



Camp Creek Reach1

Aquatic Restoration Checklist

USDA Forest Service

Blue Mountain Ranger District, Malheur National Forest

Grant County, Oregon

Implementation Description

Project Information

Project Information	
Category 2: Large Wood, Boulder, and Gravel Placement; including tree removal for large wood placement Category 4: Channel Reconstruction/Relocation Category 5: Off- and Side-Channel Habitat Restoration Category 6: Streambank Restoration Category 9: Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering Category 14: Riparian Vegetative Planting Category 16: Beaver Habitat Restoration Category 17: Fisheries, Hydrology, Geomorphology Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration	
Lead Preparer: Dan Armichardy	
Location: T10S-R33E Sect 18,19,170702030207 Lower Camp	
Lease/ Case File/ Serial number: 01032024	
Begin Date: 1/1/2024	Due Date: 4/15/2024

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 within the lowermost mile of camp creek to its confluence with the Middle Fork John Day including the mainstem Middle Fork John Day within the confluence area. Camp Creek Reach 1 Restoration Project is located at the confluence of Camp creek with the Middle Fork John Day River upstream 0.7 miles to private land. It is located within Malheur National Forest, Grant County approximately 25 miles north of John Day. The project area lies within an unconfined large depositional valley area which historically supported a substantial stream-meadow network with consistent floodplain inundation to support extensive riparian vegetation. These types of areas are highly productive and have a high potential for juvenile salmonid rearing. It currently is characterized by a single thread F type Rosgen channel or stage 6 within the channel evolution model (Cluer and Thorne 2013) with an inset floodplain (Figure 18). The existing inset floodplain and channel

range from 30-50 feet across and the valley floor extends to ~550 feet at its greatest width. Historically multiple threaded channels were located within this area based on lidar. Limiting factors addressed include degraded floodplain connectivity and function, degraded channel structure and complexity, degraded riparian areas and large woody debris recruitment, altered flow and other hydrologic processes, and degraded water quality. Restoration work occurred within this area in 2011 as part of log weir removal however work was restricted to areas where log weirs were present and as a result the existing degraded channel was not addressed nor was an adequate amount of wood added to this area (see Figure 16 and Figure 17).

The Camp creek reach 1 project proposes to fill in the existing channel or stage 8 within the channel evolution model (Cluer and Thorne 2013) and reconnect all the multiple threaded channels across the valley. Large wood and small wood as well as slash would be placed throughout the channels and embedded within floodplains as well as any cut or fill areas. Beaver dam analogs (BDAs) and post assisted log structures would be utilized to lock wood in place and facilitate aggradation, water storage, increase habitat complexity and cover for juvenile fish and beaver. All existing riparian vegetation within the existing channel would be salvaged as much as feasible and stored along the Middle Fork John Day then placed back into the reconstructed channels. Beavers have consistently tried to establish beaver dams within this area but have been washed out every spring over the last 10 years. There are active dams in camp creek upstream of this area. A total of approximately 10,000 -15,000 potted cottonwood, willow, service berry, western birch, and other native shrubs would be planted following project completion in the fall.

In-stream and floodplain wood material for this project would be sourced from Gibb and Jungle Creeks by completing riparian enhancement treatments identified as part of the Big Mosquito project NEPA completed in 2016. Prescriptions for this work were provided within the NEPA decision. Work within these areas would first add small and large wood to Gibb and Jungle creeks to improve stream and riparian habitat and any excess material from prescription treatments would be removed and used within Camp creek reach 1 for aquatic restoration purposes including treatment of aspen stands. Work within these drainages includes 2.9 miles of haul and skid on existing roads and approximately 100.3 acres of riparian enhancement treatment.

Table 1 Number of trees by location and size range to be harvested for use within the camp reach 1 project from Gibb and Jungle creeks (Figure 11).

Location	Small (9–16-inch dbh)	Medium (16–21-inch dbh)	Large > 21-inch dbh	Total
Gibb creek	296	144	10	450
Jungle creek	270	50	17	337
Jungle tributary 1	169	79	13	261
Jungle tributary 2	222	83	28	333
Grand Total	957	356	68	1381

Logging slash piles from the Gibb/Jungle sale and Camp/lick sale will be loaded into a dump truck and hauled to the restoration project site. Three locations consisting of 6-8 piles for approximately 20-25 tons of slash would be scattered throughout the project area within soil cut areas on Camp creek reach 1.

North Fork John Day watershed council is partnering with the USDA Forest Service, Malheur National Forest to complete this project. The North Fork John Day watershed council is the project sponsor and



will manage contracts for crews and equipment. The USDA Forest Service is completing necessary compliance documentation. North Fork John Day watershed council and the Forest Service will share on-site project management and implementation duties.

Land Use Plan Conformance

The project falls within management areas 3B “Anadromous Riparian Areas” and 4 “Big Game Winter Range” of the Malheur National Forest Land and Resource Management Plan (USDA Forest Service 1990). The goal of management area 3B 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). The project is consistent with Management Area 3B standards to provide the necessary habitat to maintain or increase populations of management indicator species; manage the composition and productivity of key riparian vegetation to protect or enhance riparian-dependent resources; plan, design, and implement riparian habitat improvement activities to upgrade riparian areas that are not in a condition to meet management objectives or the desired future condition; improve the rate of recovery in riparian areas that are not in a condition to meet management objectives by eliminating or reducing the impacts of management activities that may slow riparian recovery; maintain or enhance water quality or fish habitat through instream or riparian improvements; and provide for input of large woody debris into all classes of streams (USDA Forest Service 1990, Management Area 3B standards 5, 8, 9, 10, 11, and 12, page IV-63).

The following Malheur Forest Plan goals and standards apply for management area 4A “Big Game Winter Range:”

- Forest-wide standard 88: “Design and implement structural and nonstructural range improvements to maintain productivity and range condition in addition to benefiting both wildlife and livestock. Locate range structural and nonstructural improvements to encourage livestock movement away from riparian areas,” (USDA Forest Service 1990, page IV-34). This project is consistent with this standard because fences are proposed to protect riparian resources and critical fish habitat. Restoration in the long term would also improve wildlife habitat through increased forage and riparian vegetation.
- Management area 4A, standard 7: “Restrict activities that disturb wintering big game in a significant and prolonged manner from December 1 to April 1,” (USDA Forest Service 1990, page IV-70). This project is consistent with this standard because it would be implemented in summer. Camp 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 as designated by the National Marine Fisheries Service and bull trout by the United States Fish and Wildlife Services. Juvenile Chinook salmon also use the reach for rearing habitat and adult spawning occurs within the Middle Fork John Day River in proximity of the confluence of Camp creek.

Proposed Action and Implementation Plan

The following activities would occur in Camp Creek reach 1 as part of this proposal. Implementation actions are scheduled to begin in 2024 and continue into 2025 depending on weather, contracting, and planting efforts. In channel restoration would occur during the in-stream work window from July 15 to August 15, unless an instream work variance is requested and granted.

Monitoring wells

- Within the Camp creek reach 1 project area two to four groundwater monitoring wells could be installed at various locations within the floodplain. Exact locations have not yet been determined.

Wells would be installed along transect lines that span the valley bottom (from toe-slope to toe-slope)

- Along a transect line, 1-2 wells would be installed on each side of the primary stream channel
- There would be 1-2 transect lines per reach

All avoidance areas identified by Botany, Heritage, etc. would be avoided. Well installation would not occur within one-quarter mile of the Forest Service boundary, though the adjacent landowner will be contacted to discuss future project work expected to occur within this area. Aquatics staff will work with the Forest Land Surveyor to ensure that the property boundary is properly delineated and complies with current Forest Service policy.

Wells will be installed by driving 2-inch sand point well heads to a depth of approximately 3 meters. Equipment including, or similar to, hydraulic post-pounders or mini excavator may be used along with hand tools (e.g. sharpshooter shovels) to install the wells. A UTV or other means of relatively low-impact ground transport may also be used to shuttle supplies to the well sites. Site of disturbance at each well is very small (less than one square foot per site). Impacts would be isolated to the well locations.

Wells will provide existing-condition groundwater data within the Camp creek reach1 project area

- Data collected after restoration will be used to determine the scale and extent of implementation on groundwater storage within treated reaches

Channel and floodplain restoration (see map below):

- **Riparian enhancement Thinning (Tree Tipping) Gibb creek, Jungle creek, Unnamed tributaries:** Trees for camp creek reach 1 project will be obtained from the outer riparian habitat conservation area boundary within Gibb and jungle creek as part of the Big Mosquito NEPA decision for riparian enhancement treatments. Additionally whole tree will be added to Gibb and Jungle creek to meet the requirements of the NEPA. Equipment includes grapple skidder, 2 excavators, dump truck or log hauler equivalent. All trees identified for haul are marked with US Forest Service paint and will be skidded to existing landing areas. Previous existing skid trails will be utilized when feasible. Work is anticipated to begin in May once ground conditions are suitable and dry. Project design criteria for the riparian enhancement treatments can be found within the Big Mosquito [Record of Decision](#).
- **Large wood placement:** Approximately 1400 trees ranging from 6-21 dbh with root-wads attached will be added to the channel using the excavator. Wood will be added to the floodplain, filled exiting channel, side channels with key pieces embedded at specific areas and locations
- **Wood structures:** ~54 structures would be placed to activate side channels and also as habitat complexity within side channels. These wood structure will consist of multiple size classes of whole trees. Some trees will be embedded within the fill areas of the existing channel. Side channel wood jams will consist of smaller material.
- **Beaver dam analogs:** Approximately 23 beaver dam analogs will be constructed within the 2.5 miles of side channel reactivated on the west and east side of the existing stream channel.
- **Post assisted log structures.**
- **Middle Fork John Day Wood Structures:** 5 large wood structures will be built at the confluence of camp creek with the Middle Fork John Day and downstream.
- **Cut and Fill:** A dewatering plan is required as part of channel reconstruction activities and is subject to review by the restoration review team per ARBO II direction consisting of several agency representatives. A Joint Department of State Lands/Army Corp of Engineers permit is required which also covers Department of Environmental Quality specifications per the clean water Act. Approximately 19,000 cubic yards of soil will be cut from identified high elevations point (REM- relative elevation model) across the valley and staged adjacent to the existing channel. Floodplain cut and fill of the existing channel will be completed in 3 stages beginning in

the upper southwest corner then continuing downstream utilizing relic side channels to dewater the existing streambed prior to fill. Floodplain work (cut and fill staging) will begin as soon as ground conditions allow prior to the in-water work period July 15-August 15.

