Forest Aquatic Restoration Project
NEPA Compliance and Implementation Checklist
Bear Creek Restoration Project

Project Number: 01-03-2018 **Date:** 11/7/2017 **Location:** T10S, R32E, sec. 2 and 10
Category: Category 2: Large wood, and beaver dam analogue placement, including tree removal for large wood placement; Category 4: Channel Reconstruction/Relocation; Category 7: Set-back or removal of existing berms, dikes, and levees; Category 14: Riparian vegetation planting; Category 16: Beaver habitat restoration
Project Description: Construct 75 large woody debris jams, construct 30 beaver dam analogues, remove 769 feet of berms, and connect Bear Creek directly to the Middle Fork John Day River through dredge tailings.

Heritage (to be completed by heritage specialist)

Y	N	Initial	
☒	☐	KW	Specific PDC for heritage addressed (heritage surveys; avoidance areas).

Botany (to be completed by botany specialist)

Y	N	Initial	
☑	☐	AH	Specific PDC for botany addressed (sensitive plant surveys).
☑	☐	AH	Specific PDC for noxious weeds addressed.

Land Management Consistency (is the proposed project within the management area? Check yes or no. If yes, comments should indicate whether proposed actions are consistent with the standards for the management area.)

Y	N	Initial		Y	N	Initial	
☒	☐	SF	4A big game winter range	☐	☒	SF	9 research natural areas
☐	☒	SF	6A and 6B wilderness	☐	☒	SF	10 semi-primitive non-motorized recreation areas
☐	☒	SF	7 scenic area	☐	☒	SF	22/22A wild and scenic river
☐	☒	SF	8 special interest areas	☐	☒	SF	inventoried roadless areas

Comments: See wildlife comments regarding MA4A.

I have reviewed this project and have determined it is compliant with the Malheur Forest Plan and Aquatic Restoration environmental assessment project design criteria identified for my resource.

Table 1. Projects design criteria and Malheur Forest Plan compliance checklist

Resource	Signature	Date	Comments (additional PDCs may be noted if necessary)
Heritage	KateeWhee	3/22/2018	included with R2013000401008 - Big Mosquito Inventory report SEE ATTACHED NOTE TO FILE
Botany	[illegible]	2/28/18	Project should benefit riparian plants, Surveys done under Big Mosquito.
Invasive Plants	[illegible]	2/28/18	Follow PDCs, Weeds documented along Bear Creek
Wildlife	[illegible]	3/6/18	project should benefit wildlife dependent on riparian ecosystems
Fish*	[illegible]	2/27	Consistent with ARBO II and AR EA PDC's - overall benefit for steelhead
Hydrology*	[illegible]	2/27	Project will move area towards TMDL goals. Positive impacts
Range	[illegible]	4/16	PDC's make it in the documents
Soils	Robert C. McNeil	4-3-18	SOME HEAVY IMPACT; BUT NO WORK IN THOSE AREAS - HAS MILL BR. OTHERWISE, NO HEAVY IMPACTS. SEE ATTACHED GUIDANCE.
Recreation	[illegible]	3/29/18	No developed rec in vicinity. Depending on proximity to Middle Fork Rd, there is a scenic corridor ¼ to ½ mile from road
Special Uses Lands	[illegible]	3/2/18	Prior to Project implementation, coordinate w/ Lands special use permit holders to ensure no adverse impacts to authorized improvements. See attached.
Lands / Mining	[illegible]	3/4/18	Mine claim may be impacted. Please keep me informed about implementation. See attached.
Engineering	[illegible]	4/19/18	NO ISSUES IN ENGINEERING
Fuels / Fire	[illegible]	3/1/18	No concerns, should consider blasting as a tool
Silviculture	[illegible]	2/27/18	Effects to forest veg were analyzed under Big Mosquito EA.

* Ensure that an experienced fisheries biologist or hydrologist is involved in the design of all projects covered by Aquatic Restoration Biological Opinion II. The experience should be commensurate with technical requirements of a project.

District Environmental Coordinator: Sasha Fertig Date: 4/20/18

Line Officer Signature: [illegible] Date: 5/7/18

Implementation Description

Bear Creek Restoration Project

Table 1. Project information

Category 2: Large wood, and Beaver Dam Analogue placement; including tree removal for large wood placement Category 4: Channel Reconstruction/Relocation Category 7: Set-back or Removal of Existing Berms, Dikes, and Levees Category 14: Riparian Vegetation Planting Category 16: Beaver Habitat Restoration	Lead Preparer: Sean Patton
Applicant: Blue Mountain Aquatics	NEPA Reference: DN For Aquatic Restoration EA on project webpage*
Location: T10S, R32E, sec. 2 and 10 USGS Quad: Susanville	Lease/ /Case File/ Serial #: N/A (Reference #): N/A
Begin Date: 11/7/2017	Due Date: 5/15/18

*Please see http://www.fs.usda.gov/detailfull/malheur/landmanagement/?cid=STELPRD3817723&width=full

Purpose and Need

The purpose of this project is to improve riparian and aquatic habitat, including critical habitat for the threatened Middle Columbia River steelhead and Interior redband trout (a Region 6 sensitive species). There is a need to improve aquatic habitat in Bear Creek to support all life stages of threatened steelhead populations and other aquatic species.

Currently Bear Creek is lacking channel structure and habitat complexity, there is little to no instream wood, nor beaver dams in the creek. This lack of instream wood impacts channel form, limiting pool habitat and sediment catchment, which is important for creating fish habitat and storing spawning gravel. Instream large wood also serves as cover for fish and influences water temperature and floodplain connectivity. Water temperature and instream large wood are important aquatic habitat features (riparian management objectives) identified in the Malheur Forest Plan, as amended by PACFISH.

The desired condition from an aquatics perspective is to maintain and/or restore the diversity and complexity of watershed and landscape-scale features, ensuring the protection of the stream networks and aquatic systems to which species, populations, and communities are uniquely adapted. All populations of aquatic organisms are to be maintained and managed in a manner that ensures their viability and persistence.

Reaching this desired condition for Bear Creek requires improvements of riparian vegetation and hardwoods to enhance stream shade, cool temperatures, improve riparian vegetation composition and vigor, provide adequate spawning and rearing gravels, and improve streambank stability. Adding wood to the stream, removing the berm, and adding beaver dam analogues through this project will aid in doing this.

Land Use Plan Conformance

The project falls under management area (MA) 3B “Anadromous Riparian Areas” of the Malheur National Forest Land and Resource Management Plan (Malheur Forest Plan). The goal of MA3B is to “Manage riparian areas to protect and enhance their value for wildlife, anadromous fish habitat and water quality . . . Design and conduct management in all riparian areas to maintain or improve water quality and

beneficial uses" (USDA Forest Service, 1990, page IV-62). Bear Creek is a tributary to the Middle Fork John Day River and is mapped as a perennial stream. Currently, Bear Creek flows into a wetland that is not directly connected to the Middle Fork John Day River and only experiences connectivity to the Middle Fork John Day River during the highest flow events.

Approximately 1.5 miles of Middle-Columbia River steelhead critical habitat is designated on Bear Creek from the confluence with the Middle Fork John Day River upstream; however, none of this habitat is consistently accessible to anadromous fish. Current characteristics of Bear Creek identify it as a mixed transport stream reach with small depositional sections associated with instream wood and a more developed deposition reach in the form of an alluvial fan near the historical confluence with the Middle Fork John Day River. The stream alternates between an over-widened and dished-out channel, with a narrow floodplain in some sections, to a deeply incised channel with well-developed floodplains that are inaccessible even during the 10 year flood events flows in other sections (Figure 1 and Figure 2). The channel consists primarily of a main channel with no defined bank, except a few areas where deeper deposited soils are found or the channel was excavated by mining activity. Side channels and main channel meanders are limited. Channel structure is lacking, with little instream wood, resulting in extremely low pool habitat. There are a few instances of well-developed pool formation where some wood has integrated with the channel. Pockets of 1 inch and smaller gravel are present in sediment wedges associated with the instream wood; however, few pockets of fine sediment are present indicating that fine sediment is being lost from the system during high flow events. Common riparian shrubs (willow, alder, dogwood, and hawthorn) are present within the lower portion of Bear Creek. Further upstream there is abundant Rocky Mountain maple with only an occasional willow or alder. Sedges are patchy along the banks throughout Bear Creek and there is evidence of sedges within the floodplain and in areas that are inaccessible to wildlife and livestock.

Bear Creek is within a category 1 riparian habitat conservation area (fish-bearing stream) as designated by PACFISH/INFISH, and contains critical habitat for Middle-Columbia River steelhead, designated by the National Marine Fisheries Service (NMFS).

The entire project will be located within Bear Creek (HUC 170712030301). This project was originally identified through the Big Mosquito aquatic management planning process and will complement the proposed Galena Tailing Restoration Project, scheduled to begin in 2019.

Proposed Action

The purpose of this project is to restore natural processes and functions in Bear Creek to improve aquatic habitat conditions for Middle Columbia River steelhead and Chinook salmon. The following proposed actions have been developed to meet the project goals:

Construct 50 large woody debris jams throughout 1.3 miles of step pool stream channels to improve pool frequency from an average of 220 feet apart to a pattern of 10-40 feet apart. This will in turn improve channel complexity conditions.

Construct 25 large woody debris jams throughout 0.25 miles of plane-bed, forced pool-riffle stream channels to increase pool frequency from an average of 220 feet apart to a pattern of 40-60 feet apart by 2023. Five years will allow peak flow events to process and store sediment and scour pools. In addition, an increase in sinuosity from 1.02 to 1.1 by 2028 is expected. The roughness imposed by large wood will require about 10 years of peak flow events to begin adjusting straight, channelized segments into slightly meandering segments.

Construct 30 beaver dam analogues through 0.4 miles of potential beaver habitat to allow the expansion of wetland obligate plants across the floodplain from 40 feet to 100 feet by 2028. This will aid in creating a mosaic of age classes present, which is important for resistance to insects and beaver. Expansion of wetland plants will also improve insect production contributing to instream food webs. Beaver dam analogues will increase the width of floodplain that is inundated during bankfull events from 40 feet to 100 feet. This expansion of floodplain will improve groundwater recharge rates on Bear Creek's deep alluvial fan and improve cool water upwelling to the Middle Fork John Day River, which will have mine dredge tailings restored in the near future.

