may affect water quality.

The proposed action does not authorize the implementation of any road restoration actions (crossing facility removal). As such, the number of stream crossings that presently occur on all routes will remain under the proposed action, regardless of the route designation. The number of motorized crossings on designated routes under the proposed action will be reduced by 59 percent from the existing condition (baseline) for the project area (Table 1).

*Stream Crossings - Direct and Indirect Effects*

Potential direct effects are likely to occur in those situations where ford crossings exist in suitable spawning locations and are utilized during periods when specific species of fish are more likely to be spawning and/or incubating in stream bottom gravels. Given limitations of suitability for vehicle use of most ford crossings to the period following spring run-off, the greatest likelihood for potential direct effects from fords would be for late summer and early fall spawning species like Chinook salmon and bull trout. Of the two, Chinook salmon would have minimal risk, due to the fact that the majority of fords (of which there are few in any spawning habitat) are outside of the areas that cross Chinook salmon spawning habitat. The effect to bull trout would be somewhat greater as there are a few more unimproved fords that cross bull trout spawning habitat. This is determined by the location of bull trout spawning habitat and the specific location of a crossing (ford) of a designated route.

Indirect effects would be the most significant risks and would be associated with residual bank damage at crossing locations (typically between four to ten feet wide) as well the more long-term chronic and periodic acute effects resulting from point source contributions of sediment at stream crossing locations. In past cases where effects from ford crossings were of high risk for adverse effects, mitigation measures have been implemented to harden these crossings in order to stabilize the stream bottom and make it unsuitable for fish spawning.

The most significant pathways by which stream crossings may impact fish, plus their stream and riparian habitat elements include the following:

- Large Woody Debris: Firewood cutting within one tree height of a stream can result in the long term loss of large woody debris from stream channels and 100 year floodplains. The current Wallowa-Whitman Forest Firewood Permit system does not permit fuel firewood cutting within 300 feet of streams, lakes, ponds and wet/boggy areas, as previously consulted on with NMFS and FWS. Therefore, any effects from firewood cutting should be limited to illegal situations where enforcement actions are needed. Firewood permits also do not allow skidding of logs through streams, therefore the most likely effects resulting from firewood cutting would be related to those instances where firewood cutters use motorized routes that do not have developed stream crossings such as bridges or culverts, and are dependent upon ford crossings to access sources of firewood.

- Pool Quality: Pool quality and freshwater rearing habitat are not anticipated to be significantly affected beyond the "indirect effects" resulting from the total number of stream crossings that are already present on existing routes. While there is a very small

degree of "linear" stream channel directly affected per mile of stream as a result of crossings, ongoing indirect affects would continue to affect pool habitats, primarily from channel and stream gradient changes caused by the majority of culvert crossings. Channel down-cutting and resulting stream gradient and habitat changes would have an estimated "total area of effect" of a quarter mile per crossing.

- Freshwater Spawning: In addition to the effects of channel changes noted above, freshwater spawning and substrate are not anticipated to be directly affected to a major degree due to the proportionately small amount of linear stream habitat "physically" affected or eliminated by the numbers of stream crossings. However while there would be a 59 percent (7,956 crossings) reduction in the total number of future "motorized stream crossings permitted", 5,641 stream crossings would still be permitted on designated motorized routes. While closure of motorized use on 7,956 existing crossings should lead to gradual improvement of existing baseline conditions as those routes begin to re-vegetate, they would likely continue to create ongoing indirect (chronic) effects until fully rehabilitated. Assuming a ten year stabilization period through natural processes, these closed crossings would continue to have indirect effects on spawning habitats during that time frame.

- Freshwater Migration: Freshwater migration is anticipated to gradually improve over existing conditions, as inventories and monitoring are performed on closed routes over the first ten years, and legacy culvert crossings are removed in order to meet Forest Service fish passage standards. No migration barriers are being removed with the proposed action, therefore freshwater migration will be maintained at the current condition.

- Water Quality: The most significant risks to water quality resulting from stream crossings are associated with contributions of run-off, sediment and possible contaminants such as petroleum and dust abatement products that may be directed to streams at crossing locations, down the route itself. While there may also be potential contributions of sediment and petroleum products from the undercarriage of vehicles driving through low water fords, they are anticipated to be slight and not measurable. The greatest risk to water quality and related habitat elements would be from point source contributions of run-off and sediment.

**Table 5c. Changes in Designated Motorized Route Stream Crossings by 5th Field HUC (bull trout watersheds on NF lands):**

| Watershed Name | Existing Condition | | Proposed Action | | Consultation Changes | | Net Change in Routes Designated Number of Stream Crossings |
|---|---|---|---|---|---|---|---|
| | Open Routes Number of Stream Crossings | Closed Routes Number of Stream Crossings | Open Route Number of Stream Crossings | Closed Designated Open Number of Stream Crossings | Current closed – Designated Number of Stream Crossings | Current Open – Not Designated Number of Stream Crossings | |
| Pine Creek | 325 | 221 | 184 | 2 | 2 | 141 | -139 |
| Middle Imnaha River | 84 | 155 | 88 | 9 | 9 | 4 | +5 |
| Upper Big Sheep Creek | 172 | 134 | 157 | 21 | 21 | 15 | +6 |
| Granite Creek | 127 | 160 | 94 | 11 | 11 | 33 | -22 |
| Upper NF John Day River | 88 | 60 | 74 | 1 | 1 | 14 | -13 |
| Eagle Creek | 361 | 428 | 316 | 29 | 29 | 45 | -16 |
| North Powder River | 84 | 110 | 74 | 7 | 7 | 10 | -3 |
| Powder River –Wolf Creek | 56 | 126 | 56 | 16 | 16 | 0 | +16 |
| Upper Powder River | 419 | 446 | 327 | 11 | 11 | 92 | -81 |
| Grande RR-Beaver Creek | 176 | 316 | 140 | 31 | 31 | 36 | -5 |
| Grande RR – Five Points Creek | 235 | 75 | 92 | 0 | 0 | 143 | -143 |
| Grande RR – Indian Creek | 170 | 79 | 79 | 9 | 9 | 91 | -82 |
| Upper Catherine Creek | 255 | 323 | 236 | 10 | 10 | 19 | -9 |
| Upper Grande Ronde River | 684 | 878 | 562 | 64 | 64 | 122 | -58 |

**Consultation Changes Calculations**

Proposed Action: Open Routes Number of Stream Crossings = Currently open routes number of stream crossings designated open under Proposed Action

Proposed Action: Closed Designated Open Number of Stream Crossings = Currently closed route number of stream crossings designated open under Proposed Action

Consultation Changes: Current Open Routes Not Designated Open Number of Stream Crossings = (Existing Condition: Open Routes Number of Stream Crossings) – (Proposed Action: Open Routes Number of Stream Crossings)

Consultation Changes: Net Change in Routes Designated Number of Stream Crossings = (Consultation Changes: Current Closed Designated Open Number of Stream Crossings) – (Consultation Changes: Current Open Not Designated Number of Stream Crossings)

All numbers have been rounded up to whole numbers.

The values in Table 5c are calculated in the same manner as was described for Table 5a using the Pine Creek HUC as the example.

Effects of Elimination of Cross County Motorized Access

Under the proposed action, all cross country motorized vehicle use would be eliminated. This reduces the number of acres currently open to motorized vehicle use from 900,484 to zero. Unrestricted cross country motor vehicle use has led to increased erosion and sediment deliver to fish bearing streams. Cross country vehicle use can accelerate hillsides gullies that channel runoff and sediment directly to streams, create ruts in meadows that channelize flows leading to headcuts and dewatering of meadow ecosystems. This effect will be eliminated. This will reduce the chronic sediment delivery from unrestricted use in the watersheds that are accessible to cross country travel. The effect of this action will be beneficial to fish and their habitats.

Effects of Motorized Access for Dispersed Camping

Motorized access for dispersed camping would be allowed within 300 feet of designated routes, provided that no streams or wet meadows are crossed or damaged. This means that routes closer than 600 feet to a stream could have some or all of their adjacent RHCA distance, affected by motorized travel to dispersed camp sites. There would likely be little change in future use of existing locations that have been most popular and were established by years of repeated use. However, with the overall reduction in open routes for motorized travel this will significantly reduce existing RHCAs potentially susceptible to both direct and indirect effects of soil compaction, vegetation loss, soil erosion and increased sedimentation resulting from dispersed camping. Casual-use firewood cutting for campfires could still occur however, as this type of firewood cutting is not regulated by either the firewood (fuel-wood) permit or Travel Management programs. Therefore, while predominately limited to most existing usual and accustomed camping locations, dispersed camping may reduce the availability of dead, large woody debris, in some campsite locations adjacent to streams.

