Ms. Genevieve Masters  
Forest Supervisor  
Umatilla National Forest  
72510 Coyote Road  
Pendleton, OR 97801  

Subject: Formal and Informal Consultation for the Umatilla and Wallowa-Whitman National Forest’s Proposed 2016-2025 Approval of Lode and Placer Mining Plans of Operation on the Blue Smoke, Hopeful 1, Hopeful 2 & 3, Little Cross 1, Rosebud, and Troy D Mines (Lower Granite Creek); City Limits, Make It, Eddy Shipman, Old Eric 1 & 2, and Tetra Mines (Upper Granite Creek); Blue Sky Mine (Bull Run Creek); Bunch Bucket, Grubstein, and Ruby Mines (Clear Creek); and Lightning Mine (Lightning Creek), Grant and Baker Counties, Oregon (01EOWF00-2015-F-0007)

Dear Ms. Masters:

This document transmits the Fish and Wildlife Service’s (Service) Biological Opinion (Opinion) and Concurrence for the Umatilla and Wallowa-Whitman National Forest’s (UNF/WWNF) proposed 2016-2025 approval of lode and placer mining plans of operation Project (Project) on the Blue Smoke, Hopeful 1, Hopeful 2 & 3, Little Cross 1, Rosebud, and Troy D mines (Lower Granite Creek); City Limits, Make It, Eddy Shipman, Old Eric 1 & 2, and Tetra mines (Upper Granite Creek); Blue Sky Mine (Bull Run Creek); Bunch Bucket, Grubstein, and Ruby mines (Clear Creek); and Lightning Mine (Lightning Creek), Grant and Baker counties, Oregon, as requested by the UNF/WWNF, in accordance with the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). Table 1 in the enclosed document identifies the effects determinations on bull trout (Salvelinus confluentus) and bull trout critical habitat. On December 23, 2015, the Service received a December 18, 2015, request and the accompanying final Biological Assessment. This correspondence and the Assessment document your evaluation of the impacts on bull trout and bull trout critical habitat from the proposed Project.

Also included in the Assessment was information regarding recent acid mine discharge that occurred August 15, 2015, from the Blue Bird abandoned mine that impacted Clear Creek in the proposed Project area. The Blue Bird mine incident is not part of the proposed action but has since been addressed in the amended baseline section of the Assessment and thus, this Opinion.
The UNF/WWNF will continue to work with NMFS and the Service to determine impacts of the discharge and follow-up as needed. An initial report has been provided to the Service and is on file in the La Grande field office.

The UNF/WWNF determined, and the Service concurs, that the proposed approval of mining plans of operation (Plans) is not likely to adversely affect bull trout and bull trout critical habitat in the Troy D, Rosebud 1-4, Make It, Hopeful 1, City Limits, and Bunch Bucket mines; and the UNF/WWNF determined, and the Service agrees, that the proposed approval of Plans is likely to adversely affect bull trout and bull trout critical habitat in the Blue Smoke, Hopeful 2 & 3, Little Cross 1, Eddy Shipman, Old Eric 1 & 2, Tetra, Blue Sky/Bull Run, Grubsteak, Ruby Group, and Lightning mines. This Opinion/Concurrence is based on information provided in the Assessment, telephone and electronic correspondence, and other sources of information. A complete administrative record for this consultation is on file at the Service’s La Grande Field Office in La Grande, Oregon.

We appreciate your concern for listed species. The UNF/WWNF are encouraged to continue to explore opportunities to manage proactively for the benefit of native fish, wildlife and plant species, and to promote the conservation of listed species pursuant to section 7(a)(1) of the ESA. If you have any questions about this Opinion/Concurrence, or require more information regarding this consultation, please contact Suzanne Anderson or me at (541) 962-8584.

Sincerely,

[Signature]
Gary S. Miller
Field Supervisor

Enclosure

cc:
Tim Bailey, Oregon Department of Fish and Wildlife, La Grande, Oregon
Brent Smith, Oregon Department of Fish and Wildlife, John Day, Oregon
Sarah Brandy, Wallowa-Whitman National Forest, La Grande, Oregon
Traci Hickman, Umatilla National Forest, Pendleton, Washington
Rebecca Viray, National Marine Fisheries Service, La Grande, Oregon
BIOLOGICAL OPINION
on the
Hopeful 2 & 3, Little Cross 1, Eddy Shipman, Tetra Alpha, Blue Sky/Bull Run, Grubsteak, Ruby Group, and Lightning Creek Mines
and
CONCURRENCE
on the Blue Smoke, Old Eric 1 & 2, Troy D, Rosebud 1-4, Make It, Hopeful 1, City Limits, and Bunch Bucket Mines 2016 -2025 Approval of Placer and Lode Mining Plans of Operation Project,
Umatilla and Wallowa-Whitman National Forests
Granite Creek Watershed,
Grant and Baker Counties, Oregon

Action Agencies: Umatilla National Forest and Wallowa-Whitman National Forest

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

Date Issued: APR 22 2016

Issued by: [Signature]
Gary S/Miller Field Supervisor

File No.: 01EOFW00-2015-F-0007
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INTRODUCTION

This document transmits the Fish and Wildlife Service’s (Service) Biological Opinion (Opinion) on the Umatilla and Wallowa-Whitman National Forest’s (UNF/WWNF) proposed 2016-2025 approval of lode and placer mining Plans on the Hopeful 2 & 3, Little Cross 1, Eddy Shipman, Tetra Alpha Placer Mill and Lode, Blue Sky/Bull Run, Grubsteak, Ruby Group, and Lightning Creek mines (Table 1), and the Service’s Concurrence on the UNF/WWNF’s proposed 2016-2025 approval of placer mining Plans in Blue Smoke, Old Eric 1 & 2, Troy D, Rosebud 1-4, Make It, Hopeful 1, City Limits, and Bunch Bucket Mines (Table 1), and the effects on the federally threatened bull trout (Salvelinus confluentus) and bull trout critical habitat, as requested by the UNF/WWNF, in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.) The UNF/WWNF’s September 22, 2015, initial request for consultation, with the accompanying Biological Assessment (Assessment), was received on October 2, 2015. A revised final Assessment and new consultation request, dated December 18, 2015, was received by the Service on December 23, 2015.

The UNF/WWNF determined, and the Service concurs, that the proposed approval of mining Plans of Operation (Plans) is not likely to adversely affect bull trout and bull trout critical habitat for the Blue Smoke, Old Eric 1 & 2, Troy D, Rosebud 1-4, Make It, Hopeful 1, City Limits, and Bunch Bucket mines. The Service also agrees that the UNF/WWNF proposed approval of Plans is likely to adversely affect bull trout and bull trout critical habitat for the Hopeful 2 & 3, Little Cross 1, Eddy Shipman, Tetra Alpha Placer Mill and Lode, Blue Sky/Bull Run, Grubsteak, Ruby Group, and Lightning Creek mines. This Opinion/Concurrence is based on information provided in the Assessment, telephone and electronic correspondence, and other sources of information. A complete administrative record for this consultation is on file at the Service’s La Grande Field Office in La Grande, Oregon.

Table 1. The Umatilla and Wallowa-Whitman National Forests ESA Effect Determinations by Subwatershed, for the 2016-2025 Granite Mining Plans of Operation.

<table>
<thead>
<tr>
<th>Subwatershed (Distribution)*</th>
<th>Mine Plan (Mine Type)</th>
<th>Bull Trout</th>
<th>Bull Trout Critical Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Granite Creek (FMO)</td>
<td>Blue Smoke NLAA</td>
<td></td>
<td>NLAA</td>
</tr>
<tr>
<td></td>
<td>Hopeful 1 NLAA</td>
<td></td>
<td>NLAA</td>
</tr>
<tr>
<td></td>
<td>Hopeful 2 &amp; 3 LAA</td>
<td>LAA</td>
<td>LAA</td>
</tr>
<tr>
<td></td>
<td>Little Cross 1 LAA</td>
<td>LAA</td>
<td>LAA</td>
</tr>
<tr>
<td></td>
<td>Rosebud NLAA</td>
<td></td>
<td>NLAA</td>
</tr>
<tr>
<td></td>
<td>Troy D NLAA</td>
<td></td>
<td>NLAA</td>
</tr>
<tr>
<td>Upper Granite Creek (FMO)</td>
<td>City Limits NLAA</td>
<td></td>
<td>NLAA</td>
</tr>
<tr>
<td></td>
<td>Make It NLAA</td>
<td></td>
<td>NLAA</td>
</tr>
<tr>
<td></td>
<td>Eddy Shipman LAA</td>
<td></td>
<td>LAA</td>
</tr>
<tr>
<td></td>
<td>Old Eric 1 &amp; 2 NLAA</td>
<td></td>
<td>NLAA</td>
</tr>
<tr>
<td>-Boulder Creek (SR)</td>
<td>Tetra Alpha LAA</td>
<td></td>
<td>LAA</td>
</tr>
<tr>
<td>Bull Run Creek (FMO)</td>
<td>Blue Sky/Bull Run LAA</td>
<td></td>
<td>LAA</td>
</tr>
<tr>
<td>Subwatershed (Distribution)*</td>
<td>Mine Plan (Mine Type)</td>
<td>Bull Trout</td>
<td>Bull Trout Critical Habitat</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------------</td>
<td>------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Clear Creek (SR)</td>
<td>Bunch Bucket</td>
<td>NLAA</td>
<td>NLAA</td>
</tr>
<tr>
<td></td>
<td>Grubsteak</td>
<td>LAA</td>
<td>LAA</td>
</tr>
<tr>
<td></td>
<td>Ruby Group</td>
<td>LAA</td>
<td>LAA</td>
</tr>
<tr>
<td>-Lightning Creek (SR)</td>
<td>Lightning Creek</td>
<td>LAA</td>
<td>LAA</td>
</tr>
</tbody>
</table>

Tributaries are in italic and listed below the appropriate watershed.
* Distribution is identified as FMO (foraging, migration and overwintering habitat) or SR (spawning and rearing habitat).

**CONSULTATION HISTORY**

- On October 19, 2011, the Service attended a Level 1 field visit to the Project claim sites.
- February 26, 2013, the Service attended a Level 1 meeting to discuss Granite Mining EIS (Assessment).
- On May 21, 2013, a comprehensive overview of the Assessment was presented by UNF.
- On July 19, 2013, a draft Assessment was received.
- On August 21, 2013, the Service received a draft Assessment while attending a Level 1 field visit to Granite watershed and some of the claim sites.
- On September 18, 2013, the Service provided comments regarding the Assessment.
- On June 11, 2014, the Service received a draft Assessment.
- On July 31, 2014, the Service provided comments on the Assessment and requested additional information.
- On July 31, 2014, the Umatilla Level 1 discussed the latest draft and provided comments and requests for additional information.
- On August 19, 2014, the Service received a draft Assessment for review.
- On September 5, 2014, the Service received a Final Granite Mining Assessment.
- On January 16 and 26, and February 12, May 11, and July 6, 2015, the Service received additional clarifications to information provided in the Assessment.
- On March 11, 2015, the Service sent out an Agency review draft of the Opinion to UNF/WWNF.
- On May 11, 2015, Tracii Hickman (UNF) requested the Service, via email, to suspend Section 7 consultation for the Granite Mining Project. This request was due to activity in the Oregon Legislature regarding suction dredge mining activities that could impact water quality and fisheries resources.
- On August 11, 2015, Level 1 meeting notes
- On October 2, 2015, the Service received the UNF/WWNF’s September 22, 2015, request for Section 7 consultation, along with the amended Assessment, providing updated language regarding the status of SB 838, and applicant’s response to the draft Terms and Conditions.
- On October 27, 2015, NMFS asked for clarification on the now current five year moratorium.
- Based on NMFS’s October 27, 2015, request for clarification, the UNF/WWNF modified the proposed action by retracting all suction dredge and provided the Service with an amended Final Assessment on November 20, 2015.
- On December 14, 2015, the Service attended a Level 1 meeting with Tracii Hickman to clarify final comments on the November 20, 2015 Assessment.
On December 23, 2015, the Service received a December 18, 2015, request for consultation along with the Final Assessment for the Granite Mining Project.

On January 26, 2016, the Service received a request from the UNF/WWNF to provide a draft Opinion for review by the Forest Service as described on page 2-13 of the Consultation Handbook. Upon receipt of the draft Opinion, miners with Plans of Operations in the Granite Mining Project with applicant status would be sent a draft Opinion for review.

On February 2, 2016, the Service sent the draft Opinion to the UNF/WWNF, per the January 26, 2016 request.

On April 11, 2016, the Service received an April 4, 2016, letter from the UNF providing two comment letters from Applicants and stating the Forest Service had no additional comments on the draft Opinion.

CONCURRENCE

The Project area within the North Fork John Day Basin in the Granite Creek Watershed encompasses Forest Service (FS) lands on both the UNF and WNF. The Project area sub-watersheds include Bull Run Creek, Lower Granite Creek, Upper Granite Creek, Clear Creek and Lightning Creek. Within the Project area, bull trout use streams for foraging, migration, overwintering (FMO), and spawning and rearing (SR) (Figure 1).

Figure 1. Granite Mining Project Major Streams and Bull Trout Critical Habitat in the Project Area and 303d Listed Streams and Locations of Proposed Plans of Operations.
Each placer and lode mine operator must submit a Plan of Operation (Plan) that must be consistent with, and incorporate all regulations and policy in regards to protection of fish habitat and fish found in PACFISH/INFISH (USDA and USDI 1995) (goals, MM1-MM6 and Riparian Management Objectives) WWNF and UNF Forest Plans, and Oregon Department of State Lands (ODSL) permit. In addition, FS site-specific water resource protection measures (WRPMs), general requirements (GRs, as applicable), and site specific fish protection measures (FPMs, described below) must be adhered to. All actions described below will be re-working areas previously disturbed by placer and lode mining activities, no in-stream mining will occur and there is no stream fording.

The action area for the concurrence includes those uplands and riparian areas that contain bull trout and bull trout critical habitat on Lower Granite Creek, Upper Granite Creek and Clear Creek subwatersheds. Each mine has an established “no disturbance” buffer, unless there are no new activities proposed in the riparian area (Table 2).

**Table 2. Summary of Proximity of Mines to Bull Trout Designated Critical Habitat (DCH), Maximum Area Disturbed by Placer Mine Operations, Total Possible Disturbed Area over the Duration of the Assessment, Miner Identified “No Activity” Stream Buffers, and Pond/Water Source Information.**

<table>
<thead>
<tr>
<th>Plan Name</th>
<th>Stream Name</th>
<th>Area of Disturbance Distance to Bull Trout DCH</th>
<th>Maximum Area of Active Surface Disturbance at any time during the season (in acres)</th>
<th>Total Area Potentially Disturbed from Mining Activities* (in acres)</th>
<th>Width of “No Activity” Stream Buffer**</th>
<th>Ponds</th>
<th>Water Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Smoke</td>
<td>Lower Granite Creek</td>
<td>&gt;300 ft.</td>
<td>.01</td>
<td>1.75</td>
<td>n/a</td>
<td>E</td>
<td>Existing off channel dredge ponds</td>
</tr>
<tr>
<td>Old Eric 1 &amp; 2</td>
<td>Upper Granite Creek</td>
<td>150 ft.</td>
<td>.01</td>
<td>1.0</td>
<td>10 ft.</td>
<td>E</td>
<td>Existing off channel ponds</td>
</tr>
<tr>
<td>Bunch Bucket</td>
<td>Clear Creek</td>
<td>150 ft.</td>
<td>.01</td>
<td>10</td>
<td>n/a</td>
<td>Expand E</td>
<td>Existing off channel dredge ponds</td>
</tr>
<tr>
<td>City Limits</td>
<td>Upper Granite Creek</td>
<td>200 ft.</td>
<td>.01</td>
<td>1</td>
<td>n/a</td>
<td>E</td>
<td>Existing off channel dredge ponds</td>
</tr>
<tr>
<td>Hopeful 1</td>
<td>Lower Granite Creek</td>
<td>150 ft.</td>
<td>.01</td>
<td>1</td>
<td>15 ft.</td>
<td>E</td>
<td>Spring and existing off channel</td>
</tr>
<tr>
<td>Plan Name</td>
<td>Stream Name</td>
<td>Area of Disturbance Distance to Bull Trout DCH</td>
<td>Maximum Area of Active Surface Disturbance at any time during the season (in acres)</td>
<td>Total Area Potentially Disturbed from Mining Activities* (in acres)</td>
<td>Width of “No Activity” Stream Buffer**</td>
<td>Ponds E = existing B = to be built</td>
<td>Water Source</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------</td>
<td>-----------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------</td>
<td>--------------------------------------</td>
<td>-----------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Make It</td>
<td>Upper Granite Creek</td>
<td>50 ft.</td>
<td>.01</td>
<td>2</td>
<td>50 ft.</td>
<td>E</td>
<td>Pond connected to Granite Creek</td>
</tr>
<tr>
<td>Rose-Bud</td>
<td>Upper Granite Creek</td>
<td>200 ft.</td>
<td>.01</td>
<td>5</td>
<td>n/a</td>
<td>2 B @ 150 ft. x 10 ft. x 6 ft.</td>
<td>Existing off channel ponds</td>
</tr>
<tr>
<td>Troy D</td>
<td>Lower Granite Creek</td>
<td>25 ft.</td>
<td>.01</td>
<td>8</td>
<td>25 ft.</td>
<td>E</td>
<td>Existing off channel ponds</td>
</tr>
</tbody>
</table>

*This is the potential total area disturbed over the duration of the Assessment (ten years) due to operational size limits displayed in the column to the left. This entire area will not be disturbed at one time.

** n/a means there are no new activities proposed in the riparian area.

The UNF/WWNF have determined, and the Service concurs, that the proposed approval of Plans for the following claims may affect, but is not likely to adversely affect, bull trout and bull trout critical habitat. Effects to bull trout and bull trout critical habitat are expected to be discountable or insignificant based on the following:

**Blue Smoke**

- The proposed work site is located >300 feet (ft.) from bull trout FMO critical habitat in Lower Granite Creek (Table 2).
- There are no stream fords.
- Historic dredge tailings and County Road 24 and FS 1350 (Figure 2) separate mining activity from Granite Creek.
- There are three proposed excavation sites and one processing site (approximately 1.75 acres).
- Test holes will be 20 ft. x 25 ft. x 10 ft. with each test hole being reclaimed before moving on to the next excavation site so that no more than one excavation site will be open at a time and
reclamation will be ongoing each year.

- The area of active disturbance at any one time is 0.01 acres (Table 2).
- Water supply for the processing site will come from Pond #2 and if needed, a third pond will be used as overflow to ensure no sediment is mobilized via surface or subsurface flow.
- No proposed actions are expected to further impact site stability such as sediment concerns, and no measureable impacts to temperature and instream structures or habitat.
- Site-specific WRPMs: For the processing site, the miner will maintain the existing difference in water surface elevations between the processing pond and the overflow settling pond (Pond #3 Figure 2) to prevent a change in the gradient of the subsurface water as it moves through the fill.
- General Requirements, including surface runoff and water quality related (G4), disturbed areas kept in stable conditions (G5), tree removal related (G6), effective buffer strips to protect water quality during seasonal runoff events (G12), beaver dam protection (G14), stream buffers undisturbed (G15), specific requirements for visual monitoring of Granite Creek (M1), and other measures incorporated into the project design will minimize indirect effects to bull trout and bull trout critical habitat from the Project such that they are discountable.
The proposed work site is located 150 feet (ft.) from bull trout FMO critical habitat in Upper Granite Creek (Table 2, Figure 3).

The claim exists of one work site approximately one acre in size and will move no more than five yards of material during the operating season.

The operator will recirculate the existing water from an old settling pond (drainage filter area), and when it becomes unusable, water will be discharged into an existing settling pond (100 ft. x 50 ft. x 3 ft.).
• The majority of the work will be done by hand excavation with occasional backhoe use to loosen the dig site and upgrade the water source and recirculating settling pond.
• The operator will use existing roads to access the claim.
• The area of active disturbance at any one time is 0.01 acres (Table 2).
• No proposed actions are expected to further impact site stability such as sediment concerns, and no measureable impacts to temperature and instream structures or habitat.
• Site-specific WRPMs: Water temperature related; no standing water is permissible in the settling pond beyond 1 day. The area described as a settling pond is better described as a drainage filter area. The miner is to monitor water released into this area to assure there is no ponding and to stop draining if infiltration slows and water begins to pond.
• General Requirements, including surface runoff and water quality related (G4), disturbed areas kept in stable conditions (G5), tree removal related (G6), effective buffer strips to protect water quality during seasonal runoff events (G12), beaver dam protection (G14), stream buffers undisturbed (G15), specific requirements for visual monitoring of Granite Creek (M1), and other measures incorporated into the project design will minimize indirect effects to bull trout and bull trout critical habitat from the Project such that they are discountable.
Figure 3. Old Eric Detailed Site Map.

**Bunch Bucket Placer Mine**

- The proposed work site is located 150 feet (ft.) from bull trout SR critical habitat in Clear Creek (Table 2).
- In addition, FS 1310 Road and existing skid trails separate work activity from Clear Creek.
- Two sites will be mined with a series of four trenches at each site (approximately 10 acres).
The trenches will be 2 ft. wide, and dug to impermeable substrate (approximately 8 ft. deep) and reclaimed each season. Material will be stockpiled along the trenches and hauled to a stationary processing site next to the processing pond.

- The existing pond (30 ft. x 60 ft. x 10 ft.) will be expanded to secure a dependable water source and all water will be recycled. No more than one excavation site will be open at a time and reclamation will be ongoing each year.
- Up to 600 yards of material is proposed to be processed each year. The area of active disturbance at any one time is 0.01 acres (Table 2).
- No proposed actions are expected to further impact site stability such as sediment concerns, and no measureable impacts to temperature and instream structures or habitat.
- Site-specific WRPMs: No activity in the small creek mentioned in the Plan (site 1 of Figure 4) will occur without first receiving input from the minerals administrator and district hydrologist so that appropriate WRPMs are identified and implemented.
- General Requirements, including surface runoff and water quality related (G4), disturbed areas kept in stable conditions (G5), tree removal related (G6), effective buffer strips to protect water quality during seasonal runoff events (G12), beaver dam protection (G14), stream buffers undisturbed (G15), specific requirements for visual monitoring of Granite Creek (M1), and other measures incorporated into the project design will minimize indirect effects to bull trout and bull trout critical habitat from the Project such that they are discountable.

**Figure 4: Bunch Bucket Placer Mine Detailed Site Map. Note that Lightning Creek is incorrect and the stream should be labeled Clear Creek.**
City Limits Placer Mine

- The proposed work site is located 200 ft. from bull trout FMO critical habitat in Upper Granite Creek (Table 2).
- In addition, all mining activity is separated from Granite Creek by the paved FS 73 Road (Figure 5).
- Test holes no larger than 20 ft. x 30 ft. down to bedrock (approximately 8 ft.) will be dug with a backhoe. Only one test hole will be open at one time.
- Processing water will come from and be recycled in the existing off channel ponds.
- Approximately 3-5 cubic yards of material will be processed daily. The area of active disturbance at any one time is 0.01 acres (Table 2).
- No proposed actions are expected to further impact site stability such as sediment concerns, and no measureable impacts to temperature and instream structures or habitat.
- General Requirements, including surface runoff and water quality related (G4), disturbed areas kept in stable conditions (G5), tree removal related (G6), effective buffer strips to protect water quality during seasonal runoff events (G12), beaver dam protection (G14), stream buffers undisturbed (G15), specific requirements for visual monitoring of Granite Creek (M1), and other measures incorporated into the project design will minimize indirect effects to bull trout and bull trout critical habitat from the Project such that they are discountable.
The proposed work site is located 150 ft. from bull trout FMO critical habitat in Lower Granite Creek (Table 2).

In addition, there are historic tailings and an old cabin between mining activity and Granite Creek (Figure 6).

A backhoe will only be used twice during the operating season with the majority of work with pick and shovel.

Only 1-5 yards of material will be worked each summer, for a maximum total of 1 acre and the area of active disturbance at any one time is 0.01 acres (Table 2). All tailings will be placed adjacent to the dredge hole.

The operator will be using existing open, closed and temporary access roads. All road-related requirements (Appendix A, under Z) apply only during the dry season window (generally July 1 to October 1). Operators working outside this window will be required to
consult with the FS to determine if special road Best Management Practices (BMPs) are required.

- Processing water will come from an existing dredge hole. Additional water may be withdrawn later in the season from Granite Creek; however, the water right is limited to 0.09 cubic feet per second (cfs) and will be monitored by the FS Minerals Administrator. Pump must not exceed 16 horsepower with an inside diameter intake nozzle no greater than four inches. Waste water will be put into a depression in the dredge tailings.

- The water right of 0.09 cfs is not expected to cause a measurable impact to stream flow or temperature (Table 20, Assessment).

- Site-specific FPMs: If water must be withdrawn from Granite Creek, the water pump intake will be screened with 3/32” plate screen (NMFS 1997) to avoid entrainment and/or intake of juvenile fish when withdrawing water from Granite Creek.

- No proposed actions are expected to further impact site stability such as sediment concerns, and no measureable impacts to temperature and instream structures or habitat are anticipated.