Remove 769 feet of berms through two segments to increase the width of floodplain that is inundated during bankfull events from 40 feet to 100 feet. This expansion of floodplain will improve groundwater recharge rates on Bear Creek's deep alluvial fan and improve cool water upwelling to the Middle Fork John Day River that will have mine dredge tailings restored in the near future. This will also allow the expansion of wetland obligate plants across the floodplain from 40 feet to 100 feet by 2028. This will aid in creating a mosaic of age classes present, important for resistance from insects and beaver. Expansion of wetland plants will also improve insect production, contributing to instream food webs.

Directly connect approximately 700 feet of Bear Creek to the Middle Fork John Day River through reconstructing Bear Creek through mine dredge tailings along the Middle Fork John Day River. Four channels may be constructed through altered tailings and adjacent floodplains would be lowered within the disturbed footprint. This will aid in allowing adult steelhead to enter into Bear Creek annually and will restore miles of rearing habitat to be available.

The tipping and placement of trees, berm removal, sealing of beaver dam analogues, and channel reconstruction work will be carried out by an excavator with tasks such as beaver dam analogue placement and weaving accomplished by hand crews with a portable post pounder and hand tools.

Implementation Plan

Large and Coarse Wood Placement (Single and Multiple Piece Jams)

The purpose of large and coarse wood placement is to increase within channel and floodplain roughness, thus increasing fish habitat and geomorphic complexity. Large wood would be placed at key points and interwoven with coarse wood to create debris jams that create point bars, increase lateral movement, and activate secondary channels. The activation of secondary channels and reconnection of the floodplain would alleviate shear stress during high flow events on beaver dam analogues and any beaver that colonize the area, as well as facilitate deposition of sediment. Floodplain and instream channel roughness is essential within Bear Creek to meet desired conditions (Figure 3). Beaver dam analogues and coarse wood additions are expected to facilitate the effective functioning of the floodplain and secondary channels and prevent channel incision in the short term by raising the water table and rewetting the floodplain. In the long term, riparian vegetation will be reestablished in expanded areas and help fulfill these functions. Deposition of fine sediment within the secondary channels and the floodplain in conjunction with elevated water levels (beaver dam analogues) is anticipated to provide the optimum seedbed for riparian plant expansion thus increasing the likelihood of beaver colonization, and hinder the expansion of non-native invasive plants within the riparian area.

Beaver Dam Analogues

A portable post pounder will be used to insert the beaver dam analogues into the streambed and onto portions of the floodplain, where half of the pole length will extend up from the ground surface. Willow (and other material when necessary) will be woven within the posts and packed with silty-gravelly loam

from berm removal areas. The top of the beaver dam analogues will extend to be level with the floodplain (Figure 5 through Figure 9) and the shape of the feature will be convex or concave, depending on the site. Beaver dam analogues are built with 2 meter long, 7 to 10 centimeters in diameter, untreated lodge pole pine (*Pinus contorta*) posts. Using a chainsaw, a point is made at one end of the post. Posts are spaced 0.5 to 1 meter apart and driven into the active channel and inset floodplain with a handheld hydraulic post pounder or a hydraulic post pounder mounted on a mini-excavator. A series of these structures, up to three, are often located together to prevent under scour in upstream structures.

Berm Removal or Breaching

A long stretch of berm is associated with the National Forest System (NFS) Road 3690018 (Figure 4). This berm constricts floodplain access and intercepts and directs surface water runoff. Using an excavator, large segments of berm will be removed to allow floodplain access and more natural drainage. The material from this berm will be used to seal the beaver dam analogues. Segments of the berm that are well vegetated with riparian shrubs and are not presenting a problem for floodplain access and drainage will be left to minimize the amount of disturbed ground exposed.

Bear Creek Reconstruction to Middle Fork John Day River

Bear Creek is not currently connected to the Middle Fork John Day River in a manner that adult fish can access the habitat in Bear Creek regularly. Dredged mine tailings create an artificial path for Bear Creek to flow before it enters back into the Middle Fork John Day River (Figure 14). Using an excavator, a segment of mine tailings will be removed to allow channel and floodplain access and more natural drainage along the alluvial fan. Large wood may be buried into the streambed along the stream paths to maintain the base elevation and minimize channel incision responses. The channels will be vegetated with riparian shrubs.

Project-Specific Project Design Criteria

The following project-specific project design criteria apply to this proposal:

- Prior to project implementation, coordinate with the three lands special use permit holders (overhead/buried utilities and county road right of ways) within the project vicinity to ensure no adverse impacts to the authorized improvements.
- Coordinate scheduling with range staff of implementation activities to use large wood to inhibit livestock trailing along Bear Creek.
- If implementation activities use National Forest System Road 3690986, then install up to two temporary cattle guards (provided from the Blue Mountain Ranger District Range shop) at the gated locations.
- On-site Heritage Program monitoring will be conducted during implementation activities occurring at selected areas in the Bear Creek Aquatic Restoration project area.
- All inspection and monitoring will be conducted by Forest Service Heritage Program personnel under the supervision of the District Archaeologist.
- A map with cultural protection/avoidance boundaries will be provided to the project lead prior to project implementation. The project lead will consult with the District Archaeologist on locations of equipment staging and access routes and any modifications in project location or design before activities proceed. The map will be kept confidential by the project lead.
- If during project activities cultural material is encountered, all work will cease immediately and the District Archaeologist will be contacted to evaluate the inadvertent discovery. A mitigation plan, if needed, will be developed in consultation with the Oregon State Historic Preservation Office (SHPO).

- Avoid heavy machinery travel ("HMT") on slopes steeper than 35 percent, where feasible.
- No heavy equipment shall be allowed on highly erodible soil. “Highly erodible soil” generally means areas larger than 50 feet diameter, and either: (1) steeper than 30 percent, with less than 75 percent ground cover, (2) 20 to 30 percent slope with less than 50 percent ground cover, (3) 10 to 19 percent slope with less than 25 percent ground cover, or (4) with signs of current erosion, such as pedestaling or rilling.
- For tree tipping or removal for LWD projects: On areas where existing skid trails spaced 100 to 140 feet apart can be reused, reuse the old skid trails. Otherwise, space HMT travel ways about 120 feet apart where practical, using existing skid trails where possible and appropriate. Travel ways ("trails") should average less than 14 feet wide.
- Low ground pressure equipment (less than 8.5 pounds per square inch [psi]) can be allowed off trails on dry, snow-covered, or frozen soil. For soil protection practices “dry” means July through September, or obviously dry in 6 of the top 10 inches in other months; “snow-covered” means sufficient snow strength and depth to prevent compaction; “frozen” means the soil is frozen at least through the top 4 inches.
- Tree tipping trails shall be covered with slash to reduce runoff and erosion.

Figures

Figure 1. Example of degraded riparian conditions present in Bear Creek, this is typical of the “incised and widened” stream channel form which exists throughout approximately 1.5 miles of the project area. Note the lack of habitat complexity and pool development.

Figure 2. Incision and over-widened channels have resulted in conditions in which the adjacent floodplain has been cut off from the stream. Additionally, large wood entering the system does not interact with stream flow until it has reached an advanced decay class. Note lack of habitat complexity and bank development.

Figure 3. These condition are desirable in all step pool gradient reaches (4 to 8 percent slope). A small strip of functional stream on Bear Creek, this short reach is approximately 60 feet long and 80 feet wide (toe slope to toe slope) but produces a healthy riparian vegetation community with sedges and shrubs. The large wood present has created three step pool terraces that are storing sediment and water which supports the vegetation.

Figure 4. This berm, associated with the construction of National Forest System Road 36900018 (visible running from left bottom to right mid-ground), constricts Bear Creek from being able to access its entire floodplain. Under this proposal, the berm would be removed or breached and the roadbed scarified and seeded with native grasses.

Figure 5. Excavator placing small wood (lodgepole pine) within overflow channel of Camp Creek in 2016

Figure 7. Excavator with compactor head driving posts for beaver dam analogue structure in Camp Creek in 2016

Figure 6. Excavator with wide bucket for scraping sedge mats, substrate, and soil related to beaver dam analogue sealing over willow weaves in Camp Creek in 2016

Figure 8. Beaver dam analogue with willow weaves prior to sealing in Camp Creek in 2016

Figure 9. Examples of functioning beaver dam analogues from Bridge Creek, Oregon during high flow