- Approximately 15,000 cubic yards of fill and 19,000 yards of cut material would be placed within the existing incised channel. Fill would come from onsite within elevated portion of the historic floodplain. Partial; and whole trees would be buried within the fill areas. It is anticipated that there will be some excess fill material that will be staged and potentially hauled to be used at other aquatic restoration sites. Example: Caribou creek Middle Fork John Day project.
- **Exclosure Fence:** The exclosure and pasture fences will be modified to avoid the restoration area.
- 2.5 miles of off channel and side channel habitat reconnected.
- Floodplain habitat protected 42 acres.
- **Number of plantings:** Fall 2024 bare stake planting, 20,000 (rooted cottonwood/willow) fall 2025 along with ~ 4,000 additional native shrub species, 2 acres of native sedge mat.

Detailed Action Description

General Actions and Project Timeline

Permitting and Review:

- State Scenic Waterway Permit
- ARBO II reporting (Aquatic Restoration Biological Opinion)
- Department of State Lands/Army Corp of Engineers permit (joint permit)
- Restoration review team review for channel reconstruction category Scheduled April 17th
- Malheur National Forest Aquatic Restoration Environmental Assessment Checklist
- Bonneville Power Administration design review 15%, 50%, 80% check in
- State Historic Preservation Office reporting
- Oregon Department of Fish and Wildlife Collection permit for salvage

Pre-Project Work (March to June 15)

- Identify and flag botany avoidance areas and invasive weed treatment areas.
- Identify and flag any heritage avoidance areas.
- Meet with permittees to discuss project prior to turn out.
- Flag trees to be placed/felled within Gibb and Jungle creeks
- Arrange field trip with interdisciplinary team to identify final fence configuration that would best reduce impacts within sensitive areas from wildlife and livestock movement and fence construction.
- Identify and mark trees within tipping units and develop guidelines with silviculture; completed fall 2023.
- Work with the Public Affairs Office to create informational signs to be placed in the project area and put out a press release notifying the public of implementation in 2024 and 2025 if necessary.

Phase I (May 15 to July 15)

May 15-July 15th

Excavation of water table monitoring sites < m2 in size, placing perforated PVC pipe in hole, and back filling hole for category 17.

Riparian enhancement treatments Gibb and Jungle Creek Big Mosquito project.

2 excavators or equivalent, grapple skidder, dump truck or equivalent.

Work tipping trees within the riparian enhancement areas on Gibb and Jungle creek would begin pre in water work period (Figure 2). Trees would be tipped, skidded to roadside and staged for haul to camp reach 1. These trees would be obtained from the outer riparian habitat conservation area. Inner riparian habitat conservation area treatments and wood placement will occur during the in-water work period unless stream is dry. Approximately 1,400 marked trees ranging in diameter from 6-21 inch dbh would be hauled to camp creek reach 1. Additionally, approximately 20-25 tons of piled slash material from logging operations in the camp lick project and jungle sale would be hauled to camp creek reach 1 pre in water and staged at the identified staging area along camp creek reach 1 on the upper west and east sides. Work also includes adding trees to Gibb, Jungle creek and tributaries through excavators and felling. Trees for this work will be flagged prior to working beginning. Work within these drainages includes 2.9 miles of haul and skid on existing roads and approximately 100.3 acres of riparian enhancement treatment with 4 landing areas located on previous landing areas.

Move pasture fence on west side of restoration area to be above floodplain work. Complete this move prior to cattle turn out.

June 15-July 15

Work would begin cutting elevated areas and staging trees and fill material within the uppermost southwest side of project area Phase I (Figure 2). Excavators, dump trucks, and a bulldozer would be utilized to cut and move material for staging at fill areas.

Wood material will be placed throughout area and wood structures built prior to in water work period in the side channels and fill material staged along existing channel to be reached from east side of channel.

Phase II (July 15 to August 15)

July 15

Remove existing sedges and shrubs and store where roots remain wet from existing channel prior to filling uppermost existing channel (phase II Figure 2)

Berm existing channel and send camp creek into completed uppermost southwest portion of project which will bypass the existing channel. **Begin Fish/mussel salvage.**

July 15-August 15

Continue working on east side of camp creek dewater sections (phase II area Figure 2) of existing channel using relic side channels and phases of work. Construct wood structures, remove cut area, fill existing channel, place slash. Fish passage will be maintained during construction. Temporary bridges will be available for crossing diverted stream channels as well as rubber mats for tracking equipment.

Phase III (July 15 to August 15)

July 15-August 15

Working on west side of lowermost camp creek dewater sections (phase II area Figure 2) of existing channel. Construct wood structures, remove cut area, fill existing channel, place slash. Fish passage will be maintained during construction. The existing channel of camp creek will be rerouted through a side channel on the eastside while the work on the west side is happening. Fish salvage will take place. Once work on west side is completed water will be rerouted to the west side and former channel to finish work on the east lowermost portion of the project. Demobilization from lowermost east side of project area.

Two temporary bridges are available for use by the Confederate tribes of Warm spring in water work will progress from west to east from upper top ½ to bottom ½.

Phase IV

Finish wood placement, cut and fill on eastern lowermost portion of project.

October 2024

Planting rooted willows and cottonwood and sedge mats.

May 2025

Exclosure rebuild (barbed wire).

October 2025

Additional Planting of rooted hardwoods and sedge mats, native forbs.

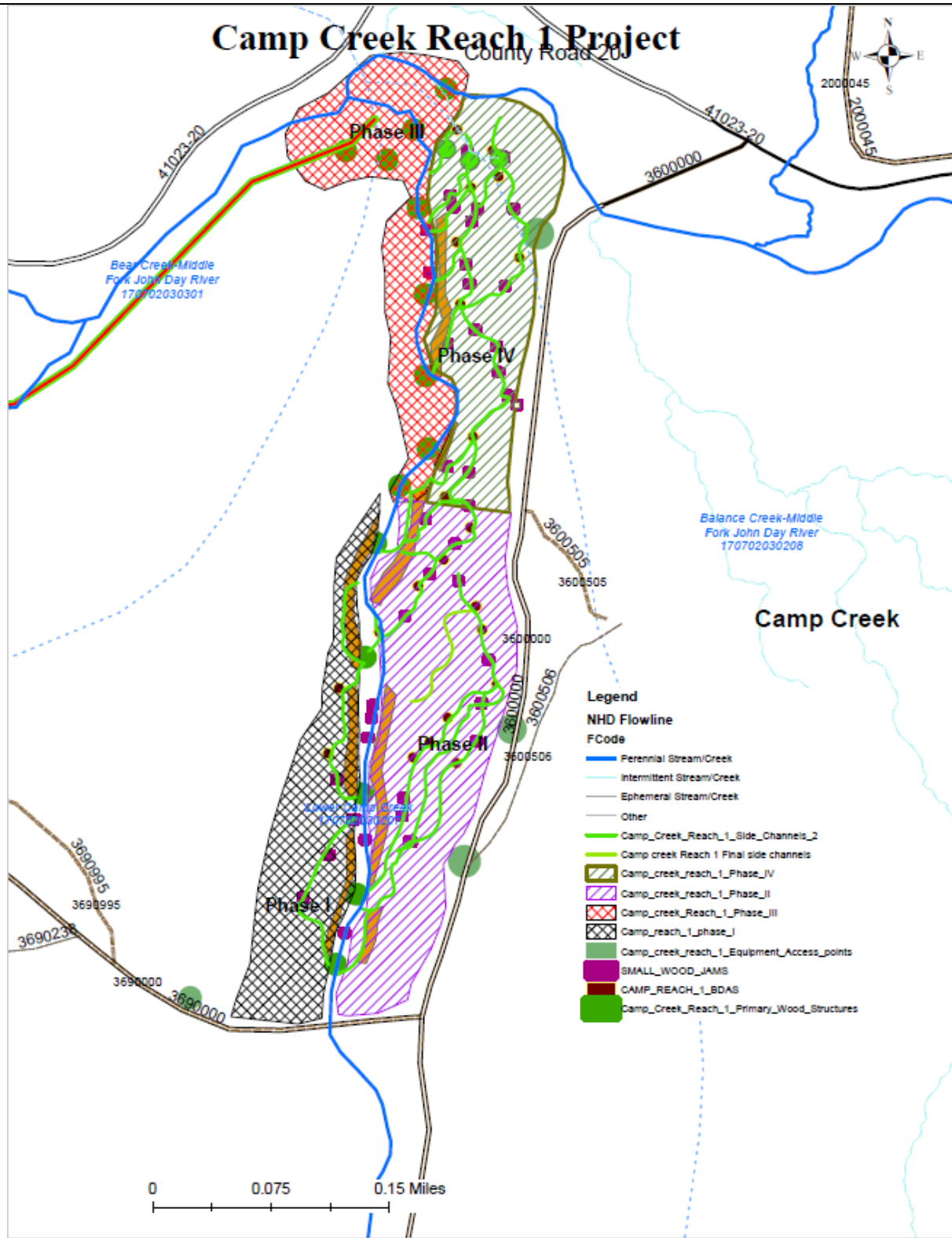


Figure 2. General design and layout Camp creek reach 1 project. Work will proceed from west to east starting at top (south) end of project area working west for the upper ½.