- General Requirements, including surface runoff and water quality related (G4), disturbed areas kept in stable conditions (G5), tree removal related (G6), effective buffer strips to protect water quality during seasonal runoff events (G12), beaver dam protection (G14), stream buffers undisturbed (G15), pumps that can be used when drafting water from a creek to minimize potential for impacts to fish (G23), and other measures incorporated into the Project design will minimize indirect effects to bull trout and bull trout critical habitat from the Project such that they are discountable.

Figure 6. Hopeful 1 Placer Mine Detailed Site Map.
**Make It Placer Mine**

- All mining activity is greater than 50 ft. away from Upper Granite Creek (FMO) (Table 2 and Figure 7).
- Approximately 15-20 cubic years of material will be worked during the operating season. The area of active disturbance at any one time is .01 acres (Table 2).
- Test holes no larger than 15 ft. x 20 ft. down to bedrock (approximately 10 ft.) will be dug with a backhoe. Only one test hole will be open at one time.
- Processing water will come from an existing pond and recycled to existing off-channel settling ponds.
- Site-specific WRPMs: 1) Water used for processing will only be put into the depressions that are being used as settling ponds. No water will be returned to the existing off-channel pond which is connected to Granite Creek and is the source water pond; and 2) the miner must avoid decreasing the source water pond level below the pond outlet elevation so that the pond and Granite Creek remain hydrologically connected via surface flow.
- Site-specific FPMs: Water pump intakes will be screened with 3/32” plate screen (NMFS 1997) (or equivalent) to avoid entrainment and/or intake of juvenile fish when withdrawing water from the pond that is connected to Granite Creek (G23).
- General Requirements, including surface runoff and water quality related (G4), disturbed areas kept in stable conditions (G5), tree removal related (G6), effective buffer strips to protect water quality during seasonal runoff events (G12), beaver dam protection (G14), stream buffers undisturbed (G15), pumps that can be used when drafting water from a creek to minimize potential for impacts to fish (G23), specific requirements for visual monitoring of Granite Creek (M1), and other measures incorporated into the Project design will minimize indirect effects to bull trout and bull trout critical habitat from the Project such that they are discountable.
Figure 7. Make-It Placer Mine Detailed Site Map.

**Rosebud 1-4 Placer Mine**

- All mining activity is greater than 200 ft. away from Lower Granite Creek (FMO) (Table 2).
- In addition, County Road 24 and FS 1035 Road separates mining activity from Lower Granite Creek (Figure 8).
- Approximately 2-10 cubic years of material will be worked during the operating season. The area of active disturbance at any one time is .01 acres (Table 2).
- Test holes will be dug with a backhoe and are located on an existing highbar. Only one test
hole will be open at one time.
- The operator is using existing roads and settling ponds.
- Site-specific WRPMs: All settling ponds must be sufficiently bermed to prevent water and sediment from overtopping to top of the ponds and flowing down the road and into the old dredge ponds. Berm material can be either sediment or straw bales but must be stable.
- Site-specific FPMs: Miner will limit loss of water in the processing pond to no more than six inches of water during daily operations. Miner is to establish a fixed measure device such as a staff gauge or measuring rod.
- No proposed actions are expected to further impact site stability such as sediment concerns, and no measurable impacts to temperature and instream structures or habitat.
- General Requirements, including surface runoff and water quality related (G4), disturbed areas kept in stable conditions (G5), tree removal related (G6), effective buffer strips to protect water quality during seasonal runoff events (G12), and other measures incorporated into the Project design will minimize indirect effects to bull trout and bull trout critical habitat from the Project such that they are discountable.

![Figure 8. Rosebud 1-4 Placer Mine Detailed Site Map.](image_url)

**Troy D Placer Mine**

- There will be a 25 foot buffer (Table 2) and an old dredge tailing berm separating all mining activity from Lower Granite Creek (FMO) (Figure 9 and 10).
- Approximately 50 cubic yards of material will be processed daily. The area of active disturbance at any one time is .01 acres (Table 2).
- Test holes will be 20 ft. x 20 ft. and down to bedrock (approximately 12 ft. deep). Only one
test hole will be open at one time.

- Material will be processed at two existing ponds greater than 200 ft. away from the old tailing berm (Figure 9). Water will be recycled on site. The trailer and processing plant are self-contained.
- The operator is using existing roads and settling ponds.
- Site-specific WRPMs: 1) Pond P (Figure 9), as identified on the miner’s map, will be used only as the source water pond; 2) pond S (Figure 9), as identified on the miner’s map, will be used as a settling pond. A trench will be dug parallel to the settling ponds for the pond length plus five ft. on either side. The trench will be on the stream side of the settling ponds and 5 to 20 ft. away from the ponds and the field location will be verified with the FS prior to installation. The trench will be lined with a bentonite blanket, filter cloth, or plastic to eliminate the potential for subsurface flow and sediment transport into the creek (Appendix B for schematic). If a bentonite blanket is used then it can be left buried. If filter cloth or plastic is used it must be removed at completion of the Project (2024).
- General Requirements, including surface runoff and water quality related (G4), disturbed areas kept in stable conditions (G5), tree removal related (G6), effective buffer strips to protect water quality during seasonal runoff events (G12), beaver dam protection (G14), stream buffers undisturbed (G15), specific requirements for visual monitoring of Granite Creek (M1), and other measures incorporated into the Project design will minimize indirect effects to bull trout and bull trout critical habitat from the Project such that they are discountable.
Figure 9: Troy D Placer Mine Detailed Overall Site Map.
Figure 10. Troy D Placer Mine Detailed Site Map of Pond Site.
BIOLOGICAL OPINION

The Umatilla and Wallowa-Whitman National Forests (UNF/WWNF) are proposing approval of the 2016-2025 Granite Mining Plans of Operation Project (Project) for lode and placer mining in the Granite Creek Watershed. The Granite Creek Watershed encompasses Forest Service (FS) lands on both the UNF and WWNF Forests (Figure 11). The Project area sub-watersheds include Lower Granite Creek, Upper Granite Creek, Bull Run Creek, Beaver Creek and Clear Creek. Within the Project area, bull trout use streams for foraging, migration, overwintering (FMO), and spawning and rearing (SR), as displayed in Table 1 (above).

![Figure 11. The Project Area Within the North Fork John Day Basin in the Granite Creek Watershed, Encompassing Forest Service Lands on both the Umatilla and Wallowa-Whitman National Forests.](image)

1. Description of the Proposed Action

The duration of this Opinion is for ten years (2016 – 2025). The proposed action is the UNF/WWNF’s approval of nine mining Plans to operate under specific conditions within the action area during the June 1 to October 31 mining season in 2016 to 2025. Each mine operator must submit a Plan that is consistent with, and incorporates all regulations and policies in regards to protection of fish and fish habitat found in PACFISH/INFISH (USDA and USDI 1995) (goals, MM1-MM6 and Riparian Management Objectives), WWNF and UNF Forest Plans, and Oregon Department of State Lands (ODSL) permit. Plans have been submitted by private citizens proposing mining activities on UNF and WWNF lands.
All newly approved Plans for mining operations on National Forest System lands must comply with the Federal Water Pollution Control Act of 1972, 33 U.S.C. §§1251-1387 (Clean Water Act or CWA). Proposed mining activities, which can reasonably be expected to result in any discharges into waters of the United States, are subject to compliance with CWA Sections 401, 402, and/or 404 as applicable:

- 401 Certification – if operation “may result in any discharge into the navigable waters”….”the mining operator must give a copy of this 401 certification to the Forest Service prior to the Agency approving the Plan of Operations” (FSM 2817.23a – Compliance with the Clean Water Act).

Oregon Department of Environmental Quality (ODEQ) and ODSL may require the following:

- ODEQ general Water Pollution Control Facilities (WPCF) 600 permit covers sources of small-scale mining operations and non-chemical ore-processing methods with disposal of wastewater by evaporation and/or seepage. Operations must be off-stream above ordinary high-water level, and discharge to Oregon waters is prohibited.
- ODSL Individual Permit is required for mining operations that do not qualify for the General Authorization Permit or that involves 25 cubic yards or more of removal-fill activity in non-ESH waters.

In addition, the UNF/WWNF have applied site-specific water resource protection measures (WRPMs), general requirements (GRs), and site-specific fish protection measures (FPMs) developed for water and fish protection. These site-specific protection measures are provided below, under each individual mine description and a complete list of protection measures is provided in Appendix A. In addition to the protection measures, the Plans include “no activity” stream buffers (Table 3) to protect the streams from introduction of sediment (GR-12 and GR-15). These mapped stream buffers will help inform compliance in the future when the ODEQ clarifies definitions for removal or disturbance of streamside vegetation that impacts water quality as required under Senate Bill (SB) 838.

In 2013 the Oregon Legislature passed SB 838, which imposes a five-year moratorium on motorized mining (such as suction dredging) in streams containing essential indigenous anadromous salmonid habitat or naturally reproducing populations of bull trout beginning in January 2016.

The State moratorium is in effect until 2021 or until the Oregon State legislature changes the law. The Granite Mining FEIS will extend beyond the 2021 moratorium. The FS, in order to ensure consistency with Section 402 of the Clean Water Act, has determined Plans proposing suction dredging in naturally reproducing populations of bull trout, and 303d streams listed for sediment will not be approved until the moratorium on suction dredging is lifted, or until an amended Plan is submitted to the FS that excludes the proposed suction dredging. Should the moratorium on suction dredging in the State of Oregon be lifted, the FS will re-initiate ESA Section 7 consultation for that activity as appropriate.
Table 3. Summary of Proximity of Placer and Lode Mines to Bull Trout Critical Habitat, Maximum Area Disturbed by Placer Mine Operation, Total Possible Disturbed Area over the Duration of the Assessment, Stream Fording, Miner Identified “No Activity” Stream Buffers, and Water Source Information.

<table>
<thead>
<tr>
<th>Plan Name</th>
<th>Stream (Distribution)</th>
<th>Area of Disturbance Distance to Bull Trout DCH</th>
<th>Maximum Area of Active Surface Disturbance (in acres) per Season</th>
<th>Total Area Potentially Disturbed from Mining Activities (in acres) for 2016-2025*</th>
<th>Temporary Road Activity**</th>
<th>Number of Stream Fords</th>
<th>Width of “No Activity” Stream Buffer</th>
<th>Ponds</th>
<th>Water Source (gpm-gallons per minute)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue-Sky/Bull Run</td>
<td>Bull Run Creek (FMO)</td>
<td>30 ft.</td>
<td>.2</td>
<td>1.7</td>
<td>0.16 miles</td>
<td>2</td>
<td>30’</td>
<td>E</td>
<td>Existing off-channel dredge ponds</td>
</tr>
<tr>
<td>Eddy Shipman</td>
<td>Upper Granite Creek (FMO)</td>
<td>20 ft.</td>
<td>.25</td>
<td>2.5</td>
<td>1</td>
<td>20’</td>
<td>Build 2 10’x 20’ x 6’</td>
<td>E</td>
<td>Water right from Chipman Gulch is “no more than 150 gpm”</td>
</tr>
<tr>
<td>Grubsteak</td>
<td>Clear Creek (SR)</td>
<td>20 ft.</td>
<td>.25</td>
<td>2</td>
<td>0.08 miles</td>
<td>1</td>
<td>20’</td>
<td>E</td>
<td>Existing off-channel dredge ponds</td>
</tr>
<tr>
<td>Hopeful 2 &amp; 3</td>
<td>Lower Granite Creek (FMO)</td>
<td>50 ft.</td>
<td>.25</td>
<td>3.5</td>
<td>2</td>
<td>20’</td>
<td>2 E, 2 B 4’x 4’ x 6’</td>
<td>E</td>
<td>Spring and existing off-channel dredge ponds What about Lower Granite Creek</td>
</tr>
<tr>
<td>Lightning Creek***</td>
<td>Lightning Creek (SR)</td>
<td>150 ft.</td>
<td>.12</td>
<td>5</td>
<td>1</td>
<td>n/a</td>
<td>E</td>
<td></td>
<td>Water right on Lightning Creek is 100 gpm</td>
</tr>
<tr>
<td>Little Cross I</td>
<td>Lower Granite Creek (FMO)</td>
<td>50 ft.</td>
<td>.25</td>
<td>1</td>
<td>0</td>
<td>15’</td>
<td>none</td>
<td></td>
<td>Existing off-channel dredge ponds</td>
</tr>
<tr>
<td>Ruby Group</td>
<td>Clear Creek (SR)</td>
<td>10 ft.</td>
<td>.01</td>
<td>2.5</td>
<td>2</td>
<td>10’</td>
<td>None</td>
<td></td>
<td>Portable water source</td>
</tr>
<tr>
<td>Tetra Alpha Placer***</td>
<td>Boulder Creek (SR)</td>
<td>25 ft.</td>
<td>.5</td>
<td>8</td>
<td>0.38 miles</td>
<td>3</td>
<td>25’</td>
<td>E</td>
<td>Existing off-channel ponds and water right on Boulder Creek is 100 gpm</td>
</tr>
<tr>
<td>Tetra Alpha Lode &amp; Mill***</td>
<td>Boulder Creek (SR)</td>
<td>25 ft.</td>
<td>.5</td>
<td>2</td>
<td>0.39 miles</td>
<td>0</td>
<td>25’</td>
<td>E</td>
<td>Reservoir on Last Chance Creek, processing pond and off-channel ponds; water right on Last Chance Creek is 100 gpm. Water right includes makeup water from Boulder Creek if flow from Last Chance Creek is not sufficient.</td>
</tr>
</tbody>
</table>

Total | 2.33 acres | 28.2 acres | 1.01 miles |

*This is potential total area disturbed over the duration of the Assessment. Due to operational size limits displayed in the column to the left (based on what the Claimant provided in his/her Plan), this entire area will not be disturbed at one time.

**No new temporary roads will cross streams. Detailed temporary roads information can be found in Appendix D of Assessment.

***These Plans include drafting from bull trout SR and FMO habitat.
Placer and Lode Mining

Placer mining is the mining of stream sand, rock and gravel deposits for minerals, or discrete grains called “placers”. The metal or gemstones are moved by stream flow from an original source such as a vein. Heavy metals like gold are considerably denser than the sand, rock and gravel deposits they are found in, thus they tend to accumulate at the base of placer deposits. The process of placer mining involves filling a pan with the crushed ore to separate the gold. Lode mining is also called hard rock mining. Gold is deposited in a lode or vein filled with mineral, in the rock of mountains. The process of lode mining involves extracting the gold from tunnels in a mountain.

All of the placer mining proposed for this Project will consist of processing previously mined and disturbed existing surface deposits or by surface equipment excavating previously mined and disturbed areas. New surface excavating will not occur. All lode operations will be “reopening” or maintaining historic shafts. Only existing adits (horizontal mine entrances) will be re-opened for any of the lode mines. Some areas have recovered with mature vegetation, which will be protected under G6. As described below under “Mine-Specific Actions”, many sites will use heavy equipment such as backhoes and loaders to dig the material and transport it to the processing equipment, all of which will be located outside of RHCAs. In addition, some sites will require stream fording or temporary bridge installation.

1.1 Mine-Specific Actions

The Plans of Operations provided in the Assessment and as follows, are a summary by the UNF/WWNF of what activities will be authorized. These summaries are based on information submitted by the miners to the UNF/WWNF (Plans are on file at the North Fork John Day Ranger District) coupled with information gathered from on-site visits by the Minerals Administrator and other FS personnel. Included in each Plan are the required FS site-specific protection measures (PMs) developed for water and fish protection. Detailed site maps of the Plans are also included. A complete list of all the best management practices (BMPs) and PMs are provided in Appendix A. The proposed operating period for all mining operations is June 1st to October 31st. Appendix C of the Assessment provides mining terminology and descriptions and photos of equipment to be used.

1.1.1 Blue Sky/Bull Run Placer Mine

Blue Sky is a proposed placer operation with test sites at four different locations and Bull Run contains two identified test sites (Figures 12, 13, and 14). Each activity site is no larger than 1/5 acre and will be mined by digging and filling a trench 20 ft. wide by 11 ft. deep. A 30 ft. stream buffer will be maintained throughout the claim and each test hole will be reclaimed before moving to the next test site. The operator will use three existing ponds (5 ft. by 10 ft. by 5 ft.) to control overflow from the main processing pond (pond #6). Up to five cubic yards of material will be hauled daily from excavations sites to the processing site. Use of the existing ford on Bull Run Creek on a non-system FS road off Forest Road 7300 by heavy machinery will not exceed four trips per season for access and repairs. There is daily use of pickups for hauling material generated by placer mining. Gravel will be placed and packed on streambanks at fords to protect streambanks. This non-system road is used by the public to access dispersed campsites (a WWNF access and travel management plan has not been completed) (see map 1 [Figure 12] of
Blue Sky – Bull Run, road E4A). There is a ford on the intermittent, non-fish bearing portion of Swamp Creek and heavy equipment will not exceed four trips per season for access and repairs; other equipment such as pickups and ATVs are not to exceed one trip per day. Some small diameter lodgepole and other riparian vegetation may be removed from the worksite. Equipment used: Washing plant, trommel, high bankers, water pump, auger, backhoe, ATV and pickup trucks.

Conclusions: A 401 certification from ODEQ and ODSL must be obtained before receiving FS approval for commencing with site activity at Blue Sky site #3 because there is the potential for a discharge.

Site-Specific Forest Service Requirements

Site-specific Water Resources Protection Measures

Processing site: None needed

Blue Sky Bull Run (Blue Sky site #1): None needed.

Blue Sky Bull Run (Blue Sky site #2): Place straw bales/coils along the low berm that separates the activity site from Swamp Creek to increase the effectiveness of the low berm.

Blue Sky Bull Run (Blue Sky site #3)
1. Measurement of the buffer would start at the top of the valley floor terrace-channel bank break in slope of the side channel.
2. Put straw bales/coils on the valley floor between the activity site and the creek [side channel]
3. The test hole must be filled in at the end of each season and the disturbed area seeded and covered with straw.
4. Straw bales will be staked on the valley floor where the mining occurred in a pattern to disperse stream flows during spring high flows and prevent concentrated flows that could erode the disturbed area.

Blue Sky Bull Run (Blue Sky site #4)
1. Measurement of the buffer would start at the top of the valley floor terrace-channel bank break in slope.
2. Use straw bales to prevent sediment transport to Bull Run Creek.

Blue Sky Bull Run (Bull Run site #1)
1. Measurement of the 30 ft. buffer would start at the top of the valley floor terrace-channel bank break in slope.
2. Miner’s protection measure related to straw bales applies to this site because site is adjacent to Bull Run Creek.

Blue Sky Bull Run (Bull Run site #2)
1. Measurement of the buffer would start at the top of the valley floor terrace-channel bank break in slope.
2. Miner’s protection measure related to straw bales applies to this site because site is adjacent to Bull Run Creek (G4 and G12).
3. Location of a proposed 7375-M1b two-track road through the forest would be determined with input from the FS (Figure 12).

Ford: There is a ford on the intermittent, non-fish bearing portion of Swamp Creek; rock and slope ford approaches.

Site-specific Fish Protection Measures (FPMs): None

General Requirements Identified for Protection of Water and/or Fish Resources

G4: Surface runoff and water quality related
G5: Disturbed areas kept in stable conditions
G6: Tree removal related
G7: Fords
G12: Effective buffer strips to protect water quality during seasonal runoff events
G14: Beaver dams protected
G15: Stream buffers undisturbed
H3: Have lined containment vault under hazardous material storage barrels
H5: Spill kit on site
H6: Hazardous substances not to be released on land, rivers etc. Have oil absorbing mats
H8: Check equipment for leaks

M1: Specific requirements for visual monitoring of Bull Run Creek
W1 – 3: Requirements for working in wetlands and floodplains
Figure 12. Blue Sky/ Bull Run Placer Mine Detailed Site Map
Figure 13. Blue Sky Bull Run Detailed Site Map (Blue Sky Site 4)
Figure 14. Blue Sky Bull Run Detailed Site Map (Bull Run Sites 1 and 2).
1.1.2 Hopeful 2 & 3 Placer Mine

The Hopeful 2 & 3 Mine is located within the Lower Granite Creek subwatershed (Figure 15), which is FMO bull trout critical habitat. This claim has been given a 20 ft. “no activity” planspecific stream buffer (Table 3). Mining is proposed on both sides of Granite Creek (3.5 acres). The operator will be working old dredge tailings and approximately 15 cubic yards of material will be processed each year. Test holes will be 6 ft. x 3 ft. x 10 ft. in size. If valuables are found, the area will be worked in quarter acre parcels. The processing water will be recycled within the ponds. Pond 1 (20 ft. x 30 ft. x 4 ft.) is existing and lies on the south side of the claim. Pond 2 (4 ft. x 4 ft. x 4 ft.) is proposed and will lie on the north side of the claim. The miner reviewed the original description of activities, and in July 2014 proposed moving the north side processing pond to a location where there would not be a discharge call. The miner will be using existing skid trail/roads. The miner will limit the number of crossings on Granite Creek as follows: One ford exists on Granite Creek and one on an unnamed tributary (Figure 15); heavy machinery and dump trucks will cross no more than four times per season, and pickup truck crossings will occur no more than two times per week for fuel or other maintenance items. Gravel will be placed and packed on streambanks at fords to protect streambanks. Equipment to be used includes a backhoe, dump truck, cat, pickup trucks, ATVs, high banker, and trommel, washing plant and water pumps.

Site-Specific Forest Service Requirements:

Site-specific WRPMs: None for the south processing site Pond 1 and north processing Site 3, Pond 3 (Figure 15):

For the proposed north processing site Pond 2 and Pond 2 settling (Figure 15): It will be ensured that the two proposed ponds are deep enough and sufficiently berm ed to prevent water from overflowing the top of the ponds. The miner will work with the FS Minerals Administrator to ensure proper location of ponds and placement of berms. The source water pond will be the west pond and at least 7 ft. from the terrace break in slope. The settling pond will be the east pond and will be at least 7 ft. from the terrace break in slope. A sediment berm will be created along the stream-side edge of the settling pond to eliminate a small swale and straw bales will be placed on the stream-side edge of the sediment berm.

Mining sites 1, 3, and 4: None needed

Site-specific FPMs:

Fords (Figure 15):

1. The channel bed must be stable and water depths must be below the frame on the vehicle before the ford can be used in order to ensure that equipment can safely cross.

2. The north approach of the East Ford (Granite Creek) will be rocked to the slope break, plus an additional 25 ft. of road above the slope break. The south approach of the East Ford will be broken into three segments:
   - Segment A: Rock the road
• Segment B: The road steepens for about 35 ft. to reach the top of the hill. A water bar will be placed at the base of the steep section of road where there is a 2.5 ft. wide flat area on the stream side of the road. The FS Minerals Administrator will be on site and verify water bar location prior to construction. The water bar will be designed so that it diverts towards the flat area (only option as the other side is a hillslope). Straw bales will be placed at the stream-side edge of the flat area to trap all sediment leaving the road and prevent it from entering the creek. This section will not be rocked so that rock does not fill the water bar.

• Segment C: A water bar will be placed where the road flattens out. The FS Minerals Administrator will be on site and verify water bar location prior to construction. This portion of the road will be rocked.

3. A ford on an unnamed tributary on the south side will be rocked on both approaches to where the road flattens out (east side) or there is a change in slope (west side). The existing corduroy bridge will be left in the channel.

**GRs Identified for Protection of Water and /or Fish Resources:**

G4: Surface runoff and water quality related
G5: Disturbed areas kept in stable conditions
G6: Tree removal related
G7: Fords
G12: Effective buffer strips to protect water quality during seasonal runoff events
G14: Beaver dams protected
G15: Stream buffers undisturbed

H1: No use of processing chemicals to extract ore unless authorized
H2: No chemical flocculent or surfactant used in ponds unless Environmental Protection Agency (EPA) approved
H3: Have lined containment vault under hazardous material storage barrels
H5: Spill kit on site
H6: Hazardous substances not to be released on land, rivers etc. Have oil absorbing mats
H8: Check equipment for leaks

M1: Specific requirements for visual monitoring of Granite Creek

W1 – 3: Requirements for working in wetlands and floodplains
Figure 15. Hopeful 2 & 3 Placer Mine Detailed Site Map.
1.1.3 Little Cross 1 Placer Mine

The Little Cross Mine is located within the Lower Granite Creek subwatershed (Figure 16), which is FMO bull trout critical habitat. The claim has been given a 15 ft. “no activity” plan-specific stream buffer (Table 3). Little Cross Mine is a small proposed placer operation, working less than a quarter acre, approximately 15 ft. from Granite Creek on a road that slopes towards Granite Creek. Tailings will be processed at the dispersed campsite using existing groundwater from the dig site. Water will be recycled and no water will be discharged into Granite Creek. Equipment to be used includes an ATV, backhoe, and highbanker.

Site-Specific Forest Service Requirements:

Site-specific WRPMs for Placer Mining:

1. Straw bales will be placed along the creek edge.
2. A second set of straw bales will be placed 6 ft. to 8 ft. upslope from the edge of the creek.
3. The site will be reclaimed at the end of each season.
4. Any sediment that collects behind the second set of straw bales will be removed prior to removing the stream side berm.