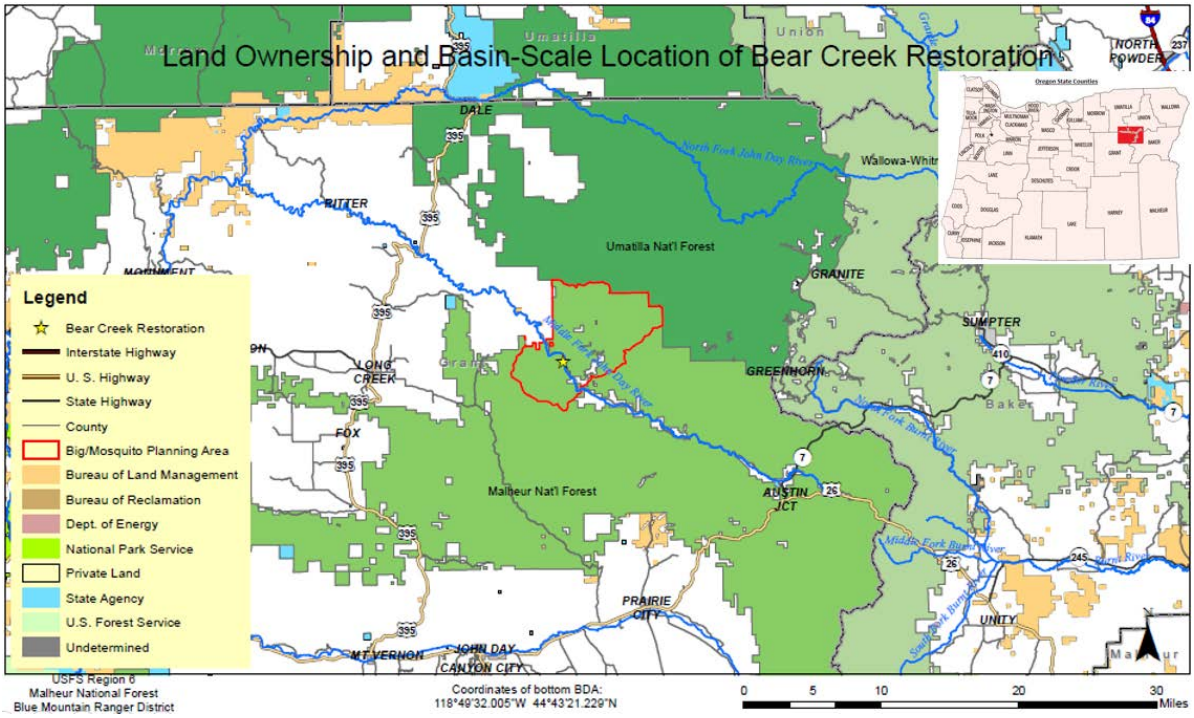

Figure 10. Location of the Bear Creek Restoration Project

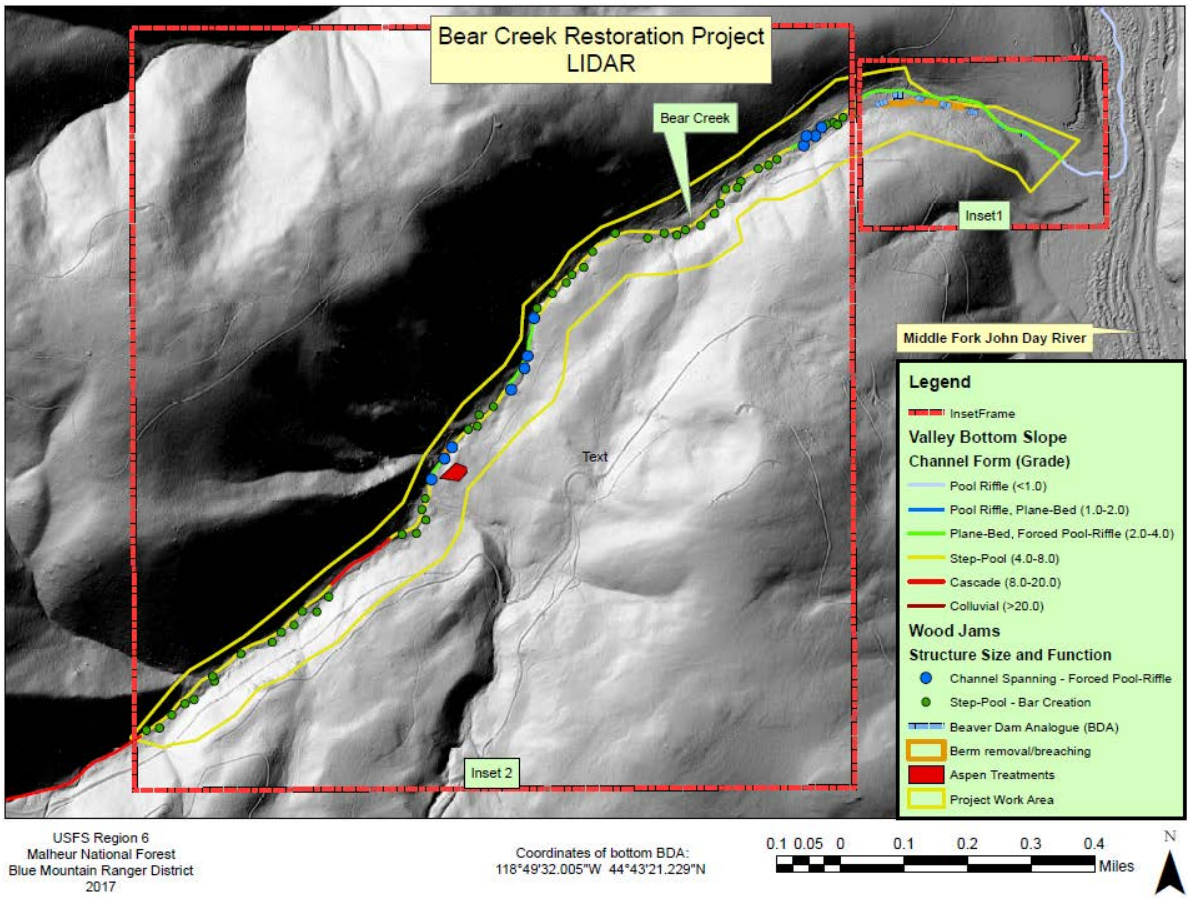

Figure 11. Bear Creek restoration plans showing entire 2 miles of proposed work

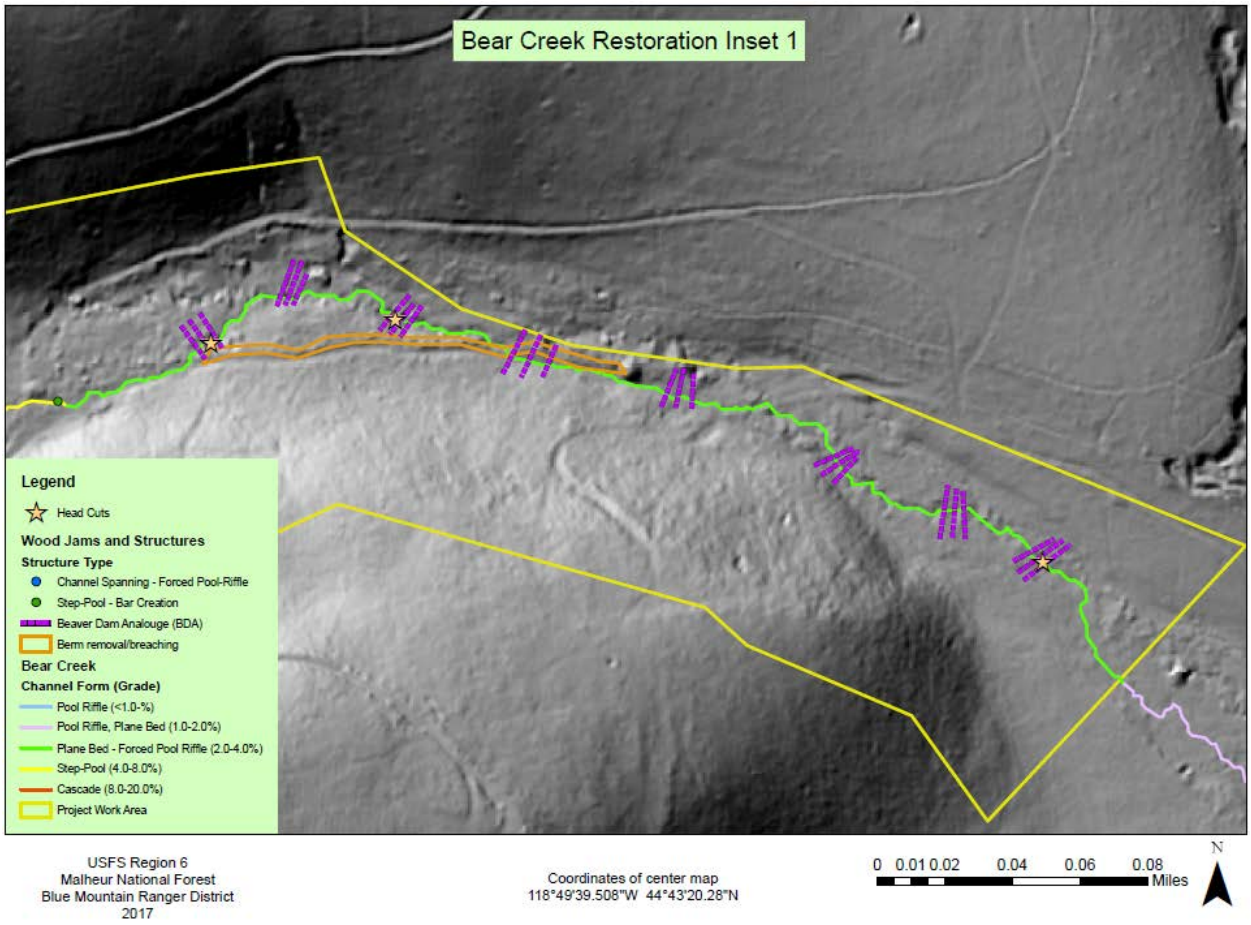

Figure 12. Inset 1 from Figure 11 gives a closer look at proposed work on the lower 0.5 miles of the project where beaver dam analogues will be favored due to the lower gradient and wider valley bottom. This map also shows the location of the berm to be removed or breached.

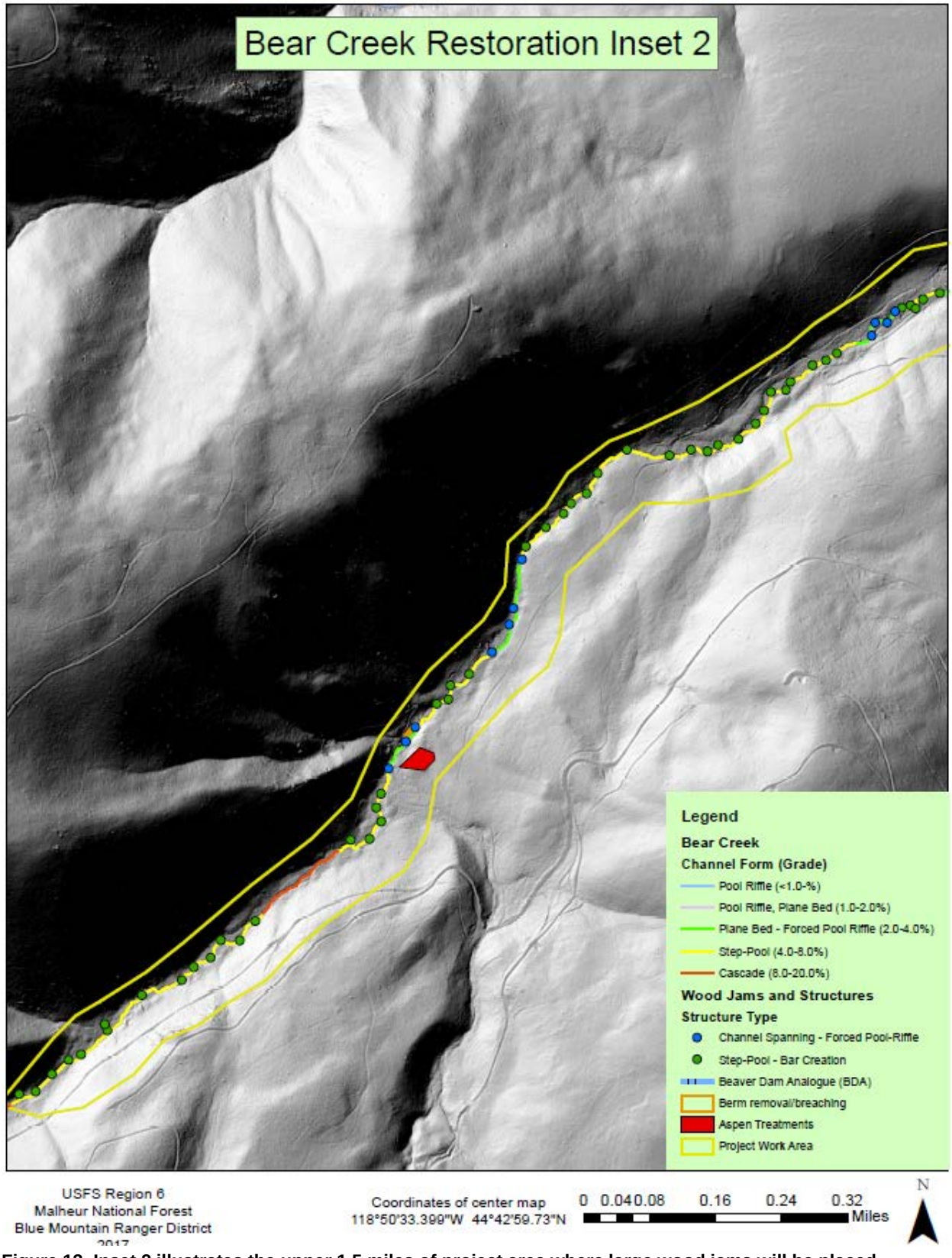

Figure 13. Inset 2 illustrates the upper 1.5 miles of project area where large wood jams will be placed