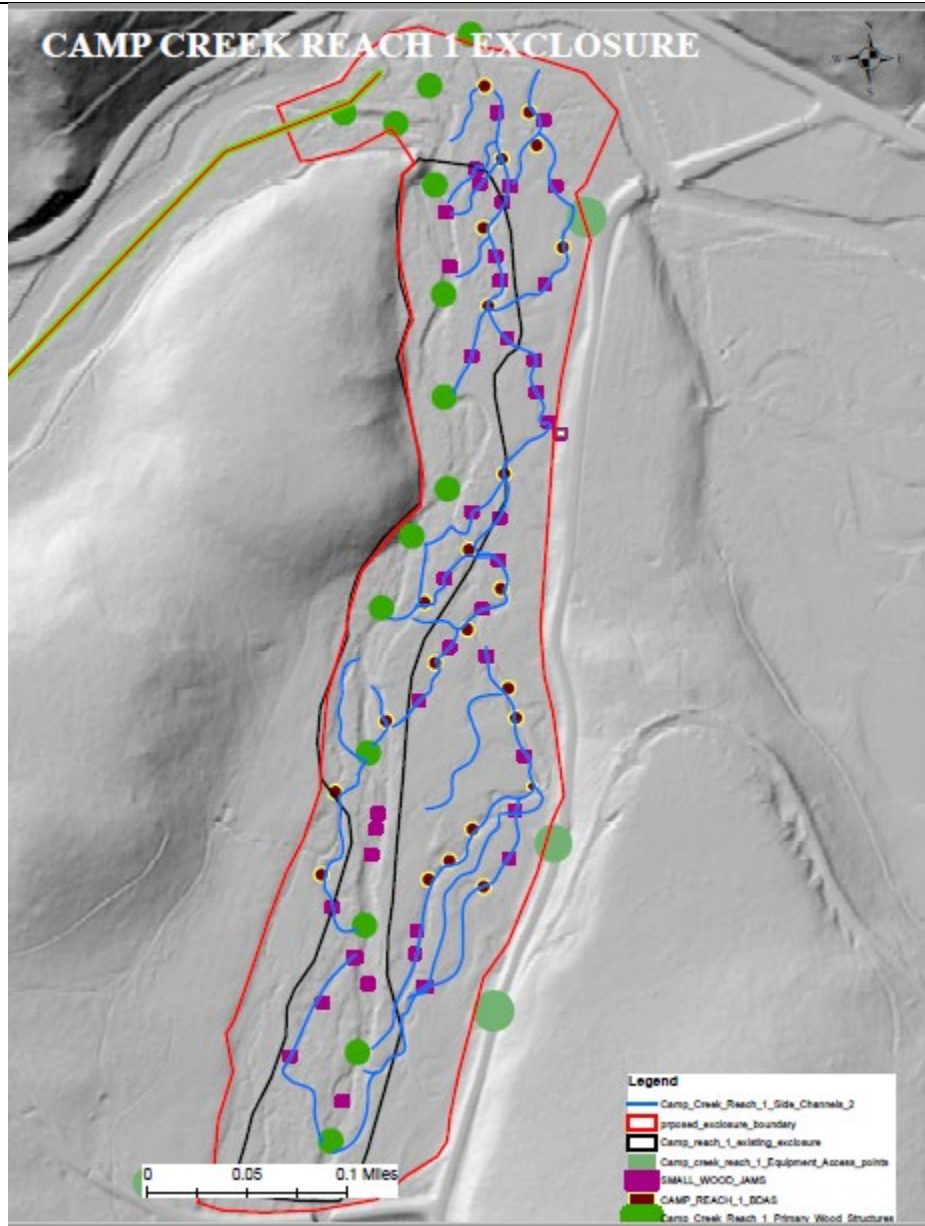


Figure 3. Existing and potential new exclosure fence

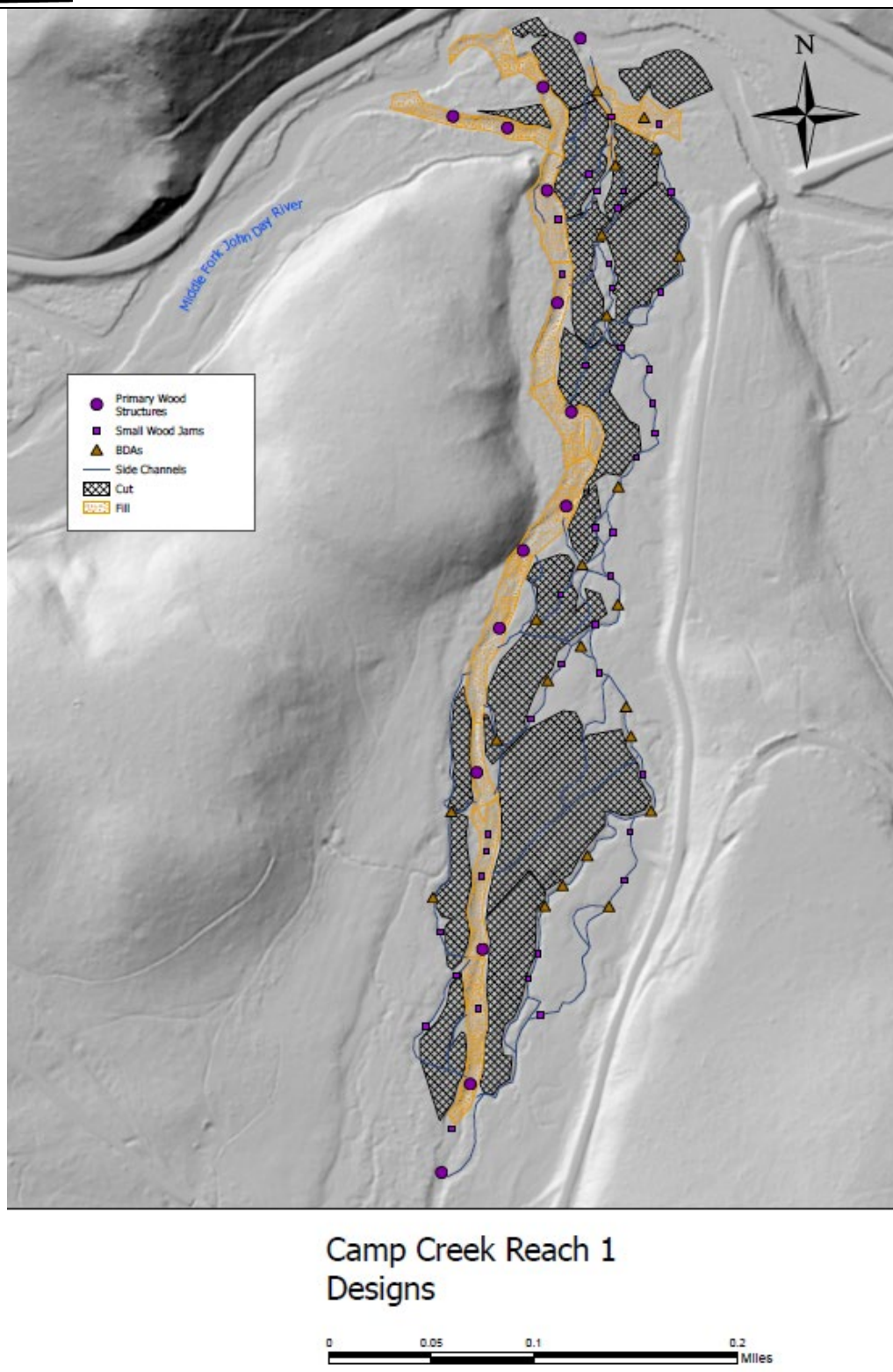
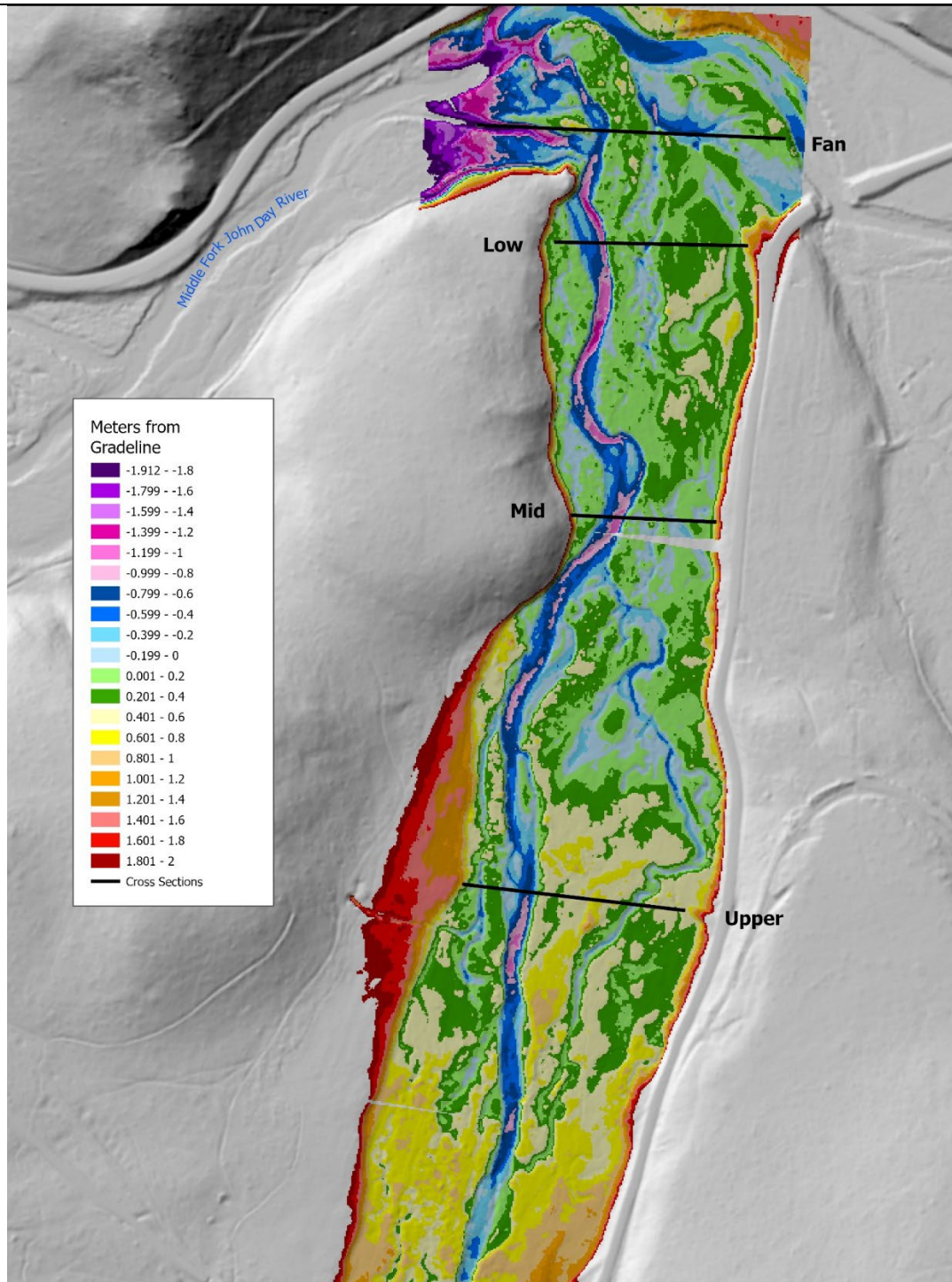


Figure 4. Cut and fill areas within Camp creek reach 1 and wood structure locations. Cut areas will become floodplain and match existing channel fill.



