Camp Valley Restoration Project (Phase II)

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 3: Dam and Legacy Structure Removal Category 4: Channel Reconstruction/Relocation Category 5: Off- and Side-Channel Habitat Restoration Category 6: Streambank Restoration Category 7: Set-back or Removal of Existing Berms, Dikes, and Levees Category 8: Reduction/Relocation of Recreation Impacts Category 9: Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering Category 14: Riparian Vegetative Planting Category 16: Beaver Habitat Restoration
Lead Preparer: Dan Armichardy
Location: T10S, R32E, sec. 25, 35, and 36; T11S, R32E, sec. 2, and 10 USGS Quad: Cougar Rock, Susanville
Lease/ Case File/ Serial number: 01032020
Begin Date: 1/10/2020 Due Date: 5/15/2020

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

Purpose and Need

The purpose of this project is to improve riparian and aquatic habitat, including high-priority habitat for Middle Columbia River steelhead listed as threatened under the Endangered Species Act. The need for this project is to increase Middle Columbia River steelhead habitat carrying capacity by increasing productivity for rearing juvenile Middle Columbia River steelhead, restoring connectivity (floodplain and fish passage), and restoring healthy riparian plant communities within tributaries of the Middle Fork John Day River, such as Camp Creek. Chinook salmon (a culturally important native fish) entering Camp Creek also utilize the lower portion of Camp Creek and Lick Creek for rearing.

Water temperatures in lower Camp Creek negatively influence juvenile steelhead over-summer habitats. Riparian vegetation and its processes of streambank shading, root reinforcement, and terrestrial insect

production are limited due to constraining legacy features like railroad grade levees, lowered water tables, ungulate browsing, and loss of overbank flooding. The lack of these processes in core areas of Camp and Cottonwood Creeks negatively impacts the ecosystem functions of available habitat to maintain cold water for cool water fisheries in and downstream of these reaches. Railroad grade and other legacy berms within the floodplain are composed almost entirely of floodplain soil scraped up from the valley floor. Because of this, many of the floodplains adjacent to the railroad grade lack suitable soil for hardwoods.

Alder vegetation was established following livestock management changes in the early 1980s. Willow and cottonwood communities are present in isolated numbers; however, they lack multiple age classes and distribution to maintain riparian resilience, provide shade and habitat, and provide for beaver life cycle histories that will self-maintain Camp Creek long into the future. Flood flows that have overtopped the railroad grade have developed multiple headcuts due to a lack of riparian plant communities with root masses that can withstand overbank flooding processes. As a result, upland plant species occur on the dry side of the floodplain (see Figure 9, Figure 12, Figure 13, Figure 15, and Figure 16). Where the creek runs through the floodplain, single threaded, long riffles with large substrate sizes are abundant where beaver likely maintained multithreaded channels and willow/cottonwood communities over centuries.

Middle Columbia River steelhead numbers in the John Day River Basin are considerably lower than historical levels. To address this sharp decline in fish numbers, the state of Oregon, National Marine Fisheries Service, and Northwest Power and Conservation Council have developed large-scale recovery plans. The Middle Columbia River Steelhead Distinct Population Segment Endangered Species Act Recovery Plan (NMFS 2009) rated the Camp Creek watershed as a high priority for habitat protection and restoration in the Middle Fork John Day River subbasin. Key watershed issues in these subwatersheds are: fish passage barriers; altered hydrology and sediment routing; and degraded floodplains, riparian communities, stream channels (habitat diversity and quantity), and water quality (stream temperature). This project would improve floodplains degraded by past management, before best management practices were implemented. Removing earthen berms (constructed as part of railroad grades or other logging-related activities) that impede flow across the floodplain, while increasing connectivity to historical side channels and wetlands, would decrease stream power and reduce peak flows in Camp Creek reaches 3, 4, and 5, and at the confluences of Cougar and Cottonwood Creeks with Camp Creek. These sections along Camp Creek have streambeds composed of cobble substrate that, with lowered stream energy (sediment routing), would transition to gravel, increasing spawning potential within the treated reaches. More importantly, water would spread out, inundating the entire valley and recreating the historical depositional environment. This altered hydrology would extend the duration of peak flows, while increasing the survivability of emerging fry and available habitat for juvenile rearing within proximity of existing adult spawning habitat. The inundation of the valley would increase organic matter exchange and improve riparian productivity of newly planted or protected cottonwoods, willows, water birch, and dogwood plants in critical shade areas (riparian communities).

Removing floodplain constraints, while increasing connectivity towards historical side channels and wetlands would put these streams on a trajectory to self-adjust over the long term. Increasing cottonwood, willow, water birch, and dogwood cover would increase seed production benefits over time to self-maintain the rest of the reach, while increasing beaver habitat that would improve the ecohydrologic[1] functions of this particular landscape.

[1] Ecohydrology: an interdisciplinary field studying the interactions between water and ecosystems. These interactions may take place within waterbodies such as rivers and lakes, or on land in forests, deserts, and other terrestrial ecosystems. Areas of research in ecohydrology include: transpiration and plant water use, adaption of

The desired conditions of the Camp Valley Restoration (Phase II) project area are:

- Improved riparian vegetation (increased algae mats; brook grasses; spike rushes; sedges; bulrushes; young and middle age class groups of cottonwood, willow, and dogwood species; and composition of wetland obligate plant communities);
- Restored side channels and wetlands (increased length and duration of side channels activated during high flows and increased water retention through naturally connected low lying areas on the floodplain);
- Improved floodplain condition (increased area of the floodplain that can be inundated frequently);
- Reduced stream temperature (reduced width-to-depth ratio of the stream and increased effective shade);
- Improved bed and channel form (decreased average riffle length);
- Restored altered flow timing (increased residence time of water on Camp Creek's floodplain through connection of side channels, frequent inundation of floodplain, and connection to wetlands);
- Increased juvenile rearing habitat in proximity of threatened Middle Columbia River steelhead spawning habitat overall; and
- Increased juvenile rearing capacity for Chinook salmon which currently enter Camp Creek and its main tributary (Lick Creek) from the Middle Fork John Day River.