Site-specific FPMs: None

GRs Identified for Protection of Water and/or Fish Resources:

G4: Surface runoff and water quality related
G5: Disturbed areas kept in stable conditions
G6: Tree removal related
G12: Effective buffer strips to protect water quality during seasonal runoff events
G14: Beaver dams protected
G15: Stream buffers undisturbed

H3: Have lined containment vault under hazardous material storage barrels
H5: Spill kit on site
H6: Hazardous substances not to be released on land, rivers etc. Have oil absorbing mats
H8: Check equipment for leaks

M1: Specific requirements for visual monitoring of Granite Creek
Figure 16. Little Cross 1 Mine Detailed Site Map.
1.1.4 Eddy Shipman Lode and Placer Mine

The Eddy Shipman Mine is located within the Upper Granite Creek subwatershed (Figure 17), which is FMO bull trout critical habitat. This claim has a 20 ft. “no activity” plan-specific stream buffer and a total 2.5 acres of potential disturbance (Table 3).

Lodgepole, western larch and red fir will be used to reinforce the adit of the lode mine. Removal of vegetation will occur within the riparian habitat conservation area (RHCA) but no shade bearing trees will be removed. Explosives will be used but no surface blasting will occur. Up to five tons of rock material per day will be crushed and milled. Water from Chipman Gulch will be used during the milling process (Figure 17). No more than 150 gallons per minute will be used in the milling process. The operator has proposed to construct a processing pond and one off-channel settling pond, both estimated at 10 ft. x 20 ft. x 6 ft. Waste rock will be placed to build up the existing berm between Upper Granite Creek and the mill site. Equipment to be used for the lode claim includes a skid mounted jaw crusher, horse, portable Arrastra for milling, ball mill, and a bobcat.

Placer mining activity will take place along approximately a quarter acre of Chipman Gulch. A 20 ft. stream buffer between the mining activity and Chipman Gulch will be maintained. Equipment to be used includes a washing plant, mill, pickup trucks, horse, ATVs and water pump, backhoe loader, small cat and dump truck.

At the processing site the processing water will be pumped from Chipman Gulch to three off-channel ponds and will be used in both the milling and placer operation. Water will be recycled between the newly constructed processing and settling ponds.

Use of the existing Granite Creek ford on the closed FS road 7300-680 (above the fish barrier culvert) will not exceed two trips per week by heavy machinery to haul material to the processing site. Gravel will be placed and packed on streambanks at fords to protect streambanks. Two to four round trips per month by pickup trucks for maintenance needs and fuel delivery will be allowed.

Site-Specific Forest Service Requirements

Site-specific WRPMS:
1. Prior to crossing the ford with a vehicle the channel bed must be determined to be stable and the water depths must be below the frame on the vehicle in order to ensure that equipment can safely cross.
2. Both approaches to the ford used to access Adit A (FS road 7300-680 and TA road 7300-E1d) will be rocked.

Processing Site
1. A berm will be built on the lower portion of each pond to prevent surface water and sediment from entering the wet meadow.
2. A straw bale berm will be placed during construction and during use of the source water and settling ponds and the edge of the bench to trap any sediment generated by the operation from entering into the wet meadow and Chipman Gulch, and thus Granite Creek.
Placer Mining
1. If any placer mining occurs in old lode tailings or results in disturbing the old lode tailings, then GRs L3 and L5 will apply.
2. The settling pond will be lined with sediment trapping cloth on the stream side of the pond with approximately 3 ft. of drape on the bottom and 3 ft. on either side (see diagram, Appendix B).
3. A straw bale berm will be placed between the existing horse corral and creek to prevent runoff of nutrients.
4. There will be no removal of trees providing stream shade.

Lode Mining (Adits A and B)
See GRs related to Lode mining below (L1 – L12) and Appendix A.

Site-specific FPMs: None

GRs Identified for Protection of Water and/or Fish Resources:

G4: Surface runoff and water quality related
G5: Disturbed areas kept in stable conditions
G6: Tree removal related
G7: Fords
G12: Effective buffer strips to protect water quality during seasonal runoff events
G14: Beaver dams protected
G15: Stream buffers undisturbed

H3: Have lined containment vault under hazardous material storage barrels
H5: Spill kit on site
H6: Hazardous substances not to be released on land, rivers etc. Have oil absorbing mats
H8: Check equipment for leaks
M1: Specific requirements for visual monitoring of Granite Creek and Chipman Gulch
W1-3: Requirements for working in wetlands and floodplains.

L3, L8, L11: These require water exiting lode mines to be tested for heavy metals.
L4: This requires that the first run of the adit material be tested to determine if there is a potential for release of heavy metals, as well as additional testing throughout the life of the operation.
L5: This requires that test results will be provided to the FS directly from the testing facility. Should the results exceed the EPA and ODEQ standards, the miner must address this issue prior to continuing this portion of the operation (36 CFR 261.11 (c)).
L1, L2, L6, L7, L9, L10, and L12: General Lode requirements that address water use and protection.
Figure 17. Eddy Shipman Detailed Site Map.
1.1.5  Tetra Alpha Lode Mine and Mill

The Tetra Lode Mine and Mill are located within the Boulder Creek subwatershed, a tributary of Upper Granite Creek (Figure 18 and 19) and is SR bull trout critical habitat. The lode claim has been given a 25 ft. “no activity” plan-specific stream buffer (Table 3). The operator will use existing roads to access the adit (1 acre) and the mill (1 acre). Material from the adit will be hauled to the mill site. No explosives are proposed for this operation. Approximately 10 tons of ore will be removed from the lode mine to the milling site which could result in an estimated 30 tons of waste over the ten-year consultation. Equipment to be used consists of an excavator, cat, dump trucks and pickup trucks.

The mill site is an existing mill site (1 acre) from a previously approved Plan. The Plan was resubmitted with amendments in order to continue operations. The water source for the mill comes from an existing pond (Figure 18, northern most) on Last Chance Creek and is not bull trout critical habitat. The water right is 100 gpm and will be monitored by the FS Minerals Administrator. Over fifty years ago, Last Chance Creek was diverted to fill the northern most pond (Figure 19, buried pipe). Last Chance Creek is intermittent and dry during the summer and there is no flow in the pipe during the period of operation. The operator will use three existing settling ponds where water will be recycled. Equipment to be used consists of a jaw crusher, vibrator mill, front end loader, dump truck, air compressor, water pumps, and a final gold recovery unit.

Per an email from Tracii Hickman (UNF), received on December 18, 2015, regarding water sources for Tetra Alpha Lode and Mill, “although the project description says water is from Last Chance Creek, the miner also has a water right to Boulder Creek and could withdraw makeup water from Boulder Creek if flow from Last Chance Creek is not sufficient.” This water right is limited to 100 gpm (Table 3).

**Site-Specific Forest Service Requirements**

Site-specific WRPMs: None needed.

Site-specific Additional FPMs:
1. No water withdrawals are permitted in Boulder Creek after August 15 to protect fish migrating to spawn.
2. If Boulder Creek is dry below where the miner is working prior to August 15, then the miner must cease withdrawing water from the creek until flow exceeds the amount withdrawn.

GRs Identified for Protection of Water and/or Fish Resources:
G4: Surface runoff and water quality related
G5: Disturbed areas kept in stable conditions
G6: Tree removal related
G12: Effective buffer strips to protect water quality during seasonal runoff events
G14: Beaver dams protected
G15: Stream buffers undisturbed

H1: No use of processing chemicals to extract ore unless authorized
H2: No chemical flocculent or surfactant used in ponds unless EPA approved
H3: Have lined containment vault under hazardous material storage barrels
H5: Spill kit on site
H6: Hazardous substances not to be released on land, rivers etc. Have oil absorbing mats
H8: Check equipment for leaks

M1: Specific requirements for visual monitoring of Boulder Creek

L3, L8, L11: These require that water exiting lode mines must be tested for heavy metals.
L4: This requires that the first run of the adit material be tested to determine if there is a potential for release of heavy metals, as well as additional testing throughout the life of the operation.
L5: Test results will be provided to the FS directly from the testing facility. Should the results exceed EPA and ODEQ’s standards, the miner must address this issue prior to continuing this portion of the operation (36CFR 261.11 (c)).
L1, L2, L6, L7, L9, L10, and L12: General Lode requirements that address water use and protection.
Figure 18: Tetra Alpha Lode Detailed Site Map.
Figure 19: Tetra Alpha Mill Detailed Site Map.
1.1.6 Tetra Alpha Placer Mine

The Tetra Alpha Placer Mine is located within the Boulder Creek subwatershed (Figure 20), a tributary of Upper Granite Creek and is SR bull trout critical habitat. This claim has a 25 ft. “no activity” plan-specific stream buffer (Table 3). Placer mining is proposed on eight acres on the south side of Boulder Creek. The operator proposes processing approximately 100 cubic yards of material per day. Placer gravels will be excavated to bedrock and all material will be hauled to a pre-existing processing site on the north side of Boulder Creek (adjacent to the existing pond). An existing pond provides water for processing and all water will be recycled on site. Water withdrawals from Boulder Creek will be monitored by the FS Minerals Administrator and are limited to 100 gpm. Mining will take place in approximately half acre parcels with a total disturbance area of one acre each season and a maximum depth of 30 ft. Each half acre parcel will be reclaimed before moving to the next work site. After material is processed it will be returned to the excavation site for fill. The operator has proposed two new ford crossings to access the placer operations on the south side of Boulder Creek (one of the fords is a ford bridge). The operator will limit crossing of the new fords to no more than 1-3 round trips per day per ford. Heavy machinery will be used for hauling material to the processing site. The operator will limit crossing the existing ford to no more than 2-4 times per week with a pickup truck or ATV for maintenance and repairs. Equipment to be used consists of an excavator, cat, generator, trommel, water pumps, dump trucks, and ATVs.

Site-Specific Forest Service Requirements

Site-specific WRPMs:
1. The high water mark is defined as the back edge of the meadow because the lushness of the meadow vegetation indicates that this area is frequently flooded and has a high water table. Measurement of the 25 ft. buffer will start at the back edge of the meadow.
2. For Stage 2 mining operations (the area accessed via 7355-M3c and 7355-M3d roads), a straw bale berm will be constructed at the base of the hillslope, outside the existing 25 ft. buffer. The Stage 2 area is located on the south side of Boulder Creek, along the eastern portion of the 7355-mc3 temporary road.

Fords:
The middle ford, labeled F/B in Figure 20 is not authorized for use. The existing Boulder Creek west ford (Figure 20) will be used to access the Stage 1 area (located along the western portion of the 7355m3a and m3b temporary road) via the 7355-M3b road:
1. Ford approaches will be rocked.

Two newly constructed Boulder Creek fords (Figure 20) will be used to access the Stage 2 mining area via the 7355-M3c and 7355-M3d roads:
1. Construction will take place during the ODFW in-water work window.
2. Material will be pulled away from the stream and deposited in a location where the sediment will not be able to reach the stream during high flow.
3. Small straw wattles, bales, or silt fence will be placed along the stream when pulling back the material during ford construction or maintenance.
4. The two newly constructed ford approaches will be rocked and sloped.
5. General requirement G7: Fords applies (Appendix A).
Access Road:
1. Where temporary road 7355-M3d crosses the meadow, it will be rocked to at least 20 ft. back from the creek to ensure that no sediment will make it to the creek and at additional areas as needed to ensure the road will not erode and trigger gullying in the meadow.
2. Two-track location will be flagged by the operator and approved by FS personnel.

Site-specific FPMs:
1. A fisheries biologist will monitor the stream fords to ensure that they are not creating a fish barrier during low flows.
2. No water withdrawals will be permitted from Boulder Creek after August 15, in order to protect bull trout spawning and rearing.
3. If Boulder Creek is dry below where the miner is working prior to August 15, then the operator must cease withdrawing water from the creek until flow exceeds the amount withdrawn. The FS Minerals Administrator will monitor flow and also determine if and when mining activities can resume with advice from the FS fisheries biologist.

General Requirements Identified for Protection of Water and /or Fish Resources:
G4: Surface runoff and water quality related
G5: Disturbed areas kept in stable conditions
G6: Tree removal related
G7: Fords
G12: Effective buffer strips to protect water quality during seasonal runoff events
G14: Beaver dams protected
G15: Stream buffers undisturbed

H3: Have lined containment vault under hazardous material storage barrels
H5: Spill kit on site
H6: Hazardous substances not to be released on land, rivers etc. Have oil absorbing mats
H8: Check equipment for leaks

M1: Visual monitoring for turbidity of Boulder Creek is not required given site conditions and distance from Boulder Creek.

W1 – 3: Requirements for working in wetlands and floodplains
Figure 20: Tetra Alpha Place Mine Detailed Site Map.
1.1.7  Grubsteak Placer Mine

The Grubsteak Mine is located within the Clear Creek subwatershed, a tributary of Lower Granite Creek and is SR bull trout critical habitat (Figure 21). This claim has been given a 20 ft. “no activity” plan-specific stream buffer (Table 3) that will be maintained with a gravel berm and straw bales. Space limits at the site and the preferred approach of keeping equipment furthest from the stream allows temporary stockpiling upslope from the berm and straw bales. If there is space, the stockpile will be moved further from the stream. This area has been designated as a temporary stockpile area because of limited operating area and the preferred approach of keeping equipment away from the stream bank. If there is space in the work area, materials will be temporarily placed further from the stream, as designated by the Minerals Officer. This placer operation will be working an existing pit (20 ft. x 30 ft. x 20 ft. deep) and will dig a new second test site (20 ft. x 30 ft. x 12 ft. deep) in the activity area (approximately 2 acres). Excavations are in historic dredge tailings. Processing water will be used from an existing processing pond (Figure 21, Site A), which is over 150 ft. away from Clear Creek. All water will be recycled. The operator is using an existing road and an existing miner-constructed bridge to access both test sites. Heavy equipment will access the site via the existing ford on Clear Creek from July 15 to August 15, four trips per season. If the operator proposes to ford outside the instream work window, then a fish biologist must inspect the crossing and approve beforehand. Gravel will be placed and packed on streambanks at fords to protect streambanks. Equipment to be used includes a backhoe, trommel, shaker, water pumps, generator, pickup trucks, ATV, utility trailer, and motorcycles.

Site-Specific Forest Service Requirements

Site-specific WRPMs: The southwest approach to the Clear Creek ford will be rocked.

Site A:  None needed

Site B:
1. A berm made of straw bales/coils will be placed between Clear Creek and the mining activity. Gravels and filter cloth will not be used.
2. Measurement of the 20 ft. buffer will start at the top of the valley floor terrace-channel bank break in slope of the side channel.
3. Because of close proximity to Clear Creek, the operator must fill the existing hole at Site B at the end of each season.
4. Due to the proximity of Site B to Clear Creek, there is a potential for subsurface flow from Clear Creek into the hole. Should the hole start to fill with water, the operator is to stop work immediately and contact the FS. Site conditions will be reevaluated at that time and additional mitigation measures added if necessary.

Site-specific FPMs: None

GRs Identified for Protection of Water and /or Fish Resources:
G4: Surface runoff and water quality related
G5: Disturbed areas kept in stable conditions
G6: Tree removal related
G7: Fords
G12: Effective buffer strips to protect water quality during seasonal runoff events
G14: Beaver dams protected
G15: Stream buffers undisturbed

H3: Have lined containment vault under hazardous material storage barrels
H5: Spill kit on site
H6: Hazardous substances not to be released on land, rivers etc. Have oil absorbing mats
H8: Check equipment for leaks

M1: Specific requirements for visual monitoring of Clear Creek

Figure 21. Grubsteak Placer Mine Detailed Site Map.
1.1.8 Ruby Group Placer Mine

The Ruby Group Mine is located on Clear Creek and tributary Ruby Creek (Figure 22 and 23). Clear Creek is SR bull trout critical habitat and Ruby Creek is not bull trout critical habitat. This claim has a 10 ft. “no activity” plan-specific stream buffer (Table 3). Ruby Group will have eight mining sites (approximately three acres) located on Clear and Ruby Creeks. The operator will dig five to twenty test holes at each site. Each test hole will be reclaimed before moving onto the next test hole. Test holes will remove one to two yards of material (typically 8 ft. deep). Yearly production is estimated at 2-5 yards of material a year. The operator will be using a self-contained and portable wash plant and using existing roads/skid trails. The operators will install a temporary, portable ATV bridge over Clear Creek but they will have to walk heavy equipment and drive pickup trucks across Ruby Creek due to the limiting size of the bridge. Using the Clear Creek ford, the miner will mobilize heavy equipment to work sites #1, 2 and 3, and the miner will limit the number of crossings over Clear Creek to no more than four times per season. The miner will limit crossings with a pickup truck to no more than two times per week for maintenance needs and fuel. The ATV bridge will be placed across Clear Creek and used daily.

Road 1310-E1a is used to ford Ruby Creek and Ruby Creek seasonally floods the road. Using the Ruby Creek ford, the operator will mobilize heavy equipment to work sites 1, 2 and 3 and these crossings will be limited to no more than four times per season. The operator will limit crossings with a pickup truck to no more than two times per week for maintenance needs and fuel. The miner will limit Ruby Creek ford crossings with an ATV to twice in June, and five trips per week in July and August, during low flows or when the crossing is dry. Gravel will be placed and packed on streambanks at fords to protect streambanks. Equipment to be used includes a backhoe, trommel, water pumps, ATVs, and pickup trucks.

Site-Specific Forest Service Requirements

Site-specific WRPMs:

Mining at Sites 1, 2, and 3 on Ruby Creek
1. Measurement of the 10 ft. buffer will start at the top of the valley floor-channel break in slope.
2. Use of the temporary road behind the barricade that accesses work sites 1, 2, and 3 is limited use only, after the road goes dry.
3. Straw bales or wattles must be placed between work sites 1, 2 and 3 and Ruby Creek.
4. Straw bales or wattles must be placed across the road used to access sites 1, 2, and 3 where the road could contribute sediment into the side channel of Clear Creek in order to trap any sediment generated by the activity.

Mining at Sites 4, 5, 6, and 8 on Clear Creek:
1. Measurement of the 10 ft. buffer will start at the top of the valley floor-channel break in slope.
2. Straw bales or wattles will be placed between test holes and Clear Creek and between the test holes and the side channel to Clear Creek.

Mining at Site 7: None
Access Roads:
Road 1310-E1a is the access road to sites 1, 2, and 3 (Figure 22). Road 1310-E1a is an existing temporary road and the miner is responsible for leaving the road in a stable and safe condition (i.e., this road will be treated as a temporary road once mining is completed [see Z8 and Z14]).

In identifying FS WRPMs to prevent a discharge of sediment into Ruby Creek from the use of 1310-E1a and the Ruby Creek ford, it was necessary to divide the road into segments as follows:

Segment A: The portion of 1310-E1a between the Clear Creek ford and the Ruby Creek ford
Segment B: The north and south approaches to the ford.
Segment C: The portion of the road between the Ruby Creek ford and Site 2
Segment D: The portion of the road between Site 2 and Site 1

Segment A: No WRPMs are needed as this section of the road does not interact with Ruby Creek.
Segment B: The north and south approaches to the ford and 25 ft. of the road on the south side of the ford, just before the approach begins, will be rocked.
Segment C: Weed-free straw bales will be placed end to end starting at the north side of the ford to Site 2 along the west side of the road. Straw bales will be two bales deep to act as a dam to prevent water from Ruby Creek from flowing onto Segment C and moving sediment generated by road use, into Ruby Creek.
Segment D: If water from Ruby Creek is observed flowing onto this segment of road, then the WRPMs stated for Segment C will be put into place.

Temporary, Portable, ATV Bridge:
1. Stream banks where the bridge will be placed will be rocked.
2. At the beginning of each season, this area will be checked and more rock added as necessary.
3. The bridge will be removed each fall.

Site-specific FPMs: None

General Requirements Identified for Protection of Water and /or Fish Resources:
G4: Surface runoff and water quality related
G5: Disturbed areas kept in stable conditions
G6: Tree removal related
G7: Fords
G12: Effective buffer strips to protect water quality during seasonal runoff events
G14: Beaver dams protected
G15: Stream buffers undisturbed
H3: Have lined containment vault under hazardous material storage barrels
H5: Spill kit on site
H6: Hazardous substances not to be released on land, rivers etc. Have oil absorbing mats
H8: Check equipment for leaks
M1: Specific requirements for visual monitoring of Clear Creek and Ruby Creek
Figure 22. Ruby Group Placer Mine Detailed Site Map (1 of 2 maps).
Figure 23. Ruby Group Placer Mine Detailed Site Map (2 of 2 maps).
1.1.9 Lightning Creek Placer Mine

The Lightning Creek Mine is located in the Clear Creek subwatershed, on tributary Lightning Creek (Figure 24) and is SR bull trout critical habitat. This claim is located over 150 ft. from bull trout critical habitat (Table 3), and FS 1305-100 Rd and old settling ponds separate mining activity from Lightning Creek (Figure 24). This operation will be working old dredge tailings on the south side of Lightning Creek. Mining will take place over three sites along the hillside. Each site will be approximately 50 ft. x 100 ft. x 15 ft. (approximately 5 acres). Reclamation of each site is required before moving to the next site. Existing processing ponds and settling ponds will be used. Water from Lightning Creek will be used under an existing water right (100 gpm) to process the material. The operator will use existing roads and a miner built bridge that crosses Lightning Creek. A hardened ford on Lightning Creek will be used twice during the year to walk heavy equipment across the creek during the ODFW in-water work window. Equipment to be used includes a backhoe, excavator, two five-yard dump trucks, pickup trucks, washing plant, water pumps, generator, and ATVs.

Site-Specific Forest Service Requirements

Site-specific WRMPs: None

Site-specific FPMs:
1. No water withdrawals are permitted in Lightning Creek after August 15 to protect bull trout SR habitat.
2. If a stream is dry below where the operator is working prior to August 15, then the operator must cease withdrawing water from the creek until flow exceeds the amount withdrawn. The FS Minerals Administrator will monitor flow and also determine if and when mining activities can resume, with advice from the FS fisheries biologist.
3. On Lightning Creek water pump intakes will be screened with 3/32” plate screen (or equivalent) to avoid entrainment and/or intake of juvenile fish.

GRs Identified for Protection of Water and/or Fish Resources:
G4: Surface runoff and water quality related
G5: Disturbed areas kept in stable conditions
G6: Tree removal related
G12: Effective buffer strips to protect water quality during seasonal runoff events
G14: Beaver dams protected
G15: Stream buffers undisturbed
G23: Identifies characteristics of pumps that can be use when drafting water from a creek to minimize potential for impacts to fish

H3: Have lined containment vault under hazardous material storage barrels
H5: Spill kit on site
H6: Hazardous substances not to be released on land, rivers etc. Have oil absorbing mats
H8: Check equipment for leaks

M1: Specific requirements for visual monitoring of Lightning Creek
Figure 24. Lightning Creek Placer and Suction Dredge Detailed Site Map.

Protection Measures

All required FS PMs are found in Appendix A. Provided below are key FS PMs and some of the key ODSL requirements that the operators also must comply with.

1. The monitoring of water withdrawals from streams within the Project is the responsibility of the FS Minerals Officer.
2. For Tetra Placer Mine, Tetra Alpha Mill and Lode, and Lightning Creek Mine, no water withdrawals are permitted in Boulder Creek or Lightning Creek after August 15 to protect fish migrating to spawn. If Boulder Creek or Lightning Creek are dry below where the miner is working prior to August 15, then the miner must cease withdrawing water from the creek until flow exceeds the amount withdrawn.

3. All water withdrawals will be monitored by the FS Minerals Administrator.

4. Mining equipment will cross creeks only at pre-approved sites, as authorized by the District Ranger, with FS, NMFS, and Service mitigations, and 2012 BMPs (USDA 2012).

5. All fords will be sloped and armored with rock, based on a site-specific evaluation.

6. Bridges will be installed so as not to result in continued sediment delivery to the stream, and will be removed upon final cessation of the mining operation in 2024.

7. All construction of new fords and installation of new bridges will only occur during ODFW’s in-water work window.

8. The duration of all temporary roads is ten years, or until a Plan is closed.

9. Tetra Alpha Placer is proposing a new temporary road in the RHCA of Boulder Creek. The location of this road must be approved by FS personnel and the road will be rocked 20 ft. back from the creek to ensure that no sediment will make it to the creek.

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). In delineating the action area, we evaluated the farthest reaching physical, chemical, and biotic effects of the action on the environment. The action area for this consultation is the Granite Creek Watershed occupied bull trout areas and bull trout critical habitat (Figure 9) encompassed by mining operations approved by the Umatilla and Wallowa-Whitman National Forests (Figures 10-24), as well as the downstream extent of stream reaches affected by mining activities (habitat parameters, sediment, temperature, and fish passage). Placer and lode mines that contain bull trout critical habitat are summarized in Table 3.

2. Analytical Framework for Jeopardy and Adverse Modification Determinations

2.1 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.