Camp Creek Reach 1 Cross Section Locations

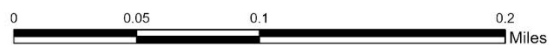


Figure 5. Valley cross sections map.

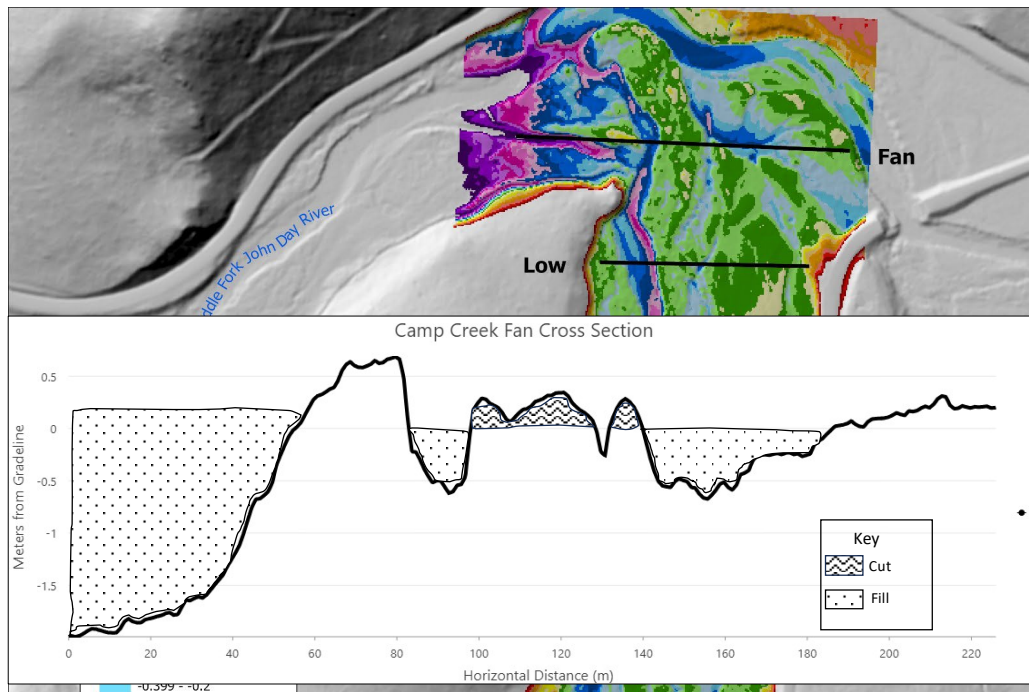


Figure 6. Camp creek fan cross section.

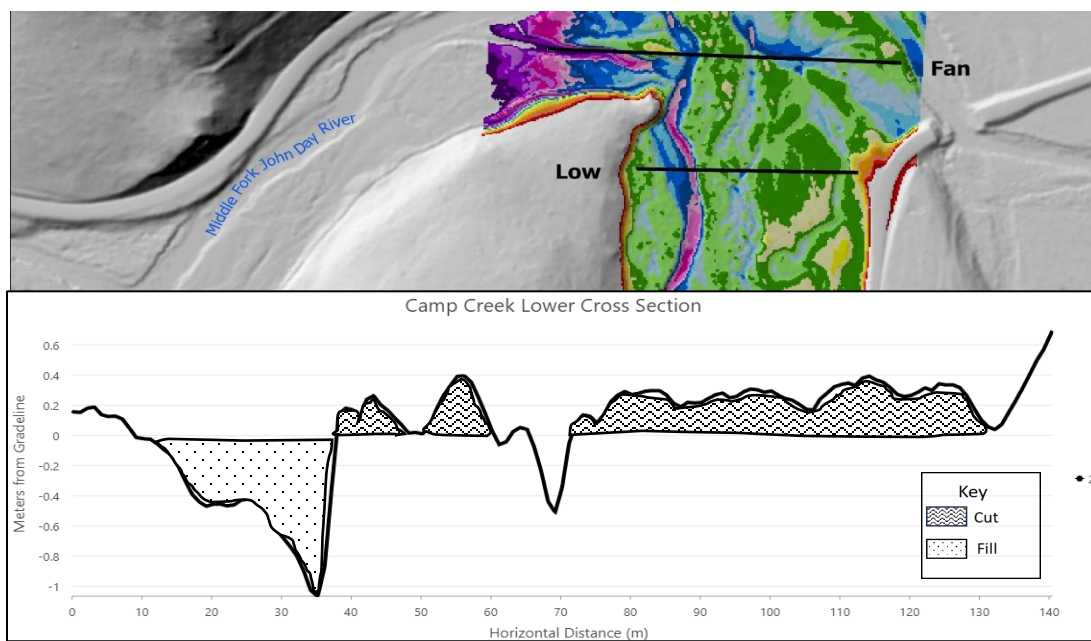


Figure 7. Camp creek lower cross section.

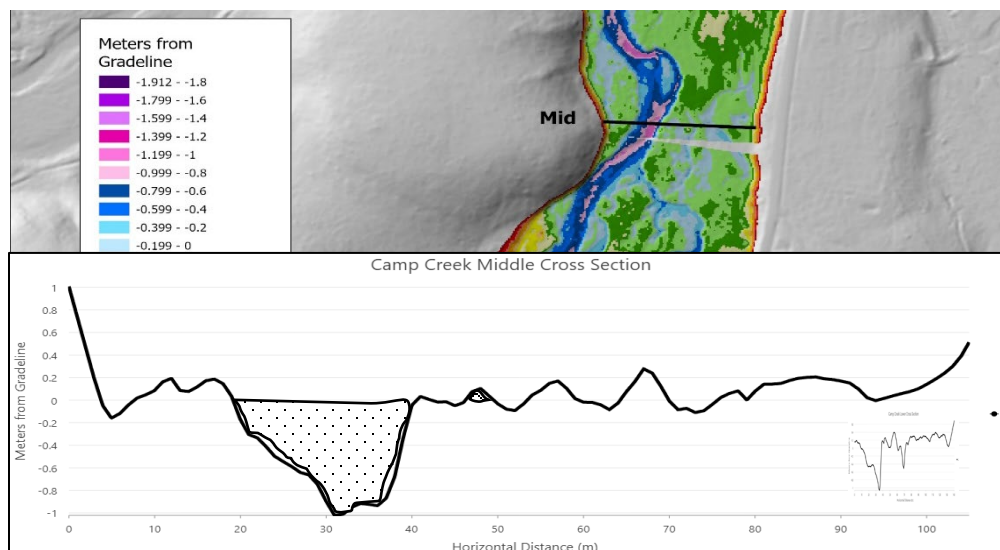


Figure 8. Camp creek middle cross section.

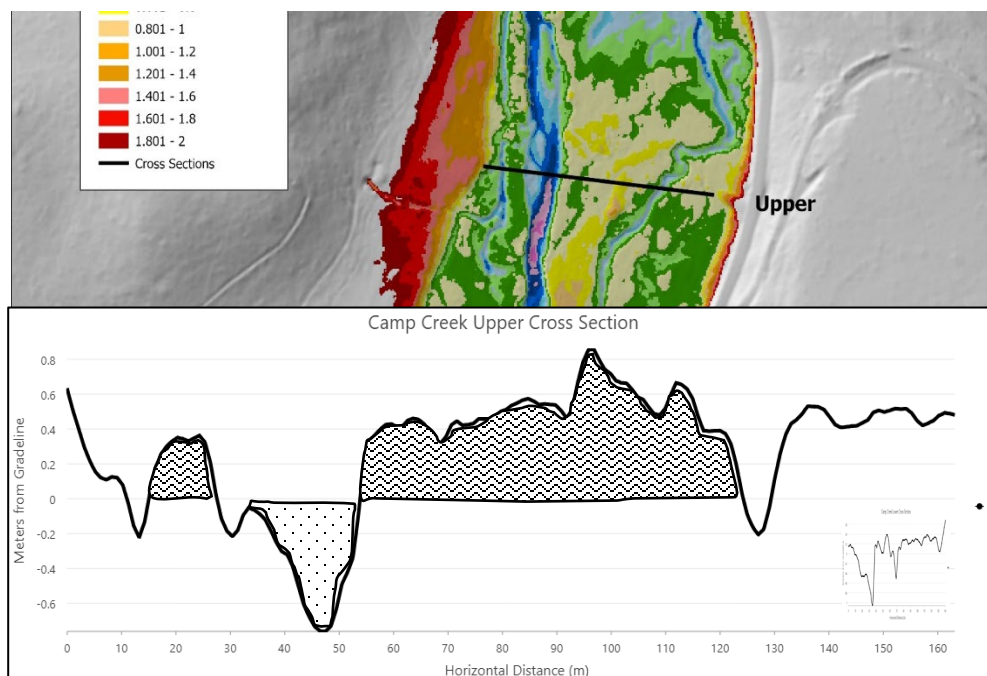


Figure 9. Camp creek upper cross section.