Within the scope of the project area and the scope and scale of the changes in the designated routes, the Wallowa-Whitman National Forest has determined that there shouldn't be any adverse effects in 12 HUC 5 watersheds where bull trout and/or their critical habitat are present

on Forest lands and where there is a significant change in the designation of motorized routes. The Forest has determined that there will be some adverse effects to bull trout in two HUC 5 watersheds; Powder River-Wolf Creek, and the Upper Powder River. In these two watersheds the adverse effect is based on the increase in designated routes, the location of those routes relative to fish and their occupied habitat, and the attendant effects of those routes on listed fish and their habitat. For the Upper Powder River Watershed there is a net decrease in open routes (-44 miles), a net decrease in RHCA miles (-12.5), and a net reduction in stream crossings (-81). This watershed has a population of bull trout that is very limited in distribution and in size. While the net reduction leads one to believe that the changes would result in no adverse impacts, the total remaining miles of open routes and the location of those routes near occupied bull trout habitat lead (baseline condition) the Forest to an adverse effect determination to bull trout in this watershed. Refer to Table 11 in the Assessment.

The Upper Big Sheep Creek Watershed has a net increase in of open routes (+10 miles), a net increase in RHCA miles (+0.5) and a net increase in stream crossings (+6). While it appears that these changes would result in adverse impacts, the location of the open routes within the watershed (on ridges and crossing intermittent channels) and the relatively healthy bull trout population has lead the Forest to a no adverse effect determination to bull trout in this watershed. Similarly, the Middle Imnaha River Watershed has a net decrease in open routes (-6 miles), a net increase in RHCA miles (+0.3), and a net increase in stream crossings (+5). These changes have been assessed relative to the location of the routes and the relative healthy population of bull trout resulting in a no adverse effect determination to bull trout in this watershed.

For the Grande Ronde River –Beaver Creek Watershed there is a net increase in RHCA miles (+0.9). With the net decrease in open routes (-12 miles) and a net decrease in stream crossings (-5) the Forest has determined that there would be no adverse effects to bull trout in this watershed. This is based on the fact that the increase in RHCA miles occurs above the La Grande Reservoir and there are no bull trout above the reservoir.

### *5.2 Effects to Designated Bull Trout Critical Habitat*

Potential adverse effects of the Wallowa-Whitman National Forest Travel Management Plan to designated critical habitat are anticipated to occur in two HUC 5 watersheds; Powder River-Wolf Creek, and the Upper Powder River. In these two watersheds the adverse effect determination is based on the increase in designated routes, the population health of bull trout in the watershed, the location of those routes relative to fish and their occupied habitat, and the attendant effects of those routes on listed fish and their habitat. An increase in sediment (due to increase in designated routes and location of these routes in fish habitat in these two watersheds) is likely to adversely affect PCE 6; and PCEs 2 (migratory habitats), PCE 3 (prey base), and PCE 8 (water quality) are all affected by PCE 6, and therefore would have similar effects. PCE 4 (complex habitat) and PCE 5 (temperature) are not likely to be adversely affected by project activities. PCE 1 (seeps and springs), PCE 7 (natural hydrograph), and PCE 9 (non-native fish) will not be affected by the Travel Management Plan.

In the remaining 12 watersheds (Pine, Middle Imnaha, Upper Big Sheep, Granite Creek, Upper North Fork John Day, Eagle Creek, North Powder River, Grande Ronde River-Beaver, Grande Ronde River-Five Points Creek, Grande Ronde River-Indian Creek, Upper Catherine Creek, and

Upper Grande Ronde River) that contain Forest lands with bull trout designated critical habitat; the proposed action is not likely to adversely affect PCE 6; and PCEs 2 (migratory habitats), PCE 3 (prey base), and PCE 8 (water quality) are all affected by PCE 6, and therefore would have similar effects. PCE 1 (seeps and springs), PCE 4 (complex habitat), PCE 5 (temperature), PCE 7 (natural hydrograph), and PCE 9 (non-native fish) will not be affected by the proposed Travel Management Plan in these 12 watersheds. In these 12 watersheds (and throughout most of the proposed action area), there is a substantial reduction in total miles of designated routes as well as a reduction in total miles of routes within RHCAs and total stream crossings by designated routes (which we estimate to be a decrease in sediment to these bull trout critical habitat areas). This was part of the design features going into Travel Management Planning to avoid or reduce effects to listed fish and their habitats. Overall, these reductions both in the total project area and in specific HUC 5s result in a positive effect to listed fish and their habitats.

The conservation measures described in the proposed action are expected to minimize the extent and duration of these habitat effects, such that it is unlikely that the function or conservation role of the critical habitat will be adversely affected in the long-term by these activities. A crosswalk between PCEs and the Matrix of Pathways and Indicators for bull trout is provided in Appendix B (additional information is provided in the Assessment).

### *5.3 Interrelated/Interdependent Effects*

Interrelated actions are those that are a part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Both interdependent and interrelated activities are assessed by applying the "but for" test, which asks whether any action and its associated impacts would occur "but for" the Designated action.

No interrelated or interdependent actions have been identified in this consultation.

## 6. Cumulative Effects

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The Service is unaware of any significant change in non-Federal activities that are reasonably certain to occur within the action area. The Service assumes that future private and State actions will continue at similar intensities as in recent years.

## 7. Conclusion

### *7.1 Bull Trout*

After reviewing the current status of bull trout, the environmental baseline for the action area, the effects of the proposed project activities, and anticipated cumulative effects, it is the Service's biological opinion that the action as proposed is not likely to jeopardize the continued existence of the Columbia River Basin DPS of bull trout. The Service reached this conclusion for the

following reasons.

- Conservation measures incorporated into the project proposal will likely minimize direct and indirect effects to bull trout from project activities.

- Potential adverse effects of the project are limited to two bull trout 5th field HUC watersheds within the larger Travel Management Plan action area.

- The overall effects of the changes (from existing) to the Travel Management Plan will be beneficial due to reductions in motorized roads and routes in RHCAs and the elimination of cross country travel.

The Service concludes that the Travel Management Plan has the potential to have direct and indirect effects on bull trout in two 5th field HUC watersheds (Powder River-Wolf Creek and Upper Powder River) based on the increase in designated routes, the location of those routes relative to fish and their occupied habitat, and the attendant effects of those routes on listed fish and their habitat. In the other 12 5th field HUC watersheds with bull trout in the project area, the overall effects of the changes to the Travel Management plan will be beneficial. Overall, the project will reduce (in comparison to existing condition) motorized route stream crossings by 59 percent. The Project as proposed (in comparison to existing condition) will reduce total motorized routes (miles) within the project area by 54 percent. The proposed action eliminates all cross country travel and reduces total motorized route miles in RHCAs by 54 percent (compared to existing condition). The project is not expected to appreciably reduce either the survival or recovery of bull trout.

### *7.2 Bull trout Designated Critical Habitat*

After reviewing the current status of designated critical habitat, the environmental baseline for the action area, the effects of the proposed project activities, and anticipated cumulative effects, it is the Service's opinion that the action, as proposed, is not likely to destroy or adversely modify designated bull trout critical habitat. The Service reached this conclusion for the following reasons.

- Potential adverse effects of the project to bull trout designated critical habitat are limited to 61.7 miles (8.8 percent) of the total bull trout critical habitat miles within the action area

- The overall effects of the changes (from existing) to the Travel Management Plan will be beneficial due to reductions in motorized routes in RHCAs, reduction in designated motorized route stream crossings, and the elimination of cross country travel.

- Conservation measures and monitoring described in the proposed action, and the above reasons, are expected to minimize the extent and duration of habitat effects, such that it is unlikely that the function or conservation role of the critical habitat will be adversely affected in the long-term by the proposed activity.

The Service concludes that any adverse impacts to PCEs 2, 3, 6, and 8 in the action area will not permanently alter or destroy the quality or function of designated bull trout critical habitat in the area covered by the Wallowa-Whitman National Forest Travel Management Plan.

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

### *8.1 Amount or Extent of Take*

The Service does not anticipate the proposed action will incidentally take any bull trout. Although the "Effects of the Action" section above includes a finding that implementation of the proposed action has the potential to cause biological effects to the bull trout that conform to the regulatory definition of take, the mere potential for take is not a legitimate basis for a take exemption. The Service must provide a reasoned basis for a likelihood of take in order to anticipate and exempt it. Since no take is anticipated or exempted, no reasonable and prudent measures and terms and conditions are provided below. If take is detected during implementation of the proposed action, reinitiation of formal consultation should be requested, and any operations causing such take must cease pending the outcome of the reinitiated consultation.