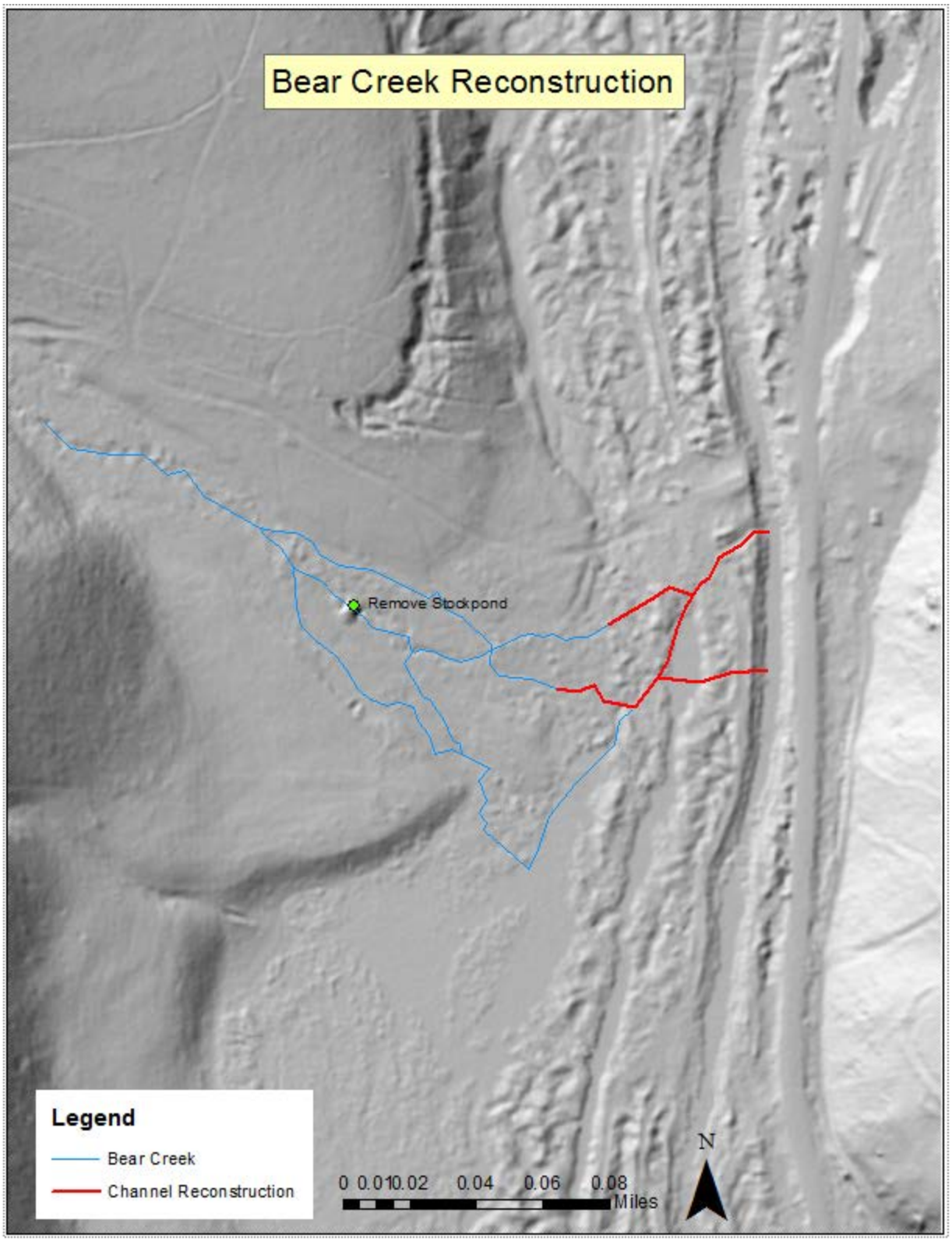

Figure 14. Illustrates the lower extent of the project area where channel reconstruction would occur

Appendix to the Aquatic Restoration EA

Implementation Description

Project Title: Bear Creek Restoration Project
Project Number: 01-03-2018
Categories:
Category 2: Large wood, and Beaver Dam Analogue placement; including tree removal for large wood placement
Category 4: Channel Reconstruction/Relocation
Category 7: Set-back or Removal of Existing Berms, Dikes, and Levees
Category 14: Riparian Vegetation Planting
Category 16: Beaver Habitat Restoration

The following information will guide actions for this project that is taking place within the bounds of the Decision Notice for the 2014 Malheur National Forest Aquatic Restoration Environmental Analysis to maintain that all conservation measures, guidelines, and project design criteria are met under this guiding document.

Much of the information below is reproduced from the Decision Notice for Aquatic Restoration Project Appendix A (pages 7 through 44), and may cite project design criteria (PDC) numbers, literature, or other documents not referenced further in this proposal document. Please refer to the Decision Notice for more information.

Program Administration

1. Integration of project design criteria and conservation measures and terms and conditions into project design and contract language
    a. This document is to outline the conservation measures and PDCs that will be used during project implementation to remain compliant with the aquatic restoration biological assessment as well as ARBO II.
2. Project notification: The following information will be provided to the National Marine Fisheries Service (NMFS) Level 1 aquatics members 30 days prior to implementation as a Project Notification Form 7.

    a. Action identifier –
    b. Project name – Bear Creek Restoration Project
    c. Location –

Table 2. Project location information

Project location	Bear Creek Restoration Project
Stream Name	Bear Creek
6th field HUC	170712030301
Latitude (Decimal Degrees)	**Start:** 44°43'19.711"N, **End:** 44°42'33.462"N
Longitude (Decimal Degrees)	**Start:** 118°49'29.524"W, **End:** 118°51'17.513"W

    d. Agency contact – Sean Patton, seanpatton@fs.fed.us, (518) 354-9178, or Bob Hassmiller rjhassmiller@fs.fed.us, (541) 575-3433.
    e. Timing – Work will occur when ground conditions allow for excavation while maintain a minimal impact to the surrounding resources. All instream work with equipment would occur from July 15 through August 15, 2018.
    f. Activity categories:

Category 2: Large wood, and Beaver Dam Analogue placement; including tree removal for large wood placement
Category 4: Channel Reconstruction/Relocation
Category 7: Set-back or Removal of Existing Berms, Dikes, and Levees
Category 14: Riparian Vegetation Planting
Category 16: Beaver Habitat Restoration

g. Project description – Project description is available in the Proposed Action section above.
h. Species affected –
    i. Listed species: Middle Columbia River steelhead
    ii. Critical Habitat: Middle Columbia River steelhead
    iii. MIS Species: Middle Columbia River steelhead, Westslope cutthroat trout, Interior Columbia redband trout
i. Date of submittal – To be completed in Spring of 2018, at least 30 day prior to implementation
j. Site assessments – Assessment for contaminants is not required at these locations.
k. Review – NMFS fish passage review and Restoration Review Team review are not required.
l. Verification – _____
m. SOD project notification – _____

3. Minor Variance: No variances from the criteria specified in the aquatic restoration document are being considered.
4. NMFS Fish Passage Review and Approval: This work does not require review by the NFMS level 1 team member.
5. Restoration Review Team: This work does not require review by the restoration review team.
6. Project Completion Report: To be completed after implementation
7. Annual Program Report: This project will be completed within 1 year, completion and annual reporting will occur in the winter of FY19 before February 15th.

General Aquatic Conservation Measures

8. **Technical skill and planning requirements:**
    a. An appropriately qualified fisheries biologist or hydrologist will be involved in the design of this project.
    b. The scope of this project is limited in both space and context. Field evaluations and site-specific surveys will require little work. Appropriate time will be allotted for these actions, prior to implementation. Planning and design will involve appropriate expertise.
    c. The assigned fisheries biologist or hydrologist will make sure that any applicable conservation measures and project design criteria are met through the contracting process.
9. **Climate change:** Due to the small scale of this work, future climate changes impacts will not have dramatic effects on this work.
10. **In-water work period:** In-stream activities will occur between July 15th and August 15th.
11. **Fish passage:** Not applicable.
12. **Site assessment for contaminants:** In developed or previously developed sites, such as areas with past dredge mines, or sites with known or suspected contamination, a site assessment for contaminants will be conducted on projects that involve excavation of greater than 20 cubic yards of material. The action agencies will complete a site assessment to identify the type, quantity, and extent of any potential contamination. The level of detail and resources committed to such an assessment will be commensurate with the level and type of past or current development at the site. The assessment may include the following:

a. Review of readily available records, such as former site use, building plans, records of any prior contamination events.
b. Site visit to observe the areas used for various industrial processes and the condition of the property.
c. Interviews with knowledgeable people, such as site owners, operators, occupants, neighbors, local government officials, etc.
d. Report that includes an assessment of the likelihood that contaminants are present at site.

13. **Pollution and erosion control measures:** Implement the following pollution and erosion control measures:
    a. **Project contact:** Identify a project contact (name, phone number, an address) that will be responsible for implementing pollution and erosion control measures.
    b. List and describe any hazardous material that would be used at the project site, including procedures for inventory, storage, handling, and monitoring; notification procedures; specific clean-up and disposal instructions for different products available on the site; proposed methods for disposal of spilled material; and employee training for spill containment.
    c. Temporarily store any waste liquids generated at the staging areas under cover on an impervious surface, such as tarpaulins, until such time they can be properly transported to and treated at an approved facility for treatment of hazardous materials.
    d. Procedures based on best management practices to confine, remove, and dispose of construction waste, including every type of debris, discharge water, concrete, cement, grout, washout facility, welding slag, petroleum product, or other hazardous materials generated, used, or stored on-site.
    e. Procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities. Ensure that materials for emergency erosion and hazardous materials control are onsite (for example, silt fence, straw bales, oil-absorbing floating boom whenever surface water is present).
    f. Best management practices to confine vegetation and soil disturbance to the minimum area, and minimum length of time, as necessary to complete the action, and otherwise prevent or minimize erosion associated with the action area.
    g. No uncured concrete or form materials will be allowed to enter the active stream channel.
    h. Steps to cease work under high flows, except for efforts to avoid or minimize resource damage.