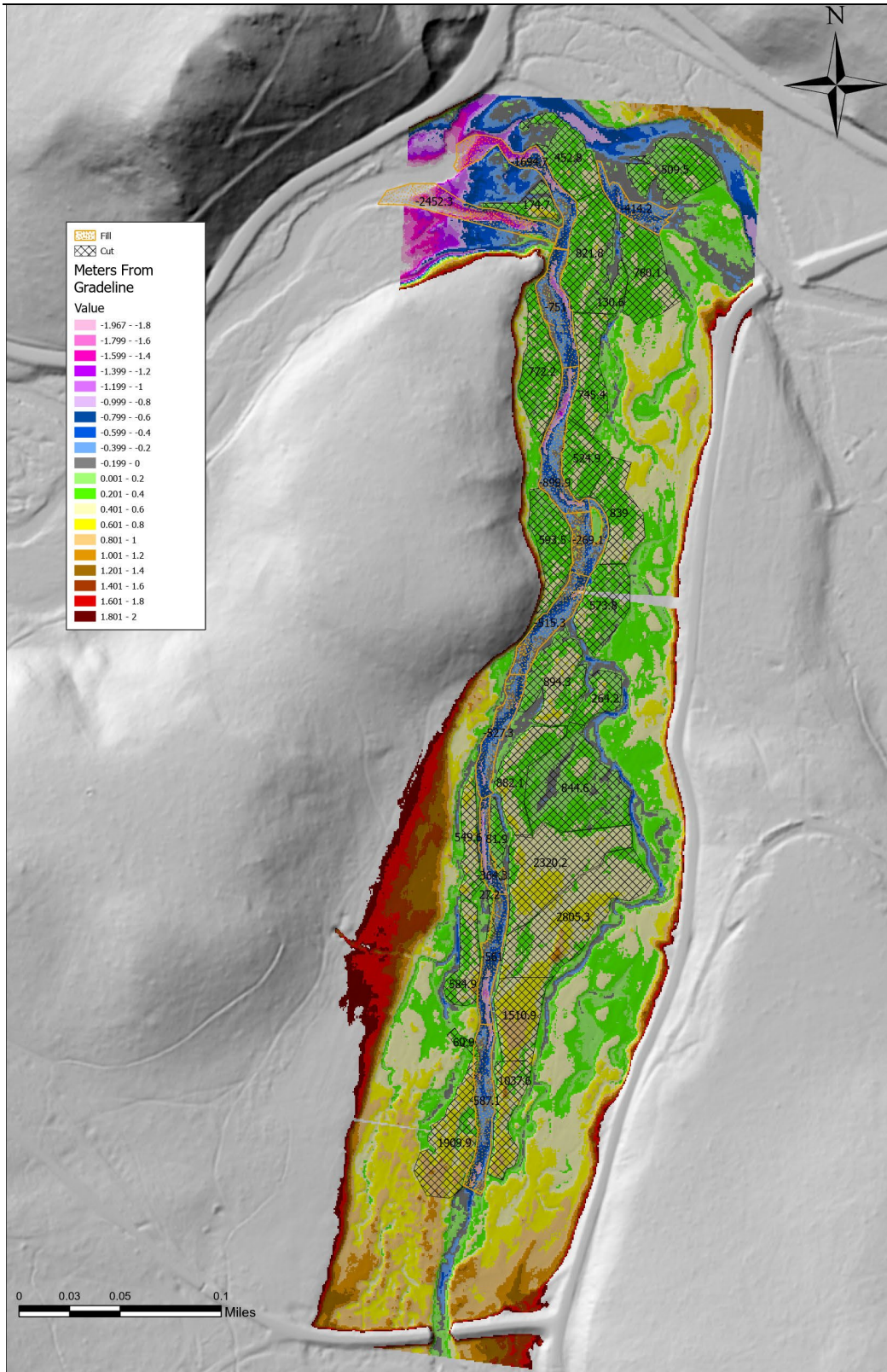


Figure 10. Concept cut and fill areas within Camp creek reach 1 project.

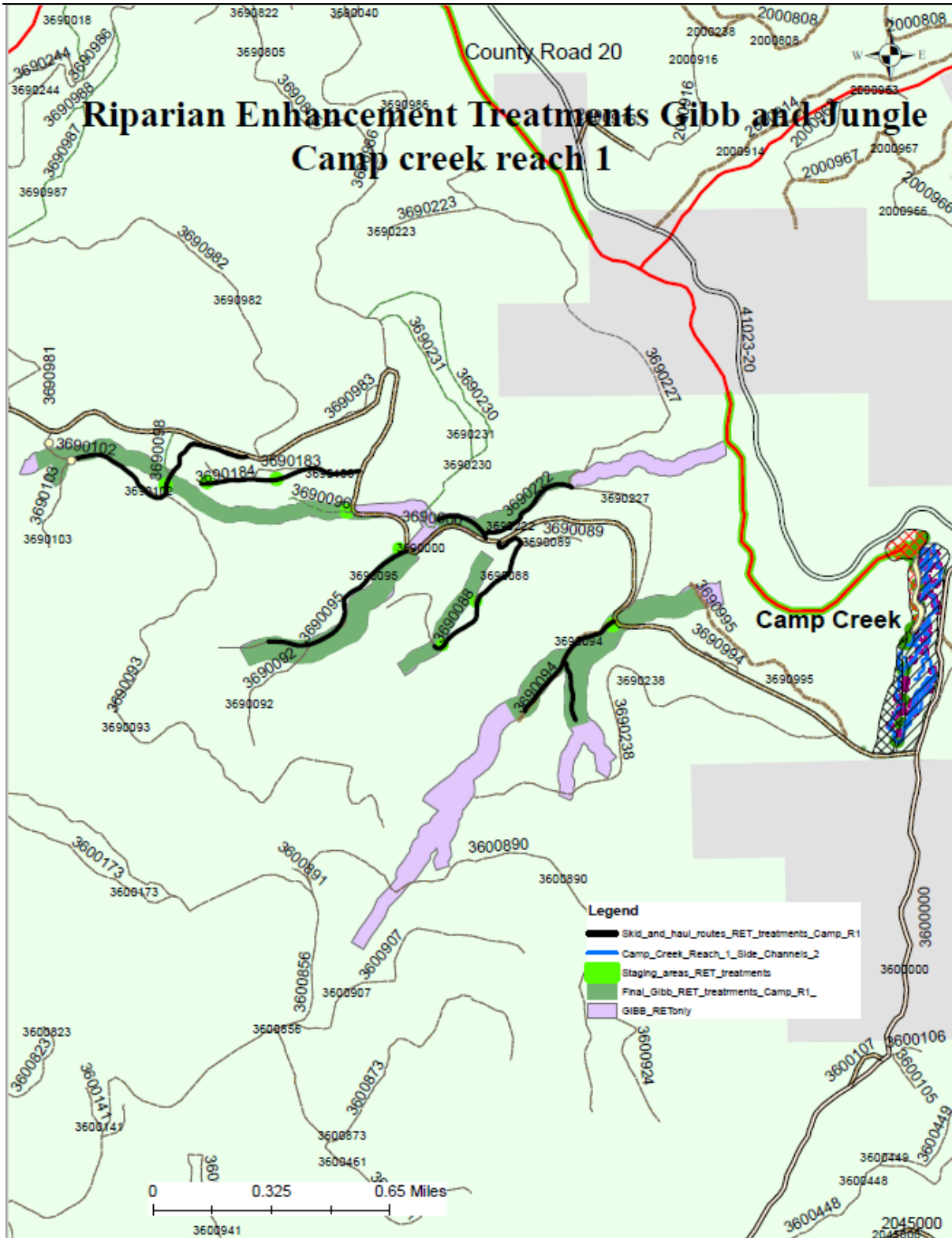


Figure 11. Riparian Enhancement treatment areas on Gibb creek, Jungle creek, and tributaries



Figure 12. Confluence of Camp creek will the Middle Fork john Day during flow of record 2011.

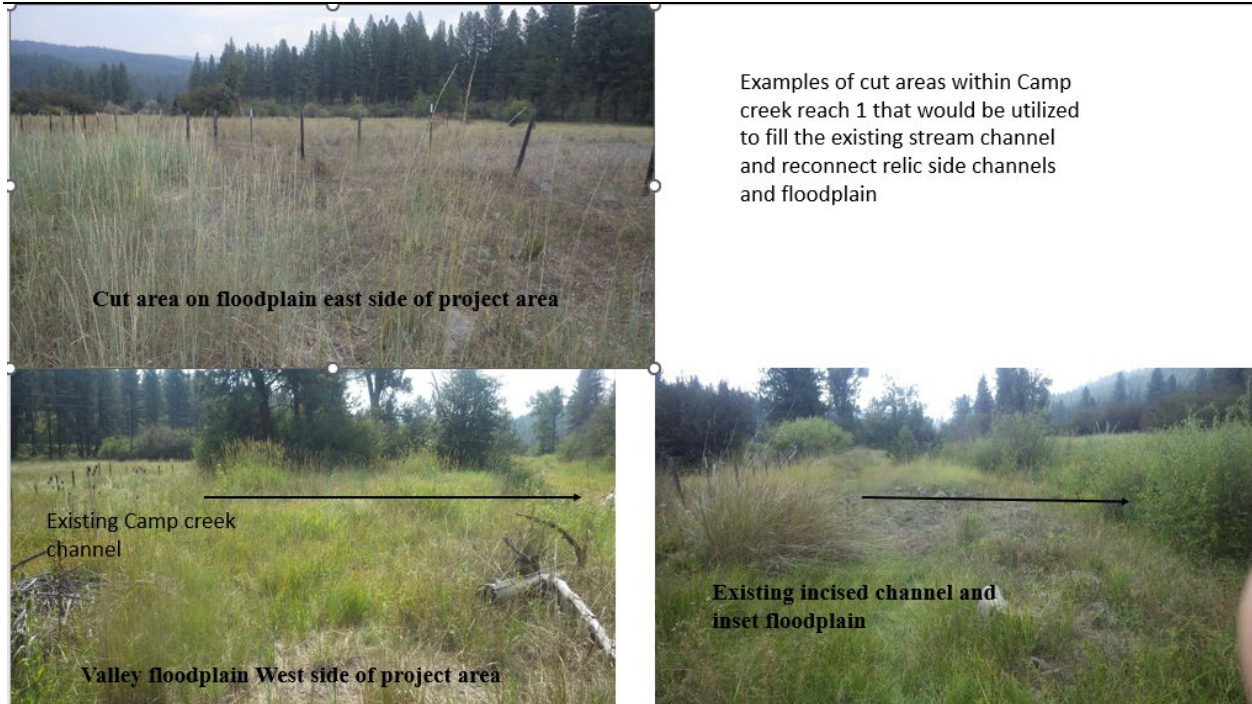


Figure 13. Examples of cut areas within Camp creek reach 1 that would be utilized to fill existing stream channel and reconnect relic side channels and floodplain.



Figure 14. Existing condition Camp creek reach 1.



Figure 15. Valley condition east side



Figure 16. Camp creek reach 1 2023- channel has narrowed but is still within an incised channel and has developed an inset floodplain.