### *8.2 Reporting Requirements*

If a dead, injured, or sick endangered or threatened species specimen (including a bull trout) is located, initial notification must be made to the nearest Service Law Enforcement Office, located at 9025 SW Hillman Court, Suite 3134, Wilsonville, OR 97070; phone: 503-682-6131. Care should be taken in handling sick or injured specimens to ensure effective treatment or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered and threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

*Review Requirement:* The Reasonable and Prudent Measures, with their implementing Terms and Conditions, are designed to minimize incidental take that might otherwise result from the

proposed action. These measures should decrease the level of take of bull trout to the degree possible, given the circumstances surrounding the proposed action. With implementation of these measures, the Service believes that some bull trout may be incidentally taken as quantified above. If, during the course of the action, this minimized level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided, the Forest must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

## 9. Conservation Recommendations

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

- Implement the proposed Travel Management Plan on the ground through adequate enforcement personnel in the field.
- Educate the public on the travel management plan through meetings, information at the visitor's center, and in the field.
- Provide "user friendly" maps of the Travel Management Plan to help educate the public.
- Support ongoing projects to fix existing road problems (including; replacing culverts/bridges and obliteration of stream bottom roads).
- Fund the continued maintenance of the Forest's existing open roads and routes.
- Document bull trout presence/absence on streams within the proposed project area.
- Document any listed plant species (new occurrences) within the proposed project area.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

## 10. Reinitiation – Closing Statement

This concludes formal consultation for the potential effects of the Travel Management Plan on bull trout and designated bull trout critical habitat. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion;

(3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. Whenever the amount or extent of incidental take is exceeded, any operations causing such take must cease, pending reinitiation of consultation with the Service.

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**Appendix A – Matrix of Pathways and Indicators for HUC 5 Watersheds under consultation for the Wallowa-Whitman National Forest Travel Management Plan.**

## Combined Matrix of Pathways and Indicators for Proposed Action

### CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION (S) ON RELEVANT INDICATORS

**Federal Action:** Travel Management Plan – Change in

**Watershed Name:** Pine Creek **Location:** Wallowa Whitman National Forest

| *Diagnostics/Pathways* | *Population and Environmental Baseline (list values or criterion and supporting documentation)* | | | *Effects of the Action(s)* | | |
|---|---|---|---|---|---|---|
| *Indicators* | *Functioning Appropriately* | *Functioning at Risk* | *Functioning at Unacceptable Risk* | *Restore* | *Maintain* | *Degrade* |
| *Subpopulation Characteristics Subpopulation Size* | | | X | | X | |
| *Growth and Survival* | | | X | | X | |
| *Life History Diversity and Isolation* | | | X | | X | |
| *Persistence and Genetic Integrity* | | | X | | X | |
| *Water Quality Temperature* | | X | | | X | |
| *Sediment* | | X | | | +X | |
| *Chemical Contam/Nutrients* | X | | | | X | |
| *Habitat Access Physical Barriers* | | | X | | X | |
| *Habitat Elements Substrate Embeddedness* | | X | | | +X | |
| *Large Woody Debris* | | X | | | X | |
| *Pool Frequency and Quality* | | X | | | X | |
| *Large Pools* | | X | | | X | |
| *Off-channel Habitat* | | X | | | X | |
| *Refugia* | | X | | | X | |
| *Channel Cond. & Dynamics Wetted Width:Max Depth* | X | | | | X | |
| *Streambank Condition* | X | | | | X | |
| *Floodplain Connectivity* | | X | | | X | |
| *Flow/Hydrology Change in Peak/Base Flows* | | X | | | X | |
| *Drainage Network Increase* | | X | | | X | |
| *Watershed Conditions Road Density & Location* | | X | | | +X | |
| *Disturbance History* | | | X | | X | |
| *Riparian Conservation* | | X | | | +X | |
| *Disturbance Regime* | | | X | | X | |
| *Integration of Species and Habitat Conditions* | | | X | | X | |

(Maintain = the function of the indicator does not change; + Maintain = long term effects of the action will have a positive effect to this indicator but will not change the function of an indicator)

**CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION (S) ON RELEVANT INDICATORS**

**Federal Action:** Travel Management Plan – Change in

**Watershed Name:** Middle Imnaha River **Location:** Wallowa Whitman National Forest

| *Diagnostics/Pathways* | *Population and Environmental Baseline (list values or criterion and supporting documentation)* | | | *Effects of the Action(s)* | | |
|---|---|---|---|---|---|---|
| *Indicators* | *Functioning Appropriately* | *Functioning at Risk* | *Functioning at Unacceptable Risk* | *Restore* | *Maintain* | *Degrade* |
| *Subpopulation Characteristics Subpopulation Size* | | X | | | X | |
| *Growth and Survival* | | X | | | X | |
| *Life History Diversity and Isolation* | | X | | | X | |
| *Persistence and Genetic Integrity* | | X | | | X | |
| *Water Quality Temperature* | | | X | | X | |
| *Sediment* | | X | | | +X | |
| *Chemical Contam/Nutrients* | X | | | | X | |
| *Habitat Access Physical Barriers* | X | | | | X | |
| *Habitat Elements Substrate Embeddedness* | X | | | | +X | |
| *Large Woody Debris* | | | X | | X | |
| *Pool Frequency and Quality* | | X | | | X | |
| *Large Pools* | X | | | | X | |
| *Off-channel Habitat* | X | | | | X | |
| *Refugia* | X | | | | X | |
| *Channel Cond. & Dynamics Wetted Width:Max Depth* | X | | | | X | |
| *Streambank Condition* | X | | | | X | |
| *Floodplain Connectivity* | X | | | | X | |
| *Flow/Hydrology Change in Peak/Base Flows* | X | | | | X | |
| *Drainage Network Increase* | X | | | | X | |
| *Watershed Conditions Road Density & Location* | X | | | | +X | |
| *Disturbance History* | | X | | | X | |
| *Riparian Conservation* | X | | | | +X | |
| *Disturbance Regime* | X | | | | X | |
| *Integration of Species and Habitat Conditions* | | X | | | X | |

(Maintain = the function of the indicator does not change; + Maintain = long term effects of the action will have a positive effect to this indicator but will not change the function of an indicator)

## CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION (S) ON RELEVANT INDICATORS

**Federal Action:** Travel Management Plan – Change in

**Watershed Name:** Upper Big Sheep Creek **Location:** Wallowa Whitman National Forest

| *Diagnostics/Pathways* | *Population and Environmental Baseline (list values or criterion and supporting documentation)* | | | *Effects of the Action(s)* | | |
|---|---|---|---|---|---|---|
| *Indicators* | *Functioning Appropriately* | *Functioning at Risk* | *Functioning at Unacceptable Risk* | *Restore* | *Maintain* | *Degrade* |
| *Subpopulation Characteristics* *Subpopulation Size* | | X | | | X | |
| *Growth and Survival* | | X | | | X | |
| *Life History Diversity and Isolation* | | X | | | X | |
| *Persistence and Genetic Integrity* | | X | | | X | |
| *Water Quality* *Temperature* | | X | | | X | |
| *Sediment* | | X | | | +X | |
| *Chemical Contam/Nutrients* | X | | | | X | |
| *Habitat Access* *Physical Barriers* | X | | | | X | |
| *Habitat Elements* *Substrate Embeddedness* | | X | | | +X | |
| *Large Woody Debris* | X | | | | X | |
| *Pool Frequency and Quality* | | X | | | X | |
| *Large Pools* | | X | | | X | |
| *Off-channel Habitat* | X | | | | X | |
| *Refugia* | X | | | | X | |
| *Channel Cond. & Dynamics* *Wetted Width:Max Depth* | X | | | | X | |
| *Streambank Condition* | X | | | | X | |
| *Floodplain Connectivity* | X | | | | X | |
| *Flow/Hydrology* *Change in Peak/Base Flows* | | X | | | X | |
| *Drainage Network Increase* | | X | | | X | |
| *Watershed Conditions* *Road Density & Location* | | X | | | +X | |
| *Disturbance History* | | X | | | X | |
| *Riparian Conservation* | | X | | | +X | |
| *Disturbance Regime* | | X | | | X | |
| *Integration of Species and Habitat Conditions* | | X | | | X | |

(Maintain = the function of the indicator does not change; + Maintain = long term effects of the action will have a positive effect to this indicator but will not change the function of an indicator)

## CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION (S) ON RELEVANT INDICATORS

**Federal Action:** Travel Management Plan – Change in

**Watershed Name:** Granite Creek **Location:** Wallowa Whitman National Forest

| *Diagnostics/Pathways* | *Population and Environmental Baseline (list values or criterion and supporting documentation)* | | | *Effects of the Action(s)* | | |
|---|---|---|---|---|---|---|
| *Indicators* | *Functioning Appropriately* | *Functioning at Risk* | *Functioning at Unacceptable Risk* | *Restore* | *Maintain* | *Degrade* |
| *Subpopulation Characteristics* *Subpopulation Size* | | X | | | X | |
| *Growth and Survival* | | X | | | X | |
| *Life History Diversity and Isolation* | | | X | | X | |
| *Persistence and Genetic Integrity* | | X | | | X | |
| *Water Quality* *Temperature* | | X | | | X | |
| *Sediment* | | X | | | +X | |
| *Chemical Contam/Nutrients* | X | | | | X | |
| *Habitat Access* *Physical Barriers* | X | | | | X | |
| *Habitat Elements* *Substrate Embeddedness* | | | X | | +X | |
| *Large Woody Debris* | X | | | | X | |
| *Pool Frequency and Quality* | | X | | | X | |
| *Large Pools* | X | | | | X | |
| *Off-channel Habitat* | X | | | | X | |
| *Refugia* | | | X | | X | |
| *Channel Cond. & Dynamics* *Wetted Width:Max Depth* | X | | | | X | |
| *Streambank Condition* | | | X | | X | |
| *Floodplain Connectivity* | | X | | | X | |
| *Flow/Hydrology* *Change in Peak/Base Flows* | | X | | | X | |
| *Drainage Network Increase* | | | X | | X | |
| *Watershed Conditions* *Road Density & Location* | | | X | | +X | |
| *Disturbance History* | | | X | | X | |
| *Riparian Conservation* | | X | | | +X | |
| *Disturbance Regime* | | X | | | X | |
| *Integration of Species and Habitat Conditions* | | | X | | X | |

(Maintain = the function of the indicator does not change; + Maintain = long term effects of the action will have a positive effect to this indicator but will not change the function of an indicator)

## CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION (S) ON RELEVANT INDICATORS

**Federal Action:** Travel Management Plan – Change in

**Watershed Name:** Upper NF John Day River **Location:** Wallowa-Whitman National Forest

| *Diagnostics/Pathways* | *Population and Environmental Baseline (list values or criterion and supporting documentation)* | | | *Effects of the Action(s)* | | |
|---|---|---|---|---|---|---|
| *Indicators* | *Functioning Appropriately* | *Functioning at Risk* | *Functioning at Unacceptable Risk* | *Restore* | *Maintain* | *Degrade* |
| *Subpopulation Characteristics* *Subpopulation Size* | | X | | | X | |
| *Growth and Survival* | | X | | | X | |
| *Life History Diversity and Isolation* | | X | | | X | |
| *Persistence and Genetic Integrity* | | | X | | X | |
| *Water Quality* *Temperature* | | X | | | X | |
| *Sediment* | | X | | | +X | |
| *Chemical Contam/Nutrients* | X | | | | X | |
| *Habitat Access* *Physical Barriers* | X | | | | X | |
| *Habitat Elements* *Substrate Embeddedness* | | X | | | +X | |
| *Large Woody Debris* | | X | | | X | |
| *Pool Frequency and Quality* | | X | | | X | |
| *Large Pools* | | X | | | X | |
| *Off-channel Habitat* | | | X | | X | |
| *Refugia* | | | X | | X | |
| *Channel Cond. & Dynamics* *Wetted Width:Max Depth* | | X | | | X | |
| *Streambank Condition* | | | | | X | |
| *Floodplain Connectivity* | | X | | | X | |
| *Flow/Hydrology* *Change in Peak/Base Flows* | | X | | | X | |
| *Drainage Network Increase* | | X | | | X | |
| *Watershed Conditions* *Road Density & Location* | | X | | | +X | |
| *Disturbance History* | | | X | | X | |
| *Riparian Conservation* | | | X | | +X | |
| *Disturbance Regime* | | X | | | X | |
| *Integration of Species and Habitat Conditions* | | | X | | X | |

(Maintain = the function of the indicator does not change; + Maintain = long term effects of the action will have a positive effect to this indicator but will not change the function of an indicator)

**CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION (S) ON RELEVANT INDICATORS**

**Federal Action:** Travel Management Plan – Change in

**Watershed Name:** Eagle Creek **Location:** Wallowa Whitman National Forest

| *Diagnostics/Pathways* | *Population and Environmental Baseline (list values or criterion and supporting documentation)* | | | *Effects of the Action(s)* | | |
|---|---|---|---|---|---|---|
| *Indicators* | *Functioning Appropriately* | *Functioning at Risk* | *Functioning at Unacceptable Risk* | *Restore* | *Maintain* | *Degrade* |
| *Subpopulation Characteristics* *Subpopulation Size* | | | | | X | |
| *Growth and Survival* | | | | | X | |
| *Life History Diversity and Isolation* | | | | | X | |
| *Persistence and Genetic Integrity* | | | | | X | |
| *Water Quality* *Temperature* | X | | | | X | |
| *Sediment* | | X | | | +X | |
| *Chemical Contam/Nutrients* | X | | | | X | |
| *Habitat Access* *Physical Barriers* | X | | | | X | |
| *Habitat Elements* *Substrate Embeddedness* | | X | | | +X | |
| *Large Woody Debris* | | X | | | X | |
| *Pool Frequency and Quality* | | X | | | X | |
| *Large Pools* | | X | | | X | |
| *Off-channel Habitat* | | X | | | X | |
| *Refugia* | | X | | | X | |
| *Channel Cond. & Dynamics* *Wetted Width:Max Depth* | X | | | | X | |
| *Streambank Condition* | X | | | | X | |
| *Floodplain Connectivity* | | X | | | X | |
| *Flow/Hydrology* *Change in Peak/Base Flows* | | X | | | X | |
| *Drainage Network Increase* | | X | | | X | |
| *Watershed Conditions* *Road Density & Location* | | X | | | +X | |
| *Disturbance History* | | X | | | X | |
| *Riparian Conservation* | | X | | | +X | |
| *Disturbance Regime* | | X | | | X | |
| *Integration of Species and Habitat Conditions* | | | | | X | |

(Maintain = the function of the indicator does not change; + Maintain = long term effects of the action will have a positive effect to this indicator but will not change the function of an indicator)

## CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION (S) ON RELEVANT INDICATORS

**Federal Action:** Travel Management Plan – Change in

**Watershed Name:** North Powder River **Location:** Wallowa Whitman National Forest

| *Diagnostics/Pathways* | *Population and Environmental Baseline (list values or criterion and supporting documentation)* | | | *Effects of the Action(s)* | | |
|---|---|---|---|---|---|---|
| *Indicators* | *Functioning Appropriately* | *Functioning at Risk* | *Functioning at Unacceptable Risk* | *Restore* | *Maintain* | *Degrade* |
| *Subpopulation Characteristics* *Subpopulation Size* | | | X | | X | |
| *Growth and Survival* | | | X | | X | |
| *Life History Diversity and Isolation* | | | X | | X | |
| *Persistence and Genetic Integrity* | | | X | | X | |
| *Water Quality* *Temperature* | | | X | | X | |
| *Sediment* | | | X | | +X | |
| *Chemical Contam/Nutrients* | | X | | | X | |
| *Habitat Access* *Physical Barriers* | | | X | | X | |
| *Habitat Elements* *Substrate Embeddedness* | | | X | | +X | |
| *Large Woody Debris* | | X | | | X | |
| *Pool Frequency and Quality* | | | X | | X | |
| *Large Pools* | | | X | | X | |
| *Off-channel Habitat* | | X | | | X | |
| *Refugia* | | | X | | X | |
| *Channel Cond. & Dynamics* *Wetted Width:Max Depth* | | X | | | X | |
| *Streambank Condition* | | | X | | X | |
| *Floodplain Connectivity* | | | X | | X | |
| *Flow/Hydrology* *Change in Peak/Base Flows* | | | X | | X | |
| *Drainage Network Increase* | | | X | | X | |
| *Watershed Conditions* *Road Density & Location* | | | X | | +X | |
| *Disturbance History* | | X | | | X | |
| *Riparian Conservation* | | | X | | +X | |
| *Disturbance Regime* | | X | | | X | |
| *Integration of Species and Habitat Conditions* | | | X | | X | |