### 2.2 Adverse Modification Determination

This Opinion applies the new regulatory definition of “destruction or adverse modification” of critical habitat at 50 CFR 402.02 (81 FR 7214, published February 11, 2016). The designation of critical habitat for bull trout used the term primary constituent element (PCE). The new critical habitat regulations (81 FR 7214) replace this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a “destruction or adverse modification” analysis, which is the same regardless of whether the original designation identified primary constituent elements, physical or biological features, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific 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 PBF (see Conservation Role and Description of Critical Habitat), 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 PBF 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 PBF 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 PBF 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 bull trout critical habitat 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 (\textit{Salvelinus confluentus}) was listed as threatened on November 1, 1999 (64 FR 58910). The 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 (Bond 1992, p. 2; Brewin and Brewin 1997, p. 215; Cavender 1978, pp. 165-166; Leary and Allendorf 1997, pp. 716-719).

Throughout its range, bull trout are threatened by the combined effects of habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, grazing, the blockage of migratory corridors by dams or other diversion structures, poor water quality, 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). Although all salmonids are likely to be affected by climate change, bull trout are especially vulnerable given that spawning and rearing are constrained by their location in upper watersheds and the requirement for cold water temperatures (Battin \textit{et al.} 2007, pp. 6672-6673; Rieman \textit{et al.} 2007, p. 1552). Poaching and incidental mortality of bull trout during other targeted fisheries are additional threats.

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 with the Columbia and Klamath population segments into one listed taxon and the application of the jeopardy standard under section 7 of the Endangered Species Act (Act) relative to this species (64 FR 58910):

\textit{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.

Since the publication of this final listing rule, the Service published the Recovery Plan for the Coterminous United States Population of Bull Trout (Recovery Plan) (USFWS 2015a), which recognized all bull trout as one DPS, but retained the previous six separate DPS as individual recovery units, comprised of 109 core areas.

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 MCRU for the bull trout based on its uniqueness and significance as described in the DPS final listing rule cited above, the Recovery Plan, and the MCRU Implementation Plan for Bull Trout (USFWS 2015b), which are 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.

**Recovery Planning**

Between 2002 and 2004, three separate draft bull trout recovery plans were completed. In 2002, a draft recovery plan that addressed bull trout populations within the Columbia, Saint Mary-Belly, and Klamath River basins (USFWS 2002a, b, c) was completed and included individual chapters for 24 separate recovery units. In 2004, draft recovery plans were developed for the Coastal-Puget Sound drainages in western Washington, including two recovery unit chapters (USFWS 2004a), and for the Jarbidge River in Nevada (USFWS 2004b). None of these draft recovery plans were finalized, but they have served to identify recovery actions across the range of the species and to provide a framework for implementing numerous recovery actions by our partner agencies, local working groups, and others with an interest in bull trout conservation.

The Service released a revised draft bull trout recovery plan in August 2014 (USFWS 2014) and a final recovery plan in September 2015 (USFWS 2015a). The final recovery plan: 1) incorporates and builds upon new information found in numerous reports and studies regarding bull trout life history, ecology, etc., including a variety of implemented conservation actions, since the draft 2002 and 2004 recovery planning period; and (2) revises recovery criteria proposed in the 2002 and 2004 draft recovery plans to focus on effective management of threats to bull trout at the core area level, and de-emphasize achieving targeted point estimates of abundance of adult bull trout (demographics) in each core area.

The 2002 and 2004 draft recovery plans provide the general life history information, habitat characteristics, diet, reasons for decline, and distribution and abundance of the different core areas. The 2014 revised draft recovery plan and the final 2015 recovery plan integrate new information collected since the 1999 listing regarding bull trout life history, distribution, demographics, conservation successes, etc., and update previous bull trout recovery planning efforts across the range of the single DPS currently listed under the Act. While the 2015 final recovery plan supersedes and replaces the previous draft recovery plans, the 2002 and 2004 draft recovery plans still provide important information on bull trout status and life history.
The 2015 recovery plan establishes three recovery actions for each of the six Recovery Units (RUs):

1) Protect, restore, and maintain suitable habitat conditions for bull trout that promote diverse life history strategies and conserve genetic diversity.

2) Prevent and reduce negative effects of non-native fishes and other non-native taxa on bull trout.

3) Work with partners to conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery actions.

3.1.1 Current Status and Conservation Needs

Bull trout recovery is based on a geographical hierarchical approach. Bull trout are listed as a single DPS within the five-state area of the coterminous United States. The single DPS is subdivided into six biologically-based recovery units: (1) Coastal Recovery Unit; (2) Klamath Recovery Unit; (3) Mid-Columbia Recovery Unit; (4) Upper Snake Recovery Unit; (5) Columbia Headwaters Recovery Unit; and (6) Saint Mary Recovery Unit (USFWS 2014, p. 32). A viable recovery unit should demonstrate that the three primary principles of biodiversity have been met: representation (conserving the genetic makeup of the species); resiliency (ensuring that each population is sufficiently large to withstand stochastic events); and redundancy (ensuring a sufficient number of populations to withstand catastrophic events) (USFWS 2014).

Each of the six recovery units contain multiple bull trout core areas, 118 total, which are non-overlapping watershed-based polygons, and each core area includes one or more local populations. Currently there are 110 occupied core areas, which comprise 600 or more local populations. There are also six core areas where bull trout historically occurred but are now extirpated, and two research needs areas where bull trout were known to occur historically, but their current presence and use of the area are uncertain.

Core areas can be further described as complex or simple. Complex core areas contain multiple local bull trout populations, are found in large watersheds, have multiple life history forms, and have migratory connectivity between spawning and rearing habitat and foraging, migration, and overwintering habitats (FMO). Simple core areas are those that contain one bull trout local population. Simple core areas are small in scope, isolated from other core areas by natural barriers, and may contain unique genetic or life history adaptations.

A local population is a group of bull trout that spawn within a particular stream or portion of a stream system. A local population is considered to be the smallest group of fish that is known to represent an interacting reproductive unit. For most waters where specific information is lacking, a local population may be represented by a single headwater tributary or complex of headwater tributaries. Gene flow may occur between local populations (e.g., those within a core population), but is assumed to be infrequent compared with that among individuals within a local population.
The habitat requirements of bull trout are often generally expressed as the four “Cs”: cold, clean, complex, and connected habitat. Cold stream temperatures, clean water quality that is relatively free of sediment and contaminants, complex channel characteristics (including abundant large wood and undercut banks), and large patches of such habitat that are well connected by unobstructed migratory pathways are all needed to promote conservation of bull trout throughout all hierarchical levels.

**Recovery Units**

The following is a summary of the description and current status of the bull trout within the six recovery units (RU). A comprehensive discussion is found in the Service’s 2015 recovery plan for the bull trout (USFWS 2014, pp. 113-126, USFWS 2015a) and the 2015 Implementation Plans.

**Coastal Recovery Unit**

The Coastal RU is located within western Oregon and Washington. The Coastal RU is divided into three regions: Puget Sound, Olympic Peninsula, and the Lower Columbia River Regions. This RU contains 21 core areas and 85 local populations, including the Clackamas River core area where bull trout had been extirpated and were reintroduced in 2011, and identified four historically occupied core areas that could be re-established. Core areas within Puget Sound and the Olympic Peninsula currently support the only anadromous local populations of bull trout. This RU also contains ten shared FMO habitats which are outside core areas and allows for the continued natural population dynamics in which the core areas have evolved. There are four core areas within the Coastal RU that have been identified as current population strongholds: Lower Skagit, Upper Skagit, Quinault River, and Lower Deschutes River. These are the most stable and abundant bull trout populations in the RU. The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, loss of functioning estuarine and nearshore marine habitats, development and related impacts (e.g., flood control, floodplain disconnection, bank armoring, channel straightening, loss of instream habitat complexity), agriculture (e.g., diking, water control structures, draining of wetlands, channelization, and the removal of riparian vegetation, livestock grazing), fish passage (e.g., dams, culverts, instream flows) residential development, urbanization, forest management practices (e.g., timber harvest and associated road building activities), connectivity impairment, mining, and the introduction of non-native species. Conservation measures or recovery actions implemented include relicensing of major hydropower facilities that have provided upstream and downstream fish passage or complete removal of dams, land acquisition to conserve bull trout habitat, floodplain restoration, culvert removal, riparian revegetation, levee setbacks, road removal, and projects to protect and restore important nearshore marine habitats.

**Klamath Recovery Unit**

The Klamath RU is located in southern Oregon and northwestern California. The Klamath RU is the most significantly imperiled recovery unit, having experienced considerable extirpation and geographic contraction of local populations and declining demographic condition, and natural re-colonization is constrained by dispersal barriers and presence of nonnative brook trout (USFWS 2014, p.38). This RU currently contains three core areas and eight local populations. Nine historic local populations of bull trout have become extirpated, and restoring additional local
populations will be necessary to achieve recovery (USFWS Klamath RU, p. B-7). All three core areas have been isolated from other bull trout populations for the past 10,000 years. The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, habitat degradation and fragmentation, past and present land use practices, agricultural water diversions, nonnative species, and past fisheries management practices. Conservation measures or recovery actions implemented include removal of nonnative fish (e.g., brook trout, brown trout, and hybrids), acquiring water rights for instream flows, replacing diversion structures, installing fish screens, constructing bypass channels, installing riparian fencing, culver replacement, and habitat restoration.

**Mid-Columbia Recovery Unit**

The Mid-Columbia RU is located within eastern Washington, eastern Oregon, and portions of central Idaho. The Mid-Columbia RU is divided into four geographic regions: Lower Mid-Columbia, Upper Mid-Columbia, Lower Snake, and Mid-Snake Geographic Regions. This RU contains 25 occupied core areas, two historically occupied core areas, one research needs area, and seven FMO habitats. The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, agricultural practices (e.g. irrigation, water withdrawals, livestock grazing), fish passage (e.g. dams, culverts), nonnative species, forest management practices, and mining. Conservation measures or recovery actions implemented include road removal, channel restoration, mine reclamation, improved grazing management, removal of fish barriers, and instream flow requirements.

**Upper Snake Recovery Unit**

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

**Columbia Headwaters Recovery Unit**

The Columbia Headwaters RU is located in western Montana, northern Idaho, and the northeastern corner of Washington. The Columbia Headwaters RU is divided into five geographic regions: Upper Clark Fork, Lower Clark Fork, Flathead, Kootenai, and Coeur d’Alene Geographic Regions. This RU contains 35 bull trout core areas; 15 of which are complex core areas as they represent larger interconnected habitats and 20 simple core areas as they are isolated headwater lakes with single local populations. The 20 small core areas are each represented by a single local population, many of which may have persisted for thousands of years despite small populations and isolated existence (USFWS Columbia RU p. D-1). Fish passage improvements within the IRU have reconnected previously fragmented habitats. The current condition of the bull trout in this RU is attributed to the adverse effects of climate change, mining and contamination by heavy metals, nonnative species, modified instream flows,
migratory barriers (e.g., dams), habitat fragmentation, forest practices (e.g., logging, roads), agriculture practices (e.g., irrigation, livestock grazing), and residential development. Conservation measures or recovery actions implemented include habitat improvement, fish passage, and removal of nonnative species. Unlike the other RUs, the Columbia Headwaters RU does not have any anadromous fish overlap. Therefore, bull trout within the Columbia Headwaters RU do not benefit from the recovery actions for salmon (USFWS Columbia RU p. D-41).

Saint Mary Recovery Unit

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

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, pp. 1-18). 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, p. 1; Goetz 1989, pp. 15-16). 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, pp. 135-137; Goetz 1989, pp. 22-25), or saltwater (anadromous form) to rear as subadults and to live as adults (Cavender 1978, pp. 139, 165-68; McPhail and Baxter 1996, p. 14; WDFW et al. 1997, pp. 17-18, 22-26). 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). Repeat- and alternate-year spawning has been reported, although repeat-spawning frequency and post-spawning mortality are not well documented (Fraley and Shepard 1989, pp. 135-137; Leathe and Graham 1982, p. 95; Pratt 1992, p. 6; Rieman and McIntyre 1996, p. 133).

The iteroparous reproductive strategy of bull trout has important repercussions for the management of this species. Bull trout require passage both upstream and downstream, not only for repeat spawning but also for foraging. Most fish ladders, however, were designed specifically for anadromous semelparous salmonids (fishes that spawn once and then die, and require only one-way passage upstream). Therefore, even dams or other barriers with fish passage facilities may be a factor in isolating bull trout populations if they do not provide a downstream passage route. Additionally, in some core areas, bull trout that migrate to marine waters must pass both upstream and downstream through areas with net fisheries at river mouths. This can increase the likelihood of mortality to bull trout during these spawning and foraging migrations.
Growth varies depending upon life-history strategy. Resident adults range from 6 to 12 inches total length, and migratory adults commonly reach 24 inches or more (Goetz 1989, pp. 29-32; Pratt 1984, p. 13). 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, p. 7). 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, pp. 137, 141; Goetz 1989, pp. 19-26; Bond in Hoelscher and Bjornn 1989, p. 57; Howell and Buchanan 1992, p. 1; Pratt 1992, p. 6; Rich 1996, pp. 35-38; Rieman and McIntyre 1993, pp. 4-7; Rieman and McIntyre 1995, pp. 293-294; Sedell and Everest 1991, p. 1; Watson and Hillman 1997, pp. 246-250). Watson and Hillman (1997, pp. 247-249) 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, p. 7), bull trout should not be expected to simultaneously occupy all available habitats (Rieman et al. 2007, p. 1560).

Migratory corridors link seasonal habitats for all bull trout life histories. The ability to migrate is important to the persistence of bull trout (Gilpin, in litt. 1997, pp. 4-5; Rieman and McIntyre 1993, p. 7; Rieman et al. 1997, p. 1114). Migrations facilitate gene flow among local populations when individuals from different local populations interbreed or stray to nonnatal streams. Local populations that are extirpated by catastrophic events may also become reestablished by bull trout migrants. However, it is important to note that the genetic structuring of bull trout indicates there is limited gene flow among bull trout populations, which may encourage local adaptation within individual populations, and that reestablishment of extirpated populations may take a long time (Rieman and McIntyre 1993, p. 7; Spruell et al. 1999, pp. 118-120). Migration also allows bull trout to access more abundant or larger prey, which facilitates growth and reproduction. Additional benefits of migration and its relationship to foraging are discussed below under “Diet.”

Cold water temperatures play an important role in determining bull trout habitat quality, as these fish are primarily found in colder streams (below 15 °C or 59 °F), and spawning habitats are generally characterized by temperatures that drop below 9 °C (48 °F) in the fall (Fraley and Shepard 1989, p. 133; Pratt 1992, p. 6; Rieman and McIntyre 1993, p. 7).

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 (Baxter et al. 1997, pp. 426-427; Pratt 1992, p. 6; Rieman and McIntyre 1993, p. 7; Rieman et al. 1997, p. 1117). Optimum incubation temperatures for bull trout eggs range from 2 °C to 6 °C (35 °F to 39 °F) whereas optimum water temperatures for rearing range from about 6 °C to 10 °C (46 °F to 50 °F) (Buchanan and Gregory 1997, pp. 121-122; Goetz 1989, pp. 22-24; McPhail and Murray 1979, pp. 41, 50, 53, 55). In Granite Creek, Idaho, Bonneau and Scarnecchia (1996) observed that juvenile bull trout selected the coldest water available in a
plunge pool, 8 °C to 9 °C (46 °F to 48 °F), within a temperature gradient of 8 °C to 15 °C (4 °F to 60 °F). 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 11 °C to 12 °C (52 °F to 54 °F).

Although bull trout are found primarily in cold streams, occasionally these fish are found in larger, warmer river systems throughout the Columbia River basin (Buchanan and Gregory 1997, pp. 121-122; Fraley and Shepard 1989, pp. 135-137; Rieman and McIntyre 1993, p. 2; Rieman and McIntyre 1995, p. 288; Rieman et al. 1997, p. 1114). Availability and proximity of cold water patches and food productivity can influence bull trout ability to survive in warmer rivers (Myrick et al. 2002). For example, in a study in the Little Lost River of Idaho where bull trout were found at temperatures ranging from 8 °C to 20 °C (46 °F to 68 °F), most sites that had high densities of bull trout were in areas where primary productivity in streams had increased following a fire (Gamett, 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, pp. 135-137; Goetz 1989, pp. 22-25; Hoelscher and Bjornn 1989, p. 54; Pratt 1992, p. 6; Rich 1996, pp. 35-38; Sedell and Everest 1991, p. 1; Sexauer and James 1997, pp. 367-369; Thomas 1992, pp. 4-5; Watson and Hillman 1997, pp. 247-249). Maintaining bull trout habitat requires stability of stream channels and maintenance of natural flow patterns (Rieman and McIntyre 1993, p. 7). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997, pp. 367-369). 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, pp. 135-137; Pratt 1992, p. 6; Pratt and Huston 1993, pp. 70-72). Pratt (1992, p. 6) indicated that increases in fine sediment reduce egg survival and emergence.

Bull trout typically spawn from August through November during periods of increasing flows and decreasing water temperatures. Preferred spawning habitat consists of low-gradient stream reaches with loose, clean gravel (Fraley and Shepard 1989, p. 135). Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989, p. 15; Pratt 1992, p. 8; Rieman and McIntyre 1996, p. 133). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992, p. 8). After hatching, fry remain in the substrate, and time from egg deposition to emergence may surpass 200 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows (Ratliff and Howell 1992 in Howell and Buchanan 1992, pp. 10, 15; Pratt 1992, pp. 5-6).

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

A literature review conducted by the Washington Department of Ecology (WDOE 2002) indicates that adverse effects of lower oxygen concentrations on embryo survival are magnified
as temperatures increase above optimal (for incubation). In a laboratory study conducted in Canada, researchers found that low oxygen levels retarded embryonic development in bull trout (Giles and Van der Zweep 1996, pp. 54-55). Normal oxygen levels seen in rivers used by bull trout during spawning ranged from 8 to 12 mg/L (in the gravel), with corresponding instream levels of 10 to 11.5 mg/L (Stewart et al. 2007). In addition, IGDO concentrations, water velocities in the water column, and especially the intergravel flow rate, are interrelated variables that affect the survival of incubating embryos (ODEQ 1995). Due to a long incubation period of 220+ days, bull trout are particularly sensitive to adequate IGDO levels. An IGDO level below 8 mg/L is likely to result in mortality of eggs, embryos, and fry.

Migratory forms of bull trout may develop when habitat conditions allow movement between spawning and rearing streams and larger rivers, lakes or nearshore marine habitat where foraging opportunities may be enhanced (Brenkman and Corbett 2005, pp. 1073, 1079-1080; Frissell 1993, p. 350; Goetz et al. 2004, pp. 45, 55, 60, 68, 77, 113-114, 123, 125-126). 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, lakes, and marine waters; greater fecundity resulting in increased reproductive potential; and dispersing the population across space and time so that spawning streams may be recolonized should local populations suffer a catastrophic loss (Frissell 1999, pp. 15-16; Rieman and McIntyre 1993, pp. 18-19; MBTSG 1998, pp. iv, 48-50; USFWS 2004a, Vol. 2, p. 63). In the absence of the migratory bull trout life form, isolated populations cannot be replenished when disturbances make local habitats temporarily unsuitable. Therefore, the range of the species is diminished, and the potential for a greater reproductive contribution from larger fish with higher fecundity is lost (Rieman and McIntyre 1993, pp. 1-18).

3.1.4 Diet

Bull trout are opportunistic feeders, with food habits primarily a function of size and life-history strategy. A single optimal foraging strategy is not necessarily a consistent feature in the life of a fish, because this strategy can change as the fish progresses from one life stage to another (i.e., juvenile to subadult). 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, and small fish (Boag 1987, p. 58; Donald and Alger 1993, pp. 239-243; Goetz 1989, pp. 33-34). Subadult and adult migratory bull trout feed on various fish species (Brown 1994, p. 21; Donald and Alger 1993, p. 242; Fraley and Shepard 1989, p. 135; Leathe and Graham 1982, p. 95). Bull trout of all sizes other than fry have been found to eat fish up to half their length (Beau champ and VanTassell 2001). In nearshore marine areas of western Washington, bull trout feed on Pacific herring (Clupea pallasi), Pacific sand lance (Ammodytes hexapterus), and surf smelt (Hypomesus pretiosus) (Goetz et al. 2004, p. 114; WDFW et al. 1997, p. 23).

Bull trout migration and life history strategies are closely related to their feeding and foraging strategies. Migration allows bull trout to access optimal foraging areas and exploit a wider
variety of prey resources. 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 source of food over another. For example, prey often occur in concentrated patches of abundance ("patch model") (Gerking 1994). As the predator feeds in one patch, 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. For example, in the Skagit River system, anadromous bull trout make migrations as long as 121 miles between marine foraging areas in Puget Sound and headwater spawning grounds, foraging on salmon eggs and juvenile salmon along their migration route (WDFW et al. 1997). Anadromous bull trout also use marine waters as migration corridors to reach seasonal habitats in non-natal watersheds to forage and possibly overwinter (Brenkman and Corbett 2005, p. 1079; Goetz et al. 2004, pp. 36, 60).

3.1.5 Effects of Climate Change on Bull Trout

The Service’s analyses include consideration of ongoing and projected changes in climate. The terms “climate” and “climate change” are defined by the Intergovernmental Panel on Climate Change (IPCC). “Climate” refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007, p. 78). The term “climate change” thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007, p. 78). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative and they may change over time, depending on the species and other relevant considerations, such as the effects of interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 8–14, 18–19). In our analyses, we use our expert judgment to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

Climate change is likely to play an increasingly important role in determining the abundance of ESA-listed species and the conservation value of designated critical habitats in the Pacific Northwest. These changes will not be spatially homogeneous across the Pacific Northwest. Areas with elevations high enough to maintain temperatures well below freezing for most of the winter and early spring will be less affected. Low-elevation areas are likely to be more affected. During the last century, average regional air temperatures increased by 1.5°F, with increases as much as 4°F in isolated areas (USGCRP 2009). Average regional temperatures are likely to increase an additional 3°F to 10°F over the next century (USGCRP 2009). Overall, about one-third of the current cold-water fish habitat in the Pacific Northwest is likely to exceed key water temperature thresholds by the end of this century (USGCRP 2009).

Precipitation trends during the next century are less certain than for temperature, but more precipitation is likely to occur during October through March, less may occur during summer months, and more winter precipitation is likely to fall as rain rather than snow (ISAB 2007, USGCRP 2009). Significant reductions in both total snow pack and low-elevation snow pack in the Pacific Northwest is predicted over the next 50 years (Mote and Salathé 2010) – changes that will shrink the extent of the snowmelt-dominated habitat available to salmonids. Where snow occurs, a warmer climate will cause earlier runoff, which will increase flows in early spring but
will likely reduce flows and increase water temperature in late spring, summer, and fall (ISAB 2007, USGCRP 2009).

As the snow pack diminishes and seasonal hydrology shifts to more frequent and severe early large storms, stream flow timing and increased peak river flows may limit salmonid survival (Mantua et al. 2010). Lower stream flows and warmer water temperatures during summer will degrade summer rearing conditions, in part by increasing the prevalence and virulence of fish diseases and parasites (USGCRP 2009). To avoid waters above summer maximum temperatures, juvenile rearing may be increasingly found only in the confluence of colder tributaries or other areas of cold water refugia (Mantua et al. 2010). Other adverse effects are likely to include altered migration patterns, accelerated embryo development, premature emergence of fry, variation in quality and quantity of tributary rearing habitat, and increased competition and predation risk from warm-water, non-native species (ISAB 2007).

The earth’s oceans are also warming, with considerable interannual and inter-decadal variability superimposed on the longer-term trend (Bindoff et al. 2007). Historically, warm periods in the coastal Pacific Ocean have coincided with relatively low abundances of salmonids, while cooler ocean periods have coincided with relatively high abundances (Scheuerell and Williams 2005; Zabel et al. 2006; USGCRP 2009). Ocean conditions adverse to salmonids may be more likely under a warming climate (Zabel et al. 2006).

Ocean acidification resulting from the uptake of carbon dioxide by ocean waters threatens corals, shellfish, and other living things that form their shells and skeletons from calcium carbonate (Orr et al. 2005; Feely et al. 2012). Such ocean acidification is essentially irreversible over a time scale of centuries (Royal Society 2005). Increasing carbon dioxide concentrations are reducing ocean pH and dissolved carbonate ion concentrations, and thus levels of calcium carbonate saturation. Over the past several centuries, ocean pH has decreased by about 0.1 (an approximately 30 percent increase in acidity) and is projected to decline by another 0.3 to 0.4 pH units (approximately 100 to 150 percent increase in acidity) by the end of this century (Orr et al. 2005; Feely et al. 2012). As aqueous carbon dioxide concentrations increase, carbonate ion concentrations decrease, making it more difficult for marine calcifying organisms to form biogenic calcium carbonate needed for shell and skeleton formation. The reduction in pH also affects photosynthesis, growth, and reproduction of marine organisms. The upwelling of deeper ocean water deficient in carbonate, and thus potentially detrimental to the food chains supporting juvenile salmonids, has recently been observed along the U.S. west coast (Feely et al. 2008).