Figure 17. Camp creek log weir removal area reach 1 2011, 2015

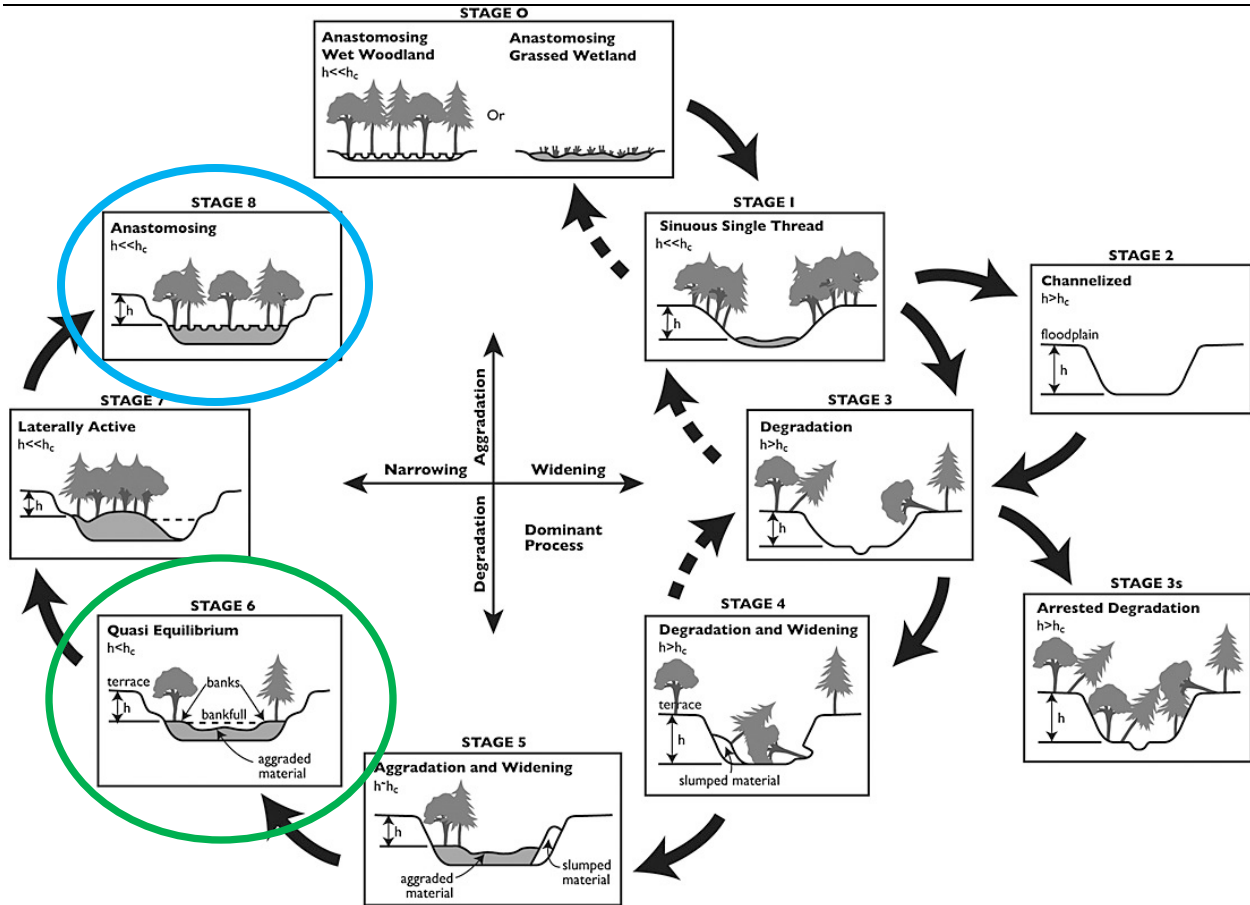


Figure 18. Stream Evolution Model (Cluer and Thorne, 2013) The green circle is the existing channel condition of Camp creek reach 1.

References Cited

- Cluer B. and C. Thorne. 2013. A stream evolution model integrating habitat and ecosystem benefits. *River Research and Applications*. 30(2): 135-154.
- USDA Forest Service. 1990. Malheur National Forest Land and Resource Management Plan. John Day, OR: USDA Forest Service, Malheur National Forest. Available online: <http://www.fs.usda.gov/main/malheur/landmanagement/planning>
- USDA Forest Service. 1995a. Environmental Assessment and Decision Notice for the implementation of interim strategies for managing anadromous fish-producing watersheds in Eastern Oregon and Washington, Idaho and Portions of California (PACFISH). U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. Available online: https://www.fs.usda.gov/detail/malheur/landmanagement/projects/?cid=fsbdev3_033813
- USDA Forest Service. 1995b. Environment Assessment for the Inland Native Fish Strategy; Interim Strategies for Managing Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana, and Portions of Nevada. (INFISH) Portland, OR: U.S. Department of Agriculture, Forest Service Intermountain, Northern, and Pacific Northwest Regions. Available online: <https://www.fs.usda.gov/main/malheur/landmanagement/planning>.
- USDA Forest Service. 2015. Big Mosquito Project and Forest Plan Amendment #78. Record of Decision. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Malheur National Forest. Blue Mountain Ranger District. Grant County, Oregon. Available online: <https://usfs-public.app.box.com/v/PinyonPublic/folder/158749879525>
- USDI Fish and Wildlife Service. 2013. Programmatic Biological Opinion for Aquatic Restoration Activities in the States of Oregon, Washington and portions of California, Idaho and Nevada (ARBO II). [FWS reference: 01EOFW00-2013-F-0090]. Portland, OR: Oregon Fish and Wildlife Office. P. 41.

Project Review

Malheur National Forest Aquatic Restoration Project

NEPA Compliance and Implementation Checklist

Project Number: 01032024 **Date:** 3/4/2024 **Location:** Camp creek

Category: Category 2: Large Wood, Boulder, and Gravel Placement; including tree removal for large wood placement Category 4: Channel Reconstruction/Relocation Category 5: Off- and Side-Channel Habitat Restoration Category 6: Streambank Restoration Category 9: Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering Category 14: Riparian Vegetative Planting Category 16: Beaver Habitat Restoration Category 17: Fisheries, Hydrology, Geomorphology Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration

Project Description: Restoration of Camp creek reach 1.

Heritage (to be completed by heritage specialist)

Y / N Initial

Y KW Specific PDC for heritage addressed (heritage surveys; avoidance areas).

Botany (to be completed by botany specialist)

Y / N Initial

Y AH Specific PDC for botany addressed (sensitive plant surveys).

Y 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

Y SLP 4A big game winter range

N SLP 9 research natural areas

N SLP 6A and 6B wilderness

N SLP 10 semi-primitive non-motorized recreation areas

N SLP 7 scenic area

N SLP 22/22A wild and scenic river

N SLP 8 special interest areas

N SLP inventoried roadless areas

Comments: The nearest Resource Natural area is Dixie Butte 10.5 miles to the Southeast. The Strawberry Wilderness is 22 miles to the South.

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.

For details about 4a big game winter range please see the Land Use Plan Conformance section.

Table 2. Projects design criteria and Malheur Forest Plan compliance checklist

Resource	Signature	Date	Comments
Heritage	<i>/s/ Katee R. Withee</i>	4/3/2024	No effect to Historic Properties
Botany	<i>/s/ Amanda Hardman</i>	4/4/2024	No rare plants encountered within project boundary
Invasive Plants	<i>/s/ Amanda Hardman</i>	4/4/2024	Project will enhance riparian habitat and reduce upland invasive species known in area. PDCs will ensure no new invasions from outside the project area.
Wildlife	<i>/s/ Jenny Henning</i>	4/4/2024	For off-site water developments: Work with Wildlife Biologist when selecting location for spring developments and design criteria for the structure. Raptors: If a raptor exhibiting territorial behavior is observed in the project area, stop implementation work and consult Wildlife Biologist. Closed Roads: Submit a closed road waiver request to Wildlife Biologist if there is a need to access any ML-1 roads with a closed road sign, closed roads that are clearly grown in or plugged, bermed, or gated. Exclosure Development: Utilize wildlife friendly specifications for fence construction and material.
Fish*	<i>/s/ Dan Armichardy</i>	4/3/2024	Proposed project is consistent with ARBO II, RGP-4, and DSL general permit. A short-term negative effect from the proposed actions with a long-term benefit to ESA threatened Mid-Columbia River steelhead.
Hydrology*	<i>/s/ Gregory Shafer</i>	4/8/2024	Follow Malheur National Forest Aquatic EA and ARBO II project design criteria. This project may have short-term impacts to water quality, but long-term benefits to floodplain development, channel form, and riparian function will improve shade and floodplain storage leading to movement toward meeting temperature standards.
Range	<i>/s/ Lance Henderson</i>	4/24/2024	Short term rangeland effect is dramatic with all forage being ripped up on previously grazable land. Long term effect benefits the riparian area taking away upland forage but increasing floodplain. Put Exclosure fence as far away from the NF Road 36 as possible, so cattle do not get trapped between the fence and road.

Resource	Signature	Date	Comments
Soils	<i>/s/ Leslee Crawford</i>	4/4/2024	Additional project design criteria for Soil Protection using Heavy Equipment Off Roads are as follows: 1) Avoid ground-based equipment travel on slopes steeper than 35%, where feasible. 2) No ground-based 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%, with <75% ground cover, (2) 20-30% slope with <50% ground cover, (3) 10-19% slope with <25% ground cover, or (4) with signs of current erosion, such as pedestaling or rilling. 3) For tree-tipping or removal for large woody debris 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 <14 feet wide. 4) Low ground pressure equipment (less than 8.5 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. 5) Tree tipping trails shall be covered with slash to reduce runoff and erosion. 6) If during ground-based equipment operations that ruts, channels, trenches, or depressions in soils are 6 inches deep for a continuous length of 50 feet, repair them. Return displaced soil back into the impacted area and ensure a minimum of 6 inches of slash remains over the repaired area for the duration of activities requiring use of ground-based machinery.
Recreation	<i>/s/ Lisa Arntz</i>	4/15/2024	No impacts to recreation
Special Uses	<i>/s/ Lisa Arntz</i>	4/15/2024	No impacts to special uses
Lands	<i>/s/ Lisa Arntz</i>	4/18/2024	Forest needs to verify boundary has been posted or verify ROW/Easement for the roads on PVT
Mining	<i>/s/ Ray Poe</i>	4/11/2024	No impact to active mining claims or other geologic resources
Engineering	<i>/s/ Scott Officer</i>	4/22/2024	For all pieces of placed large woody debris within 500 feet upstream of a culvert or bridge, the length of each piece of large woody debris with a rootwad should be less than 50% of the effective culvert or greater than 300% of the effective culvert opening or bridge opening width, and the length of each piece of large woody debris without a rootwad should be less than 75% of the effective culvert or bridge opening width. Do not operate wheeled or tracked equipment on the cut and fill slopes of roads. For all hauling and transport activities follow the Malheur Road Use Rules.
Fuels / Fire	<i>/s/ Chad Lauer</i>	4/22/2024	No impact to fire and fuels based on project outline above.