(Maintain = the function of the indicator does not change; + Maintain = long term effects of the action will have a positive effect to this indicator but will not change the function of an indicator)

## CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION (S) ON RELEVANT INDICATORS

**Federal Action:** Travel Management Plan – Change in

**Watershed Name:** Powder River – Wolf Creek **Location:** Wallowa Whitman National Forest

| *Diagnostics/Pathways* | *Population and Environmental Baseline (list values or criterion and supporting documentation)* | | | *Effects of the Action(s)* | | |
|---|---|---|---|---|---|---|
| *Indicators* | *Functioning Appropriately* | *Functioning at Risk* | *Functioning at Unacceptable Risk* | *Restore* | *Maintain* | *Degrade* |
| *Subpopulation Characteristics* *Subpopulation Size* | | | X | | X | |
| *Growth and Survival* | | | X | | X | |
| *Life History Diversity and Isolation* | | | X | | X | |
| *Persistence and Genetic Integrity* | | | X | | X | |
| *Water Quality* *Temperature* | | | X | | X | |
| *Sediment* | | | X | | +X | |
| *Chemical Contam/Nutrients* | | X | | | X | |
| *Habitat Access* *Physical Barriers* | | | X | | X | |
| *Habitat Elements* *Substrate Embeddedness* | | | X | | -X | |
| *Large Woody Debris* | X | | | | X | |
| *Pool Frequency and Quality* | | | X | | X | |
| *Large Pools* | | | X | | X | |
| *Off-channel Habitat* | | X | | | X | |
| *Refugia* | | | X | | X | |
| *Channel Cond. & Dynamics* *Wetted Width:Max Depth* | | X | | | X | |
| *Streambank Condition* | X | | | | X | |
| *Floodplain Connectivity* | | | X | | X | |
| *Flow/Hydrology* *Change in Peak/Base Flows* | | | X | | X | |
| *Drainage Network Increase* | | | X | | X | |
| *Watershed Conditions* *Road Density & Location* | | | X | | -X | |
| *Disturbance History* | | | X | | X | |
| *Riparian Conservation* | | | X | | +X | |
| *Disturbance Regime* | | | X | | X | |
| *Integration of Species and Habitat Conditions* | | | X | | -X | |

(Maintain = the function of the indicator does not change; + Maintain = long term effects of the action will have a positive effect to this indicator but will not change the function of an indicator)

## CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION (S) ON RELEVANT INDICATORS

**Federal Action:** Travel Management Plan – Change in

**Watershed Name:** Upper Powder River **Location:** Wallowa Whitman National Forest

| *Diagnostics/Pathways* | *Population and Environmental Baseline (list values or criterion and supporting documentation)* | | | *Effects of the Action(s)* | | |
|---|---|---|---|---|---|---|
| *Indicators* | *Functioning Appropriately* | *Functioning at Risk* | *Functioning at Unacceptable Risk* | *Restore* | *Maintain* | *Degrade* |
| *Subpopulation Characteristics* *Subpopulation Size* | | | X | | X | |
| *Growth and Survival* | | | X | | X | |
| *Life History Diversity and Isolation* | | | X | | X | |
| *Persistence and Genetic Integrity* | | | X | | X | |
| *Water Quality* *Temperature* | | X | | | X | |
| *Sediment* | | X | | | -X | |
| *Chemical Contam/Nutrients* | X | | | | X | |
| *Habitat Access* *Physical Barriers* | | X | | | X | |
| *Habitat Elements* *Substrate Embeddedness* | | | X | | -X | |
| *Large Woody Debris* | | X | | | X | |
| *Pool Frequency and Quality* | | | X | | X | |
| *Large Pools* | | | X | | X | |
| *Off-channel Habitat* | | | X | | X | |
| *Refugia* | | | X | | X | |
| *Channel Cond. & Dynamics* *Wetted Width:Max Depth* | X | | | | X | |
| *Streambank Condition* | | X | | | X | |
| *Floodplain Connectivity* | X | | | | X | |
| *Flow/Hydrology* *Change in Peak/Base Flows* | | | X | | X | |
| *Drainage Network Increase* | | | X | | X | |
| *Watershed Conditions* *Road Density & Location* | | | X | | -X | |
| *Disturbance History* | | | X | | X | |
| *Riparian Conservation* | | | X | | +X | |
| *Disturbance Regime* | | X | | | X | |
| *Integration of Species and Habitat Conditions* | | | X | | -X | |

(Maintain = the function of the indicator does not change; + Maintain = long term effects of the action will have a positive effect to this indicator but will not change the function of an indicator)

## CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION (S) ON RELEVANT INDICATORS

**Federal Action:** Travel Management Plan – Change in

**Watershed Name:** Grande Ronde River –Beaver Creek **Location:** Wallowa Whitman National Forest

| *Diagnostics/Pathways* | *Population and Environmental Baseline (list values or criterion and supporting documentation)* | | | *Effects of the Action(s)* | | |
|---|---|---|---|---|---|---|
| *Indicators* | *Functioning Appropriately* | *Functioning at Risk* | *Functioning at Unacceptable Risk* | *Restore* | *Maintain* | *Degrade* |
| *Subpopulation Characteristics Subpopulation Size* | | | X | | X | |
| *Growth and Survival* | | | X | | X | |
| *Life History Diversity and Isolation* | | | X | | X | |
| *Persistence and Genetic Integrity* | | | X | | X | |
| *Water Quality Temperature* | | | X | | +X | |
| *Sediment* | | | X | | +X | |
| *Chemical Contam/Nutrients* | X | | | | X | |
| *Habitat Access Physical Barriers* | | | X | | X | |
| *Habitat Elements Substrate Embeddedness* | | | X | | +X | |
| *Large Woody Debris* | | X | | | | |
| *Pool Frequency and Quality* | | | X | | X | |
| *Large Pools* | | X | | | X | |
| *Off-channel Habitat* | | X | | | X | |
| *Refugia* | | X | | | X | |
| *Channel Cond. & Dynamics Wetted Width:Max Depth* | | X | | | X | |
| *Streambank Condition* | | X | | | X | |
| *Floodplain Connectivity* | | X | | | X | |
| *Flow/Hydrology Change in Peak/Base Flows* | X | | | | X | |
| *Drainage Network Increase* | | X | | | X | |
| *Watershed Conditions Road Density & Location* | | X | | | +X | |
| *Disturbance History* | X | | | | X | |
| *Riparian Conservation* | | X | | | +X | |
| *Disturbance Regime* | | X | | | X | |
| *Integration of Species and Habitat Conditions* | | | X | | X | |

(Maintain = the function of the indicator does not change; + Maintain = long term effects of the action will have a positive effect to this indicator but will not change the function of an indicator)

## CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION (S) ON RELEVANT INDICATORS

**Federal Action:** Travel Management Plan – Change in

**Watershed Name:** Grande Ronde River – Five Points Creek **Location:** Wallowa-Whitman National Forest

| *Diagnostics/Pathways* | *Population and Environmental Baseline (list values or criterion and supporting documentation)* | | | *Effects of the Action(s)* | | |
|---|---|---|---|---|---|---|
| *Indicators* | *Functioning Appropriately* | *Functioning at Risk* | *Functioning at Unacceptable Risk* | *Restore* | *Maintain* | *Degrade* |
| *Subpopulation Characteristics* *Subpopulation Size* | | | X | | X | |
| *Growth and Survival* | | | X | | X | |
| *Life History Diversity and Isolation* | | | X | | X | |
| *Persistence and Genetic Integrity* | | | X | | X | |
| *Water Quality* *Temperature* | | | X | | +X | |
| *Sediment* | | | X | | +X | |
| *Chemical Contam/Nutrients* | X | | | | X | |
| *Habitat Access* *Physical Barriers* | X | | | | X | |
| *Habitat Elements* *Substrate Embeddedness* | | | X | | +X | |
| *Large Woody Debris* | | X | | | X | |
| *Pool Frequency and Quality* | | | X | | X | |
| *Large Pools* | | X | | | X | |
| *Off-channel Habitat* | | X | | | X | |
| *Refugia* | | X | | | X | |
| *Channel Cond. & Dynamics* *Wetted Width:Max Depth* | | | X | | X | |
| *Streambank Condition* | | | X | | X | |
| *Floodplain Connectivity* | | X | | | X | |
| *Flow/Hydrology* *Change in Peak/Base Flows* | | | X | | X | |
| *Drainage Network Increase* | | | X | | X | |
| *Watershed Conditions* *Road Density & Location* | | X | | | +X | |
| *Disturbance History* | | | X | | X | |
| *Riparian Conservation* | | X | | | +X | |
| *Disturbance Regime* | | X | | | X | |
| *Integration of Species and Habitat Conditions* | | | X | | X | |