14. **Site preparation:**
    a. **Flagging sensitive areas:** Prior to construction, clearly mark critical riparian vegetation areas, wetlands, and other sensitive sites to minimize ground disturbance.
    b. **Staging area:** Establish staging areas for storage of vehicles, equipment, and fuels to minimize erosion into or contamination of streams and floodplains.
        i. No topographical restrictions: Place staging area 150 feet or more from any natural water body or wetland in areas where topography does not restrict such a distance.
        ii. Topographical restrictions: Place staging area away from any natural water body or wetland to the greatest extent possible in areas with high topographical restriction, such as constricted valley types.
    c. **Temporary erosion controls:** Place sediment barriers prior to construction around sites where significant levels of erosion may enter the stream directly or through road ditches. Temporary erosion controls will be in place before any significant alteration of the action site and will be removed once the site has been stabilized following construction activities.
    d. **Stockpile materials:** Minimize clearing and grubbing activities when preparing staging, project, or stockpile areas. Any large wood, topsoil, and native channel material displaced

by construction will be stockpiled for use during site restoration. Materials used for implementation of aquatic restoration categories (for example, large wood, boulders, and fencing material) may be staged within the 100-year floodplain.

e. **Hazard trees:** Where appropriate, include hazard tree removal (amount and type) in project design. Fell hazard trees when they pose a safety risk. If possible, fell hazard trees within riparian areas towards a stream. Keep felled trees on site when needed to meet coarse large wood objectives.

15. **Heavy equipment use:**
    a. **Choice of equipment:** Heavy equipment will be commensurate with the project and operated in a manner that minimizes adverse effects to the environment (for example, minimally-sized, low pressure tires, minimal hard turn paths for tracked vehicles, or temporary mats or plates within wet areas or sensitive soils).
    b. Fueling and cleaning and inspection for petroleum products and invasive weeds:
        i. All equipment used for instream work will be cleaned for petroleum accumulations, dirt, plant material (to prevent the spread of noxious weeds), and leaks repaired prior to entering the project area. Such equipment includes large machinery, stationary power equipment (for example, generators and canes), and gas-powered equipment with tanks larger than 5 gallons.
        ii. Store and fuel equipment in staging areas after daily use.
        iii. Inspect daily for fluid leaks before leaving the vehicle staging area for operation.
        iv. Thoroughly clean equipment before operation below ordinary high water or within 50 feet of any natural water body or areas that drain directly to streams or wetlands and as often as necessary during operation to remain grease free.
    c. **Temporary access roads:** Existing roadways will be used whenever possible. Minimize the number of temporary access roads and travel paths to lessen soil disturbance and compaction and impacts to vegetation. Temporary access roads will not be built on slopes where grade, soil, or other features suggest a likelihood of excessive erosion or failure. When necessary, temporary access roads will be obliterated or revegetated. Temporary roads in wet or flooded areas will be restored by the end of the applicable in-water work period. Construction of new permanent roads is not permitted.
    d. **Stream crossings:** Minimize number and length of stream crossings. Such crossings will be at right angles and avoid potential spawning areas to the greatest extent possible. Stream crossings shall not increase the risk of channel re-routing at low and high water conditions. After project completion, temporary stream crossings will be abandoned and the stream channel and banks restored.
    e. **Work from top of bank:** To the extent feasible, heavy equipment will work from the top of the bank, unless work instream would result in less damage to the aquatic ecosystem.
    f. **Timely completion:** Minimize time in which heavy equipment is in stream channels, riparian areas, and wetlands. Complete earthwork (including drilling, excavation, dredging, filling and compacting) as quickly as possible. During excavation, stockpile native streambed materials above the bankfull elevation, where it cannot reenter the stream, for later use.

16. **Site Restoration:**
    a. **Initiate rehabilitation:** Upon project completion, rehabilitate all disturbed areas in a manner that results in similar or better than pre-work conditions through removal of project related waste, spreading of stockpiled materials (soil, large wood, trees, etc.) seeding, or planting with local native seed mixes or plants.
    b. **Short-term stabilization:** Measures may include the use of non-native sterile seed mix (when native seeds are not available), weed-free certified straw, jute matting, and other similar techniques. Short-term stabilization measures will be maintained until permanent

erosion control measures are effective. Stabilization measures will be instigated within three days of construction completion.

c. **Revegetation:** Replant each area requiring revegetation prior to or at the beginning of the first growing season following construction. Achieve reestablishment of vegetation in disturbed areas to at least 70 percent of pre-project levels within three years. Use an appropriate mix of species that will achieve establishment and erosion control objectives, preferably forb, grass, shrub, or tree species native to the project area or region and appropriate to the site. Barriers will be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

d. **Planting manuals:** All riparian plantings shall follow Forest Service direction described in the Regional letter to Units, Use of Native and Nonnative Plants on National Forests and Grasslands May 2006 (Final Draft), and/or Bureau of Land Management (BLM) Instruction Memorandum No. OR-2001-014, Policy on the Use of Native Species Plant Material.

e. **Decompact soils:** Decompact soil by scarifying the soil surface of roads and paths, stream crossings, staging, and stockpile areas so that seeds and plantings can root.

17. **Monitoring:** Monitoring will be conducted by action agency staff, as appropriate for that project, during and after a project to track effects and compliance with this opinion.

    a. Implementation:

    i. Visually monitor during project implementation to ensure effects are not greater (amount, extent) than anticipated and to contact Level 1 representatives if problems arise.

    ii. Fix any problems that arise during project implementation.

    iii. Regular biologist/hydrologist coordination if biologist/hydrologist is not always on site to ensure contractor is following all stipulations.

    b. **401 Certification**: To minimize short-term degradation to water quality during project implementation, follow current 401 Certification provisions of the Federal Clean Water Act for maintenance or water quality standards described by the following: Oregon Department of Environmental Quality (Oregon BLM, Forest Service, and BIA); Washington Department of Ecology (Washington BLM); and the Memorandum of Understanding between the Washington Department of Fish and Wildlife (WDFW) and Forest Service regarding Hydraulic Projects Conducted by Forest Service, Pacific Northwest Region (WDFW and USDA-Forest Service 2012); California, Idaho, or Nevada 401 Certification protocols (BLM and Forest Service).

    c. **Post project:** A post-project review shall be conducted after winter and spring high flows.

    i. For each project, conduct a walk through/visual observation to determine if there are post-project affects that were not considered during consultation. For fish passage and revegetation projects, monitor in the following manner:

    ii. Fish Passage Projects: Note any problems with channel scour or bedload deposition, substrate, discontinuous flow, vegetation establishment, or invasive plant infestation.

    iii. Revegetation: For all plant treatment projects, including site restoration, monitor for and remove invasive plants until native plants become established.

    iv. In cases where remedial action is required, such actions are permitted without additional consultation if they use relevant PDC and aquatic conservation measures and the effects of the action categories are not exceeded.

18. **Work Area Isolation, Surface Water Withdrawals, and Fish Capture and Release**: Isolate the construction area and remove fish from a project site for projects that include concentrated and major excavation at a single location within the stream channel. This condition will typically

apply to the following aquatic restoration categories: Fish Passage Restoration; Dam, Tidegate, and Legacy Structure Removal; and Channel Reconstruction/Relocation.

a. **Isolate capture area:** Install block nets at up and downstream locations outside of the construction zone to exclude fish from entering the project area. Leave nets secured to the stream channel bed and banks until construction activities within the stream channel are complete. If block nets or traps remain in place more than one day, monitor the nets or traps at least on a daily basis to ensure they are secured to the banks and free of organic accumulation and to minimize fish predation in the trap.
b. **Capture and release:** Fish trapped within the isolated work area will be captured and released as prudent to minimize the risk of injury, then released at a safe release site, preferably upstream of the isolated reach in a pool or other area that provides cover and flow refuge. Collect fish in the best manner to minimize potential stranding and stress by seine or dip nets as the area is slowly dewatered, baited minnow traps placed overnight, or electrofishing (if other options are ineffective). Fish must be handled with extreme care and kept in water the maximum extent possible during transfer procedures. A healthy environment for the stressed fish shall be provided—large buckets (five-gallon minimum to prevent overcrowding) and minimal handling of fish. Place large fish in buckets separate from smaller prey-sized fish. Monitor water temperature in buckets and well-being of captured fish. If buckets are not being immediately transported, use aerators to maintain water quality. As rapidly as possible, but after fish have recovered, release fish. In cases where the stream is intermittent upstream, release fish in downstream areas and away from the influence of the construction. Capture and release will be supervised by a fishery biologist experienced with work area isolation and safe handling of all fish.
c. **Electrofishing:** Use electrofishing only where other means of fish capture may not be feasible or effective. If electrofishing will be used to capture fish for salvage, NMFS's electrofishing guidelines will be followed (NMFS 2000).
    i. Reasonable effort should be made to avoid handling fish in warm water temperatures, such as conducting fish evacuation first thing in the morning, when the water temperature would likely be coolest. No electrofishing should occur when water temperatures are above 18 degrees Celsius or are expected to rise above this temperature prior to concluding the fish capture.
    ii. If fish are observed spawning during the in-water work period, electrofishing shall not be conducted in the vicinity of spawning fish or active redds.
    iii. Only direct current (DC) or pulsed direct current shall be used.
    iv. Conductivity less than 100, use voltage ranges from 900 to 1100. Conductivity from 100 to 300, use voltage ranges from 500 to 800. Conductivity greater than 300, use voltage to 400.
    v. Begin electrofishing with minimum pulse width and recommended voltage and then gradually increase to the point where fish are immobilized and captured. Turn off current once fish are immobilized.
    vi. Do not allow fish to come into contact with anode. Do not electrofish an area for an extended period of time. Remove fish immediately from water and handle as described above (PDC 20b). Dark bands on the fish indicate injury, suggesting a reduction in voltage and pulse width and longer recovery time.
    vii. If mortality is occurring during salvage, immediately discontinue salvage operations (unless this would result in additional fish mortality), reevaluate the current procedures, and adjust or postpone procedures to reduce mortality.
d. **Dewater construction site:** When dewatering is necessary to protect species or critical habitat, divert flow around the construction site with a coffer dam (built with non-erosive materials), taking care to not dewater downstream channels during dewatering. Pass flow

and fish downstream with a by-pass culvert or a water-proof lined diversion ditch. Diversion sandbags can be filled with material mined from the floodplain as long as such material is replaced at end of project. Small amounts of instream material can be moved to help seal and secure diversion structures. If Endangered Species Act (ESA) listed-fish may be present and pumps are required to dewater, the intake must have a fish screen(s) and be operated in accordance with NMFS fish screen criteria described below (in part e.iv) of this section. Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. If diversion allows for downstream fish passage, place diversion outlet in a location to promote safe reentry of fish into the stream channel, preferably into pool habitat with cover. Pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel.