Resource	Signature	Date	Comments
Silviculture	<i>/s/ Zane Murray</i>	4/19/2024	Follow silvicultural prescription for tree felling. The prescription will include diameter limits and species preference.

* 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: */s/ Sean Levin-Pompetzki* Date: 4/24/2024

Line Officer Signature: Date: 5/6/2024

Appendix to the Aquatic Restoration EA

Implementation Description

Project name: Camp creek reach 1

Project number: 01032024

Category 2: Large Wood, Boulder, and Gravel Placement; including tree removal for large wood placement

Category 5: Off- and Side-Channel Habitat Restoration

Category 3: Dam and Legacy Structure Removal

Category 6: Streambank Restoration

Category 9: Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering

Category 14: Riparian Vegetative 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 – Enter action identifier
 - b. Project name – Camp creek reach 1
 - c. Location – Camp creek

Table 3. Project location information

Project Location	Camp creek Reach 1
Stream name	Camp Creek
6th field HUC	Lower Camp creek watershed
Latitude (decimal degrees)	Start -118.793,44.694

Project Location	Camp creek Reach 1
Longitude (decimal degrees)	End -118.798,44.685

d. Agency contact – Dan Armichardy, darmichardy@usa.gov

e. Timing – Start date: 3/4/2024 End date: 10/31/2025

f. Activity category –

Category 2: Large Wood, Boulder, and Gravel Placement; including tree removal for large wood placement

Category 3: Dam and Legacy Structure Removal

Category 4: Channel Reconstruction/Relocation

Category 5: Off- and Side-Channel Habitat Restoration

Category 9: Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering

Category 14: Riparian Vegetative Planting

Category 16: Beaver Habitat Restoration

Category Choose a category

g. Project description – Project description is available in the Proposed Action and Implementation Plan section above.

h. Species affected –

i. Listed species: Mid-Columbia River Steelhead

ii. Critical Habitat: Yes

iii. MIS Species: lamprey, chinook salmon, bull trout (over wintering)

i. Date of submittal – Spring 2024

j. Site assessments – Assessment for contaminants is not required at these locations.

k. Review – A Restoration Review team is required

l. Verification – [Click here to enter text.](#)

m. SOD project notification – [Click here to enter text.](#)

3. Minor Variance: No variances are proposed for this project at this time.

4. NMFS Fish Passage Review and Approval: This work does require review by the NFMS level 1 team member.

5. Restoration Review Team: This work requires 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 2 years, completion and annual reporting will occur in the winter of fiscal year 24 and 25 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 °C 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.

b. **Engineered logjams:** are structures designed to redirect flow and change scour and deposition patterns. To the extent practical, they are patterned after stable natural log jams and can be either unanchored or anchored in place using rebar, rock, or piles (driven into a dewatered area or the streambank, but not in water). Engineered log jams create a hydraulic shadow, a low-velocity zone downstream that allows sediment to settle out. Scour holes develop adjacent to the log jam. While providing valuable fish and wildlife habitat they also redirect flow and can provide stability to a streambank or downstream gravel bar.

i. **NMFS fish passage review and approve:** For engineered log jams that occupy greater than 25 percent of the bankfull area, the action agencies will ensure that the action is individually reviewed and approved by NMFS for consistency with criteria in Anadromous Salmonid Passage Facility Design (NMFS 2011e).

ii. Engineered log jams will be patterned, to the greatest degree possible, after stable natural log jams.

iii. Grade control engineered log jams are designed to arrest channel down-cutting or incision by providing a grade control that retains sediment, lowers stream energy, and increases water elevations to reconnect floodplain habitat and diffuse downstream flood peaks.

iv. Stabilizing or key pieces of large wood that will be relied on to provide streambank stability or redirect flows must be intact, solid (little decay). If possible, acquire large wood with untrimmed rootwads to provide functional refugia habitat for fish.

v. When available, trees with rootwads attached should be a minimum length of 1.5 times the bankfull channel width, while logs without rootwads should be a minimum of 2.0 times the bankfull width.

vi. The partial burial of large wood and boulders may constitute the dominant means of placement, and key boulders (footings) or large wood can be buried into the stream bank or channel

vii. Angle and offset: The large wood portions of engineered log jam structures should be oriented such that the force of water upon the large wood increases stability. If a rootwad is left exposed to the flow, the bole placed into the streambank should be oriented downstream parallel to the flow direction so the pressure on the rootwad pushes the bole into the streambank and bed. Wood members that are oriented parallel to flow are more stable than members oriented at 45 or 90 degrees to the flow.

viii. If large wood anchoring is required, a variety of methods may be used. These include buttressing the wood between riparian trees, the use of manila, sisal or other biodegradable ropes for lashing connections. If hydraulic conditions warrant use of structural connections, such as rebar pinning or bolted connections, may be used. Rock may be used for ballast but is limited to that needed to anchor the large wood.

c. **Porous boulder structures and vanes:**

i. Full channel-spanning boulder structures are to be installed only in highly uniform, incised, bedrock-dominated channels to enhance or provide fish habitat in stream reaches where log placements are not practicable due to channel conditions (not feasible to place logs of sufficient length, bedrock-dominated channels, deeply-incised channels, artificially constrained reaches, etc.), where damage to infrastructure on public or private lands is of concern, or where private landowners will not allow log placements due to concerns about damage to their streambanks or property.

ii. Install boulder structures low in relation to channel dimensions so that they are completely overtopped during channel-forming flow events (approximately a 1.5-year flow event).

iii. Boulder step structures are to be placed diagonally across the channel or in more traditional upstream pointing “V” or “U” configurations with the apex oriented upstream.

- iv. Boulder step structures are to be constructed to allow upstream and downstream passage of all native fish species and life stages that occur in the stream. Plunges shall be kept less than 6 inches in height.
- v. The use of gabions, cable, or other means to prevent the movement of individual boulders in a boulder step structure is not allowed.
- vi. Rock for boulder step structures shall be durable and of suitable quality to assure long-term stability in the climate in which it is to be used. Rock sizing depends on the size of the stream, maximum depth of flow, planform, entrenchment, and ice and debris loading.
- vii. The project designer or an inspector experienced in these structures should be present during installation.
- viii. Full spanning boulder step structure placement should be coupled with measures to improve habitat complexity and protection of riparian areas to provide long-term inputs of large wood.

d. Gravel augmentation:

- i. Gravel can be placed directly into the stream channel, at tributary junctions, or other areas in a manner that mimics natural debris flows and erosion.
- ii. Augmentation will only occur in areas where the natural supply has been eliminated, significantly reduced through anthropogenic disruptions, or used to initiate gravel accumulations in conjunction with other projects, such as simulated log jams and debris flows.
- iii. Gravel to be placed in streams shall be a properly sized gradation for that stream, clean, and non-angular. When possible, use gravel of the same lithology as found in the watershed. Reference the Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings (USDA-Forest Service 2008) to determine gravel sizes appropriate for the stream.
- iv. Gravel can be mined from the floodplain at elevations above bankfull, but not in a manner that would cause stranding during future flood events. Crushed rock is not permitted.
- v. After gravel placement in areas accessible to higher stream flow, allow the stream to naturally sort and distribute the material.
- vi. Do not place gravel directly on bars and riffles that are known spawning areas, which may cause fish to spawn on the unsorted and unstable gravel, thus potentially resulting in redd destruction.
- vii. Imported gravel must be free of invasive species and non-native seeds. If necessary, wash gravel prior to placement.

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, 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.

3. Dam, Tidegate and Legacy Structure Removal

Dam, tidegate and legacy structure removal includes removal of dams, tidegates, channel-spanning weirs, legacy habitat structures, **earthen embankments**, subsurface drainage features, spillway systems, outfalls, pipes, instream flow redirection structures (for example, drop structure, gabion, and groin), or similar devices used to control, discharge, or maintain water levels. Projects will be implemented to reconnect stream corridors, floodplains, and estuaries, reestablish wetlands, improve aquatic organism passage, and restore more natural channel and flow conditions. Any instream water control structures that impound substantial amounts of contaminated sediment are not proposed. Equipment such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

- c. **Removal of legacy structures:** This action includes the removal of past projects, such as large wood, boulder, rock gabions, and other in-channel and floodplain structures.
- d. If the structure being removed contains material (large wood, boulders, concrete, etc.) not typically found within the stream or floodplain at that site, remove material from the 100-year floodplain.
- e. If the structure being removed contains material (for example, large wood or boulders) that is typically found within the stream or floodplain at that site, the material can be reused to implement habitat improvements described under the Large Wood, Boulder, and Gravel Placement activity category in this opinion.
- f. If the structure being removed is keyed into the bank, fill in “key” holes with native materials to restore contours of stream bank and floodplain. Compact the fill material adequately to prevent washing out of the soil during over-bank flooding. Do not mine material from the stream channel to fill in “key” holes.
- g. When removal of buried log structures may result in significant disruption to riparian vegetation or the floodplain, consider using a chainsaw to extract the portion of log within the channel and leaving the buried sections within the streambank.
- h. If a project involves the removal of multiple barriers on one stream or in one watershed over the course of a work season, remove the most upstream barrier first if possible.
- i. If the legacy structures (log, rock, or gabion weirs) were placed to provide grade control, evaluate the site for potential headcutting and incision due to structure removal. If headcutting and channel incision are likely to occur due to structure removal, additional measures must be taken to reduce these impacts.
- j. If the structure is being removed because it has caused an over-widening of the channel, consider implementing other ARBO II restoration categories to decrease the width to depth ratio of the stream to a level commensurate with the geomorphic setting.

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.