(Maintain = the function of the indicator does not change; + Maintain = long term effects of the action will have a positive effect to this indicator but will not change the function of an indicator)

**CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION (S) ON RELEVANT INDICATORS**

**Federal Action:** Travel Management Plan – Change in

**Watershed Name:** Grande Ronde River – Indian Creek **Location:** Wallowa-Whitman National Forest

| *Diagnostics/Pathways* | *Population and Environmental Baseline (list values or criterion and supporting documentation)* | | | *Effects of the Action(s)* | | |
|---|---|---|---|---|---|---|
| *Indicators* | *Functioning Appropriately* | *Functioning at Risk* | *Functioning at Unacceptable Risk* | *Restore* | *Maintain* | *Degrade* |
| *Subpopulation Characteristics* | | | | | | |
| *Subpopulation Size* | | X | | | X | |
| *Growth and Survival* | | | X | | X | |
| *Life History Diversity and Isolation* | | X | | | X | |
| *Persistence and Genetic Integrity* | | | X | | X | |
| *Water Quality* | | | | | | |
| *Temperature* | | | X | | +X | |
| *Sediment* | | X | | | +X | |
| *Chemical Contam/Nutrients* | X | | | | X | |
| *Habitat Access* | | | | | | |
| *Physical Barriers* | X | | | | X | |
| *Habitat Elements* | | | | | | |
| *Substrate Embeddedness* | | X | | | +X | |
| *Large Woody Debris* | | X | | | X | |
| *Pool Frequency and Quality* | | X | | | X | |
| *Large Pools* | | | X | | X | |
| *Off-channel Habitat* | | | X | | X | |
| *Refugia* | X | | | | X | |
| *Channel Cond. & Dynamics* | | | | | | |
| *Wetted Width:Max Depth* | | | X | | X | |
| *Streambank Condition* | | X | | | X | |
| *Floodplain Connectivity* | X | | | | X | |
| *Flow/Hydrology* | | | | | | |
| *Change in Peak/Base Flows* | X | | | | X | |
| *Drainage Network Increase* | | X | | | X | |
| *Watershed Conditions* | | | | | | |
| *Road Density & Location* | | X | | | +X | |
| *Disturbance History* | X | | | | X | |
| *Riparian Conservation* | | X | | | +X | |
| *Disturbance Regime* | | X | | | X | |
| *Integration of Species and Habitat Conditions* | | X | | | X | |

(Maintain = the function of the indicator does not change; + Maintain = long term effects of the action will have a positive effect to this indicator but will not change the function of an indicator)

## CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION (S) ON RELEVANT INDICATORS

**Federal Action:** Travel Management Plan – Change in

**Watershed Name:** Upper Catherine Creek **Location:** Wallowa-Whitman National Forest

| *Diagnostics/Pathways* | *Population and Environmental Baseline (list values or criterion and supporting documentation)* | | | *Effects of the Action(s)* | | |
|---|---|---|---|---|---|---|
| *Indicators* | *Functioning Appropriately* | *Functioning at Risk* | *Functioning at Unacceptable Risk* | *Restore* | *Maintain* | *Degrade* |
| *Subpopulation Characteristics Subpopulation Size* | | X | | | X | |
| *Growth and Survival* | | | X | | X | |
| *Life History Diversity and Isolation* | | X | | | X | |
| *Persistence and Genetic Integrity* | | | X | | X | |
| *Water Quality Temperature* | | | X | | +X | |
| *Sediment* | | X | | | +X | |
| *Chemical Contam/Nutrients* | X | | | | X | |
| *Habitat Access Physical Barriers* | X | | | | X | |
| *Habitat Elements Substrate Embeddedness* | | X | | | +X | |
| *Large Woody Debris* | | X | | | X | |
| *Pool Frequency and Quality* | | X | | | X | |
| *Large Pools* | | | X | | X | |
| *Off-channel Habitat* | | | X | | X | |
| *Refugia* | X | | | | X | |
| *Channel Cond. & Dynamics Wetted Width:Max Depth* | | | X | | X | |
| *Streambank Condition* | | X | | | X | |
| *Floodplain Connectivity* | X | | | | X | |
| *Flow/Hydrology Change in Peak/Base Flows* | X | | | | X | |
| *Drainage Network Increase* | | X | | | X | |
| *Watershed Conditions Road Density & Location* | | X | | | +X | |
| *Disturbance History* | X | | | | X | |
| *Riparian Conservation* | | X | | | +X | |
| *Disturbance Regime* | | X | | | X | |
| *Integration of Species and Habitat Conditions* | | X | | | X | |

(Maintain = the function of the indicator does not change; + Maintain = long term effects of the action will have a positive effect to this indicator but will not change the function of an indicator)

**CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION (S) ON RELEVANT INDICATORS**

**Federal Action:** Travel Management Plan – Change in

**Watershed Name:** Upper Grande Ronde River **Location:** Wallowa-Whitman National Forest

| *Diagnostics/Pathways* | *Population and Environmental Baseline (list values or criterion and supporting documentation)* | | | *Effects of the Action(s)* | | |
|---|---|---|---|---|---|---|
| *Indicators* | *Functioning Appropriately* | *Functioning at Risk* | *Functioning at Unacceptable Risk* | *Restore* | *Maintain* | *Degrade* |
| *Subpopulation Characteristics Subpopulation Size* | | | X | | X | |
| *Growth and Survival* | | | X | | X | |
| *Life History Diversity and Isolation* | | | X | | X | |
| *Persistence and Genetic Integrity* | | | X | | X | |
| *Water Quality Temperature* | | | X | | +X | |
| *Sediment* | | X | | | +X | |
| *Chemical Contam/Nutrients* | X | | | | X | |
| *Habitat Access Physical Barriers* | | X | | | X | |
| *Habitat Elements Substrate Embeddedness* | | X | | | +X | |
| *Large Woody Debris* | | X | | | X | |
| *Pool Frequency and Quality* | | X | | | X | |
| *Large Pools* | | X | | | X | |
| *Off-channel Habitat* | | X | | | X | |
| *Refugia* | | X | | | X | |
| *Channel Cond. & Dynamics Wetted Width:Max Depth* | X | | | | X | |
| *Streambank Condition* | X | | | | X | |
| *Floodplain Connectivity* | | X | | | X | |
| *Flow/Hydrology Change in Peak/Base Flows* | | X | | | X | |
| *Drainage Network Increase* | | X | | | X | |
| *Watershed Conditions Road Density & Location* | | X | | | +X | |
| *Disturbance History* | | | X | | X | |
| *Riparian Conservation* | | X | | | +X | |
| *Disturbance Regime* | | | X | | X | |
| *Integration of Species and Habitat Conditions* | | | X | | X | |

(Maintain = the function of the indicator does not change; + Maintain = long term effects of the action will have a positive effect to this indicator but will not change the function of an indicator)

## Appendix B – 2010 Bull Trout Critical Habitat Primary Constituent Elements

**Appendix B1. Primary Constituent Elements for bull trout critical habitat and associated habitat indicators**

| PCE # | PCE description | Matrix Indicators (Subpopulation/Habitat) |
|---|---|---|
| 1 | Springs, seeps, groundwater sources, and subsurface water connectivity (hyporehic flows) to contribute to water quality and quantity and provide thermal refugia. | floodplain connectivity, change in peak/base flows, increase in drainage network, riparian conservation areas, chemical contamination/nutrients |
| 2 | Migratory 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. | life history diversity and isolation, persistence and genetic integrity, temperature, chemical contamination/nutrients, physical barriers, average wetted width/maximum depth ratio in scour pools in a reach, change in peak/base flows, refugia |
| 3 | An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish. | growth and survival, life history diversity and isolation, riparian conservation areas, floodplain connectivity |
| 4 | Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure. | large woody debris, pool frequency and quality, large pools, off channel habitat, refugia, average wetted width/maximum depth ratio in scour pools in a reach, streambank condition, floodplain connectivity, riparian conservation areas |
| 5 | Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence. | temperature, refugia, average wetted width/maximum depth ratio in scour pools in a reach, streambank condition, change in peak/base flows, riparian conservation areas, floodplain connectivity |
| 6 | Substrates 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 (e.g., less than 12 percent) of fine substrate less than 0.85 mm (0.03 in.) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions. | sediment, substrate embeddedness, large woody debris, pool frequency and quality |
| 7 | A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph. | change in peak/base flows, increase in drainage network, disturbance history, disturbance regime |
| 8 | Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited. | sediment, chemical contamination/nutrients, peak/base flows |
| 9 | Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present. | persistence and genetic integrity, physical barriers persistence and genetic integrity, physical barriers |

***Crosswalk to support primary constituent element analysis through the matrix of pathway indicators for bull trout***

The crosswalk provides rationale supporting that the proposed PCEs for bull trout critical habitat are thoroughly addressed in the current matrix analysis and that environmental baseline and determination for effects to the species consists of a biological and habitat component addressing in total the PCEs listed in the proposed rule for Critical Habitat (USFWS 2010).