Land Use Plan Conformance

The project falls under Management Area 3B "Anadromous Riparian Areas" of the Malheur National Forest Land and Resource Management Plan (Malheur Forest Plan). 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 (1) provide the necessary habitat to maintain or increase populations of management indicator species; (2) manage the composition and productivity of key riparian vegetation to protect or enhance riparian-dependent resources; (3) 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; (4) 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; (5) maintain or enhance water quality and/or fish habitat through instream or riparian improvements; and (6) 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 project also overlaps Management Area 4A "Big Game Winter Range." Management Area 4A, standard 7 applies: "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 of 2020 or 2021.

Camp Creek reaches 3, 4, and 5 (including confluence of Cougar Creek), and Cottonwood Creek reach 1 are within a category 1 riparian habitat conservation area (fish-bearing stream) as designated by PACFISH/INFISH[2], and contain critical habitat for Middle Columbia River steelhead as designated by the National Marine Fisheries Service.

organisms to their water environment, influence of vegetation on stream flow and function, and feedbacks between ecological processes and the hydrological cycle.

[2] PACFISH refers to USDA Forest Service 1995a, and INFISH refers to USDA Forest Service 1995b.

All proposed activity categories comply with the Malheur Forest Plan as amended by INFISH (USDA Forest Service 1995b) and PACFISH (USDA Forest Service 1995a).

Proposed Action and Implementation Plan

Implementation actions are scheduled to begin in 2020 and may continue through fall of 2021. The following project activities would occur in Camp Creek reaches 3, 4 (upper and lower), and 5 (including the confluence of Cougar Creek with Camp Creek); and Cottonwood Creek reach 1 (at the confluence of Cottonwood Creek with Camp Creek):

- Remove railroad grade that effectively splits Camp Valley floodplain in half.
- Redistribute material from high spots (other than the railroad grade) that impede the channel's access to the historical floodplain to fill low spots within the floodplain.
- Redistribute the soil from the railroad grade (which is soil that was historically scraped from Camp Creek) to provide more nutrient-rich soil for riparian grasses and shrubs.
- Reconnect secondary side channels.
- Place wood at strategic locations within railroad grade removal areas that would inundate the floodplain and reconnect side channels during a 2-year flood event.
- Slow streamflow across the floodplain to facilitate sediment deposition on the floodplain and provide more nutrient-rich soil for riparian plants.
- Fence existing and newly planted hardwoods and shrubs (using a combination of panels, and electric or buck and pole fence).
- Plant cottonwoods, willows, and water birch.
- Tip trees in riparian habitat conservation areas.
- Rebuild existing wildlife exclosure.
- Rest or temporarily exclude riparian pastures where work takes place within Camp Creek from livestock grazing using multiple strategies (for example, electric fencing, small wildlife hog panel exclosures, etc.).
- Harden livestock crossings.
- Restore cool water tributary confluences of Cougar and Cottonwood Creeks with Camp Creek.

Table 1. Overview of all metrics associated with Camp Valley Restoration Project Phase II (Camp Creek reaches 3 through 5 and Cottonwood Creek reach 1)

Metric	Reach 3	Reach 4	Reach 5	Cottonwood	Total
Total reach length (miles)	1.0	1.5	0.2	0.1	**2.8**
Reconnected floodplain (acres)	12.7	26.8	5.0	0.5	**45.0**
Side channels activated (miles)	1.9	2.1	n/a	n/a	**4.0**
Primary wood structures (20 trees per structure)	14.0	24.0	n/a	n/a	**38.0**
Secondary wood structures (10 trees per structure)	10.0	21.0	n/a	n/a	**31.0**
Tree tipping units (acres)	10.3	18.9	38.9	1.0	**69.1**

Note: Reach 5 includes the tree tipping units along Cougar Creek and Trail Creek.

Table 2. Approximate volumes of bedload material (in cubic yards) that would be redistributed across the floodplain from railroad grade (or legacy) berms and additional high spots

Activity	Camp Reach 3	Camp Reach 4 (Upper)	Camp Reach 4 (Lower)	Camp Reach 5	Cottonwood Reach 1	Total
Railroad grade berm removal only (cubic yards)	824	2,459	7,357	3,138	2,602	**16,380**
Railroad grade berm removal plus additional high spots/berms (cubic yards)	10,781	9,068	17,636	3,138	2,602	**43,225**

Note: Reach 5 includes restoration activities occurring at the confluence of Cougar Creek.

General Actions and Timeline

Pre-project Work (March to June 15)

- Identifying and flagging botany avoidance areas and invasive weed treatment areas;
- Identifying and flagging heritage avoidance areas;
- Identifying and flagging trees within tipping units and developing guidelines with silviculture;
- Meeting with permittees to discuss the project prior to turn out;
- Arranging multiple field trips with the Oregon Natural Desert Association for discussion of revegetation; and
- Working with the Public Affairs Office to place informational signs in the project area and submit an article to the Blue Mountain Eagle describing the project to notify the public of implementation in 2020.