- a. **General project design criteria:**
 - i. **Design review:**

1. **NMFS fish passage review and approve** – The action agencies will ensure that the action is individually reviewed and approved by NMFS for consistency with NMFS (2011e).
 2. **Restoration Review Team** – The Action Agencies will ensure that the action is individually reviewed by the Restoration Review Team.
- ii. **Design guidance:**
1. Construct geomorphically appropriate stream channels and floodplains within a watershed and reach context.
 2. 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.
 3. To the greatest degree possible, remove nonnative fill material from the channel and floodplain to an upland site.
 4. 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 where appropriate to support the project goals and objectives.
 5. Structural elements shall fit within the geomorphic context of the stream system. For bed stabilization and hydraulic control structures, constructed riffles shall be preferentially used in pool riffle stream types, while roughened channels and boulder step structures shall be preferentially used in step-pool and cascade stream types.
 6. Material selection (large wood, rock, gravel) shall also mimic natural stream system materials.
 7. Construction of the streambed should be based on Stream Simulation Design principles as described in section 6.2 of Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings or other appropriate design guidance documents (USDA-Forest Service 2008).
- iii. **Project documentation:** Prior to the design review, the project contact will provide NMFS and the restoration review team with the following documentation:
1. Background and problem statement
 - a. Site history.
 - b. Environmental baseline.
 - c. Problem description.
 - d. Cause of problem.
 2. Project description
 - a. Goals/objectives.
 - b. Project elements.
 - c. Sequencing, implementation.
 - d. Recovery trajectory –how does it develop and evolve?
 3. Design analysis
 - a. Technical analyses.
 - b. Computations relating design to analysis.
 - c. References.
 4. River restoration analysis tool: The river restoration analysis tool (restorationreview.com) was created to assist with design and monitoring of aquatic restoration projects. The following questions taken from the tool must be addressed in the project documentation:
 - a. Problem identification
 - i. Is the problem identified?
 - ii. Are causes identified at appropriate scales?
 - b. Project context

- i. Is the project identified as part of a plan, such as a watershed action plan or recovery plan?
 - ii. Does the project consider ecological, geomorphic, and socioeconomic context?
- c. Goals and objectives
 - i. Do goals and objectives address problem, causes, and context?
 - ii. Are objectives measurable?
- d. Alternatives/options evaluation
 - i. Were alternatives/options considered?
 - ii. Are uncertainties and risk associated with selected alternative acceptable?
- e. Project design
 - i. Do project elements collectively support project objectives?
 - ii. Are design criteria defined for all project elements?
 - iii. Do project elements work with stream processes to create and maintain habitat?
 - iv. Is the technical basis of design sound for each project element?
- f. Implementation
 - i. Are plans and specifications sufficient in scope and detail to execute the project?
 - ii. Does plan address potential implementation impacts and risks?
- g. Monitoring and management
 - i. Does monitoring plan address project compliance?
 - ii. Does monitoring plan directly measure project effectiveness?
- h. Monitoring: Develop a monitoring and adaptive plan that has been reviewed and approved by the restoration review team and the services. The plan will include the following:
 - i. Introduction
 - ii. Existing monitoring protocols
 - iii. Project effectiveness monitoring plan
 - iv. Project review team triggers
 - v. Monitoring frequency, timing, and duration
 - vi. Monitoring technique protocols
 - vii. Data storage and analysis
 - viii. Monitoring quality assurance plan
 - ix. Literature cited

5. Off- and Side-Channel Habitat Restoration

Off- and side-channel habitat restoration projects will be implemented to reconnect historic side-channels with floodplains by removing off-channel fill and plugs. Furthermore, new side-channels and alcoves can be constructed in geomorphic settings that will accommodate such features. This activity category typically applies to areas where side channels, alcoves, and other backwater habitats have been filled or blocked from the main channel, disconnecting them from most if not all flow events. These project types will increase habitat diversity and complexity, improve flow heterogeneity, provide long-term nutrient storage and substrate for aquatic macroinvertebrates, moderate flow disturbances, increase retention of leaf litter, and provide refuge for fish during high flows. Equipment such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

- a. **Review and approve:** When a proposed side channel will contain greater than 20 percent of the bankfull flow, the action agencies will ensure that the action is reviewed by the restoration review team and reviewed and approved by NMFS for consistency with criteria in NMFS (2011e).

- b. **Data requirements:** Data requirements and analysis for off- and side-channel habitat restoration include evidence of historical channel location, such as land use surveys, historical photographs, topographic maps, remote sensing information, or personal observation.
- c. **Allowable excavation:** Off- and side-channel improvements can include minor excavation (less than 10 percent of volume) of naturally accumulated sediment within historical channels. There is no limit as to the amount of excavation of anthropogenic fill within historic side channels as long as such channels can be clearly identified through field or aerial photographs. Excavation depth will not exceed the maximum thalweg depth in the main channel. Excavated material removed from off- or side-channels shall be hauled to an upland site or spread across the adjacent floodplain in a manner that does not restrict floodplain capacity.

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 and freshwater deltas:

- 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.

9. Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering Facilities

Livestock fencing, stream crossings and off-channel livestock watering facilities projects will be implemented by constructing fences to exclude riparian grazing, providing controlled access for walkways that livestock use to transit across streams and through riparian areas, and reducing livestock use in riparian areas and stream channels by providing upslope water facilities. Such projects promote a balanced approach to livestock use in riparian areas, reducing livestock impacts to riparian soils and vegetation, streambanks, channel substrates, and water quality. Equipment such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

a. Livestock fencing:

- i. Fence placement must allow for lateral movement of a stream and to allow establishment of riparian plant species. To the extent possible, fences will be placed outside the channel migration zone.
- ii. Minimize vegetation removal, especially potential large wood recruitment sources, when constructing fence lines.
- iii. Where appropriate, construct fences at water gaps in a manner that allows passage of large wood and other debris.

b. Livestock stream crossings:

- i. The number of crossings will be minimized.
- ii. Locate crossings or water gaps where streambanks are naturally low. Livestock crossings or water gaps must not be located in areas where compaction or other damage can occur to sensitive soils and vegetation (for example, wetlands) due to congregating livestock.
- iii. To the extent possible, crossings will not be placed in areas where ESA-listed species spawn or are suspected of spawning (for example, pool tailouts where spawning may occur), or within 300 feet upstream of such areas.
- iv. Existing access roads and stream crossings will be used whenever possible, unless new construction would result in less habitat disturbance and the old trail or crossing is retired.
- v. Access roads or trails will be provided with a vegetative buffer that is adequate to avoid or minimize runoff of sediment and other pollutants to surface waters.
- vi. Essential crossings will be designed and constructed or improved to handle reasonably foreseeable flood risks, including associated bedload and debris, and to prevent the diversion of streamflow out of the channel and down the trail if the crossing fails.
- vii. If necessary, the streambank and approach lanes can be stabilized with native vegetation or angular rock to reduce chronic sedimentation. The stream crossing or water gap should be armored with sufficient-sized rock (for example, cobble-size rock) and use angular rock if natural substrate is not of adequate size.
- viii. Livestock crossings will not create barriers to the passage of adult and juvenile fish. Whenever a culvert or bridge—including bridges constructed from flatbed railroad cars, boxcars, or truck flatbeds—is used to create the crossing, the structure width will tier to project design criteria listed for Stream Simulation Culvert and Bridge Projects under Fish Passage Restoration (PDC 21).
- ix. Stream crossings and water gaps will be designed and constructed to a width of 10 to 15 feet in the upstream-downstream direction to minimize the time livestock will spend in the crossing or riparian area.
- x. When using pressure-treated lumber for fence posts, complete all cutting or drilling offsite (to the extent possible) so that treated wood chips and debris do not enter water or flood-prone areas.
- xi. Riparian fencing is not to be used to create livestock handling facilities or riparian pastures.

c. Off-channel livestock watering facilities:

- i. The development of a spring is not allowed if the spring is occupied by ESA-listed species.
- ii. Water withdrawals must not dewater habitats or cause low stream flow conditions that could affect ESA-listed fish. Withdrawals may not exceed 10 percent of the available flow.
- iii. Troughs or tanks fed from a stream or river must have an existing valid water right. Surface water intakes must be screened to meet the most recent version of NMFS fish screen criteria (NMFS 2011e)(NMFS 2011e)(NMFS 2011e)(NMFS 2011e)(NMFS 2011e)(NMFS 2011e)(NMFS 2011e), be self-cleaning, or regularly maintained by removing debris buildup. A responsible party will be designated to conduct regular inspection and as-needed maintenance to ensure pumps and screens are properly functioning.

- iv. Place troughs far enough from a stream or surround with a protective surface to prevent mud and sediment delivery to the stream. Avoid steep slopes and areas where compaction or damage could occur to sensitive soils, slopes, or vegetation due to congregating livestock.
- v. Ensure that each livestock water development has a float valve or similar device, a return flow system, a fenced overflow area, or similar means to minimize water withdrawal and potential runoff and erosion.
- vi. Minimize removal of vegetation around springs, wet areas.
- vii. When necessary, construct a fence around the spring development to prevent livestock damage.

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.

b. Habitat restoration:

- i. Beaver restoration activities may include planting riparian hardwoods (species such as willow, red osier dogwood, and alder) and building exclosures (such as temporary fences) to protect and enhance existing or planted riparian hardwoods until they are established (Malheur National Forest and the Keystone Project 2007).
- ii. Maintain or develop grazing plans that will ensure the success of beaver habitat restoration objectives.
- iii. As a means to restore desired vegetation (for example, aspen, willow, alder, and cottonwood) associated with quality beaver habitat, follow project design criteria in the *Riparian Vegetation Treatment (controlled burning) b. Noncommercial thinning associated with Moderate-severity burns* category.

17. Fisheries, Hydrology, Geomorphology, Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration

Fisheries, hydrology, geomorphology, wildlife, botany, and cultural surveys in support of aquatic restoration include assessments and monitoring projects that could or are associated with planning, implementation, and monitoring of aquatic restoration projects covered by this opinion. Such support projects may include surveys to document the following aquatic and riparian attributes: fish habitat, hydrology, channel geomorphology, water quality, fish spawning, fish presence, macro invertebrates, riparian vegetation, wildlife, and cultural resources (including excavating test pits less than 1 square meters in size). This also includes effectiveness monitoring associated with projects implemented under ARBO II, provided the effectiveness monitoring is limited to the same survey techniques described in this section.

- a. Train personnel in survey methods to prevent or minimize disturbance of fish. Contract specifications should include these methods where appropriate.
- b. Avoid impacts to fish redds. When possible, avoid sampling during spawning periods.
- c. Coordinate with other local agencies to prevent redundant surveys.
- d. Locate excavated material from cultural resource test pits away from stream channels. Replace all material in test pits when survey is completed and stabilize the surface.
- e. Does not include research projects that have or should obtain a permit pursuant to section 10(a) of the ESA.

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 riparian habitat conservation area 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 4. 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 5. 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/1321/pdf/circ1321.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 outslowed 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 burn plan objectives for all fuel treatment activities within riparian habitat conservation areas.

- 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 burns, but would be limited, and typically no heavy equipment would be used. Prescribed burns 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 enclosure 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 enclosures 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.

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer and lender.