e. Surface water withdrawals:

i. Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate. Where ESA-listed fish may be present, diversions may not exceed 10 percent of the available flow and fish screen(s) will be installed, operated, and maintained according to NMFS's fish screen criteria (NMFS 2011e).

ii. For the dewatering of a work site to remove or install culverts, bridge abutments etc., if ESA-listed fish may be present, a fish screen that meets criteria specified by NMFS (2011e) must be used on the intake to avoid juvenile fish entrainment. If ESA-listed salmon, steelhead, eulachon, or green sturgeon may be present, the action agencies will ensure that the fish screen design is reviewed and approved by NMFS for consistency with NMFS (2011e) criteria if the diversion (gravity or pump) is at a rate greater than 3 cubic feet per second (cfs). NMFS approved fish screens have the following specifications: (1) An automated cleaning device with a minimum effective surface area of 2.5 square feet per cfs, and a nominal maximum approach velocity of 0.4 feet per second (fps), or no automated cleaning device, a minimum effective surface area of 1 square foot per cfs, and a nominal maximum approach rate of 0.2 fps; and (2) a round or square screen mesh that is no larger than 2.38 mm (0.094 inches) in the narrow dimension, or any other shape that is no larger than 1.75 mm (0.069 inches) in the narrow dimension.

f. **Stream re-watering:** Upon project completion, slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden release of suspended sediment. Monitor downstream during re-watering to prevent stranding of aquatic organisms below the construction site.

Applicable Project Design Criteria

Project Design Criteria for Aquatic Restoration Activity Categories

2. Large Wood, Boulder, and Gravel Placement

Large wood, boulder, and gravel placement includes large wood and boulder placement, engineered log jams, porous boulder structures and vanes, gravel placement, and tree removal for large wood projects. Such activities will occur in areas where channel structure is lacking due to past stream cleaning (large wood removal), riparian timber harvest, and in areas where natural gravel supplies are low due to anthropogenic disruptions. These projects will occur in stream channels and adjacent floodplains to increase channel stability, rearing habitat, pool formation, spawning gravel deposition, channel complexity, hiding cover, low velocity areas, and floodplain function. Equipment such as helicopters,

excavators, dump trucks, front-end loaders, full-suspension yarders, and similar equipment may be used to implement projects.

a. **Large wood and boulder projects:**

i. Place large wood and boulders in areas where they would naturally occur and in a manner that closely mimics natural accumulations for that particular stream type. For example, boulder placement may not be appropriate in low-gradient meadow streams.

ii. Structure types shall simulate disturbance events to the greatest degree possible and include, but are not limited to, log jams, debris flows, windthrow, and tree breakage.

iii. No limits are to be placed on the size or shape of structures as long as such structures are within the range of natural variability of a given location and do not block fish passage.

iv. Projects can include grade control and bank stabilization structures, while size and configuration of such structures will be commensurate with scale of project site and hydraulic forces.

v. The partial burial of large wood and boulders is permitted and may constitute the dominant means of placement. This applies to all stream systems but more so for larger stream systems where use of adjacent riparian trees or channel features is not feasible or does not provide the full stability desired.

vi. Large wood includes whole conifer and hardwood trees, logs, and rootwads. Large wood size (diameter and length) should account for bankfull width and stream discharge rates. When available, trees with rootwads should be a minimum of 1.5 times bankfull channel width, while logs without rootwads should be a minimum of 2.0 times bankfull width.

vii. Structures may partially or completely span stream channels or be positioned along stream banks.

viii. Stabilizing or key pieces of large wood must be intact, hard, with little decay, and if possible have root wads (untrimmed) to provide functional refugia habitat for fish. Consider orienting key pieces such that the hydraulic forces upon the large wood increases stability.

ix. Anchoring large wood – Anchoring alternatives may be used in preferential order:

1. Use of adequate sized wood sufficient for stability
2. Orient and place wood in such a way that movement is limited
3. Ballast (gravel or rock) to increase the mass of the structure to resist movement
4. Use of large boulders as anchor points for the large wood
5. Pin large wood with rebar to large rock to increase its weight. For streams that are entrenched (Rosgen F, G, A, and potentially B) or for other streams with very low width to depth ratios (less than 12) an additional 60 percent ballast weight may be necessary due to greater flow depths and higher velocities.

e. **Tree removal for large wood projects:**

i. Live conifers and other trees can be felled or pulled/pushed over in a Northwest Forest Plan (USDA and USDI 1994a) Riparian Reserve or PACFISH/INFISH (USDA-Forest Service 1995 ; USDA and USDI 1994b) riparian habitat conservation areas (RHCA), and upland areas (for example, late successional reserves or adaptive management areas for northern spotted owl and marbled murrelet critical habitat) for in-channel large wood placement only when conifers and trees are fully stocked. Tree felling shall not create excessive stream bank erosion or increase the likelihood of channel avulsion during high flows.

ii. Danger trees and trees killed through fire, insects, disease, blow-down and other means can be felled and used for in-channel placement regardless of live-tree stocking levels.

iii. Trees may be removed by cable, ground-based equipment, horses or helicopters.

iv. Trees may be felled or pushed/pulled directly into a stream or floodplain.

v. Trees may be stock piled for future instream restoration projects.

vi. The project manager for an aquatic restoration action will coordinate with an action-agency wildlife biologist in tree-removal planning efforts.

4. Channel Reconstruction/Relocation

Channel reconstruction/relocation projects include reconstruction of existing stream channels through excavation and structure placement (large wood and boulders) or relocation (rerouting of flow) into historic or newly constructed channels that are typically more sinuous and complex. This proposed action applies to stream systems that have been straightened, channelized, dredged, or otherwise modified for the purpose of flood control, increasing arable land, realignment, or other land use management goals or for streams that are incised or otherwise disconnected from their floodplains resulting from watershed disturbances. This activity type will be implemented to improve aquatic and riparian habitat diversity and complexity, reconnect stream channels to floodplains, reduce bed and bank erosion, increase hyporheic exchange, provide long-term nutrient storage, provide substrate for macroinvertebrates, moderate flow disturbance, increase retention of organic material, and provide refuge for fish and other aquatic species. Equipment such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

7. Set-Back or Removal of Existing Berms, Dikes, and Levees

Set-back or removal of existing berms, dikes, and levees will be conducted to reconnect historic fresh-water deltas to inundation, stream channels with floodplains, and historic estuaries to tidal influence as a means to increase habitat diversity and complexity, moderate flow disturbances, and provide refuge for fish during high flows. Other restored ecological functions include overland flow during flood events, dissipation of flood energy, increased water storage to augment low flows, sediment and debris deposition, growth of riparian vegetation, nutrient cycling, and development of side channels and alcoves. Such projects will take place where estuaries and floodplains have been disconnected from adjacent rivers through drain pipes and anthropogenic fill. Equipment such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

a. **Floodplains:**

i. Design actions to restore floodplain characteristics—elevation, width, gradient, length, and roughness—in a manner that closely mimics, to the extent possible, those that would naturally occur at that stream and valley type.

ii. Remove drain pipes, fences, and other capital projects to the extent possible.

iii. To the extent possible, remove nonnative fill material from the floodplain to an upland site.

iv. Where it is not possible to remove or set-back all portions of dikes and berms, or in areas where existing berms, dikes, and levees support abundant riparian vegetation, openings will be created with breaches. Breaches shall be equal to or greater than the active channel width to reduce the potential for channel avulsion during flood events. In addition to other breaches, the berm, dike, or levee shall always be breached at the downstream end of the project or at the lowest elevation of the floodplain to ensure the flows will naturally recede back into the main channel, thus minimizing fish entrapment.

v. Elevations of dike/levee setbacks shall not exceed the elevation of removed structures.

vi. When necessary, loosen compacted soils once overburden material is removed. Overburden or fill comprised of native materials, which originated from the project area, may be used within the floodplain to create set-back dikes and fill anthropogenic holes provided that floodplain function is not impeded.

14. Riparian Vegetation Planting

Riparian vegetation planting includes the planting of native riparian species that would occur under natural disturbance regimes. Activities may include the following: planting conifers, deciduous trees, and shrubs; placement of sedge, rush mats, or both; and gathering and planting willow cuttings. The resulting benefits to the aquatic system can include desired levels of stream shade, bank stability, stream nutrients, large wood inputs, increased grasses, forbs, and shrubs, and reduced soil erosion. Equipment may include excavators, backhoes, dump trucks, power augers, chainsaws, and manual tools.

a. Experienced silviculturists, botanists, ecologists, or associated technicians shall be involved in designing vegetation treatments.
b. Species to be planted will be of the same species that naturally occur in the project area. Acquire native seed or plant sources as close to the watershed as possible.
c. Tree and shrub species, willow cuttings, as well as sedge and rush mats to be used as transplant material shall come from outside the bankfull width, typically in terraces (abandoned flood plains), or where such plants are abundant.
d. Sedge and rush mats should be sized to prevent their movement during high flow events.
e. Concentrate plantings above the bankfull elevation.
f. Removal of native and non-native vegetation that will compete with plantings is permitted.
g. Exclosure fencing to prevent utilization of plantings by deer, elk, and livestock is permitted.

16. Beaver Habitat Restoration

Beaver habitat restoration includes installation of in-channel structures to encourage beavers to build dams in incised channels and across potential floodplain surfaces. The dams are expected to entrain substrate, aggrade the bottom, and reconnect the stream to the floodplain.

a. **In-channel structures:**
   i. Consist of porous channel-spanning structures comprised of biodegradable vertical posts (beaver dam support structures) approximately 0.5 to 1 meter apart and at a height intended to act as the crest elevation of an active beaver dam. Variation of this restoration treatment may include post lines only, post lines with wicker weaves, construction of starter dams, reinforcement of existing active beaver dams, and reinforcement of abandoned beaver dams (Pollock et al. 2012).
   ii. Place beaver dam support structures in areas conducive to dam construction as determined by stream gradient or historical beaver use.
   iii. Place in areas with sufficient deciduous shrub and trees to promote sustained beaver occupancy.