Camp Creek

Phase 1 (June 15 to July 15)

Work within Camp Creek reach 3 would entail tipping trees with an excavator from the identified tipping units starting June 15th. These trees would be used within reaches 3, 4, and 5 to meet wood requirements or, if adequate in number, would be moved to other locations within the project area. Some trees may be used in Trail Creek, placing tipped trees from either the units nearby or from outside the primary shade zone to create log jams (within the first 0.4 mile of the stream to incorporate Middle Columbia River steelhead critical habitat). Trees may also be tipped in Cougar Creek (0.5 miles) to further restore the stream's confluence with Camp Creek and to move both streams towards meeting wood requirements. The newly tipped trees would augment 2014 restoration efforts and would be used within the newly restored alluvial fan where legacy berm and railroad grade were removed along Camp Creek. Old log jams on Cougar Creek would not be moved or adjusted. Trees would not be harvested within the primary shade zone. Trees along the tipping units in Cougar and Trail Creeks would not be harvested if they are close enough to the stream to be future instream large wood (typically meaning a 100-foot buffer would be left between the harvest unit and the stream). Trees tipped in the riparian habitat conservation area of Cougar Creek would be transported along a legacy skid trail. Aspen are located within the tipping unit adjacent to National Forest System Road 3600000. As part of this work, all conifers would be removed around aspen per silviculture and wildlife prescriptions. A grapple skidder would be used to move trees to desired locations adjacent to National Forest System Road 3600000, and a flatbed log truck or off-road dump truck would be required to move these trees to staging areas. Once at staging areas, a grapple skidder would be used to move trees to wood structure locations. Potential staging areas and wood structures are identified in the maps below (See Figure 2 through Figure 5).

One D10 bulldozer[3] and one D6 bulldozer[4] or equivalent would be used to grade floodplain, road berm, and railroad grade (legacy berms) to desired elevations within specified locations. This work would occur prior to the instream work window. Activation of floodplain and side channels would not occur during this period. This work would also occur at the tributary confluences of Cottonwood, Cougar, and Pepper Creeks which have had their alluvial fans altered by legacy berms.

There are fences along most of the riparian habitat conservation area units within Camp Creek reach 5. These fences would need to be removed prior to project activities and reinstalled after. During fence repair, the unit 3 fence (near confluence of Camp and Cougar Creeks) may be moved higher up and off the floodplain.

Phase II (July 15 to August 15)

Instream work would involve two to three excavators building primary and secondary wood structures, placing wood and posts or anchoring structures on the floodplain, and adding roughness to floodplain side channels by installing bank stabilization and planting riparian hardwoods. Within over-widened sections of Camp Creek in the project area, fill from legacy berms would be used to reduce the width of the existing channel by half, using streambank restoration bioengineering techniques. This work would entail installing sedge plugs and willow wattles, as well as brush mattresses for stabilizing newly created streambanks.

Legacy berms associated with log weirs were not modified within the project area during activities completed in 2011. However, log weirs that were removed, and wood placed in proximity to those weirs as part of the 2011 work would be modified during this project to effectively interact with the stream channel, facilitate deposition, and activate side channels that were disconnected due to the railroad grade and log weir legacy berms.

Phase III (October 15 to November 12)

A mixture of wetland plant and riparian hardwood planting would entail planting of approximately 5,000 willows, 5,000 cottonwoods, and 1,500 water birch in both reaches 3 and 4 initially, and planting of approximately 5,000 willows, 5,000 cottonwoods, and 5,000 dogwoods initially in reach 5 of Camp Creek. Planting strategy is two-fold with one planting focusing on outside meanders to maximize stream shade, and the other planting on both the mainstem of Camp Creek and within newly activated side channels following legacy berm removal. The focus in the fall would be on planting rooted stock for reaches 3 and 4, and cut stakes for reach 5; however, rooted stock may be available and utilized. Planting focus areas include newly activated floodplains and side channels, as well as streambank restoration areas.

Planting would occur in the fall once hardwoods enter dormancy. Between October 15 and October 31 on normal years, rainfall returns and a 2-week window ideal for planting occurs. Seeding of native seed on bare soil areas would also occur during this time. A mini or small-tracked excavator would be used for planting, with the capability to dig holes and trenches for planting.

A combination of electric fencing, hog panel configurations with a narrow internal width, and potential rest of gather pasture for up to 3 years would be used for hardwood protection. Electric fencing, hog panel maintenance, and set up would be the responsibility of aquatic staff and not the permittee. Because of the project's proximity to National Forest System Road 3600000, it is anticipated that maintenance, set up,

[3] Refers to a Caterpillar D10, a track-type tractor manufactured by Caterpillar Inc.
[4] Refers to a Caterpillar D6, a track-type tractor manufactured by Caterpillar Inc.

and monitoring would be generally straightforward. It is also anticipated that with strong coordination with pasture riders, any downed electric fence could be reported to Forest Service staff and addressed in an appropriate manner. Because designated monitoring areas would not be fenced, it is possible livestock may concentrate in these areas. These areas would be monitored as part of the end of year standard monitoring, and if increased use is noted or standards are not met, adaptive management would be implemented, which includes several methods for minimizing impacts through coordination with the permittee.

Portions of the lowermost livestock fence in Camp Creek reach 3 are located on top of the railroad grade down the middle of the valley. As part of the work for this reach, these fences would be relocated to the toeslope of the valley. Four existing livestock crossings within Camp Creek reach 4 and Cougar Creek are identified for improvement and hardening. In addition, the existing wildlife exclosure within Camp Creek reach 4 is in disrepair with portions falling down. As part of the work for this reach, it would be rebuilt and expanded to the toeslope of the valley. A user-created road adjacent to the exclosure with ruts in the floodplain would be removed, and National Forest System Road 3600000 would be available to access the dispersed campsite previously accessed by the user-created road.

Electric fencing, hog panel, and construction and material costs for the Camp Creek reach 4 wildlife exclosure rebuild were submitted as part of the grant application for the Camp Valley Restoration Project through the Oregon Watershed Enhancement Board.

Cottonwood Creek

Work on Cottonwood Creek reach 1 entails legacy berm removal and grading of the confluence with Camp Creek, along with wood placement using an excavator and D6 bulldozer or equivalent. Individual key wood pieces (greater than 21 inches diameter at breast height and at least twice as long as the channel is wide) would be tipped using an excavator for 0.1 miles upstream from the confluence with Camp Creek (see Figure 7 and Figure 8) within the riparian habitat conservation area, and trees would be obtained onsite. An additional legacy berm would be removed and reused, and wood would be placed using an excavator on the remaining 0.06 miles. A culvert replacement was included on a separate 2019 aquatic checklist and was replaced that year.