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

This PCE is addressed by analysis of floodplain connectivity and riparian conservation areas. Floodplain connectivity considers hydrologic linkage of off-channel areas with the main channel and overbank flow maintenance of wetland function and riparian vegetation and succession. Floodplain and riparian areas provide hydrologic connectivity for springs, seeps, groundwater upwelling and wetlands and contribute to the maintenance of the water table (USFWS 1998). The analysis of changes in peak/base flows would address subsurface water connectivity. Increase in drainage network would address potential changes to groundwater sources and subsurface water connectivity. Chemical contamination/nutrients would address concerns regarding groundwater water quality.

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

The biological indicator life history diversity and isolation addresses the function of migration and/or subsequent isolation with respect to the population. The biological indicator persistence and genetic integrity indirectly reflects the status of migratory corridors. Physical, biological or chemical barriers to migration are addressed directly through water quality habitat indicators, including temperature, chemical contamination/nutrients and physical barriers. The analysis of these indicators would assess if barriers have been created due to impacts such as high temperatures, high concentrations of contaminants or physical barriers. Analysis of change in peak/base flows and average wetted width/maximum depth ratio in scour pools in a reach would assess whether changes in flow might create a seasonal barrier to migration. An analysis of refugia, which considers the habitat's ability to support strong, well distributed, and connected populations for all life stages and forms of bull trout, would also be pertinent to this PCE.

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

An analysis of floodplain connectivity and riparian conservation areas would assess these contributions to the food base. Floodplain and riparian areas provide habitat to aquatic invertebrates, which in turn provides a forage base to bull trout (USFWS 1998). This PCE is indirectly addressed through the biological indicator of growth and survival and life history diversity and isolation. Both of these indicators look at habitat quality and subpopulation

condition, which provides information on food base. This PCE is a synthesis of the previous PCEs. It is addressed through the analysis of biological and habitat indicators in that, if a bull trout population either exists or could exist in a watershed, then there is an adequate forage base. A healthy habitat provides a forage base for the target species. Any potential impairment to the forage base has been addressed by way of summarizing the biological and habitat indicators.

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

The analysis of large woody debris, such as current values and sources available for recruitment, directly addresses this PCE. Large woody debris increases channel complexity and creates pools and undercut banks. Pool frequency and quality would also directly address this PCE, showing the number of pools per mile as well as the amount of cover and temperature of water in the pools. Average wetted width/maximum depth ratio in scour pools in a reach is an indicator of channel shape and pool quality. Low ratios suggest deeper, higher quality pools. Large pools, consisting of a wide range of water depths, velocities, substrates and cover, are typical of high quality habitat and are a key component of channel complexity (USFWS 1998). An analysis of off-channel habitat would describe side-channels and other off-channel areas. Streambank condition would analyze the stability of the banks, including such features as undercut banks. The analysis of both riparian conservation areas and floodplain connectivity would directly address this PCE. Floodplain and riparian functions include the maintenance of habitat and channel complexity, the recruitment of large woody debris and the connectivity to off-channel habitats or side channels (USFWS 1998). Complex habitats provide refugia for bull trout and in turn, refugia analysis would assess complex stream channels. All of these habitat indicators consider the numerous characteristics of instream bull trout habitat and quantify critical components that are fundamental to creating and maintaining complex instream habitat over time.

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

This PCE is addressed directly by the analysis of temperature. It is addressed indirectly through consideration of refugia, which by definition is high quality habitat of appropriate temperature. Availability of refugia is also considered in analysis of pool frequency and quality and large pools. Average wetted width/maximum depth ratio in scour pools is an indication of water volume, which indirectly indicates water temperature, i.e., low ratios indicate deeper water, which in turn indicates possible refugia. This indicator in conjunction with change in peak/base flows is an indicator of potential temperature and refugia concerns particularly during low flow periods. Streambank condition, floodplain connectivity and riparian conservation areas address the components of shade and groundwater influence, both of which are important factors of water temperature. Stable streambanks and intact riparian areas, which include part of the

floodplain, typically support adequate vegetation to maintain thermal cover to streams during low flow periods.

6. *Substrates 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 (e.g., less than 12 percent) of fine substrate less than 0.85 mm (0.03 in.) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions.*

This PCE is addressed directly by analysis of sediment in areas of spawning and incubation and considers directly the size class composition of instream sediments, particularly fine sediments <63 mm. This PCE is also addressed directly by analysis of substrate embeddedness in rearing areas, which is a function of sediment size class and bedload transport. Both of these indicators would assess substrate composition and stability in relation to the various life stages of the bull trout as well as the sediment transportation and deposition. Large woody debris and pool frequency and quality affect sediment transport and redistribution within a stream and would indirectly assess substrate composition and amounts.

7. *A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph.*

This PCE is addressed by analysis of change in peak/base flows, which considers changes in hydrograph amplitude or timing with respect to watershed size, geology, and geography. Considering increase in drainage network and disturbance history provides further information. Roads and vegetation management both have effects strongly linked to a stream's hydrograph. Disturbance regime ties this information together to consider how a watershed reacts to disturbance and the time required to recover back to pre-disturbance conditions.

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

Flow conditions, such as perennial or ephemeral would be analyzed through changes in peak/base flows, and addressed in consideration of current base flows. Changes in hydrograph amplitude or timing with respect to watershed size, geology, and geography would be considered. The level of contaminants is addressed directly by the analysis of chemical contamination/nutrients and sediment. Current listing under 303(d) status should be considered, as well as the causes for that listing. Sediment is considered a contaminant especially in spawning and rearing habitat and analysis would apply to this PCE.

9. *Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present.*

This PCE is addressed specifically by analysis of the biological indicator persistence and genetic integrity. This indicator analyzes the probability of hybridization or displacement by competitive species. An analysis of physical barriers may indirectly address non-native species in those areas where a barrier may prevent the invasion of non-native species. Updated

information on this PCE is from Bull Trout Core Area Assessments in the various bull trout basins, September 2008.

## Literature Cited

USFWS (U.S. Fish and Wildlife Service). 2010. Proposed Rule: Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for Bull Trout in the Coterminous United States. Federal Register 75(9):2270-2431. January 14, 2010.

USFWS (U.S. Fish and Wildlife Service). 1998. Final Rule: Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Klamath River and Columbia River Distinct Population Segments of Bull Trout. Federal Register 63(111):31647-31674. June 10, 1998.

**Appendix B2. Baseline condition of nine Primary Constituent Elements on the Wallowa-Whitman National Forest for the Travel Management Plan for 12 of the 14 HUC 5 watersheds (does not include Powder River-Wolf Creek, or Upper Powder River watersheds) listed in Table 11 (Assessment) that contain Bull Trout or their designated critical habitat and have Forest lands within the proposed action area.**

| PCE # | PCE description | Baseline Condition | Rationale |
|---|---|---|---|
| 1 | Springs, seeps, groundwater sources, and subsurface water connectivity (hyporehic flows) to contribute to water quality and quantity and provide thermal refugia. | FAR | |
| | | | This project will not affect PCE 1 |
| 2 | Migratory 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. | FUR | |
| | | | This project may affect but not likely adversely affect PCE 2 |
| 3 | An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish. | FAR | |
| | | | This project may affect but not likely adversely affect PCE 3 |
| 4 | Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure. | FA | |
| | | | This project will not affect PCE 4 |
| 5 | Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence. | FUR | |
| | | | This project will not affect PCE 5 |

| PCE # | PCE description | Baseline Condition | Rationale |
|---|---|---|---|
| 6 | Substrates 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 (e.g., less than 12 percent) of fine substrate less than 0.85 mm (0.03 in.) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions. | FAR | |
| | | | This project may affect but not likely adversely affect PCE 6 |
| 7 | A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph. | FAR | |
| | | | This project will not affect PCE 7 |
| 8 | Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited. | FAR | |
| | | | This project may affect but not likely adversely affect PCE 8 |
| 9 | Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present. | FA | |
| | | | This project will not affect PCE 9 |