Project Design Criteria by Resource

Fisheries and Hydrology

Fisheries and hydrology resources will follow all mitigation measures and project design criteria for aquatic restoration activities as shown in the ‘Aquatic Restoration Project Categories, Program Administration, General Aquatic Conservation Measures, and Project Design Criteria for Aquatic Restoration Activity Categories on the Malheur National Forest.’

Additional Aquatic project design criteria were developed for the following elements: tree tipping and felling, juniper treatments, tree hauling, and prescribed burning.

General For Inside Riparian Habitat Conservation Areas

All snags will be maintained within the RHCA unless deemed a hazard to the restoration activity.

Tree Tipping and Tree Felling for Large Wood Projects

Source trees being extracted (either by tipping or felling) as part of this project for instream restoration will not be harvested from within the primary shade zone.

Table 3. Primary shade zone width slope distance (feet), based on adjacent hillslope (percent)

Hillslope less than 30 percent	Hillslope 30 to 60 percent	Hillslope greater than 30 percent
50 feet	55 feet	60 feet

The Temperature Implementation Strategies allow the distances in the above table to be less (but not less than 25 feet.) if any of the following conditions applies:

- The trees are located on a south facing slope (175 to 185 degree azimuth) and therefore do not provide stream shade;
- An appropriate level of analysis is completed and documented, such as shade modeling, using site-specific characteristics to determine the primary shade tree width; and/or
- Field monitoring or measurements are completed to determine the width where optimum angular canopy density (65 percent or greater) is achieved (see TMDL Implementation Strategies).
- If trees are being felled for safety reasons they can be felled towards the stream.
- Source trees should come from but are not limited to: over or fully stocked upland and riparian stands, hazard trees, trees generated from administrative sites (maintenance, expansion, or new construction), and hardwood restoration.

There is no DBH (diameter at breast height) restriction for large wood, but consider the following before removing and placing trees:

Diameter:

- The key to establishing a logjam is utilizing larger diameter wood that resists decay. These pieces of wood are often called “key pieces,” and serve as the anchors for the logjam structure. Wood can improve fish habitat only if the wood is large enough to stay, influence flow patterns, and sediment sorting. Larger diameter wood retains its size longer as abrasion and decay occurs over the years. Larger diameter wood is more effective in creating pools and complex channels that improve fish populations. The minimum diameter required for a key piece of wood depends on the bankfull width of the stream is found in the following table:

Table 4. Bankfull widths and minimum diameter of logs to be considered key pieces

Bankfull width* (in feet)	Minimum diameter* (inches)
0 to 10	10
10 to 20	16
20 to 30	18
Over 30	22

*This table was taken from ‘1995 A Guide to Placement of Large Wood in Streams.

Length:

- The length of the wood is also important to stability. To be considered a key piece a log with a rootwad still attached should be at least 1 1/2 times (1.5 times) the bankfull or a log without a rootwad should be twice (2 times) the length of the stream’s bankfull width. As the best fish habitat is formed around jams composed of three to seven logs, at least two key pieces should be used at each structure.
- Mimic natural accumulations of large woody debris based on stream type, valley setting, and community type and ensure future large woody debris recruitment.

- Tailholds as part of tree tipping operations are permitted across perennial, intermittent and ephemeral streams, but the use of protective straps will be required to prevent tree damage.

Juniper Treatments

The majority of the juniper treatment areas would be within the riparian habitat conservation areas and adjoining uplands. For each area evaluated for juniper treatments, interdisciplinary teams would discuss the following questions in order to identify the attributes of an area and select the appropriate treatments:

- What kind of site (potential natural vegetation, soils)?
- Successional state of site?
- Components that need to be restored?
- How units may fit into the overall landscape mosaic?
- Long-term goals and objectives?

Utilize the "Western Juniper Field Guide: Asking the Right Questions to Select the Appropriate Management Actions (Bates et al. 2007, Circular 1321) (see http://pubs.usgs.gov/circ/l 32 l/pdf/circ l 321.pdf).

Tree and Boulder Hauling

- Apply mitigation and best management practices for dust abatement (water, lignosulfonate, calcium, and magnesium chlorides) dry conditions, and erosion control as directed by physical scientist or road engineer (see road maintenance project design criteria #6 for application).
    - ♦ Haul on gravel and native-surface roads will be limited to dry conditions.

Haul Restrictions to Prevent Fine Sediment Delivery to Streams

- Haul or maintenance is permitted on roads under the following conditions:
    - ♦ During haul, weather conditions are monitored daily for the chance of precipitation by the hydrologist or fish biologist.
    - ♦ No rutting of the road surface is occurring, indicating the subsurface is wet.
    - ♦ Frozen ground conditions.
    - ♦ Haul will cease at any time when the travelway of the road is wet and turbid water or fines are observed moving off the road surface to ditchlines that deliver to stream channels regardless of time of year.

Roads Exempt from Haul Restrictions Include (Due to No Mechanism for Sediment Delivery):

- Paved roads
- Surfaced ridge top roads
- Surfaced outsloped roads with no ditch or stream crossings

Prescribed Burning and Related Activities

- Mechanical piling and burning of large piles will be restricted to existing roads and landings.
- Include all relevant PDC in silviculture prescriptions and bum plan objectives for all fuel treatment activities within RHCAs.
- Use all available fuel treatments and preparation activities as necessary (for example, multiple entries, slash pull-back, modified ignition methods, locations, timing, and sequence, thinning of small green trees, pruning of green trees and snags, prescribed fire, fire suppression, jack pot burning, etc.) to achieve the specific PDC. Suppression should be used only as a last resort to achieve other PDC.

For Perennial and Fish-Bearing Stream Channels:

- Avoid removing trees along stream banks (for example, don't cause bank instability or increase erosion).
- Within primary shade zone retain 100 percent of the overstory canopy closure with the exception of hardwood treatment.
- For intermittent. non-fish-bearing stream channels:
  - Within 50 feet of the stream channel backing fire is preferred.
- For the maintenance and use of water sources and draft sites:
  - Minimize disturbance of existing riparian vegetation to the greatest extent practical; in particular, maintain shade, bank stability, and large woody material recruitment potential.
  - Use sediment control measures such as straw bales, filter cloth, or sediment fences when conditions warrant.
  - Maximize maintenance activities during late summer and early fall to best avoid wet conditions.
  - Do not pump from streams that do not have continuous surface flow. When pumping water in all situations from streams, ensure that at least one-half of the original streamflow remains below the pump site.
  - Refuel power equipment, or use absorbent pads for immobile equipment, and prepare concrete at least 150 feet (or as far as possible from the water body where local site conditions do not allow a 150 foot setback) from water bodies to prevent direct delivery of contaminants into associated water bodies.
  - Fisheries, hydrology or other qualified personnel must work with engineering/fire personnel to review proposed activities to minimize potential effects to fish, stream channel conditions, and water quality.
  - Use and develop off-channel ponds outside of stream channels were feasible and appropriate. Work with fire folks to prioritize and decommission unnecessary in-stream drafting sites.
  - Water withdrawal equipment must have a fish screen installed, operated and maintained in accordance to NOAA Fisheries guidelines.

Wildlife

Threatened, Endangered or Sensitive Species

- If wolves become established (denning) while project implementation is occurring, measures will be taken to avoid activity in that vicinity.
- If any evidence of wolverines is discovered during project implementation, measures will be taken to provide protection. If a den is found we would protect it from human disturbance.

Raptors

- No activities will occur within currently known goshawk or other raptor nest stands. To conserve nesting habitat and to minimize disturbance to nesting individuals, restrictions would be executed according to the requirements of the species involved.
- With all newly discovered raptor nests, a buffer zone would be established by the wildlife biologist to restrict activities near the nest area during occupancy.
- Where possible, retain trees with inactive nests that may be important to secondary nesters (for example, great gray owl).
- Any snags in riparian areas or uplands will be protected from disturbance, removal, or use in stream restoration activities unless deemed a safety hazard at a specific work site.

Big Game

- Within big game winter range a wildlife biologist will be consulted between December 1 and April 1 to determine if activities should be restricted for big game needs.

Botany

Note: Pre-implementation planning project design criteria are identified.

Rare and Sensitive Plants and Habitats

- ***Pre-Implementation:*** Proposed restoration projects shall be completely surveyed early in the implementation planning process by a qualified botanist or rare plant technician, to identify and assess any sensitive or rare plant populations or habitats.
- ***Pre-Implementation:*** Proposed restoration projects shall develop restoration plans for degraded sensitive species habitats and/or mitigation plans in areas where sensitive plant populations are documented. This shall be accomplished by a journey-level Forest Service botanist in collaboration with the interdisciplinary team and other stakeholders.
- Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, recreation sites, prescribed fires, fire lines, and other operational activities shall not be allowed in any documented sensitive plant sites unless it is for the demonstrated benefit or protection of the site. All sensitive plant populations should be buffered 100 feet from all operational activities where topography does not restrict such a distance. Sensitive plant sites and associated buffers shall be identified as areas to protect

Sensitive and Unique Habitats

- The integrity of unique habitats shall be maintained. Unique habitats [may] include meadows, rimrock, talus slopes, cliffs, animal dens, wallows, bogs [fens], seeps and springs. This shall be accomplished by incorporating cover buffers approximately 100 feet in width.
- Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, recreation sites, prescribed fires, fire lines, and other operational activities shall not occur within, or at the interface of lithosols (scablands).
- Cutting of old-growth juniper shall be prohibited. Old-growth characteristics include: sparse limbs, dead limbed or spiked-tops, deeply furrowed and fibrous bark, branches covered with bright-green arboreal lichens, noticeable decay of cambium layer at base of tree, and limited terminal leader growth in upper branches.

Groundwater-Dependent Ecosystems

- The integrity of groundwater-dependent ecosystems shall be maintained. Spring developments shall not dewater groundwater-dependent ecosystems. Spring developments shall not be allowed if the spring is occupied by rare or sensitive plant species, or in peatlands, fens, or where histic soils are present. These sites should be buffered 100 feet from all operational activities where topography does not restrict such a distance, and be identified as areas to protect.
- Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, fire lines, and other operational activities shall not be allowed in springs, seeps, or any other groundwater dependent ecosystem, unless it is for the benefit or protection of the groundwater dependent ecosystems or development of the spring.
- Spring developments should not disturb the spring orifice (point where water emerges). Spring head boxes should be placed in a location that will cause the least amount of disturbance to the soils and vegetation of the groundwater dependent ecosystems. Preferable locations for spring head boxes

should be in an established channel downstream from the orifice or a location where flowing water becomes subsurface.
- When necessary, construct fenced exclosures around spring developments to prevent damage from wild ungulates and livestock.
- Spring developments shall have a return flow system to minimize the diversion of surface and subsurface water from the catchment area. Consider using a float valve or similar device to reduce the amount of water withdrawn from the groundwater dependent ecosystems.
- When developing springs, place troughs far enough away from groundwater-dependent ecosystems, wetlands, and other sensitive or unique habitats to prevent erosion, compaction, or degradation to sensitive soils and vegetation due to livestock congregation.