Metrics Associated with Actions by reach:

Camp Creek reach 3:

- Total reach length: 1.0 miles
- Reconnected floodplain: 12.67 acres
- Miles of side channel activated: 1.9 miles
- Primary wood structures (20 trees per structure): 14 structures
- Secondary wood structures (10 trees per structure): 10 structures
- Tree tipping within riparian habitat conservation area: 10.3 acres
- Volume of material to be redistributed across floodplain:
    - Railroad grade berm removal only: 824 cubic yards
    - Railroad grade berm plus additional high spots and other legacy berms: 10,781 cubic yards

Camp Creek reach 4:

- Total reach length: 1.5 miles
- Reconnected floodplain: 26.84 acres
- Miles of side channel activated: 2.1 miles

- Primary wood structures (20 trees per structure): 24 structures
- Secondary wood structures (10 trees per structure): 21 structures
- Tree tipping within riparian habitat conservation area: 18.9 acres
- Volume of material to be redistributed across floodplain:
    - Upper Reach:
        - Railroad grade berm removal only: 2,459 cubic yards
        - Railroad grade berm plus additional high spots/berms: 9,068 cubic yards
    - Lower Reach:
        - Railroad grade berm removal only: 7,357 cubic yards
        - Railroad grade berm plus additional high spots/berms: 17,636 cubic yards
    - Wildlife Exclosure Replacement (relocation of recreation impacts):
        - Linear feet: 4,540.8 feet
        - Acres: 14.5 acres

Camp Creek reach 5:

- Total reach length: 0.1 mile on Camp Creek; 0.1 mile on Cougar Creek (from confluence of Camp Creek)
- Reconnected floodplain: 5.00 acres
- Tree tipping within riparian habitat conservation area: 38.9 acres total
    - Units along Camp Creek: 6.6 acres
    - Units along Trail Creek: 18.0 acres
    - Units along Cougar Creek: 14.3 acres
- Volume of material to be redistributed across floodplain
    - Railroad grade berm removal only: 3,138 cubic yards

Cottonwood Creek reach 1:

- Total reach length: 0.1 miles
- Reconnected floodplain: 0.50 acres
- Legacy berm modification length: 0.06 miles
- Confluence roughness improvement: 25 trees between 6 and 12 inches diameter at breast height (streambank stabilization)
- Tree tipping within riparian habitat conservation area: 1.0 acre
- Volume of material to be redistributed across floodplain
    - Railroad grade berm removal only: 2,602 cubic yards

Project-Specific Design Criteria

The following project design criteria would apply for this project:

- Heritage avoidance areas shall be flagged with orange and black striped flagging prior to implementation.
- Post-implementation monitoring shall occur per State Historic Preservation Office (SHPO) concurrence. Heritage mitigation shall be negotiated after concurrence is established.
- Avoid loss of snags.
- Road drainage or general road conditions that control drainage, at locations where heavy or other equipment leave roads to enter the off-road portions of the project area, shall be inspected before the equipment leaves the project and repaired.
- Range will be involved in the design of fenced areas.
- Permittees will not be responsible for additional fences created as part of this project.

- After 5 years, the fences will be assessed for need and/or removed. Buck and pole aspen fences will be maintained five years after installation and then left to deteriorate.
- Construct fences out of buck and pole material when feasible.
- Livestock use monitoring will not occur in the project area during the year(s) of project implementation.
- If possible, a soil scientist or other qualified individual should be present during railroad berm soil relocation operations to ensure damage to soil resources are kept to a practical minimum.
- Avoid heavy machinery travel ("HMT") on slopes steeper than 35 percent, where feasible. No heavy equipment shall be allowed on highly erodible soil. "Highly erodible soil" generally means areas larger than 50 feet diameter, and either: (1) steeper than 30 percent, with less than 75 percent ground cover, (2) 20 to 30 percent slope with less than 50 percent ground cover, (3) 10 to 19 percent slope with less than 25 percent ground cover, or (4) with signs of current erosion, such as pedestaling or rilling.
- On areas where existing skid trails spaced 100 to 140 feet apart can be reused, reuse the old skid trails. Otherwise, space heavy machinery travel ways ("trails") about 120 feet apart where practical, using existing skid trails where possible and appropriate.
- Travel ways ("trails") should average less than 14 feet wide.
- Low ground pressure equipment (less than 8.5 pounds per square inch [psi]) can be allowed off trails on dry, snow-covered, or frozen soil. For soil protection practices "dry" means July through September, or obviously dry in 6 of the top 10 inches in other months; "snow-covered" means sufficient snow strength and depth to prevent compaction; "frozen" means the soil is frozen at least through the top 4 inches.
- Tree tipping trails shall be covered with slash to reduce runoff and erosion.
- Contact the Forest Lands Special Uses Administrator for the specific location of the buried utility line located within National Forest System Road 3600000 road prism/right-of-way within the project area.
- Contact 811 prior to any excavation or ground disturbing activities within National Forest System Road 3600000 road prism/right-of-way to locate buried utility and protect the 20-foot utility right-of-way from project disturbances.
- All projects shall have legal access identified and secured prior to project implementation or contractual obligations. Project Leads shall work directly with Engineering and Forest Land Zone to verify and secure legal access.
- Ensure compliance with the National Forest Boundary Line Policy prior to project implementation and all adjacent landowners are adequately notified of project activities.
- If mineral material from Malheur National Forest rock quarries is used, minerals staff shall be notified.
- Follow Malheur Road Rules and Road Maintenance Specifications during and after operations.
- Do not construct fence within 6 feet of road ditch or road cut slope.
- Do not construct fence across any road without installing a gate or cattle guard.
- Do not construct new road barriers, including earth berms, without approval from Engineering.
- Follow Industrial Fire Precaution Level (IFPL) standards and request waivers when necessary to continue work.