1) FA = Functioning Appropriately
2) FAR = Functioning at Risk
3) FUR = Functioning at Unacceptable Risk

**Appendix B3. Baseline condition of nine Primary Constituent Elements on the Wallowa-Whitman National Forest for the Travel Management Plan for Powder River-Wolf Creek HUC 5 watershed that contains Bull Trout and their designated critical habitat.**

| PCE # | PCE description | Baseline Condition | Rationale |
|---|---|---|---|
| 1 | Springs, seeps, groundwater sources, and subsurface water connectivity (hyporehic flows) to contribute to water quality and quantity and provide thermal refugia. | FAR | |
| | | | This project will not affect PCE 1 |
| 2 | Migratory 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. | FUR | |
| | | | This project may affect and is likely to adversely affect PCE 2 |
| 3 | An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish. | FAR | |
| | | | This project may affect and is likely to adversely affect PCE 3 |
| 4 | Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure. | FA | |
| | | | This project may affect and is not likely to adversely affect PCE 4 |
| 5 | Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence. | FUR | |
| | | | This project may affect and is not likely to adversely affect PCE 5 |

| PCE # | PCE description | Baseline Condition | Rationale |
|---|---|---|---|
| 6 | Substrates 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 (e.g., less than 12 percent) of fine substrate less than 0.85 mm (0.03 in.) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions. | FAR | |
| | | | This project may affect and is likely to adversely affect PCE 6 |
| 7 | A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph. | FAR | |
| | | | This project will not affect PCE 7 |
| 8 | Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited. | FAR | |
| | | | This project may affect and is likely to adversely affect PCE 8 |
| 9 | Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present. | FA | |
| | | | This project will not affect PCE 9 |

1) FA = Functioning Appropriately
2) FAR = Functioning at Risk
3) FUR = Functioning at Unacceptable Risk

**Appendix B4. Baseline condition of nine Primary Constituent Elements on the Wallowa-Whitman National Forest for the Travel Management Plan for the Upper Powder River HUC 5 watershed that contains Bull Trout and their designated critical habitat.**

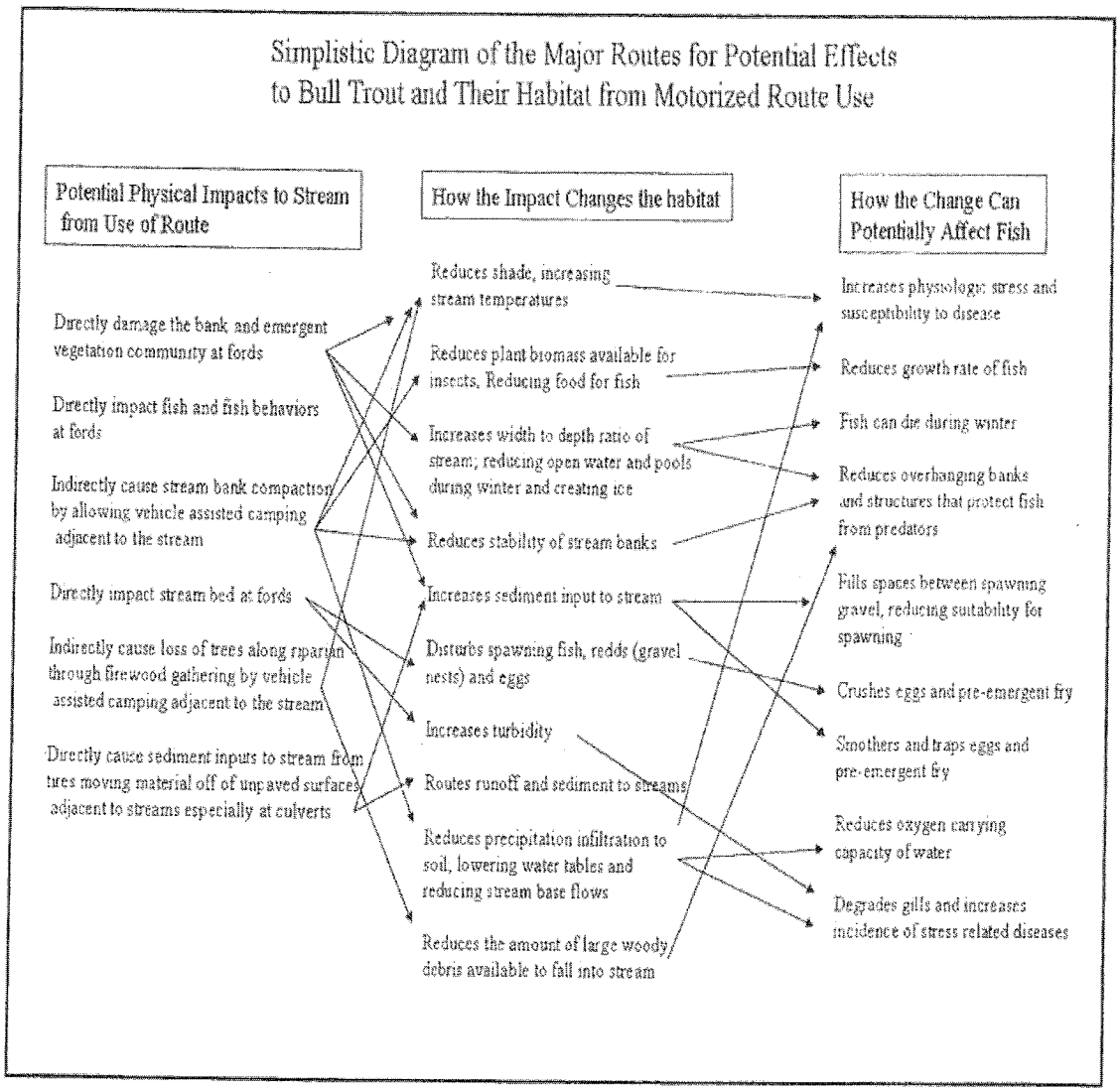
| PCE # | PCE description | Baseline Condition | Rationale |
|---|---|---|---|
| 1 | Springs, seeps, groundwater sources, and subsurface water connectivity (hyporehic flows) to contribute to water quality and quantity and provide thermal refugia. | FAR | |
| | | | This project will not affect PCE 1 |
| 2 | Migratory 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. | FUR | |
| | | | This project may affect and is likely to adversely affect PCE 2 |
| 3 | An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish. | FAR | |
| | | | This project may affect and is likely to adversely affect PCE 3 |
| 4 | Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure. | FA | |
| | | | This project may affect and is not likely to adversely affect PCE 4 |
| 5 | Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence. | FUR | |
| | | | This project may affect and is not likely to adversely affect PCE 5 |

| PCE # | PCE description | Baseline Condition | Rationale |
|---|---|---|---|
| 6 | Substrates 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 (e.g., less than 12 percent) of fine substrate less than 0.85 mm (0.03 in.) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions. | FAR | |
| | | | This project may affect and is likely to adversely affect PCE 6 |
| 7 | A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph. | FAR | |
| | | | This project will not affect PCE 7 |
| 8 | Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited. | FAR | |
| | | | This project may affect and is likely to adversely affect PCE 8 |
| 9 | Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present. | FA | |
| | | | This project will not affect PCE 9 |

1) FA = Functioning Appropriately
2) FAR = Functioning at Risk
3) FUR = Functioning at Unacceptable Risk

**Appendix B5. Effects of the Proposed Action on the nine Primary Constituent Elements.**

| PCE # | PCE description | Degrade | Maintain | Restore |
|---|---|---|---|---|
| 1 | Springs, seeps, groundwater sources, and subsurface water connectivity (hyporehic flows) to contribute to water quality and quantity and provide thermal refugia. | | X | |
| 2 | Migratory 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. | | X | |
| 3 | An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish. | | X | |
| 4 | Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure. | | X | |
| 5 | Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence. | | X | |
| 6 | Substrates 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 (e.g., less than 12 percent) of fine substrate less than 0.85 mm (0.03 in.) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions. | | X | |
| 7 | A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph. | | X | |
| 8 | Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited. | | X | |
| 9 | Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present. | | X | |

Information Sources for the above Matrix Tables and PCE Tables are from: the Assessment; Bull Trout Core Area Assessment Meetings in 2008; and Level 1 Team discussions on the Wallowa-Whitman National Forest Travel Management Plan.

**Appendix C. Common Examples of Mechanisms and Types of Effects that Roads and Trails can have on bull trout.**