Invasive Plant Species

- ***Pre-Implementation:*** Proposed restoration projects shall be surveyed for invasive plants early in the implementation planning process by a qualified invasive plant specialist /technician, to identify and assess any undocumented invasive plant infestation.
- ***Pre-Implementation****:* For project areas that overlap or are adjacent to invasive plant infestations, assure that there is sufficient time prior to develop a long-term site strategy for control, eradication, and revegetation of the site. This shall be accomplished by a qualified invasive plant specialist in collaboration with the interdisciplinary team and other stakeholders.
- All activities shall be conducted in a manner as to minimize or prevent the potential spread or establishment of invasive species.
- Actions conducted on National Forest System Lands that will operate outside the limits of the road prism, require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering the Malheur National Forest. Cleaning will be inspected and approved by the forest officer in charge of administering the project.
- Assure that all materials are weed-free. Use weed-free straw and mulch for all projects conducted or authorized by the Forest Service on National Forest System Lands. If State certified straw or mulch is not available, individual national forests should require sources certified to be weed-free using the North American Weed Free Forage Program standards or a similar certification process.
- Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, or rock that are judged to be weed free by District or Forest weed specialists.
- Prohibit heavy equipment operation, vehicle travel, staging areas, fire-control lines, and any other operational activities in invasive plant infestations, unless the activities are for the express purpose of eradicating the infestation or INV1 and INV2 have been completed.
- Conduct post-implementation monitoring for invasive plants. Continue monitoring, treating, and removing invasive plants until all infestations are eradicated and native plant species are well established.

Native Plant Materials and Revegetation

- ***Pre-Implementation****:* Where the need for native plant materials is anticipated, assure that there is sufficient time for the plant materials specialist to develop a native plant materials plan and/or prescription prior to implementation of planned revegetation, rehabilitation, and restoration projects. This may include allowing for enough time to harvest and store hardwood cuttings, produce suitable quantities of native seed, and/or grow-out container stock.
- Locally adapted, genetically appropriate native plant materials are the first choice for use in revegetation, restoration, and rehabilitation, where timely natural regeneration of the native plant

community is not likely to occur. Use a diverse assemblage of species that have the potential to naturally occur in the project area. Acquire native seed or plant sources as close to the watershed as possible. Examples of areas that may need treatment include: habitat restoration efforts, log decks, staging areas, landing zones, temporary roads, slash piles, culvert replacements, severely burned areas, skid trails, decommissioned roads, invasive species treatments, and other disturbances.

- Non-native, non-invasive plant species may be used in the following situations: (1) when needed in emergency conditions to protect basic resource values (for example, soil stability, water quality, and to help prevent the establishment of invasive species), (2) as an interim, non-persistent measure designed to aid in the re-establishment of native plants, (3) if native plant materials are not available or not economically feasible, and (4) in permanently altered plant communities.
- Under no circumstances shall non-native invasive plant species or noxious weeds be used for revegetation.
- Development, review, and/or approval of revegetation, rehabilitation, and restoration prescriptions, including species selection, genetic heritage, growth stage, seed mixes, sowing guidelines, and any needed site preparation, shall be accomplished by a plant materials specialist who is knowledgeable and trained or certified in the plant community type where the revegetation will occur.
- Concentrate plantings above the bank-full elevation. Sedge and rush mats should be placed and sized to prevent their movement during high flow events.
- Newly planted or seeded areas should be protected from animals and activities that may prevent, retard, or slow the establishment and recovery of native vegetation. Site-specific measures may include building fences, piling slash, jackstrawing, closing areas to vehicles, and/or temporarily changing grazing regimes until the desired condition is sufficiently achieved.

Soils

- For projects involving heavy machinery off roads, the project proponents shall inspect the site for existing impacts to the soil. If existing impacts appear to be heavy on the Malheur National Forest or moderate on the Ochoco National Forest, they shall contact a soil scientist, who shall determine what site specific project design criteria are necessary to meet Forest Plan and Forest Service Manual standards and guidelines. (If a soil scientist is not available, a silviculturist or hydrologist can do the work.) If standards and guidelines cannot be met, heavy machinery shall not be used.
- Erosion would be minimized by following General Aquatic Conservation Measures (see section, above) and by implementing the appropriate project design criteria based on the type of activity (see Appendix A).
- Erosion from heavy machinery use would be minimized; by minimizing compaction and puddling, rutting would be minimized.
- For Livestock Stream Crossings and Off-Channel Watering Facilities, out-of-channel erosion would be minimized.
- For Road Erosion Control, erosion would be minimized.
- For Juniper Removal, erosion would be minimized. It is possible that juniper removal would increase ground cover within a few years, and thereby reduce erosion.
- Prescribed fire (including for disposal of slash after juniper removal) can involve only low- and moderate-severity fire, and erosion from fire lines would be minimized, so erosion from prescribed fire would not be significant.

Fire and Fuels

- Mechanical tools may be necessary to prepare fire control lines for these bums, but would be limited, and typically no heavy equipment would be used. Prescribed bums or wildfires could temporarily affect air quality.

- The project design criteria for both Juniper Removal and Riparian Vegetation Treatment (controlled burning) would be followed. National, state, and local policies regarding prescribed fire implementation will be met.
- Activities that are expected to create smoke emissions would follow the State of Oregon Smoke Management Plan. Prior to burning, approval will be obtained from the Oregon Department of Forestry, who determines compliance with the Clean Air Act. State smoke forecasts, which predict wind direction and smoke mixing height, will be obtained prior to all burning to ensure smoke intrusions will not occur in the local smoke sensitive receptor areas.
- Burning will follow the guidance provided by the Oregon Smoke Management Plan (Directive 1-4-1-601, Operational Guidance for the Oregon Smoke Management Program), which is an agreement between federal land management agencies in northeast Oregon and Oregon Department of Forestry limiting smoke emission amounts. Oregon Department of Forestry monitors activity, and if a limit is reached it will shut down prescribed fire activity.

Heritage Resources

- Compliance with section 106 of the National Historic Preservation Act for activities authorized under this analysis will be completed and concurred with by the Oregon State Historic Preservation Office before any ground disturbing action takes place. For each potential activity the district or zone archaeologist will determine which of the criteria in the 2004 Programmatic Agreement with the Oregon State Historic Preservation Office best fit the particular project. This will vary somewhat project to project based on the scale of the particular activity, the location on the landscape, and the nature of associated cultural resources, if any.
- The district or zone archaeologist will document their findings on a programmatic agreement form with a project description, rationale and location map which will be attached to the Forest Service Heritage Event database. The forest archaeologist will review and sign off on the programmatic review form if concurred with. For appendices A, B and C projects as defined in the 2004 Programmatic Agreement, the Forest will retain the documentation and provide the Oregon State Historic Preservation Office with the annual summary of projects as described in the Preservation Act.
- For full inventories the district or zone archaeologist will complete an inventory report meeting current Oregon State Historic Preservation Office (SHPO) standards which will be reviewed by the forest archaeologist. The forest archaeologist will forward the completed inventory report to the Oregon State Historic Preservation Office for review and concurrence signature or further discussion as appropriate.
- Consultation with Native American tribes is conducted under the terms of the Memorandums of Understanding the Forest has with each individual tribe. The Forest regularly consults with the Burns Paiute Tribe, the Confederated Tribes of the Umatilla Indian Reservation and the Confederated Tribes of Warm Springs Reservation.
- For work requiring a full inventory under the terms of the 2004 Programmatic Agreement any identified cultural resources sites will generally be avoided. For cases where site avoidance is impractical mitigation procedures will be developed in consultation with the Oregon SHPO before project work begins.
- If any previously unidentified cultural resources are located during project implementation, ground disturbing work will be halted until the resources are evaluated by the district or zone archaeologist. If the cultural resources are determined to be potentially eligible for listing on the National Register of Historic Places work will either be permanently halted or a mitigation plan will be developed in consultation with the Oregon SHPO before work continues.

Recreation

- Motorized aquatic restoration methods would not be used within wilderness, wild portions of wild and scenic rivers, and inventoried roadless areas.
- Mechanized aquatic restoration methods would not be used within wilderness or wild portions of wild and scenic rivers.

Grazing

General

- Range and fire specialists and permittees would coordinate activities including scheduling of burning activities in grazing units.
- Utilize the Forest Post-Fire Interim Grazing Guidelines to aid in determining when to resume grazing activities.
- Whenever possible, units to be rested would be burned in the spring of the year to be rested or in the fall prior to the rest year.
- If a rest period is required following a burn the permittee has the option to exclude cattle grazing from those portions of a pasture that were burned through the use of fencing and could continue to graze the unburned areas of a unit.

Protection of Government and Permittee Investments

- All existing structural range improvements (fences, gates, spring developments, etc.) and permanent ecological plots would be contractually protected.
- Maintain structural integrity of range improvements.
- If structural improvements are damaged during project operations they would be repaired to Forest Service standards prior to livestock scheduled use by the party responsible for causing the damage. Repairs would be required of the purchaser if damage were done during thinning or fuel treatment contractors or by force account where appropriate.
- Three or more splices to a single wire within a distance of 20 feet will be replaced with a single splice.
- Fence right-of-ways (6 feet either side of fence), trails, other developments and access to them would be cleared of slash produced by project activities.

Aspen Restoration

- New aspen exclosure fences would have gates installed in proper locations to allow for removal of stray livestock. Aspen fences would be maintained each year and repaired whenever necessary. Plans for aspen exclosures will define when restoration of the protected stand has been achieved and who has responsibility for maintenance of the structure. When fences are no longer needed, aspen fences should be removed.
- Alternate livestock water sources to those being used in aspen stands would be developed off-site before fencing aspen or re-evaluate fencing of the aspen site. Coordinate with range specialist and permittee.

Notification

- During the planning stage of each individual project all potentially impacted grazing permittees will have notice of action and opportunity to provide input that may lessen impacts to their livestock operation well in advance of implementation.

- Prior to implementation all potentially impacted grazing permittees will be given notice of dates when work will start.