Figures

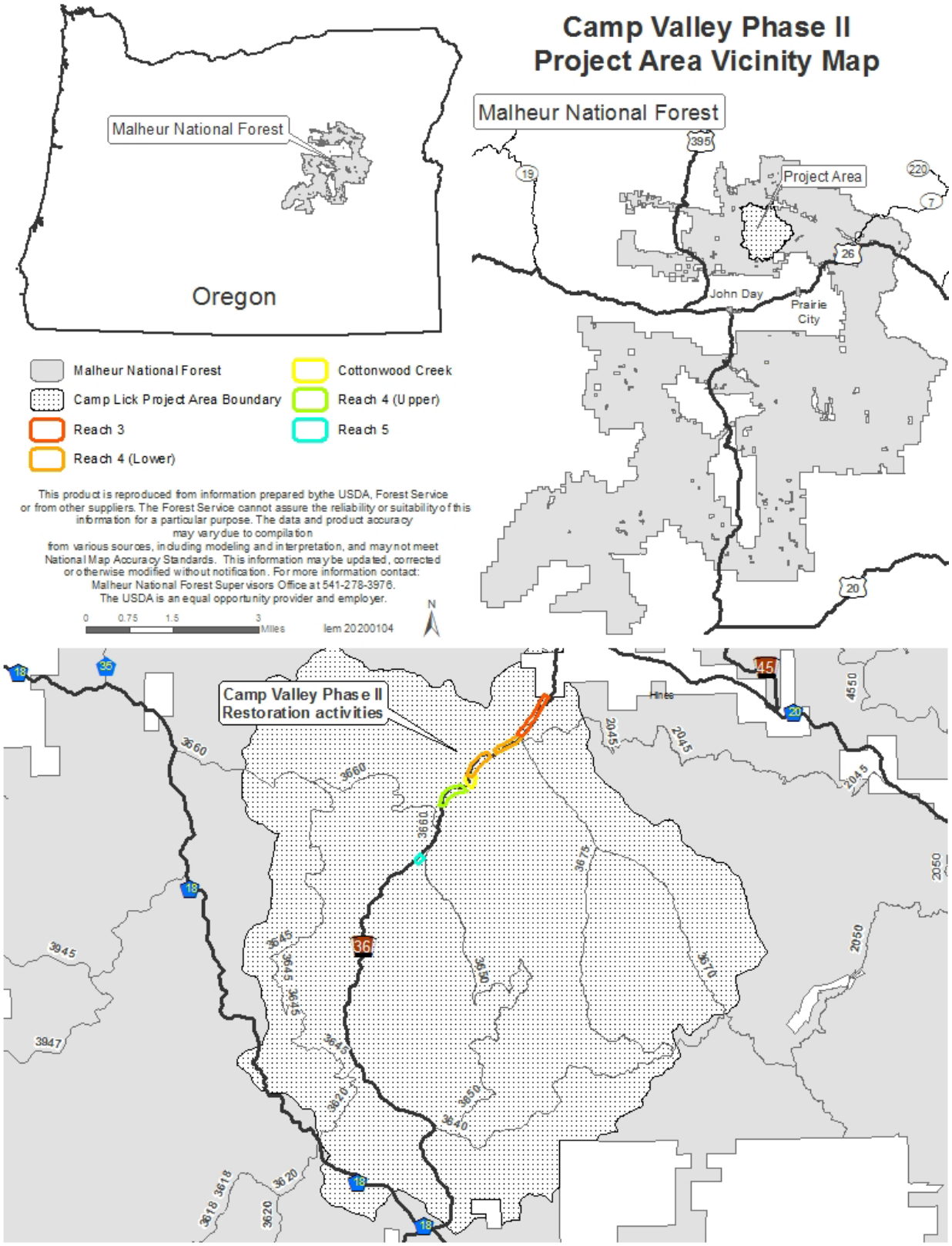

Figure 1. Camp Valley Phase II project area vicinity map

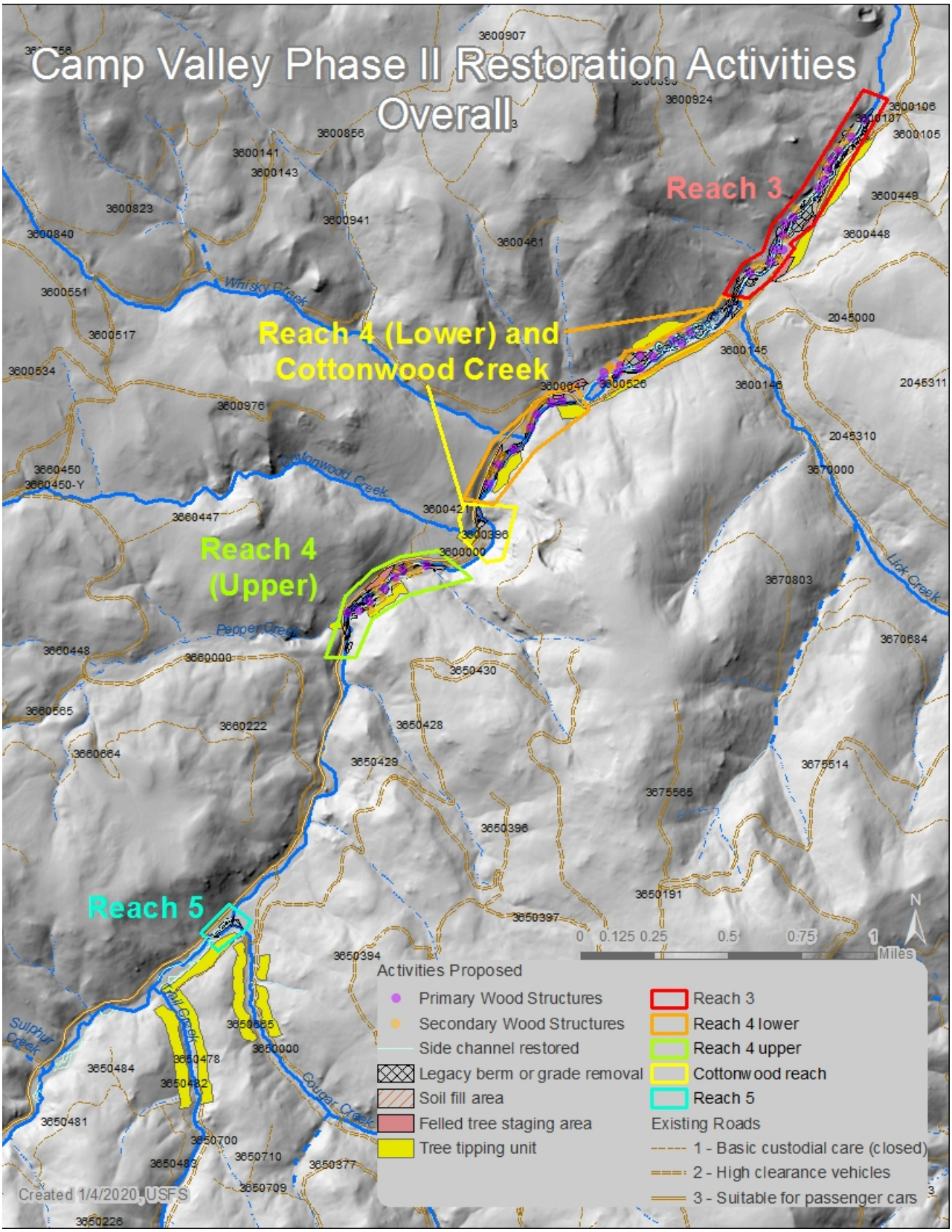

Figure 2. Map of restoration activities proposed along Camp Creek within the Camp Valley Phase II Project