Climate change is expected to make recovery targets for ESA-listed species more difficult to achieve. Actions improving freshwater and estuarine habitats can offset some of the adverse impacts of climate change. Examples include restoring connections to historical floodplains and estuarine habitats, protecting and restoring riparian vegetation, purchasing or applying easements to lands that provide important cold water or refuge habitat, and leasing or buying water rights to improve summer flows (Battin et al. 2007; ISAB 2007).

3.2 Bull Trout Critical Habitat

3.2.1 Legal Status

The Service published a final rule designating critical habitat for the coterminous United States
population of the bull trout on October 18, 2010 (75 FR 63898); the rule became effective on November 17, 2010. A justification document was also developed to support the rule and is available on our website (http://www.fws.gov/pacific/bulltrout). The scope of the rule included consideration of the following six draft recovery units: Mid-Columbia, Saint Mary, Columbia Headwaters, Coastal, Klamath, and Upper Snake (75 FR 63927). While the Service’s 1999 coterminous listing rule identified five interim recovery units (see Status of the Species), our most recent five year review recommended re-evaluation of these units based on new information (USFWS 2008a, p. 9). The final recovery plan was published in 2015 and includes six recovery units (USFWS 2015a).

Range-wide, the Service designated numerous miles of streams/shorelines and acres of reservoirs/lakes as bull trout critical habitat (Table 4). These totals include approximately 823 miles of streams/shorelines and 16,701 acres of lakes/reservoirs that are currently considered unoccupied by bull trout. These unoccupied areas were determined by the Service to be essential for restoring functioning migratory bull trout populations based on currently available scientific information. These unoccupied areas often include lower main stem river environments that could provide seasonally important migration habitat for bull trout. This type of habitat is essential where reestablishing bull trout in currently unoccupied areas is considered necessary to achieve recovery. Designated critical habitat is of two types based on its potential use by bull trout, which are: 1) spawning and rearing habitats; and 2) foraging, migration, and over-wintering habitats. Approximately 9,495 miles (48 percent) of the stream and marine shoreline reaches are used as spawning and rearing habitats, with the remainder (including all reservoirs and lakes) used as foraging, migration, and over-wintering habitats.

Table 4. Stream/ Shoreline Distance and Reservoir/ Lake Area Designated as Bull Trout Critical Habitat by State.

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

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

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

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 (75 FR 63943). The core areas reflect the metapopulation structure of bull trout and are the closest approximation of a biologically functioning unit for the purposes of recovery planning and risk analyses. CHUs generally encompass one or more core areas and may include foraging, migration, and over-wintering habitats outside of core areas that are considered important to the survival and recovery of bull trout.

Because there are exclusions associated with the proposed 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 the designated critical habitat areas, the PBFs for bull trout are those habitat components that are essential for the primary biological needs of foraging, reproducing, rearing of young, dispersal, genetic exchange, or sheltering. Based on our current knowledge of the life history, biology, and ecology of this species and the characteristics of the habitats necessary to sustain its essential life-history functions, we have determined that the following PBFs are essential for the conservation of bull trout.

(1) Springs, seeps, groundwater sources, and subsurface water connectivity (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.

These revised PBFs are similar to those previously in effect under the 2005 critical habitat designation (70 FR 56212). The most significant modification is the addition of PBF 9 to address the presence of non-native predatory, interbreeding, or competitive fish species. Although this PBF applies to both freshwater and marine environments, currently no non-native fish species are of concern in the marine environment.

Note that only PBFs 2, 3, 4, 5, and 8 apply to marine nearshore waters identified as critical habitat. Also, lakes and reservoirs within the CHUs also contain most of the physical or biological features necessary to support bull trout, with the exception of those associated with PBFs 1 and 6. Although PBF 9 applies to both the freshwater and marine environments, currently no non-native fish species are of concern in the marine environment, though this could change in the future. Additionally, all except PBF 6 apply to FMO habitat designated as critical habitat. Throughout the remainder of this Opinion, the PBFs will be referred to by the corresponding number, as listed above.

Critical habitat includes the stream channels within the designated stream reaches and has a lateral extent as defined by the bankfull elevation on one bank to the bankfull elevation on the opposite bank. Bankfull elevation is the level at which water begins to leave the channel and move into the floodplain and is reached at a discharge that generally has a recurrence interval of
1 to 2 years on the annual flood series. If bankfull elevation is not evident on either bank, the
ordinary high-water line must be used to determine the lateral extent of critical habitat. The
lateral extent of designated lakes is defined by the perimeter of the waterbody as mapped on
standard 1:24,000 scale topographic maps. The Service assumes in many cases this is the full-
pool level of the waterbody. In areas where only one side of the waterbody is designated (where
only one side is excluded), the mid-line of the waterbody represents the lateral extent of critical
habitat.

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

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

Activities that cause adverse effects to critical habitat are evaluated to determine if they are
likely to “destroy or adversely modify” critical habitat by no longer serving the intended
conservation role for the species or retaining those PBFs that relate to the ability of the area to at
least periodically support the species. Activities that may destroy or adversely modify critical
habitat are those that alter the PBFs to such an extent that the conservation value of critical
p. 69-114). The Service’s evaluation must be conducted at the scale of the entire critical habitat
area designated, unless otherwise stated in the final critical habitat rule (USFWS and NMFS
1998, pp. 4-39). Thus, adverse modification of bull trout critical habitat is evaluated at the scale
of the final designation, which includes the critical habitat designated for the Klamath River,
Jarbidge River, Columbia River, Coastal-Puget Sound, and Saint Mary-Belly River population
segments. However, we consider all 32 CHUs to contain features or areas essential to the
conservation of the bull trout (75 FR 63898:63901, 63944). Therefore, if a proposed action
would alter the physical or biological features of critical habitat to an extent that appreciably
reduces the conservation function of one or more critical habitat units for bull trout, a finding of
adverse modification of the entire designated critical habitat area may be warranted (75 FR
63898:63943).

3.2.3 Current Rangewide Condition of Bull Trout Critical Habitat

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

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

3.2.4 Effects of Climate Change on Bull Trout Critical Habitat

One objective of the final rule was to identify and protect those habitats that provide resiliency for bull trout use in the face of climate change. Over a period of decades, climate change may directly threaten the integrity of the essential physical or biological features described in PBFs 1, 2, 3, 5, 7, 8, and 9. Protecting bull trout strongholds and cold water refugia from disturbance and ensuring connectivity among populations were important considerations in addressing this potential impact. Additionally, climate change may exacerbate habitat degradation impacts both physically (e.g., decreased base flows, increased water temperatures) and biologically (e.g., increased competition with non-native fishes). Also, see discussion under Section 3.1.5 above.

3.2.5 Consulted on Effects for Critical Habitat

The Service has formally consulted on the effects to bull trout critical habitat throughout its range. Section 7 consultations include actions that continue to degrade the environmental baseline in many cases. However, long-term restoration efforts have also been implemented that provide some improvement in the existing functions within some of the critical habitat units.

4. Environmental Baseline

The preamble to the implementing regulations for section 7 (51 FR 19932; third paragraph, left column) contemplates that the evaluation of “…the present environment in which the species or
critical habitat exists, as well as the environment that will exist when the action is completed, in
terms of the totality of factors affecting the species or critical habitat...will serve as the baseline
for determining the effects of the action on the species or critical habitat.” The regulations at 50
CFR 402.02 define the environmental baseline to include “the past and present impacts of all
Federal, State, or private actions and other human activities in the action area, the anticipated
impacts of all proposed Federal projects in the action area that have already undergone formal or
early section 7 consultation, and the impact of State or private actions which are
contemporaneous with the consultation in process.” The analyses presented in this section
supplement the above Status of the Species and Status of Critical Habitat evaluations by focusing
on the current condition of the bull trout and its critical habitat in the action area, the factors
responsible for that condition (inclusive of the factors cited above in the regulatory definition of
environmental baseline), and the role the action area plays in the survival and recovery of the
bull trout and in the recovery support function of designated critical habitat. Relevant factors on
lands surrounding the action area that are influencing the condition of the bull trout and its
critical habitat were also considered in completing the status and baseline evaluations herein.

4.1 Description of the Subbasins, Watersheds, and Action Area

John Day River Subbasin

The John Day River subbasin is located in the southwest portion of the Blue Mountains
ecological province. The John Day River is the fourth largest drainage basin in Oregon,
consisting of a mainstem, north, middle, and south forks. The 20,979 square kilometer (8,100
square mile) river basin contains more than 804 kilometers (500 miles) of stream in the
mainstem and its three forks and the John Day River is one of the longest free-flowing streams in
the continental United States. The mainstem, middle and north forks originate in the Blue
Mountains, and the south fork originates in the Ochoco Mountains. The mainstem originates
southeast of the community of Prairie City and flows west through the communities of John Day
and Dayville where it is joined by the south fork. Downstream from Dayville, the river turns
north through Picture Gorge and continues on to the community of Kimberly, where it joins with
the north fork. The John Day River then flows west from Kimberly for approximately 64
kilometers (40 miles) before turning to the north to the Columbia River confluence at River
kilometer 351 (River Mile 218) at an elevation of approximately 61 meters (200 ft.) (Oregon
Water Resource Department 1986). The lower John Day River from Parish Creek downstream to
Tumwater Falls is included in the Oregon Scenic Waterways and National Wild and Scenic
River systems.

North Fork John Day River Watershed

The largest tributary to the John Day River is the North Fork John Day River (NFJDR) which
originates in the Elkhorn Mountains at approximately 2,440 meters (8,000 ft.) in elevation. From
its source, the NFJDR flows primarily west for 188 kilometers (117 miles) where it joins the
mainstem John Day River at an elevation of approximately 1,007 meters (3,300 ft.) near the town
of Kimberly. The NFJDR watershed consists of approximately 155,351 hectares (383,582
acres). The Middle Fork John Day River flows into the North Fork upstream of the town of
Monument, about 50 kilometers (31 miles) before the confluence of the North Fork with the
mainstem. The North Fork is included in the Oregon Scenic Waterways and National Wild and
Scenic River systems from the North Fork John Day wilderness boundary to River Kilometer


32.5 (River Mile 20.2) above the town of Monument. Major tributaries to the NFJDR include Desolation and Granite Creeks. The primary land uses include agriculture, timber production, mining and recreation. The action area of the Project within the NFJDR basin is in the Granite Creek Subwatershed and encompasses 94,526 acres in northeastern Oregon of lands managed by the WNW (40,878) and UNF (49,262) and includes 3,239 acres of private land (Figure 9). There is approximately 25,000 acres of North Fork John Day Wilderness, mostly on the UNF in the Granite Creek Watershed.

Historically, there were two common types of placer mining in the Granite Watershed: dredging and hydraulic mining. Placer mining peaked during 1866-1863. Many acres were heavily impacted by these mining practices and over 30 miles of ditches were constructed in Upper Clear Creek subwatershed to deliver water to highbar areas. Lode mining and several mills continued through the early 1900’s with the discovery of ore rich veins during placer operations. Still present in the Granite Watershed are relic mining shafts or underground mines that were used to extract minerals and ore. Overburden from some of these underground mines is still present on the landscape today. With lode mining closing around 1911, instream dredging of alluvial deposits became popular and suction dredging is still actively practiced today in the Granite Watershed. Historic mining roads now make up a significant portion of the older Forest system roads.

It is estimated that over 100 historic and/or abandon mines exist in the Granite Creek Watershed. Inventory and assessment of these mines is an ongoing project for the UNF/WWNF. In 1999, the UNF had 661 claims filed within the boundaries of the North Fork John Day Ranger District, but only about 40 claims had the necessary approval to actually extract minerals. In 2000, there were 50+ mining claims in the Granite Creek System on the UNF and a larger number on the Wallowa-Whitman National Forest (UNF in litt. 2000). Shaft mining in the Granite Creek system has, in some cases, produced a mine shaft effluent high in iron, which precipitates as the oxide, coating the stream substrate with a fine orange flocculent precipitate (UNF in litt. 2000). The Red Boy Mine (not part of this Project) affects water quality in Clear Creek from heavy metals leaching out of the mine adit (ODFW in litt. 2000). Boulder Creek, a tributary inhabited by bull trout in the Granite Creek watershed, has a dewatered section which isolates it due to past mining activities (John Day River Recovery Unit Team in litt. 2001). Lightning and Salmon Creeks, in the Granite Creek watershed, are negatively affected by the Pete Mann mining ditch. The ditch diverts water from Granite Creek to the Burnt River watershed, and impedes bull trout movement upstream (UNF/WWNF 1997, ODFW in litt. 2000). Past placer mining throughout the NFJDR subbasin has flushed fine sediment into area streams (UNF in litt. 2000).

Extensive dredge mining on the NFJDR and in the Granite and Clear creek system in the 1950s and 1960s drastically altered the stream channel, effectively channelizing the stream and restricting its access to the flood plain (UNF in litt. 2000). In 1998, ODEQ identified habitat modification as a parameter limiting beneficial water uses in the NFJDR. Project streams indicated as water quality limited due to habitat modification included Bull Run and Granite creeks. In 2012, ODEQ identified Granite, Bull Run, and Clear creeks as 303(D) listed; all are Project streams. The Pete Mann Ditch on Clear Creek impedes upstream movement of bull trout from Lightning and Salmon Creeks (ODFW in litt. 2000). No barrier culverts or unscreened diversions were identified by Claire and Gray (1993). Currently, there are no streams within the Granite Watershed that are ODEQ 303d listed for mercury contaminants above state or federal regulatory standards (2014 Assessment, page 62).
4.2 Status of the Species and Critical Habitat in the Action Area

4.2.1 Bull Trout in the North Fork John Day River Basin

Seven local populations have been identified in the NFJDR Subbasin: (1) upper North Fork John Day River 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 (includes South Fork Desolation Creek below the falls and North Fork Desolation Creek), and (7) South Fork Desolation Creek above the falls. Based upon inventories conducted in 1992, bull trout distribution in the NFJDR and tributaries is limited to 18 percent of the previously known range (Claire and Gray 1993).

Resident bull trout are the predominant life history form in the North Fork with a few fluvial migratory individuals documented in recent years. There is limited data available for the local populations in this core area. Redd counts have been conducted in the upper mainstem North Fork and Baldy Creek. Recent redd counts in Baldy Creek show a downward trend in redd abundance. The North Fork has been described as the most challenging area to identify bull trout redds in Oregon based on the decomposing granite gravel substrate and extensive hybridization with brook trout. One priority for the John Day Basin is to develop a system to monitor bull trout presence and population trends.

In addition to the limited redd count data, researchers from Utah State University initiated bull trout research in the NFJDR in 2005. Population estimates for the NFJDR showed low abundances of bull trout in the mainstem of the North Fork and in Baldy Creek (1000 each for both). Due to limited distribution of bull trout below the confluence with Baldy Creek, in 2006 researchers focused population surveys above the Baldy Creek confluence. In 2006, researchers from Utah State University estimated the population of bull trout greater than 120mm in the upper North Fork John Day above the Baldy Creek confluence at 432 individuals (95% CI = 274-752) and 1,193 individuals in Baldy Creek (95% Confidence Interval = 825 – 2509) (Budy et. al. 2005; Budy et. al. 2006).

Migratory and resident bull trout subpopulations are found throughout the Granite Creek Subwatershed and designated critical habitat (Table 5). Spawning habitat in the Granite Creek subwatershed is limited and whether there is possible brook trout hybridization is largely unknown. There is evidence of brook trout hybridization in the lower reaches and tributaries of the NFJDR. Little is known about the current status of many of the bull trout subpopulations throughout Granite Watershed. Given existing conditions and information from the extensive 1990 ODFW surveys, most of these populations are considered at risk (USFWS 2002c).

Surveys by ODFW in the John Day basin (Figure 27) show declines in bull trout redd counts. Streams surveyed include Baldy Creek, Upper Big Creek, Call Creek, and North Fork Reynolds Creek. Brook trout are a non-native fish species found in the Granite Creek Watershed in Lake Creek, above and below Olive Lake.
Table 5. Miles of Bull Trout Designated Critical Habitat and Distribution with Known Migratory and Resident Bull Trout Subpopulations.

<table>
<thead>
<tr>
<th>SWS (HUC 6)</th>
<th>Bull Trout Distribution</th>
<th>Bull Trout DCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Granite Creek(^1)</td>
<td>FMO</td>
<td>9.8</td>
</tr>
<tr>
<td>Upper Granite Creek(^2)</td>
<td>FMO</td>
<td>11.8</td>
</tr>
<tr>
<td>Tributary Boulder Creek</td>
<td>SR</td>
<td></td>
</tr>
<tr>
<td>Bull Run Creek(^3)</td>
<td>FMO</td>
<td>17</td>
</tr>
<tr>
<td>Clear Creek(^4)</td>
<td>SR</td>
<td>24.1</td>
</tr>
<tr>
<td>Tributary Lightning Creek</td>
<td>SR</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)Lower Granite primarily provides migratory and rearing habitat for steelhead and bull trout.
\(^2\)Upper Granite Cr. is assumed rearing and spawning habitat for bull trout.
\(^3\)Bull Run Creek - There is limited survey information concerning bull trout presence. Bull trout rearing is assumed from stream mile 0-7.0 on Bull Run Creek. There is little spawning habitat in the headwater streams and warm summer temperatures limit rearing and spawning distribution.
\(^4\)Clear Creek - Stream mile 0-7.0 on Clear Cr. is migratory and rearing habitat for bull trout. Upper Clear Cr. and designated CH on tributaries is primarily spawning and rearing habitat for bull trout.

Figure 27. ODFW Bull Trout Spawning Surveys in the John Day Basin. Streams Surveyed Include Baldy, Upper Big, and North Fork Reynolds Creeks, 2001 to 2011.

4.2.2 Designated Critical Habitat

Table 6 shows the baseline condition on each of the subwatersheds where mining is proposed. The nine PBFs for bull trout critical habitat are as follows: PBF 1 (water connectivity), PBF 2 (migratory habitat), PBF 3 (food base), PBF 4 (complex environment), PBF 5 (temperature), PBF 6 (substrate), PBF 7 (natural hydrograph), PBF 8 (water quality and quantity), and PBF 9 (competitive species). See Appendix C for a complete breakdown of the PBF components baseline information.
Table 6. Baseline Condition for each Primary Constituent Element of Bull Trout Critical Habitat Applicable to the Action Area Based on Three of the Subwatersheds. FAR is defined as “Functioning at Risk”; FAUR is defined as “Functioning at Unacceptable Risk”.

<table>
<thead>
<tr>
<th>Creek</th>
<th>PBF 1</th>
<th>PBF 2</th>
<th>PBF 3</th>
<th>PBF 4</th>
<th>PBF 5</th>
<th>PBF 6</th>
<th>PBF 7</th>
<th>PBF 8</th>
<th>PBF 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Granite</td>
<td>FAR/FAUR¹</td>
<td>FAR/FAUR²</td>
<td>FAR</td>
<td>FAR</td>
<td>FAUR</td>
<td>FAR</td>
<td>FAR</td>
<td>FAUR¹/FAR</td>
<td>FAR</td>
</tr>
<tr>
<td>Upper Granite</td>
<td>FAR/FAUR¹</td>
<td>FAR/FAUR²</td>
<td>FAR</td>
<td>FAR</td>
<td>FAUR</td>
<td>FAR</td>
<td>FAR</td>
<td>FAUR¹/FAR</td>
<td>FAR</td>
</tr>
<tr>
<td>Bull Run</td>
<td>FAR/FAUR¹</td>
<td>FAR/FAUR²</td>
<td>FAR</td>
<td>FAR</td>
<td>FAUR</td>
<td>FAR</td>
<td>FAR</td>
<td>FAUR¹/FAR</td>
<td>FAR</td>
</tr>
<tr>
<td>Clear</td>
<td>FAR/FAUR¹</td>
<td>FAR/FAUR²</td>
<td>FAR</td>
<td>FAUR</td>
<td>FAR</td>
<td>FAUR¹/FAR</td>
<td>FAR</td>
<td></td>
<td></td>
</tr>
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¹ For PBF 1, the floodplain connectivity component is FAUR.
² For PBF 2, the water quality component is FAUR.
³ For PBF 8, the temperature and chemical contaminant/nutrients components are FAUR.

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.

Based upon current knowledge of the John Day River (JDR) Subbasin, it is reasonable to say that aquatic habitat, as well as the historical hydrologic regime, has been highly altered over the last 120 years through a number of factors. Threats to long-term bull trout persistence within the subbasin include forest management practices, roads, agricultural practices, grazing, non-native species and an increased populace that depends on limited surface and ground water supplies. Agricultural practices contribute to degraded stream and riparian conditions throughout the basin. Draining and conversion of wetlands to pastures, diking and channelizing of streams, and the removal of large trees in riparian corridors negatively affect the river’s interaction with its floodplain. Additionally, attempts to armor the JDR’s banks to prevent bank erosion continue to simplify the river channel and reduce habitat diversity.

According to the Northwest Power Planning Council (NPPC 2001), although reduced in frequency and intensity, mining still continues in the JDR basin. Gold and locatable mineral mining occurs on the upper North and Middle forks of the JDR and tributaries to the upper mainstem JDR (NPPC 2001). Aggregate (rock and gravel) mining for road construction occurs throughout the basin (NPPC 2001). Extensive gold mining throughout the upper mainstem and tributaries, the upper Middle Fork and tributaries, the North Fork between Desolation Creek and
Big Creek and in the Granite Creek basin have greatly reduced habitat diversity and contributed to reduced water quality (ODFW in litt. 2000). Inadequate buffer strips between mining activity and streams, flooded settling basins during high flows, and the cumulative impact of numerous small recreational operations degrade habitat quality, removing shade, and large wood, displacing aquatic invertebrates, and destabilizing spawning gravels (ODFW in litt. 2000). According to ODFW (in litt. 2000), gold dredges operated in the three major basins up until the 1940s.

Although hydraulic mining is uncommon today, previously degraded habitats have not yet recovered and still exhibit excessive sediment transport, downcutting, and instability. For example, hydraulic mining (e.g., gold) from stream deposits and hill slopes dramatically altered stream channels, riparian zones, and floodplains (Spence et al. 1996). As described earlier, hydraulic mining effects such as mounds on streambanks and abandoned ditches are still visible in the Granite Watershed.

During lode mining there is a potential to intercept groundwater and create acid mine waste discharge. Examples of acid mine waste in the Project area are the abandoned Redboy, Blue Bird and Black Jack Mines as described in Tables 17 and 18 of the Assessment. These mines are old; some were developed before the National Forest was established. The mines are now Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites and have acid drainage occurring year round, with ongoing piping of acid waste water to settling ponds and annual maintenance of the drainage pipes.

In August of 2015 the pipes in Blue Bird mine carrying acid mine waste plugged. Maintenance of the pipes corrected the drainage problem and returned the system to normal operations. Monitoring at the site found approximately forty dead fish. In response to the spill the fish are being tested for cause of death and water samples are being tested for mineral content. An incident report is on file with the La Grande field office. There are two other known accidental discharges of acid mine drainage that were only made known to the Service in August 2015. In 2003, there was a discharge of acid mine drainage during maintenance at Blue Bird Mine that resulted in one dead fish but no record of the species was provided. In 2010, the retaining dam inside Black Jack Mine overtopped when floating debris was caught in the inlet, but acid mine discharge did not reach Clear Creek.

The FS will continue to work with NMFS and the Service to determine impacts of the 2015 Blue Bird Mine discharge and follow-up as needed. It is important to note that in a 2003 Service consultation covering the maintenance of the three, above mentioned abandoned mines, the proposed action included replacing the existing six-inch overflow pipes with larger, 18-inch pipes. Pipes on Blue Bird and Black Jack are currently the six-inch; Red Boy pipes were replaced in 2013 with 18 to 24-inch pipe (September 2015 email from Tracii Hickman, UNF).

Local restoration partners have eliminated more than 100 fish passage barriers in the main stem of the JDR, and a concentrated restoration and monitoring effort in the Middle Fork JDR is providing information about the effectiveness of different restoration treatments (OWEB 2009-11 Biennial Report). In 2000, partners completed riparian tree planting, riparian habitat enhancement, dredge pile leveling, and floodplain restoration on Granite Creek.
Low stream flows are also a concern in the John Day basin. Total basin discharge is adequate to satisfy all water rights on an average annual basis, but there is insufficient flow on many streams in late summer to satisfy all water rights holders and meet instream needs. Conservation priorities in the John Day reflect its importance to anadromous fish in the region. Over the past 15 years there has been a tremendous increase in stream restoration work involving multiple agencies and numerous private landowners, and there are indications that these efforts have led to improved habitat quality in some areas. Acquisition priorities identified for this Project include systems contributing to improved hydrologic function (wetlands and riparian areas) and prairie grasslands, which have declined significantly from historic levels and are underrepresented on public lands. Ponderosa pine woodlands and big sagebrush steppe also have been included on the list even though their distribution has not decreased as much as that of other types and they are relatively well-represented on public lands. The John Day basin is a good area in which to address the statewide decline in these above-mentioned habitat types because of the nature of their current distribution and opportunities to expand or connect existing conservation areas to a greater effect (OWEB 2004).