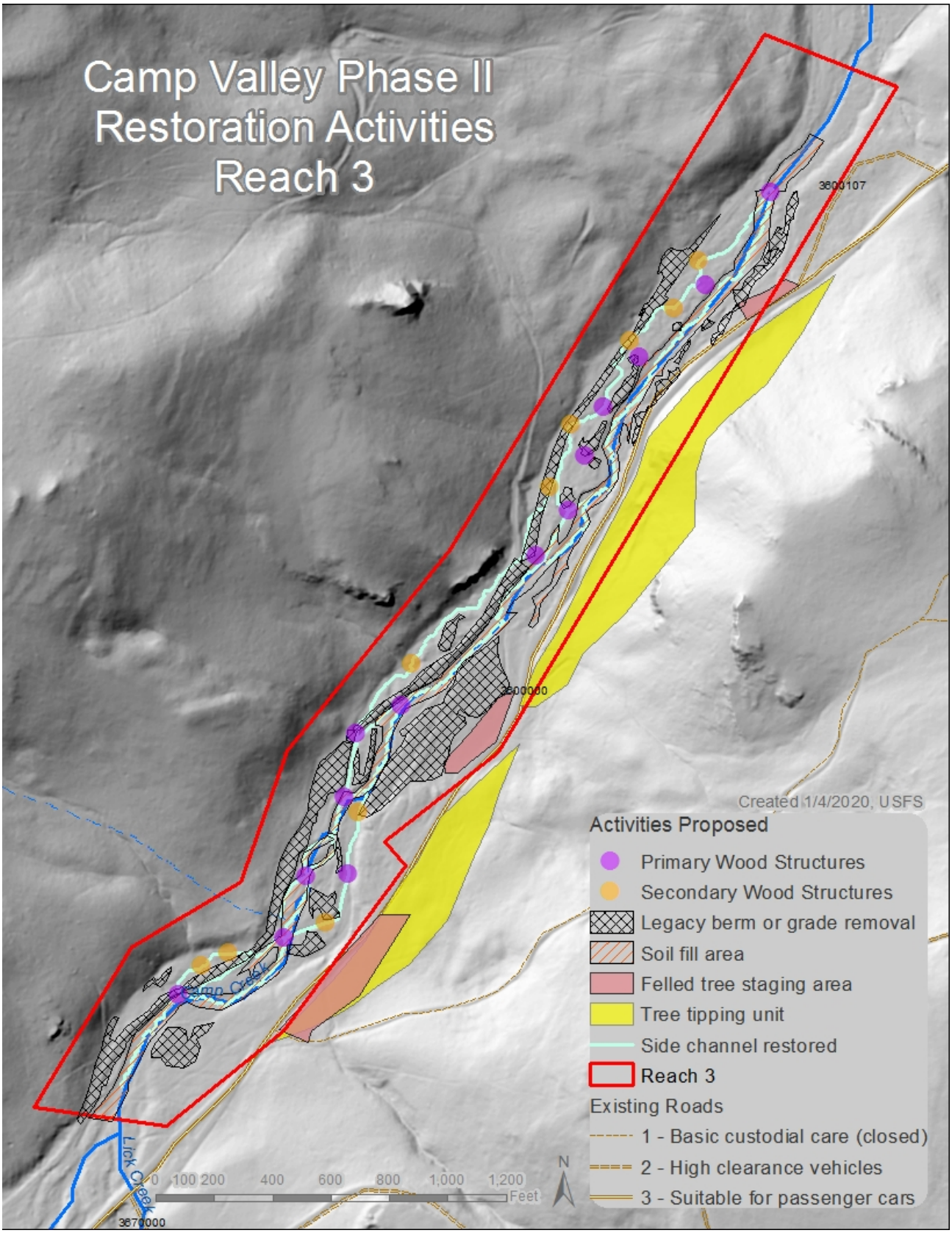

Figure 3. Map of restoration activities proposed along Camp Creek reach 3

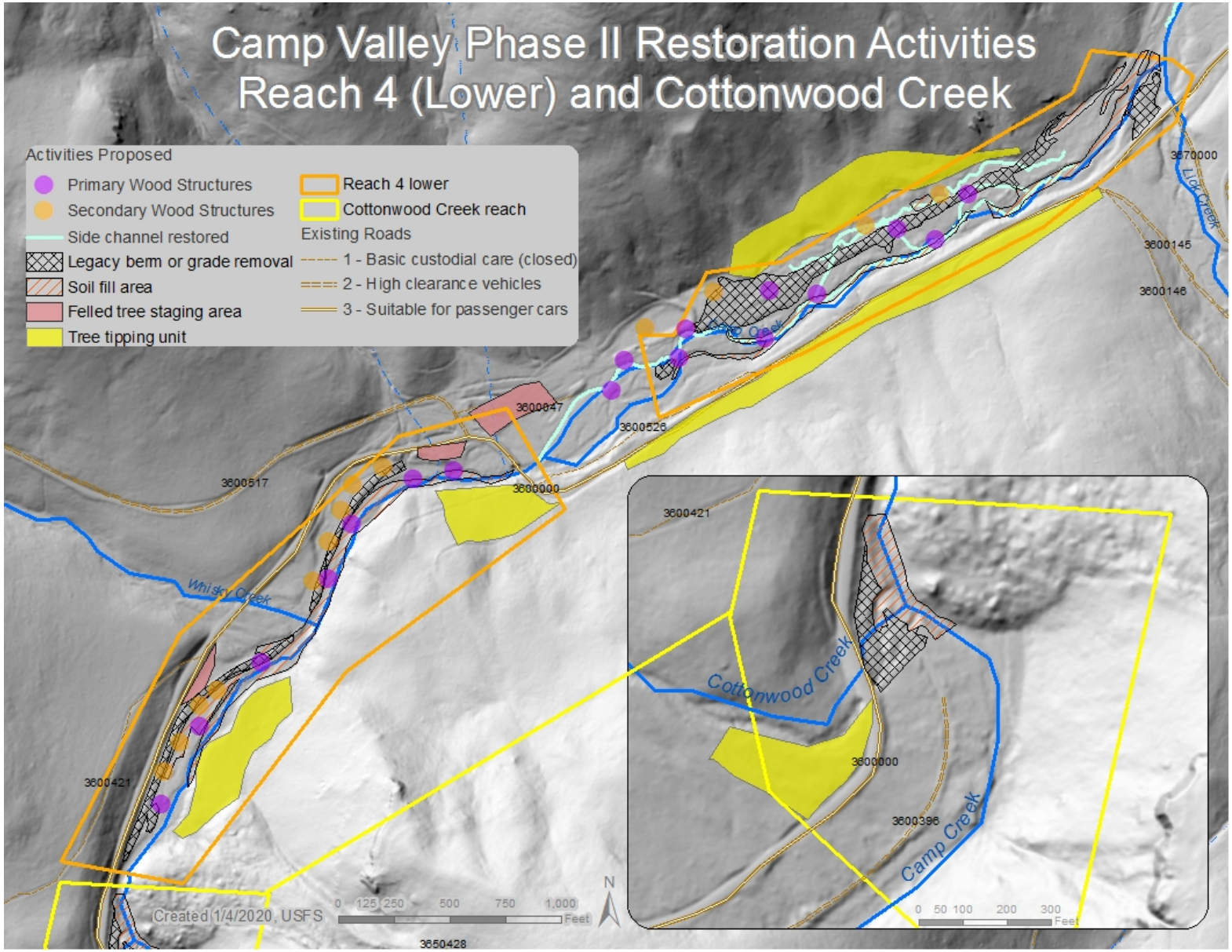

Figure 4. Map of restoration activities proposed along Camp Creek, reach 4 (lower) and the confluence of Cottonwood Creek