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 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 UNF/WWNF proposed 2016-2025 approval of lode and placer mining plans of operation Project is expressed in terms of the expected effect on aquatic habitat, including the PBFs, in the Project area. The completed bull trout matrix, showing current conditions and effects of the action on specific habitat parameters is provided in Appendix C.

Table 3 shows the maximum disturbance possible in the Project area is approximately 28.2 acres for placer mining, the use of twelve stream fords, construction of one temporary road in an RHCA, and three plans that include water drafting from SR critical habitat. However, placer mining activities will not occur instream, all fords must be preapproved by a FS fisheries biologist prior to each season’s use, temporary road construction must be pre-approved by the FS and will only occur during the ODFW in-water work window, and all water drafting will be monitored by the FS Minerals Administrator each season. Additional PMs and site-specific mitigations are expected to limit potential effects to bull trout and bull trout critical habitat.

5.1 Direct and Indirect Effects to Bull Trout

Based on the figures given above and the PMs that will be implemented for each Plan, effects to bull trout and bull trout critical habitat are expected to occur from the proposed Project activities of placer mining, stream fording, temporary road construction, and water withdrawal. The proposed action may also indirectly affect bull trout by impacting water quality (temperature, turbidity and chemical contamination/nutrients) and altering streamflow conditions (quality and
quantity). Given the existing conditions of most of these subwatersheds within the Project area, placer mining, stream fording, temporary road construction, and water withdrawal may negatively affect bull trout and bull trout critical habitat.

5.1.1 Placer Mining

The mining proposed in the Project is placer mining of old tailings which does not involve any instream work. In areas adjacent to streams there is a potential for indirect effects from transport of sediments to streams as tailings are worked. Tailings are often composed of coarse sediment from previous processing and sorting of rock, and sediment may be transported subsurface through the porous cobble and rock. The impacts from placer mining activities in RHCAs will be limited by 1) A “no activity” stream buffer from any mining activity; distances vary from 10 ft to $\geq 150$ ft. (Table 3); and 2) limits on the size of test holes and maximum area to be worked and disturbed at any one time. Test holes range in size from 20 ft. by 10 ft., up to half an acre, and the maximum area disturbed at any one time is half an acre (Table 3). The proposed action could degrade water quality and habitat within the action area by increasing sediment delivery to and/or by resuspending instream sediments. The negative effects of sediment and turbidity on fish and aquatic species is well established (Henley et al. 2000, Michel et al. 2013) and includes alteration of food chains, decreases in primary productivity, mortality or behavior modification and depressed rates of growth, reproduction and recruitment.

Placer mining activities may directly affect riparian areas by removing established vegetation to access tailings. Many sites have poor conditions for vegetative growth as a result of past mining disturbance, and these sites have little to no established vegetation. Vegetation next to streams provides bank stability and shade and can trap transported sediments. Riparian vegetation contributes leaf detritus and insects that fall into the stream and supplement the salmonid diet. Riparian vegetation also contributes logs and branches that shape channel morphology, retain organic matter, and provide essential fish habitat” (Meehan 1991). Fish and aquatic resources are indirectly affected by loss of riparian vegetation because of potential negative effects to bank stability, loss of shade, loss of large wood, increased sedimentation and turbidity, and loss of organic material. Operators are prohibited from removing, relocating, or disturbing stable in-stream woody debris or boulders (PM 10). We do not expect any adverse effects to bull trout associated with the removal of large woody debris or boulders.

5.1.2 Stream Fording and Construction of a Temporary Road in a RHCA

Seven mine operations have proposed stream fording that will be utilized in and outside of the in-water work window (July 15 - August 15) (Table 3) on open public and closed roads. These fords can have direct and indirect effects to bull trout. Crossing of the fords with heavy machinery can modify fish behavior, movement and feeding behavior. Fording streams can temporarily increase turbidity in the following ways: 1) Wave action from fording vehicles eroding streambanks; 2) tire rutting concentrating surface runoff on approaches; 3) water draining off vehicles and eroding approaches; and 4) dirt washing off of vehicles during the crossing. Tetra Alpha Placer Mine has proposed the construction of a new, temporary road (0.77 miles) in the RHCA of Boulder Creek (SR) which will involve ground disturbance that will likely contribute sediment to nearby Boulder Creek.
Fording and road construction will likely deliver temporary pulses (minutes) of sediment during general use and construction and during initial rain events. Fine sediment delivered to action area streams from fording and road construction activities is likely to increase turbidity in the water column immediately downstream and potentially increase fine sediment levels in interstitial spaces of stream substrates. Turbidity is likely to exceed ambient levels and potentially affect bull trout downstream of sediment delivery points associated with fording and the use of the newly constructed temporary road for a short distance (300 ft.). Elevated turbidity is expected to be short-lived and highly localized because of the dispersed nature of the fords and the new temporary road. As such, concentrations of suspended sediments in these plumes are not likely to reach levels that kill or injure fish; however, concentrations are likely to cause fish to be periodically displaced from preferred habitat, which could result in increased energy expenditure and possibly increase their exposure to predators.

Most fording across stream channels will be on existing hardened fords, with only two new proposed ford crossings. The PM G7 requires that all ford sites be pre-approved by the FS and rocked to avoid adverse effects to bull trout. In addition, new ford construction will only occur during ODFW’s in-water work window of July 15 – August 15. Protection measures Z1-Z14 address indirect effects from the construction of the ford crossings and road construction. Following authorized use through the year 2025, the temporary road will be decommissioned after use.

In addition, several of these operations must receive an ODEQ 401 certification before the FS will authorize construction or improvements of fords and temporary roads. The majority of ford improvements will have short-term effects associated with the hardening of fords and site-specific mitigations for these operations will have conditioning of the crossing (reference project proposal and general requirements for site specific conditioned stream crossings) with heavy machinery to minimize direct effects to fisheries. Appendix D of the Assessment outlines existing road conditions and any proposed temporary road activities. Of the approximately 0.77 miles of proposed new temporary road construction for Tetra Alpha Placer Mine, the road occurs in the RHCA but none will cross Boulder Creek and all construction will occur during ODFW’s in-water work window.

5.1.3 Chemical Contamination

Use of mechanized equipment (including large equipment such as excavators and dump trucks, and small equipment such as pumps) in riparian areas and fording streams creates a potential for contamination from petroleum products. Equipment operation, including excavation work in and adjacent to streams in the Granite Creek watershed could introduce hazardous materials including fuel, lubricants, hydraulic fluids, and coolants into the waterway. These chemicals can be acutely toxic to fish at high levels of exposure and can cause acute and chronic effects to fish species, aquatic invertebrates, and aquatic and riparian vegetation. The hazardous materials PMs H4 through H12 apply and require such things as a hazardous substance plan, spill kits, and storage of fuel outside the plan-specific stream buffers for all mining-related activities. The PM H8 requires that all equipment operating on mining operations will be in good repair and free from leakage of lubricants, fuel, coolants, and hydraulic fluid.

The FS requires that all mechanical equipment be maintained to ensure there are no leaks and any leaks that do occur are immediately cleaned up and repaired. In addition, the FS requires
development of a spill plan and presence of spill containment kits on site in the event a spill occurs. Unless specifically approved by a FS fisheries biologist, all chemicals will be stored outside of RHCAs.

Although improbable, if a spill were to occur, the likelihood of adverse effects will depend upon the size and proximity of the spill to live water and bull trout. If a fuel spill were to occur directly into live water, all spawning, rearing, and incubating life stages of fish that are present could be killed (the extent of which would vary tremendously, dependent on the quantity of the spill and the size of the receiving waterbody). However, the fuel spill and equipment leak contingencies and preventions provided in Appendix A are sufficient to render the risk of adverse effects from toxic contamination to those extremely unlikely to occur.

5.1.4 Water Withdrawal

Stream flows are a critical part of fish habitat and viability. Reducing stream flow can reduce the amount and types of habitat accessible to bull trout, reduce food availability, and increase stream temperatures. Maintaining bull trout habitat requires stability of stream channels and maintenance of natural flow patterns (Rieman and McIntyre 1993, p. 7). Tributary habitats offer refugia for bull trout, and the mouths of tributaries serve as important rearing habitats and/or temperature refugia for juvenile bull trout. Reducing flow could eliminate access of juveniles to these important habitat types and could result in long-term degradation of stream habitat. Reductions in streamflow due to water withdrawal may result in increased stream temperatures during the summer because there is less volume of water to buffer against solar radiation and air temperature fluctuations (Arismendi et al. 2012).

The proposed action includes water withdrawal from SR bull trout habitat in Clear, Boulder and Lightning creeks (Tetra Alpha Placer, Tetra Alpha Lode and Mill, and Lightning Creek mines). Juvenile bull trout have been documented in these streams so their presence cannot be discounted. The water rights for Tetra Alpha Placer, Tetra Alpha Lode and Mill, and Lightning Creek are not to exceed 100 gpm each, and will likely occur intermittently during the operating season (June through October). Typically water is drafted into existing ponds for processing, and all water is recycled on site. Water withdrawal will not affect high flows or winter base flows.

Monitoring of water withdrawal by the FS Minerals Administrator will contribute substantially to the protection of fish migration, spawning, and other life stages at and downstream of diversions. As stated in the Assessment (Table 20) and Table 3, if the Tetra Alpha Mill and Lode miner exercises their water right from Boulder Creek, there is a potential for direct effects to bull trout and critical habitat. No water withdrawals are permitted in SR habitat after August 15 to protect fish migrating to spawn, and if a stream is dry below where the miner is working prior to August 15, then the miner must cease withdrawing water from the creek until flow exceeds the amount withdrawn. Therefore, for Boulder Creek, a reduction in streamflow as a result of water withdrawal is expected to decrease habitat availability, decrease forage, and increase stream temperatures to a degree that will adversely affect bull trout. Lightning Creek water withdrawals are not expected to result in adverse effects to bull trout and this conclusion is based on the fact that only a very small proportion of the streamflow will be removed on an intermittent basis for five months of the year (for up to ten years).
5.1.1 Summary

We are not expecting any bull trout mortality from proposed placer mining, stream fording, temporary road construction, or water withdrawal. Few adult or juvenile bull trout are likely to be present in these stream reaches and most fish in the area will likely move up or downstream when mining activities commence. Direct mortality from trampling of redds may occur when large equipment using fords, enters the immediate vicinity of a redd. However, this risk will be extremely low because adult bull trout (and therefore bull trout redds) are in low abundance and all fords must be examined by a FS fish biologist prior to use. In addition, after reviewing the available information and considering the measures the miners have proposed to protect SR habitat, the Service concludes that the probability of mining activities interrupting spawning or juvenile rearing is low, but not discountable. Due to implementation of the PMs the Service is only expecting the following adverse effects to bull trout from the proposed placer mining, stream fording, temporary road construction and water withdrawal, in the Granite Creek action area:

- Short-term physiological distress and reduced feeding rate for bull trout exposed to increased levels of suspended sediment and increased water temperatures.
- Older juveniles, age-1+, are expected to move away from suspended sediment, while eggs and alevins are not expected in the action area.
- Reduction of macro-invertebrate prey base and loss of substrate habitat for juvenile bull trout exposed to increased levels of deposited sediment or increased water temperatures.
- Loss of territories and associated increased competition, increased predation risk, stress, and reduced feeding efficiency for bull trout disturbed by placer mining operations, stream fording, temporary road construction and water withdrawal.

5.2 Effects to Bull Trout Critical Habitat

Designated critical habitat within the action area consists of bull trout SR and FMO habitat. Potential adverse effects of Blue Sky/Bull Run, Eddy Shipman, Grubsteak, Hopeful 2 & 3, Lightning Creek, Little Cross 1, Ruby Group, and Tetra Alpha Placer/Tetra Alpha Lode Mines to critical habitat are related to several factors described in more detail above. A crosswalk between PBFs and the Matrix of Pathways and Indicators for bull trout and a more in-depth analysis is found in Appendix C.

The Service expects placer mining, stream fording, and temporary road construction to result in a short-term degradation to the suspended sediment/turbidity resulting in reductions in abundance of forage fish, short-term reduction of macro-invertebrate prey base, and loss of substrate habitat for juvenile bull trout exposed to increased levels of deposited sediment, and loss of territories and associated increased competition, increased predation risk, stress, and reduced feeding efficiency for bull trout. Water withdrawal has the capacity to reduce habitat access, reduce food availability and increase stream temperatures. The Service anticipates that the Project will result in short-term adverse effects to PBFs 3 (abundant food base), 4 (complex habitat), 5 (water temperature), and 8 (water quality). As the miners are prohibited from operating in or near bull trout spawning habitat in the action area the Service is expecting insignificant effects to PBF 6 (substrate in spawning habitat). Similarly, placer mining, stream fording, temporary road construction, and water withdrawal will have no significant effects on PBFs 1 (springs), 2 (migration), and no effect on PBFs 7 (natural hydrograph) and 9 (non-native species). The
adverse effects will be short-term during Project implementation and will not significantly affect the function of FMO and SR habitat for bull trout in Lower Granite Creek, Upper Granite Creek, Boulder Creek, Bull Run Creek, Clear Creek, and Lightning Creek.

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 proposed action.

Interrelated or interdependent actions associated with this Project include transporting heavy equipment to the mining sites over existing roads. The Assessments states that this will have no more of an effect to listed fish species and their habitat than normal vehicle travel over these roads.

Actions interrelated and interdependent to the FS authorization of mining Plans include potential long-term camping associated with mining. Forest Service policy limits the duration of occupancy of miners to no more than 14 days without additional permits. Camping over 14 days requires additional permission and all camping will follow PMs G5, G20, and G21 (Appendix A). In addition, annual inspections and implementation and effectiveness monitoring should address the above concerns. Most miners occupy campsites on their claims for fewer days than the maximum allowed. With full implementation of the PMs, the Service is not expecting significant effects to bull trout from miners camping in RHCAs during the 2016 to 2025 mining seasons.

6.0 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.

7.0 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 bull trout. The Service reached this conclusion for the following reasons:

- Only short-term physiological distress and reduced feeding rates for bull trout exposed to increased levels of suspended sediment is anticipated with no long-term effects,
- Only a short-term reduction of macro-invertebrate prey base and loss of substrate habitat for juvenile bull trout exposed to increased levels of deposited sediment, and
- Loss of territories and associated increased competition, increased predation risk, stress, and reduced feeding efficiency for bull trout disturbed by placer mining, stream fording, temporary road construction and water withdrawal operations.

These adverse effects are anticipated to be limited and occur only within the action area during the annual mining season of June 1 to October 31, 2016 through 2025 and should be substantially minimized by the PMs incorporated into the Project proposal.

Placer mining, stream fording, temporary road construction, and water withdrawal will occur in bull trout critical habitat on Lower Granite Creek, Upper Granite Creek, Boulder Creek, Bull Run Creek, Clear Creek and Lightning Creek. Therefore, spawning bull trout, eggs, or alevins could be affected by the Project. However, we anticipate that the number of bull trout present in the action area will be low and the proposed action will likely result in no lethal take of bull trout. Given these considerations, the Service concludes that the numbers, distribution, and reproduction of bull trout in the action area, the North Fork John Day River core area, or in the Mid-Columbia River recovery unit will not be significantly changed as a result of this Project.

### 7.2 Bull trout 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 biological opinion that the action, as proposed, is not likely to destroy or adversely modify designated bull trout critical habitat. The Service concludes that any adverse impacts to PBFs 3, 4, 5 and 8 will be short-term and will not permanently alter or destroy the quality or function of designated critical habitat in the action area of Granite Creek watershed. We expect that the PMs incorporated into the proposed action should reduce the magnitude of adverse effects, but not eliminate them.

### 8.0 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.

The UNF/WWNF have a continuing duty to regulate the activity covered by the incidental take statement. If the UNF/WWNF (1) fail to assume and implement the terms and conditions or (2)
fail to require the miners to adhere to the terms and conditions of the incidental take statement through enforceable terms, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the UNF/WWNF must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

8.1 Amount/Extent of Take Anticipated

Available survey information indicates that there are a low number of bull trout in the action area but, because the Service has no accurate estimate of the number of bull trout that may be in the action area at any time, to address take associated with the proposed action, the amount of stream channel subject to placer mining, temporary road construction, and stream fording was used as a surrogate. Table 3 lists the placer mines, along with the number of fords and temporary road construct for the Project area that occur in bull trout FMO and SR habitat that may be affected due to localized increases in suspended sediment.

The Service anticipates that a low number of bull trout present in action areas of the placer mining, temporary road construction or stream fording, (and 300 feet immediately downstream of each ford) each year may be subject to take in the form of harm or harassment. Specifically, bull trout will be harmed from: (1) short-term physiological distress and reduced feeding rate for bull trout exposed to increased levels of suspended sediment; (2) older juveniles, age-1+, are expected to move out of the vicinity, while eggs and alevins are not expected in the action area; (3) short-term reduction of the macro-invertebrate prey base and loss of substrate habitat for juvenile bull trout exposed to increased levels of deposited sediment; and (4) loss of territories and associated increased competition, increased predation risk, stress, and reduced feeding efficiency for bull trout disturbed by placer mining, temporary road construction or stream fording. With full implementation of the required PMs the Service anticipates the total amount of take will be low during the placer mining seasons.

Authorized take will be confined to the amount of habitat affected and authorized take will be exceeded if:

1. The area affected by placer mining, temporary road construction, or fording is greater than described in the proposed action and/or turbidity levels beyond background amounts occur greater than 300 feet immediately downstream of the each activity; or
2. Miners do not comply with all of the mitigation and PMs contained in this Opinion; or
3. Mining operations result in the mortality of any bull trout of any life-stage in the action area.

If authorized take is exceeded, placer mining operations and/or placer mining activities, temporary road construction or use of stream fords will cease and the UNF/WWNF will reinitiate consultation. The Service expects no lethal take of any life history stage of bull trout and none is authorized.

8.2 Effect of Take

For this Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species.
8.3 *Reasonable and Prudent Measures*

The Service believes that the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize impacts of incidental take of bull trout. The UNF/WWNF shall:

1. Avoid bull trout at all times during placer mining operations, temporary road construction, and when using stream fords.
2. Minimize incidental take caused by habitat impacts of the proposed action by ensuring proper monitoring and compliance/enforcement occur.
3. Implement a program of monitoring and reporting to ensure that the amount and extent of take limits are not exceeded.

8.4 *Terms and Conditions*

In order to be exempt from the prohibitions of section 9 of the Act, the UNF/WWNF must see to it that the claimants comply with the following terms and conditions, which will implement the reasonable and prudent measures described above. These terms and conditions shall be incorporated as mandatory requirements for each claimant’s Plan that has been approved by the UNF/WWNF. The UNF/WWNF’s monitoring and enforcement of the terms and conditions within this Opinion will further reduce the risk of impacts to bull trout and designated critical habitat within the Granite Creek watershed. These terms and conditions are non-discretionary.

1. To implement reasonable and prudent measure #1 (avoid bull trout), the UNF/WWNF shall enforce upon claimants, the following:
   a. Placer mining operations, temporary road construction, water withdrawal and use of stream fords must shut down immediately if the operator observes adfluvial adult (large) bull trout. The operation must remain shut down until the fish move(s) at least 100 ft. upstream of the operation or at least 500 ft. downstream.
   b. Miners must be particularly vigilant with regard to early rearing bull trout, as this life stage may be present in the substrate being affected by fording. If early rearing bull trout are observed or their presence suspected, in or near the substrate while fording is occurring, operations must shut down until the fish have moved out of the immediate area. Miners and a FS fisheries biologist must coordinate regarding the identification of early rearing bull trout.
   c. All mining operations must shut down immediately if any sick, injured, or dead specimen of bull trout is found (see Section 8.5). In addition, if any fish eggs are excavated or if destruction of redds is observed, operators must contact the FS and receive authorization to proceed prior to resuming operations.

2. To implement reasonable and prudent measure #2 (minimize habitat effects), the UNF/WWNF shall enforce upon claimants, the following:
   a. All placer mine “no activity” streams buffers must be maintained between streams and mining activities.
b. Prior to using stream fords, operators must meet with a FS fisheries biologist who will inspect each existing and proposed ford site. No fording will be allowed in areas of known bull trout spawning or in areas identified as spawning habitat.

c. Ford crossing will only occur during the ODFW in-water work window for all use. If the miner proposes to ford outside the in-water work window, then a FS fish biologist must inspect the crossing and approve beforehand.

d. Fords must be located in areas of large substrate not preferred by spawning bull trout.

e. There should not be any streambank disturbance except at fords, because each Plan has a “no activity” buffer. Should unexpected streambank disturbance occur in any way, the banks must be restored to the original contour and re-vegetated with native species at the end of the annual mining season in which the disturbance occurred.

f. Camping areas, paths, and other disturbed sites that are located along stream banks and that are associated with mining operations must be re-vegetated or otherwise restored to their original conditions at the end of the mining season.

g. Any temporary roads, road repair or road maintenance proposed by the operator that will occur within any RHCA or which has the potential to transmit sediment to stream channels must be specifically approved by the FS in detail and in writing, and will be inspected by the FS during the mining season.

h. Operators must cease activities during the wet periods when Project activities are causing excessive ground disturbance (visible ground disturbance due to soil saturation) or excessive damage (muddying/rutting) to roads.

i. Mining operators must not remove, relocate, or disturb stable in-stream woody debris or boulders greater than 12 inches in diameter.

j. The operator will not remove any large down or standing woody debris or trees for firewood within one tree length of the stream.

k. No mechanized equipment will be operated below the mean high water mark except for when fording at designated sites.

l. Gasoline and other petroleum products must be stored in spill-proof containers at a location that minimizes the opportunity for accidental spillage.

m. A spill kit must be available in case of accidental spills. Soil contaminated by spilled petroleum products, must be excavated to the depth of saturation and removed from the National Forest for proper disposal.

n. Operators will not entrain, mobilize, or disperse any mercury discovered during mining operations. Operators must cease operations and notify the FS if mercury is encountered in placer material. Operators must not use mercury, cyanide, or any other hazardous or refined substance to recover or concentrate gold.

o. To prevent the threat of aquatic invasive species, tools used while placer mining, and associated equipment must be thoroughly cleaned with a pressure washer and dried at least five days prior to use on the Forest.

3. To implement reasonable and prudent measure #3 (Implementation, effectiveness, bull trout monitoring and reporting), the UNF/WWNF shall:

a. Once per season, turbidity monitoring shall be conducted to assess the extent and duration of turbidity plumes associated with “no activity” buffers of 20 ft. or less, i.e. Eddy Shipman on Granite Creek, Grubsteak on Clear Creek, and Ruby Group
on Ruby and Clear Creeks. Turbidity monitoring shall occur during active placer mining at 300 ft. downstream of the project area. Turbidity at the downstream sample location shall be recorded every 30 minutes until the plume has dissipated.

b. Once per week during construction and then once a month for the rest of the first season only, turbidity monitoring shall be conducted to assess the extent and duration of turbidity plumes associated with temporary road construction for Tetra Alpha Placer and Tetra Alpha Lode and Mill Mines. Turbidity monitoring shall occur during construction of the temporary road. If noticeable turbidity is observed reaching the stream, all activities must cease immediately or decrease in intensity until no increase in turbidity is observed at a 300 ft. mark downstream of the origin of turbidity.

c. Once per month, per the first season, turbidity monitoring shall be conducted to assess the extent and duration of turbidity plumes associated with each stream ford and must occur during mobilization of both heavy equipment and daily equipment such as pick-up trucks and all-terrain vehicles. Turbidity monitoring shall occur approximately 300 ft. downstream of each ford, immediately following fording (i.e., when the plume reaches the monitoring location), and occur every five minutes until the plume dissipates. Background turbidity shall be collected prior to fording, and may be collected at the downstream monitoring location. The type and number of vehicles/heavy equipment fording the stream shall also be recorded.

d. Stream flow shall be measured, monitored and recorded during water withdrawals for each mine a minimum of once per month each season for the following mines: Grubsteak Mine on Clear Creek, Lightning Creek Mine on Lightning Creek; and Tetra Alpha Placer, Lode and Mill Mines on Boulder Creek.

e. Water withdrawal from instream flow cannot exceed more than the established water rights identified in the Assessment during the water withdrawal period (Table 3).

f. Provide a written report or letter to the Service, by December 31st of each year indicating:

i. The actual number of bull trout taken, if any, including observations by claimants of any adfluvial and early life stages of bull trout (per Term and Condition 1.a. and 1.b.), and any relevant biological/habitat data or other pertinent information on bull trout that was collected;

ii. The results of the turbidity plumes observed in the “no activity buffers” for Eddy Shipman on Granite Creek, Grubsteak on Clear Creek, and Ruby Group on Ruby and Clear Creeks.

iii. The results of the turbidity monitoring associated with each ford.

iv. The results from stream flow monitoring associated with each water withdrawal.

v. The results of any unexpected streambank disturbance, along with the restoration and revegetation associated with the disturbance.

vi. Any new findings by FS fisheries biologist regarding stream fording in newly identified bull trout spawning and rearing habitat and relevant mitigation.

vii. Claimant/operator compliance with the Terms and Conditions of this Opinion;

viii. Remedies to address and resolve any identified problems; and
ix. Any environmental effects of the action that were not considered in the Assessment or this Opinion.

x. In addition, the report will include the location and duration of each miner/Plan’s mining activities. Individual operators should keep a daily log of mining activities to facilitate the FS’s compliance with this monitoring requirement.


8.5 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 MNF 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.

9.0 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. The Service recommends the following conservation recommendations:

1. Limit future activities and projects that may negatively affect watershed conditions in the Granite Creek watershed. Allow sufficient time for the watershed to become hydrologically and ecologically stable following mining activity before undertaking substrate disturbing activities.

2. Promote recovery of bull trout in the Granite Creek watershed by identifying potential habitat restoration opportunities and implementing these actions in the near-term.
3. Continue to survey and monitor bull trout populations and habitat in the Granite Creek watershed.

4. Monitor invasive/noxious weed infestations in the action area. Take necessary steps to control or eliminate weed infestations to minimize negative impacts on bull trout habitat.

5. Collect necessary data to continue to update the baseline conditions for Granite Creek, Boulder Creek, Bull Run Creek, Clear Creek, and Lightning Creek.

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 proposed approval of the 2016-2025 Granite Mining Plans of Operation Project (Project) for lode and placer mining on bull trout in the Granite Creek Watershed. 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.
LITERATURE CITED


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


USFWS. 2002c. Chapter 20 of the bull trout (Salvelinus confluentus) draft recovery plan: Lower Columbia Recovery Unit, Washington. USFWS, Region 1, Portland, Oregon. 102 pp.


APPENDIX A. Required Protection Measures

PACFISH/INFISH Standards and Guidelines for Minerals Management

MM-1.
If the Notice of Intent indicates a mineral operation would be located in a Riparian Habitat Conservation Area, or could affect attainment of Riparian Management Objectives, or adversely affect listed anadromous fish, require a reclamation plan, an approved Plan of Operations, and reclamation bond. Such plans and bonds must address costs of removing facilities, equipment and materials; recontouring disturbed areas; isolating and neutralizing toxic material; salvage and replacement of topsoil; and revegetation of RHCAs. Reclamation bonds must contain measurable attainment and bond release criteria for each reclamation activity.

MM-2
Where no alternative to sitting facilities in RHCAs exist, locate and construct the facilities in ways that avoid impact to RHCAs and adverse effects. Where no alternative to road construction exists, keep roads to the minimum necessary for the approved mineral activity. Close obliterate and revegetate roads no longer required for mineral or land management activities.

MM-3
If no alternative to locating mine waste facilities in RHCAs exists, and releases can be prevented and stability can be ensured, then:

- Analyze the waste material using current sampling methods
- Locate and ensure mass stability and prevent the release of acid or toxic materials.
- Reclaim and monitor waste facilities to assure chemical and physical stability and vegetation.
- Require adequate reclamation bonds to ensure long term chemical and physical stability

MM-6
Develop inspection, monitoring, and reporting requirements for mineral activities. Evaluate and apply the results of inspection and monitoring to modify mineral plans as needed to eliminate impacts that prevent attainment of RMOs and avoid adverse effects to listed fish.

General Requirements for Protection of Surface Resources

The general mitigations apply to all mine operations analyzed in the Granite Mining Project.

G1. In accordance with 36 CFR §228.4(d), the operator will submit a supplement to a Plan of Operations for any ground-disturbing operations not specifically covered within the initial Plan. Any supplemental plan shall be subject to approval by the authorized officer in the same manner as the initial plan (36CFR §228.5(c)).

G2. Prior to approval of the Plan of Operations, the operator will furnish a reclamation bond (36CFR §228.13(a)). The bond will be calculated based on site-specific conditions addressing
the resource concerns listed in 36CFR §228.8(g), Reclamation. The bond shall also cover the removal of all equipment and improvements authorized in the plan, or any subsequent supplements or modifications to the plan. The bond amount may be adjusted during the term of this proposed plan of operations in response to changes in the operations or to changes in the economy.

G3. Operations shall be conducted to prevent damage to historic properties or objects of antiquity protected by American Antiquities Act (16 U.S.C. 433); Section 106 of the National Historic Preservation Act of 1966, as amended; National Environmental Policy Act of 1969; American Indian Religious Freedom Act of 1978; Archaeological Resource Protection Act of 1979, as applicable in 36 CFR 261 Regulations; applicable Sections 36 CFR 800 Regulations; and other laws and various executive orders that protect cultural resources. Operator shall stop all operations and notify the Forest Service of any discovery of cultural or natural history resources and work will not continue in the area of the discovery until the properties have been evaluated and all necessary consultations are complete. Removal or destruction of historic artifacts is a violation of Federal law and as such not allowed.

Historic building that are eligible for listing or are unevaluated will be maintained as eligible by following the Secretary of Interior’s guidelines for Historic Preservation and consulting with the Forest Service.

G4. Surface runoff water from off-site shall be diverted around the operating site to ensure that this runoff water does not have a negative impact on water quality. Wood, certified weed-free straw bales (See R3), silt fences, or other Forest Service approved barriers, may be used to establish a barrier along the banks to control sediment movement into the creek. If tree boles are used, the logs must be embedded so that the entire length of the bole is in contact with the ground, and the logs overlap in a parallel shingle arrangement so that sediment-laden runoff cannot escape the impounded area.

G5. During ongoing mining activities, all disturbed sites (roads, cut and fill slopes, campsites, ponds, dumps, and stockpiles) shall be maintained in a stable condition.

G6. No live trees greater than 7” diameter at breast height (4.5’ from uphill side of base of tree) shall be cut without prior written approval. All live trees approved for removal shall remain on-site. Forest Service personnel will determine which trees approved for removal are merchantable. These trees will be stockpiled by the operator for Forest Service disposal, or for use during final reclamation.

Forest Service shall approve removal of snags or trees with signs of mistletoe, prior to falling. If snags greater than 12” are removed, the Forest Service shall be notified and a new snag in the same area shall be created with the approval of the Forest Service wildlife biologist.

G7. Mining equipment shall cross creeks only at pre-approved sites, as authorized by the District Ranger with FS, NMFS and USFWS mitigations, and 2012 BMPs. All fords shall be sloped and armored with rock, based on a site-specific evaluation. Gravel will be compacted by equipment when placed on banks at stream crossings. Subsequent use will further stabilize the material. Chris Helberg, Minerals Administrator states “Driving back and forth packs it in rather well, (based on monitoring) several old fords that we are using.” Bridges shall be installed so as
not to result in continued sediment delivery to the stream, and shall be removed upon final cessation of mining operations.

G8. All use and/or construction of any structures shall be listed and authorized in the Plan of Operations or supplement (36CFR 261.10 (a)). Only structures reasonably incident and necessary for the proposed level of mining operations will be authorized (FSM 2812, and 69 Stat. 367; 30 U.S.C. 601, 603, 611-615).

G9. Snow removal on roads is not approved unless addressed in an approved Plan of Operations or subsequent modifications or supplements to the Plan of Operations.

G10. Excavations left open for more than a week shall have the sides contoured to allow wildlife to escape should they fall in.

G11. Other than seasonally, where operations have ceased for a year or more, the operator shall annually submit a written statement of intent to the District Ranger which includes the operator’s intent to maintain the equipment and structures, the expected date operations will resume, and an estimate of extended duration of operations. The operator will maintain the site, equipment, and structures in a neat and safe condition during non-operating periods (36 CFR 228.10).

G12. Buffer strips and/or silt fencing (or other materials approved by the District Ranger) between the approved operation and the channel of intermittent or perennial streams shall be of sufficient width and filtering capacity (as determined by the District Ranger) to prevent the introduction of sediment into the stream system during normal seasonal runoff events such as snowmelt or high-intensity rainstorm events.

In addition, if straw bales or silt fences are used, they will be installed with adequate support (i.e. straw bales staked into the ground, silt fences dug into the ground and with seams on stakes facing away from sediment sources) and maintained during use (i.e. fences and bales regularly checked for failure or movement, sediment removed with it accumulates to 1/3 height of silt fence or bale).

January 16, 2015 amendment is as follows: Buffer strips and/or silt fencing (or other materials approved by the District Ranger) between the approved operation and the channel erosion control materials such as straw bales and silt fences will be placed outside the no activity stream buffers.

The Minerals Administrator, representing the District Ranger, will oversee and/or monitor erosion control material placement to be as close to activities as reasonable to maximize effectiveness.

G13. All explosive handling and storage will comply with Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) requirements and Mine Safety and Health Administration (MSHA). Copies of any permits that require any improvements (storage facilities, gates, etc.) on national forest system (NFS) lands must accompany the Plan of Operation or supplemental Plan, and the improvements shall be identified within the approved Plan.
G14. Beaver dams will not be breached by the operators. If pond levels behind the dams increase to the point that there is the potential to flood the mining operation, the operator shall work with the Forest Service to install pond-level control devices.

G15. Plan-specific stream buffers for mining-related activities (as specified in Appendix 1A of the EIS) are to be undisturbed. No mining activities, storage of equipment or overburden, or vegetation removal is permitted. Driving a vehicle off an existing road within a stream buffer is only permitted where necessary to access the stream for mining related activities such as installation of a pump or dredge put in, as long as there is no significant impact to surface resources, and is consistent with 2012 BMPs. For requirements specific to use of fords, see G7.

G16. If new active goshawk nests are discovered, a 30-acre nest area will be delineated by district wildlife personnel around active goshawk nest sites, and a seasonal restriction on the use of heavy equipment would be recommended in the immediate vicinity of the nests to reduce disturbance to goshawks during courtship and nesting. Nest areas will be deferred from tree removal with the exception of snags cut to address hazards around work areas. An active nest site is one that has been used for nesting within the previous five years. Failure to monitor a nest site does not equate to inactive status.

If a new active goshawk nest is discovered after a Plan of Operation is approved, the Forest would initiate a Plan modification process per (CFR 228.4e) to determine what reasonable additional restrictions could be added to the Plan to mitigate this unanticipated impact.

G17. If unexpected heritage resources are encountered during project implementation, these resources will be protected from disturbance and evaluated for eligibility for inclusion on the National Register of Historic Places. Significant resources will be avoided or mitigated as described below. In accordance with 36 CFR 800 and Section 106 of the National Historic Preservation Act (1966), all unevaluated sites will be avoided pending determination of eligibility for listing on the National Register of Historic Places by the Forest Service and consultation with the Oregon State Historic Preservation Office. All eligible and unevaluated sites will be protected throughout the life of the project if possible. Protection of these sites, in most cases, shall be accomplished through avoidance by ground-disturbing activities.

If protection or avoidance of significant heritage resources is not possible, mitigation measures will be developed in consultation with the Forest Service and the Oregon State Historic Preservation Office and in some cases, the Advisory Council on Historic Preservation.

G18. Approval of this plan does not relieve the operator from complying with all applicable Federal, State, or County laws or regulations. Any regulations/laws referenced herein are for emphases only and not intended to cover all regulations that may apply to this operation.

G19. Copies of any permits/certifications issued by other regulatory agencies related to mining operations on NFS lands shall be submitted to the authorized officer. In some cases this may be required prior to approval of the Plan. (CWA §401(a)(1). BMP Min-8)

G20. Extended occupancy (longer than allowed under the Forest Order) must be incidental to and necessary for the level of proposed mining operation and authorized in the Plan of
Operations\textsuperscript{1}. No person not actively involved in the day to day operations will be authorized to stay longer than allowed under the Forest Order (ORDER NO. 2010-0616-WW-12 and Uma FO 2009-0614-UM-01) (36CFR 261.1(a) and 261.58(a)).

G21. The work site and camp area will be kept clean and orderly. Litter and other non-essential mining items brought in by the operator will be removed by the operator from NFS lands and disposed of properly. Burning or burying of trash is not authorized. (36CFR 261.11 (b)(c)(d))

G22. When the operator is contemplating a sale of the claim(s) associated with their approved Plan of Operations, the claimant/operator shall notify the District Ranger. The Plan of Operations will not automatically transfer to the new owner, and the new owner must file their own notice to the Forest Service (36CFR 288.4). If a new owner wishes to submit the same Plan, additional environmental analysis may not be needed.

G23. During water drafting, pumps should be screened with 3/32” plate screen (or equivalent). Screens should be kept in good and efficient state of repair, and water must not be withdrawn at any time that the screen is removed.

G24. At a pre-arranged meeting time and place, the Forest Service minerals administrator will inspect all equipment prior to its placement on NFS land in order to make sure that it is in working order, and there are no obvious leaks.

G25: Any existing Forest Service section corners and/or marker trees removed or damaged by the miner will be replaced at the miner’s expense

Hazardous Materials

H1. No processing chemicals shall be used in the process to extract ore unless authorized in a Plan of Operations. Authority will be in conjunction with Oregon DEQ permitting regulations.

H2. No chemical flocculent or surfactant shall be used in ponds unless it is EPA approved and shown to be safe for aquatic species (amphibians).

H3. Operators shall be required to have a lined containment vault under hazardous material storage barrels.

H4. Before commencing operations, operator shall provide a Hazardous Substances Plan. The Plan must include, but is not limited to, hazardous substances (as defined by 29 CFR 1910.120) to be used in the mining operation and identification of operators’ representatives responsible for supervising initial containment action for releases and, if required by Forest Service, subsequent cleanup. Material Safety Data Sheets (MSDSs) for all hazardous materials used will be available at the mining operation and all such materials shall be labeled in accordance with Federal and State regulations. The Plan should show operator's procedures for reporting and responding to a

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\textsuperscript{1} 1. Be reasonably incident - Reasonably incident means the statutory standard "prospecting, mining, or processing operations and uses reasonably incident thereto" (30 U.S.C. 612). It is a shortened version of the statutory standard. It includes those actions or expenditures of labor and resources by a person of ordinary prudence to prospect, explore, define, develop, mine, or beneficiate a valuable mineral deposit using methods, structures, and equipment appropriate to the geological terrain, mineral deposit, and stage of development and reasonably related activities.
release. The current names and telephone numbers of those to be notified and their responsibilities should be listed. The Forest's Emergency Response Coordinator (name shall be supplied by the Forest service) should be included as a person to be notified early. The Plan should also list the appropriate hazardous substance response services to be employed for release assessment and cleanup actions.

H5. Spill kits shall be available on site in case of an accidental spill. Spill kits (minimum size 40 gallons) must be able to absorb and contain oils, coolants, solvents and other materials in the event of a spill.

H6. Petroleum products or other hazardous substances shall not be released into land, rivers, streams, impoundments, or natural or man-made channels leading thereto. Storage of fuel, fueling of equipment or routine maintenance shall require the use of oil-absorbing mats, and storage would occur outside the plan-specific stream buffers for mining-related activities (as specified in Appendix 1A of the EIS). Oil-absorbing mats are required under all stationary equipment to prevent leaking or spilled petroleum base products from contaminating soil and water resources. Such material will be furnished by operator and approved by the District Ranger before use.

H7. Burning of spilled substances shall not occur unless authorized by the District Ranger and Oregon DEQ.

H8. All equipment shall be checked for fluid leaks on a daily basis. All equipment operating on mining operation will be in good repair and shall be free from leakage of lubricants, fuel, coolants, and hydraulic fluid. Servicing of all equipment shall be done only in the areas approved by the District Ranger as part of the Plan of Operations. Unless otherwise agreed, operator shall properly dispose of all contaminated soil, vegetation, debris, vehicle oil filters (drained of free-flowing oil), oily rags, and waste oil in accordance with local, State, and Federal regulations off NFS lands and shall transport such substances in accordance with State and Federal regulations.

H9. Operator shall immediately implement the Hazardous Substances Plan, notifying appropriate agencies, including the Forest Service, concerning all spills, leaks, or other releases of petroleum products or other hazardous substances (as defined in (29 CFR 1910.1200 and/or releases) on or in the vicinity of all NFS lands which are caused by operator's employees, directly or indirectly, as a result of mining operations. Plans of Operations must display storage locations for hazardous substances.

H10. In addition to taking initial action to contain all releases, operator shall be held liable for all damages and costs of additional labor, subsistence, equipment, supplies, and transportation deemed necessary by the government for the containment and cleanup of petroleum products or other hazardous substances.

H11. If the total oil or oil products storage exceeds 1,320 gallons or if any single container exceeds a capacity of 660 gallons, operator shall prepare and implement a Spill Prevention Control and Countermeasures (SPCC) Plan. Such plan shall meet applicable EPA requirements (40 CFR 112), including certification by a registered professional engineer. This plan shall
include notification of appropriate State and local officials, the Forest Service, and other appropriate agencies.

**H12.** It is the intent that all releases shall be removed from NFS lands and disposed of according to above regulations. De minimus (trifling) releases are occasional drips that fall from operating equipment. Routine systematic releases are drips that become increasingly worse and/or operator takes no preventative action to curtail releases. The Forest Service is not expected to enforce this provision as to de minimus releases, but routine systematic releases warrant enforcement.

**Fire Protection and Suppression Requirements**

Specific fire prevention measures are listed below and shall be effective for the period of April 1 to October 31 of each year. The Forest Service may change the dates of said period by advance written notice if justified by unusual weather or other conditions. Required tools and equipment shall be kept currently in serviceable condition and immediately available for initial attack on fires.

Compliance with State Forest Laws - Listing of specific fire precautionary measures herein is not intended to relieve the operator in any way from compliance with the State Fire Laws covering fire prevention and suppression equipment, applicable to operations under this Plan of Operations. These requirements meet the intent of 36 CFR 228.11.

**F1.** Fire Plan – Before starting any operations, the mine operator shall prepare a fire plan, in cooperation with the district minerals administrator, providing for the prevention, notification and control of fires in the project area.

**F2.** Substitute Measures - The District Ranger may by written notice authorize substitute measures or equipment or may waive specific requirements during periods of low fire danger.

**F3.** Emergency Measures - The Forest Service may require emergency measures, including the necessary shutting down of equipment or portions of operations in the mining claim during periods of fire emergency created by hazardous climatic conditions.

**F4.** Fire Control - The mine operator shall, independently and in cooperation with the WWNF, take all reasonable action to prevent and suppress fires on the mining claim. Independent initial action shall be prompt and shall include the use of all personnel and equipment available in the mining claim.

**F5.** Fire Precautions

1) Smoking and Open Fires - Smoking and fires shall be permitted only at the option of the mine operator. Campfires shall be on mineral soil within a fire ring (either rock or metal) and shall not be left unattended. Unless restricted by State Law or Federal Regulation, smoking shall be permitted only in such portions of the mining claim that are free of flammable material. Smokers shall extinguish and press out all burning material in a closed container or in mineral soil before leaving the cleared area.

2) Fire Extinguishers and Equipment on Trucks, Tractors, etc. - All power-driven equipment operated on NFS lands, except portable fire pumps, shall be equipped with one fire extinguisher having a UL rating of at least 5 BC, and one "D" handled or long-handled, round-
point shovel size "0" or larger. In addition, each motor patrol, truck, and passenger-carrying vehicle shall be equipped with a double-bit axe or Pulaski, 3½ pounds or larger. Equipment shall be kept in a serviceable condition and shall be readily available.

3) Power Saws - Each gasoline power saw operator shall be equipped with a pressurized chemical fire extinguisher of not less than 8-ounce capacity by weight and one long-handled, round-point shovel, size "0" or larger. The extinguisher shall be kept in possession of the saw operator at all times. The shovel shall be accessible to the operator within 1 minute.

4) Spark Arresters and Mufflers - Each internal combustion engine shall be equipped with a spark arrester meeting either (1) USDA Forest Service Standard 5100-1a, or (2) appropriate Society of Automotive Engineers (SAE) recommended practice J335(b) and J350(a) as now or hereafter amended unless it is:
   (a) Equipped with a turbine-driven exhaust supercharger such as the turbocharger. There shall be no exhaust bypass.
   (b) A passenger-carrying vehicle or light truck or medium truck up to 40,000 GVW used on roads and equipped with a factory-designed muffler complete with baffles and an exhaust system in good working condition.
   (c) A heavy duty truck, such as a dump or log truck, or other vehicle used for commercial hauling, used only on roads and equipped with a factory designed muffler and with a vertical stack exhaust system extending above the cab.

Exhaust equipment described in this subsection, including spark arresters and mufflers, shall be properly installed and constantly maintained in serviceable condition.

F6. The operator shall observe all the requirements of the Industrial Fire Precaution Level. It is the responsibility of the operator to obtain the Industrial Fire Precaution Level daily. The Industrial Fire Precaution Level may be obtained daily from the Forest Service at approximately 4PM to 6PM, local time. (R6-FS-6300-51 Regional Forester Order No. 3).

F7. Fire Security - When the Industrial Fire Precautions Level is "I" or higher, unless a waiver is granted, the operator shall designate a person who shall perform fire security services listed below on the mining claim and vicinity. The designated person shall be capable of operating the operator's communications and firefighting equipment specified in F-6b, and of directing the activities of the operator's personnel on forest fires. In lieu of having the designated person perform the required supervisory duties, the operator may provide another person meeting the qualifications stated above to direct the activities of the operator's personnel and equipment during all firefighting activities.

Services described shall be for at least 1 hour from the time the operator's operations are shut down. For the purposes of this provision, personnel servicing equipment and their vehicles who are not engaged in cutting or welding metal are excluded.

Fire security services shall consist of moving throughout the operation area or areas constantly looking, reporting, and taking suppression action on any fires detected.

Whenever the Industrial Fire Precaution Level is "II" or greater, a fire security person equipped with a long-handled, round point, Number "0" or larger, shovel, and a five-gallon backpack pump can filled with water will stay at the location of a blast for 1 hour after blasting is done. Blasting may be suspended by Forest Service in writing, in an area of high rate of spread and resistance to control.
F8. Surface blasting - Fuses shall not be used for blasting. Explosive cords shall not be used without written Forest Service permission, which may specify conditions under which such explosives may be used and precautions to be taken.

**Invasive Species and Noxious Weeds**

**IS1.** The minerals administrator will provide the mine operator with a noxious weed identification book and a map of known noxious weed locations on or near the proposed activity area so that the operator is able to recognize the presence of noxious weeds.

**IS2.** Actions conducted or authorized by written permit by the Forest Service that will operate outside the limits of the road prism, require the cleaning of all equipment (e.g. heavy equipment, pumps, ATVs) prior to entering NFS lands, and will comply with regional and forest-specific invasive plant management plans, and the 2011 Region 6 Aquatics Invasive Species Management Plan.

The Forest Service minerals administrator will inspect all equipment prior to its placement on NFS land to make sure that it has been cleaned for invasive species. Mining equipment already on NFS land will be cleaned by the operator, to remove invasive species at the current work site before moving to another location.

**IS3.** Use only gravel, fill, sand, and rock that is judged to be weed free by Forest Service weed specialists.

**IS4.** The presence of any previously unknown invasive species infestations (aquatic or terrestrial) should be reported to the Forest Service Minerals Administrator as soon as possible. Upon notification, Forest Service employees shall initiate a weed inventory at the reported site.

**IS5.** All noxious weed infestations will be avoided during times of seed production. If avoidance is not feasible, then mechanical treatment (pulling, chopping, weed eating, etc.) will occur prior to any ground disturbing activities. Treatment of these areas will, at the minimum, remove all flower heads prior to seed set.

**IS6.** When invasive plants begin to grow on stockpiled soil, mechanical treatment will occur to prevent seed set. Mechanical treatment (like pulling, chopping, etc.) will occur as flowers begin to form. The resulting organic matter may be left on site if removed prior to seed set.

**Lode Mines**

**L1.** When water from an adit is used in the mining process, it shall be piped or trenched around the mine dump to a settling pond for use. Certified weed-free straw bales and filter cloth will also be used to minimize sediment if determined necessary by the District Ranger.

**L2.** Settling ponds shall not be built on mine dumps.

**L3.** Prior to the beginning of operations, the operator(s) will test any adit discharge for compliance with the CWA and Safe Drinking Water Act, Oregon State and the EPA, at an approved testing facility. As conditions change during operations, the operator(s) will
periodically test the discharge to see if water chemistry has changed (e.g. heavy metals or sulfides). Upon completion of the operations, a final water quality test of the adit discharge will be completed.

L4. When processing is conducted on Forest Service land, tailings from the first run will need to be tested at an approved testing facility to see if they have the potential to release acidity or other contaminants. (See EPA standards and CWA for guidelines). Testing of the waste rock may be required based on the type of rock present. Additional testing will be required throughout the life of the operation as conditions change. Upon completion of the operations, a final test of the tailings and waste rock will be required before the Plan can be closed out. Reclamation procedures may be modified, depending on the results of the testing.

L5. When testing of adit discharge, tailings or waste rock, a copy of the test results will be sent directly from the testing facility to the District Ranger. Should the results exceed EPA and ODEQ’s standards, the operator must address this issue prior to continuing this portion of the operation (36CFR 261.11 (c)). A modification to the Plan may be required as per direction found in 36CFR 228.4 (e).

L6. Water and winter run off will be diverted around tailings and waste rock piles.

L7. When opening a collapsed adit portal, the surface soils will be set aside for later closure of the adit or use as top soil for reclamation.

L8. Should water begin to discharge from previously dry adits, the District Ranger will be notified immediately and L3 and L5 would apply.

L9. Tailings, waste rock, and soil piles will be placed in separate locations. Tailings and waste rock piles will be placed a sufficient distance from any nearby surface waters such that no surface discharge from the waste rock or tailings will reach the waters.

L10. The operator will be held financially responsible for containing/controlling tailings or waste rock that exceeds EPA standards for human health and safety. The operator(s)/owners(s) will be held responsible until the tailings and waste rock are in a stable, non-leaching condition.

L11. Portal discharges resulting from underground development conducted during the life of the approved Plan of Operations must meet State standards for water quality for the receiving stream. The point of compliance shall be at the point of entry into Waters of the State. If water quality standards are exceeded, then the operator(s) shall comply with OAR 340-041-0004. If treatment systems are needed to meet State Water Quality standards, a supplemental plan must be submitted to the District Ranger for approval prior to implementation.

L12. Decontamination procedures for White Nose Syndrome “Geomyces destructans” will be required for all equipment leaving or coming into an adit site. See EIS for procedures as of Jan 25, 2013. The most current procedures can be found at the following web site or through local State or Federal Fish and Wildlife office.
http://www.whitenosesyndrome.org/topics/decontamination
Placer Mining

P1. When mining or processing old lode tailings or waste rock, the following Lode requirements apply: L1-6, L8-10, L11.

Reclamation Requirements

Ongoing Reclamation

R1. Prior to reclamation, the operator will coordinate with the Forest Service on reclamation activities for things such as, but not limited to, placement of topsoil, use of slash (e.g. scattering on the surface, burying to create an organic layer), seed mixes and seeding rates, and means of accelerating vegetative recovery and soil development.

R2. Reclamation shall be ongoing to ensure stabilization of the area and so that a minimum amount of ground will be open at any time.

R3. Use certified weed-free straw for all projects, conducted or authorized by the Forest Service, on NFS lands. If State certified straw is not available, use sources certified to be weed free using the North American Weed Free Forage Program Standards or a similar certification process.

R4. All mining excavations, not approved for winter hold over, will be refilled and reclaimed to normal contours before seasonal shutdown of each year. This shall include refilling of the excavations, re-vegetating to avoid active erosion, and mulching with certified weed-free straw.

R5. All mining excavations, approved for winter hold over, shall be stabilized prior to seasonal shutdowns or extended periods of inactivity. This shall be accomplished before any equipment is removed. Stabilization includes, but is not limited to, the following: covering the stockpiled top soil and other areas of bare soil with certified weed-free straw, sloping pond sides and trenches, and installing sediment barriers in disturbed areas such as roads or mined area to prevent soil from reaching stream channels.

R6. Topsoil, where it exists, shall be scraped off the areas to be excavated and stockpiled for later reclamation. All material shall be stockpiled in the order that it was excavated and used to refill the excavation in that order.

R7. At the end of each operating season, areas of stockpiled soil (including silt removed from placer mining settling ponds, or removed topsoil) will be covered with at least 3 inches of certified weed-free straw.

R8. General specifications for revegetation, such as seed mixes, shrub types, and the rate of application or planting densities, will be developed by the time of Operating Plan approval. Actual seed mixes, shrub types, and the rate of application or planting densities will be finalized at the time reclamation begins in coordination with the Forest Service.

R9. Re-vegetated areas will initially be inspected for stocking and planting methods and then evaluated annually by the Forest Service to determine if the site’s original or surrounding densities have been maintained. Year to year improvement must occur in order for that portion
of the bond, held for re-vegetation, to be returned. Annual improvement must show establishment of desired species and spread, equal to or greater than 10% each year such that by the end of year 3 there is at least 30% establishment in order to meet the objectives of this requirement (W-W LMP pg. 4-25)(UMA LMP 4-70 & 80)(BMP Min-8).

R10. The operator must follow the requirements of the State of Oregon 600 permit (General Water Pollution Control Facility Permit issued pursuant to ORS 468B.050) as it applies to use of ponds as settling ponds. Water shall be contained in settling ponds with no sediment discharge allowed. All ponds approved to be left open during seasonal shutdown shall be left dry or at the normal water table. The mine operator shall have certified weed-free straw bales or wattles or other material available on-site, that are approved by the Forest Service, to be used as a filtering agent should overtopping of ponds or significant soil movement from storm events occur.

Final Reclamation

R11. All mined areas included in Plan of Operation activities shall be returned to natural or near-natural contours; if located on the hillside, the areas will be benched for stability.

R12. Following re-contouring of the ground, the ground will be seeded with native seed species or locally appropriate native trees and shrubs, and certified weed-free straw shall be scattered over the reclaimed area.

R13. Mine access roads, landings, and terrace areas created under the mining operation shall scarified to a depth of 2 to 4 inches, seeded with seed certified free of noxious weeds, and covered with certified weed-free straw and wood, if available, to discourage vehicle access.

R14. Exposed cutbanks created by the operator (excluding streambanks and terrace banks) shall be sloped to a 2:1 slope to minimize soil movement wherever testing in these banks has taken place.

R15. In order to determine which ponds should be reclaimed or retained, and whether modifications are necessary for the retained ponds, refer to Table in EIS.

Pond Reclamation: Where ponds are identified for reclamation, the pond shall be backfilled, re-contoured and seeded as specified in R 12.

Pond Retention AND modification required: Where existing or newly constructed ponds are identified for retention and modification, the operator should slope sides from 0-18” deep along the north, west, and east edges. This sloped portion of the pond should be a minimum of 3 ft. in width. These specifications were developed to provide spotted frog breeding habitat. Species of vegetation planted around the retained ponds will reflect the native species composition for the area. Pre-existing ponds that are occupied/suitable for amphibians shall be left for amphibian habitat.

Pond Retention BUT no modification required: Leave pond as is.

R16. After seeding, the mine operator will distribute certified weed-free straw, 3 inches thick over approximately two-thirds of the area in mid to late fall leaving patchy open areas.
R17. All stockpiled topsoil and/or other suitable fines, such as silt from the settling ponds, shall be spread over disturbed areas in an ongoing restoration program after consultation with the Forest Service as to placement of fines and/or topsoil, and will be consistent with the approved Plan of Operations and reclamation standards included in the WWNF Forest Plan and UNF Forest Plan (WWNF Forest Plan, 4-25 #27-29, UNF Forest Plan (4-80 #2).

R18. Final reclamation will be evaluated for success, with consideration given to variables such as the time of the year, how much topsoil was available, the density of the existing ground cover, and if native plants are establishing, and is consistent with the reclamation standards included in the WWNF Forest Plan (WWNF Forest Plan, 4-25 #27-29 and Umatilla NF Forest Plan (4-70 #1-6, and 4-81).

Requirements for Working in Wetlands and Floodplains

These requirements, along with the reclamation requirements above, are included to meet the intent of Executive Order 11990 – Protection of Wetlands, and Executive Order 11988 – Protection of Floodplains

W1. Mining in the floodplain or wetlands will be accomplished by placing equipment in dry areas located outside the floodplain or wetland. The wet areas and floodplain areas will be mined and reclaimed after July 1. Seasonal reclamation shall be accomplished by late fall in time to allow for the areas to revegetate and stabilize before winter (see R8 and R9 for specifications regarding revegetation).

W2. Where wetland vegetation is approved to be removed, it shall be kept wet by placing it in the ponds for up to 14 days while the area is being mined and reclaimed. The vegetation shall be replaced in the riparian area to approximately the original density and monitored for success for 3 years as described in R9 above. The success of final reclamation shall be evaluated as stated in R18 above.

W3. The size, location and function of wetlands after reclamation shall be similar to what now exists.

Road-related Requirements (Z-Requirements)

Definitions:

Open road: Road designated for motorized travel on a Motor Vehicle Use Map and/or designated as a National Forest System Road Operating above a Maintenance Level 1. This includes roads seasonally open.

Closed road: Road listed in a forest transportation atlas and a National Forest System Road operating at a Maintenance Level 1 and/or not shown on a Motor Vehicle Use Map.

Temporary access road: Roads created by the operator whether by blading or continued travel. A road or trail necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a forest road or trail and that is not
included in a forest transportation atlas. These roads are not necessary for long-term resource management and will be decommissioned after use. The level of decommissioning will be specified in the operating plan. Temporary access roads are given a number in the operating plans for tracking and mapping purposes. An “M” number is a miner-created road that the operator is responsible for decommissioning and/or obliterating once mining activity is complete. An “E” number is an existing road designated for use by the operator, and the operator is not required to decommission and/or obliterate once mining activity is complete.

**Decommissioned road:** A road that was listed in a forest transportation atlas and has had an action taken to eliminate use of the road, eliminate resource protection concerns, has no deferred maintenance needs, and requires no further maintenance. These roads have a route status of “decommissioned”. If specified in the operating plan, these roads may be utilized as temporary access roads, in lieu of new ground-disturbing construction.

**Requirements:**

The following requirements apply only during the dry season window (generally July 1 to October 1). During the dry season window, it would be unusual to get enough precipitation over a duration long enough to cause significant road damage. Outside the dry season window, weather and road conditions become variable daily. Operators working outside this window will be required to consult with the Forest Service to determine if special road Best Management Practices (BMPs) are required. The type of special BMPs required will vary and may range from timing of vehicular passage to full construction of erosion or drainage control structures.

The operator will be responsible for acquiring state, county and or local permits and activities shall be in accordance with the current edition of the National Forest Commercial Road Use Rules for hauling of mining equipment or excavated materials.

**Z1.** Use of closed and temporary access roads will be incidental to mining operations.

**Z2.** Temporary roads proposed in the Plan of Operations will be flagged by the operator and ground verified by the Forest Service prior to creation. The creation of these temporary roads should be with minimal impact to the environment, fit the terrain, limit the need for excavation by following natural contours, favor lower slope routes, and be consistent with other environmental protections.

**Z3.** Prior to use of existing closed or temporary access roads identified for use in the plan of operations, danger trees shall be identified by certified Forest Service personnel. The operator is responsible for felling of the danger trees and clearing any debris from the road prior to use. Danger trees shall be left on the ground in a stable manner, so as not to roll onto the road or encroach the traveled way, and left for wildlife purposes or dealt with as stated in the G6 requirement.

**Z4.** Existing closed and temporary access roads shall have brush and trees removed to the extent necessary to accommodate the movement of the operator’s equipment and vehicles only. All stumps and brush in the road bed to be removed shall be flush cut no more than 2 inches above the ground. Grubbing of roots and stumps shall only be allowed with prior written approval.
from the Forest Service. To minimize the potential for road damage, removal of trees and brush is limited to the dry season.

**Z5.** Disposal of trees/brush removed from proposed and existing closed and temporary access shall be accomplished in one of the following ways, based on site-specific characteristics determined in writing by the Forest Service: 1) Vegetation shall be scattered on the downhill side of the road, and shall not be placed in draws, catch basins, ditch lines, or stream channels. 2) Vegetation shall be moved to a Forest Service designated site, and left in piles of a size approved by the Forest Service.

**Z6.** The operator shall be responsible for reducing water flow concentrations resulting in road erosion on closed and temporary access roads. Traveled way maintenance activity shall be limited to the dry season to minimize the potential for road damage. Minor road work, such as slough removal, shall be in permitted areas where the fill slope materials have settled over time. Minor blading and shaping of the road shall be permitted to remove minor deformities (i.e. boulders, holes, gullies) in travel ways that impede the passage of high-clearance vehicles. A rocky-based material shall be applied to wet (i.e. seep areas) or eroded areas, as prescribed by the Forest Service, in order to minimize or prevent gulling of the road, concentration of flow, or rutting and pooling of water. All sources of rocky material shall be approved by the Forest Service in writing prior to application.

**Z7.** All closed roads and temporary access roads used by the operator shall be prepared for seasonal runoff during inactive periods (over winter). Water bars shall be constructed to provide effective surface drainage relief.

**Z8.** During the use and maintenance of all closed or temporary access roads, surface drainage and erosion control features or structures shall be maintained, repaired or installed. This work shall be accomplished in a manner to effectively control and/or prevent water concentrations upon the road bed and prevent or eliminate the movement of sediment from any activity or source from entering into streams. Examples of erosion control and drainage structures, and those to be maintained, repaired, or installed include silt fences, erosion control blankets, earthen berms, sediment catch basins, drain dips, armored grade sags, water bars and corrugated metal pipes. New installation of these structures shall be agreed upon by the Forest Service prior to installation.

The above structures shall be positioned to optimize the use of existing filter strips (vegetated area of land between road/sediment sources and the stream, capable of providing filtering and confinement, reducing water velocity to prevent transport of sediment into the stream). All drainage and erosion control structures shall be maintained to function during actual use and throughout periods of seasonal non-use. Additional measures shall be employed, if necessary, to counteract additional drainage and erosion needs during traditional wet seasons. The additional structures shall be installed prior to a seasonal shut down. The Forest Service may direct additional measures be implemented prior to high-intensity drainage periods (i.e. winter, spring snow melt and rain).

**Z9.** Seasonal wet areas in access roads shall be avoided until they have dried up, unless otherwise approved in writing by the Forest Service. If a seasonal wet area must be crossed prior to drying up, the crossing site will be designed to permit continued subsurface diffuse flow (i.e.
French drain) and prevent rutting or channel development. The design and materials to be used shall be reviewed and approved by the Forest Service in writing prior to construction.

**Z10.** Crossing of permanent wetlands to access a site will be avoided.

**Z11.** Crossing a channel with intermittent flow to access mining operations shall occur only at Forest Service approved locations. Additional measures (i.e., culvert, ford, etc.) may be required if determined necessary by the Forest Service.

**Z12.** During seasonal shutdowns, to restrict vehicular travel, the operator is responsible for closing roads not designated as open and all temporary access roads as identified in the Plan of Operations.

**Z13.** Proposed gate location as identified in the Plan of Operations shall be approved by the Forest Service District Ranger before installation. The gate shall be constructed according to the National Forest specifications.

**Z14.** Temporary access roads that have a road number ending with an “M” shall be decommissioned or hydrologically obliterated by the operator (as defined below) when mining activities are completed. Methods are to be approved in writing by the Forest Service district ranger prior to decommissioning or hydrologically obliterating.

- **Decommission:** To remove those elements of a road that reroute hill slope drainage and present slope stability hazards.
- **Hydrological obliteration:** The reclamation and or restoration of land to resource production from that of a transportation facility. The roadbed is treated so that it no longer functions as a road. The wheel tracks or pathway is no longer continuous or suitable for traffic. This may involve some of the following activities: Closing entrances, scarifying road surfaces, decompacting (sub soiling) to establish vegetation and reduce run-off, seeding, partial to full restoration of the stream channel crossings by removing culverts.

**Monitoring**

**M1.** The operator will visually evaluate the clarity of the creek water upstream and downstream of their operation at a minimum prior to beginning work that day and after ceasing operations that day. If there is a change in water clarity below the mining site, the operation shall cease work until the cause of the sediment input is determined by the Forest Service (36CFR 261.11 (c)). Notification of the Forest Service of the change in water quality shall occur no later than the end of the first normal working day after the observation has been made.
APPENDIX B. Schematic for How to Lay a Bentonite Blanket, Filter Cloth, or Plastic

- Valley floor
- Bentonite Blanket
- Winter pond water level
- Summer/Fall pond water level
- POND
- Valley floor

DASHED BLACK arrows = direction of flow through placer tailings

Blanket ends 1-2 feet below valley floor to allow for winter and spring overflow through the placer tailings.
### APPENDIX C. Baseline Condition and Analysis of Bull Trout MPI Indicators Corresponding to PBFs of Designated Critical Habitat for Columbia River Bull Trout within the Granite Creek Watershed.

<table>
<thead>
<tr>
<th>PBF</th>
<th>PBF Habitat Feature</th>
<th>Matrix Pathway</th>
<th>Matrix Indicator</th>
<th>Baseline Condition</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td>Past mining activities have degraded floodplain connection in the Granite Watershed. There have been restoration efforts but, most operators are working existing dredge tailings. In some instances, tailings or existing artificial berms have separated the active stream channel from surrounding floodplain. Designated stream buffers are to be undisturbed. No mining activities, storage equipment or overburden or vegetation removal is permitted within these buffers, see G15 (General Requirements for Protection of Surface Resources). Reclamation requirements R1-R18 apply to all operations. Impacts from water withdrawals.</td>
</tr>
<tr>
<td></td>
<td>1) Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia</td>
<td>Floodplain Connectivity</td>
<td>Channel Condition and Dynamics</td>
<td>Floodplain connectivity</td>
<td>FAR-All Watersheds</td>
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<td></td>
<td></td>
<td>Pronounced changes in peak/base flow due to past mining impacts and road density. There are &gt;3.0 miles/sq miles, and many valley bottom roads. Past disturbance has been located in riparian areas. There is no new proposed activity that would change peak/base flows. There is minimal temp road construction and no new temp road construction across stream channels.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td>Obstruction</td>
<td>Water Quality</td>
<td>Chemical contaminants/ nutrients, temperature</td>
<td>FAR, FAUR-202, 203, 204, 206, 201 FA-204, 201</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>A Fuel Spill Prevention Plan is required for every mechanical operation. Hazardous materials mitigations H1-H12 apply. Temperatures are a limiting factor for bull trout migration and distribution in Bull Run and Beaver, Olive and possibly Boulder creeks; however, there is no causal mechanism that the proposed mining operations would further increase water temperatures at the subwatershed scale that will continue to contribute to further habitat obstruction.</td>
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<td>This project may affect but is not likely to adversely affect PBF 1.</td>
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</tbody>
</table>

1) Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia
<table>
<thead>
<tr>
<th>PBF Feature</th>
<th>PBF Habitat Feature</th>
<th>Matrix Pathway</th>
<th>Matrix Indicator</th>
<th>Baseline Condition</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>3) An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.</td>
<td>Forage</td>
<td>Water Quality, Habitat Elements, Channel Condition and Dynamics, Habitat Access</td>
<td>All 13 associated with these 4 pathways</td>
<td>FA-204 FAR-203, 202, 204, 206</td>
<td>Designated stream buffers are to be undisturbed. No mining activities, storage equipment or overburden or vegetation removal is permitted within these buffers, see G15 (General Requirements for Protection of Surface Resources). Reclamation requirements R1-R18 apply to all operations. BMPs and site specific mitigations are designed to limit potential sediment mobilization and transport, reference road-related requirements “Z1-Z14” mitigations and general requirements “G7”. Operations with potential subsurface or surface discharge will be required to obtain a 401 certification from ODEQ and ODSL before the FS approves their plan of operation. Effects of the placer and load operations within the project are limited to isolated or site-specific impacts. There would likely be non-measurable increases in sedimentation on a subwatershed scale.</td>
</tr>
<tr>
<td>4) Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as</td>
<td>Complex Condition</td>
<td>Habitat Elements</td>
<td>Large woody debris</td>
<td>FAR-203, 204, 206, 201 FA-202</td>
<td>There will be no removal of large woody material from the riparian reaches or stream channel. There is no causal mechanism to alter large woody recruitment or instream structure.</td>
</tr>
</tbody>
</table>

This project may affect but is not likely to adversely affect PBF 2.

The project may adversely affect PBF 3 due to small magnitude of sediment. LAA
<table>
<thead>
<tr>
<th>PBF Feature</th>
<th>PBF Habitat Feature</th>
<th>Matrix Pathway</th>
<th>Matrix Indicator</th>
<th>Baseline Condition</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>116</td>
<td>large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure</td>
<td></td>
<td>Pool frequency and quality</td>
<td>FA-202, 204, 201 FAR-203, 206</td>
<td>Existing off channel habitat is limited to due to past mining disturbances in the Granite Watershed. BMPs and site specific mitigations are designed to limit potential sediment mobilization and transport. Operations with potential subsurface or surface discharge will be required to obtain a 401 certification from ODEQ and ODSL before the FS approves their plan of operation.</td>
</tr>
<tr>
<td>116</td>
<td>Pool frequency and quality</td>
<td>Large pools</td>
<td>FA-202, 204, 201 FAR-203, 206</td>
<td></td>
<td></td>
</tr>
<tr>
<td>116</td>
<td>FA-202, 204, 201 FAR-203, 206</td>
<td>FAR-All Watersheds</td>
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<td></td>
</tr>
<tr>
<td>116</td>
<td>Off channel habitat</td>
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<tr>
<td>116</td>
<td>Refugia</td>
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<tr>
<td>116</td>
<td>FAR-All Watersheds</td>
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</table>

This project may affect but is not likely to adversely affect PBF 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.

<table>
<thead>
<tr>
<th>Water Quality</th>
<th>Water Quality</th>
<th>Temperature</th>
<th>FAR, FAUR-202, 203, 204, 206, 201 FA-204, 201</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Quality</td>
<td>Water Quality</td>
<td>Temperature</td>
<td>FAR, FAUR-202, 203, 204, 206, 201 FA-204, 201</td>
</tr>
</tbody>
</table>

Water quality is temperature limited in parts of the Granite Watershed; however, Oregon Department of Environmental Quality (ODEQ) has completed Total Maximum Daily Loads (TMDLs) for the North Fork John Day Subbasin (2010). There will be no removal of shade bearing trees within RHCAs and there is no mechanism to change pool frequency on a scale that would measurably alter stream temperatures on the stream or subwatershed scale. Olive Tone and Belvadear have shared water rights (4 cfs) however, water will be recycled during processing and Olive Creek seasonal water levels must be maintained when drafting water. Water temperature Lightning. Tetra Alpha Placer and Tetra Alpha Mill and Lode impacts from water withdrawals.

This project will not affect PBF 5.
<table>
<thead>
<tr>
<th>PBF Habitats Feature</th>
<th>Matrix Pathway</th>
<th>Matrix Indicator</th>
<th>Baseline Condition</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>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.</strong> 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.</td>
<td>Water Quality</td>
<td>Sediment</td>
<td>FA-204 FAR-203, 202, 206</td>
<td>BMPs and site specific mitigations are designed to limit potential sediment mobilization and transport, reference road-related requirements “Z1-Z14” mitigations and general requirement “G7”. Operations with potential subsurface or surface discharge will be required to obtain a 401 certification from ODEQ and ODSL before the FS approves their plan of operation. Fording across stream channels will be on existing hardened fords and constructed fords shall only occur at Forest Service approved locations to avoid adverse impacts to fisheries.</td>
</tr>
<tr>
<td><strong>Suitable Substrate</strong></td>
<td>Habitat Elements</td>
<td>Substrate Embeddedness</td>
<td>FA-204, 201 FAR-203,202, 206</td>
<td></td>
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<tr>
<td><strong>The project is not likely to adversely affect PBF 6 because of the small amount of sediment potentially transported to stream channels from some placer mining.</strong></td>
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<tr>
<td><strong>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.</strong></td>
<td>Water Quantity</td>
<td>Flow/Hydrology</td>
<td>Change in peak/base flows</td>
<td>FAR– All Watersheds</td>
</tr>
<tr>
<td><strong>Water Quantity</strong></td>
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<tr>
<td><strong>There are pronounced changes in peak/base flow due to past mining impacts and road density. Past disturbance has been located in riparian areas. There is no new proposed activity that would change peak/base flows at a subwatershed scale.</strong></td>
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<tr>
<td><strong>This project will not affect PBF 7.</strong></td>
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<tr>
<td>PBF Feature</td>
<td>PBF Habitat Feature</td>
<td>Matrix Pathway</td>
<td>Matrix Indicator</td>
<td>Baseline Condition</td>
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<tr>
<td>Water Quality</td>
<td>Water Quality</td>
<td>Temperature</td>
<td>FAR, FAUR-202, 203, 204, 206, 201 FA-204, 201</td>
<td></td>
</tr>
<tr>
<td>Sediment</td>
<td></td>
<td>FAR-204 FAR-203, 202, 206, 206</td>
<td></td>
<td>BMPs and site specific mitigations are designed to limit potential sediment mobilization and transport, reference road-related requirements “Z1-Z14” mitigations and general mitigations G7. Operations with potential subsurface or surface discharge will be required to obtain a 401 certification from ODEQ and ODSL before the FS approves their plan of operation.</td>
</tr>
<tr>
<td>Chemical Contam./ Nutrients</td>
<td>All PF</td>
<td></td>
<td></td>
<td>A Fuel Spill Prevention Plan is required for every mechanical operation. Hazardous materials mitigations H1-H12 apply.</td>
</tr>
<tr>
<td>Change in Peak/Base Flows</td>
<td>FAR- All Watersheds</td>
<td></td>
<td></td>
<td>There are pronounced changes in peak/base flow due to past mining impacts and road density. Past disturbance has been located in riparian areas. There is no new proposed activity that would change peak/base flows at a subwatershed scale.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Because of the small amount of sediment potentially transported to stream channels from some placer mining and effects from fording likely to adversely affect PBF 8.</td>
</tr>
<tr>
<td>PBF</td>
<td>PBF Habitat Feature</td>
<td>Matrix Pathway</td>
<td>Matrix Indicator</td>
<td>Baseline Condition</td>
</tr>
<tr>
<td>------</td>
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</tr>
<tr>
<td>9)</td>
<td>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.</td>
<td>Species</td>
<td>Subpopulation characteristics</td>
<td>Persistence and Genetic Integrity</td>
</tr>
</tbody>
</table>

This project will not affect PBF 9.