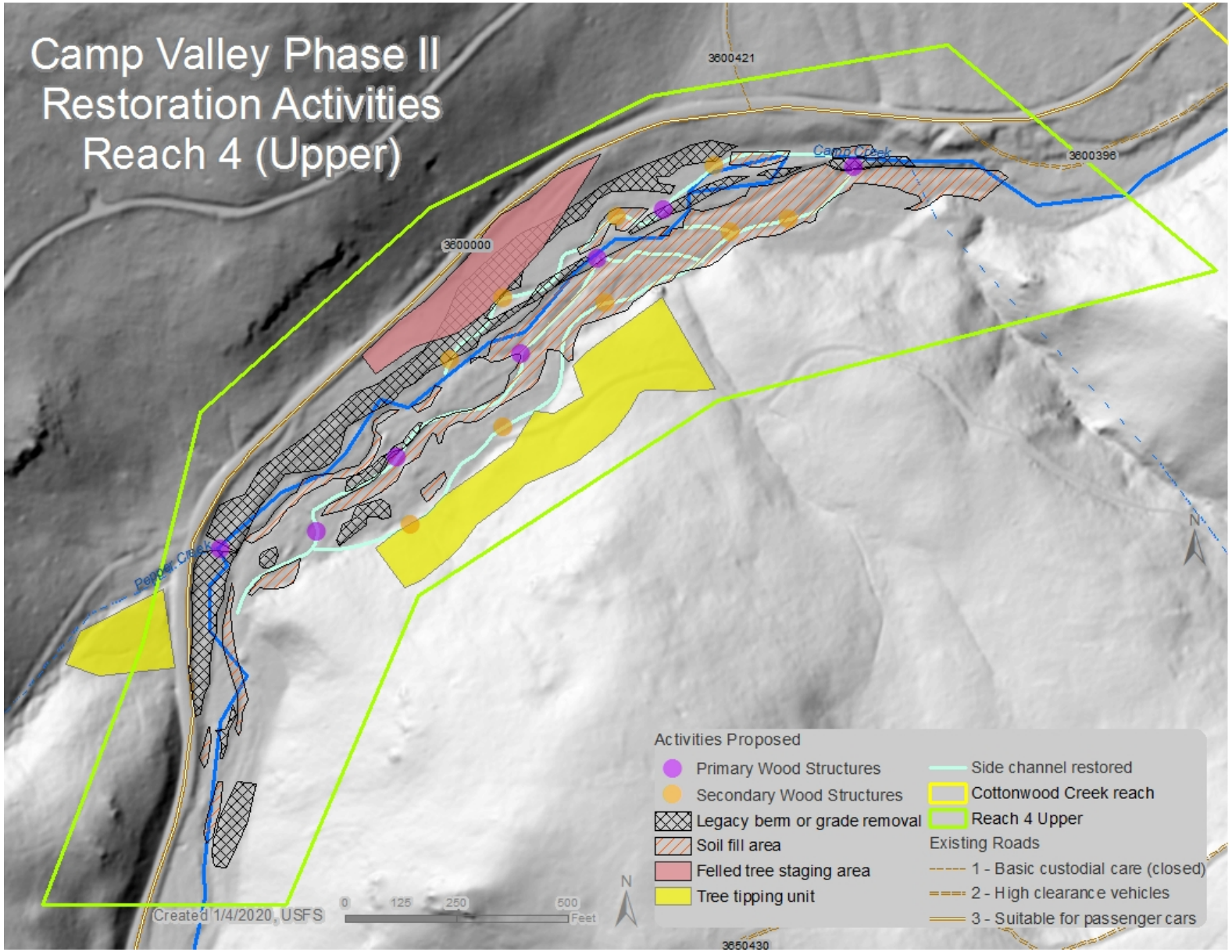

Figure 5. Map of restoration activities proposed along Camp Creek, reach 4 (upper)

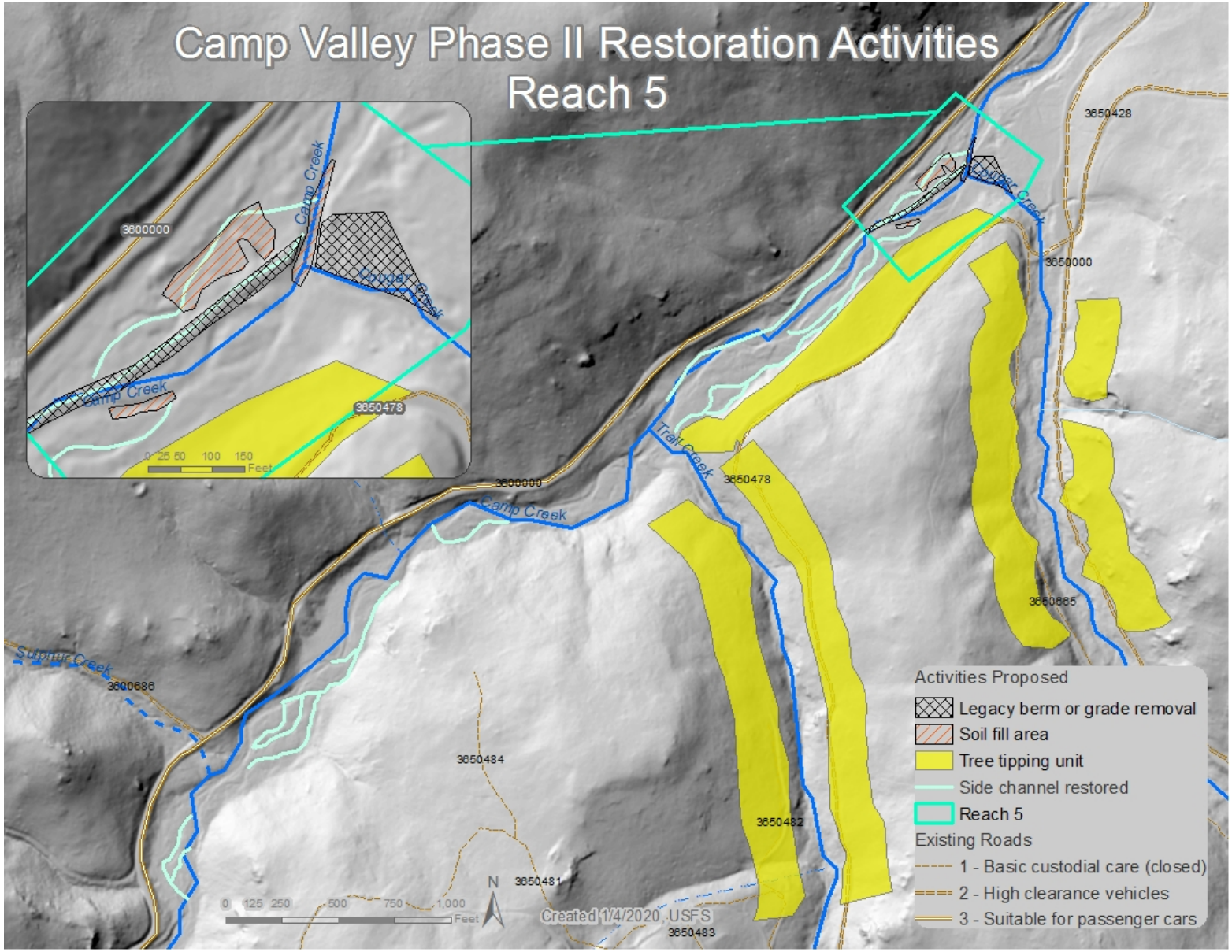

Figure 6. Map of restoration activities proposed along Camp Creek, reach 5

Figure 7. Cottonwood Creek confluence with Camp Creek

Figure 8. Cottonwood Creek looking downstream from culvert replacement site, towards confluence with Camp Creek

Figure 9. Camp Creek reach 5 railroad grade with separated floodplain looking downstream

Figure 10. Camp Creek reach 5 legacy berm

Figure 11. General channel conditions and hardwood community within Camp Creek reach 5

Figure 12. Railroad grade along Camp Creek reach 5 looking upstream near confluence with Cougar Creek. Arrow depicts where the stream channel is stuck against the railroad grade.

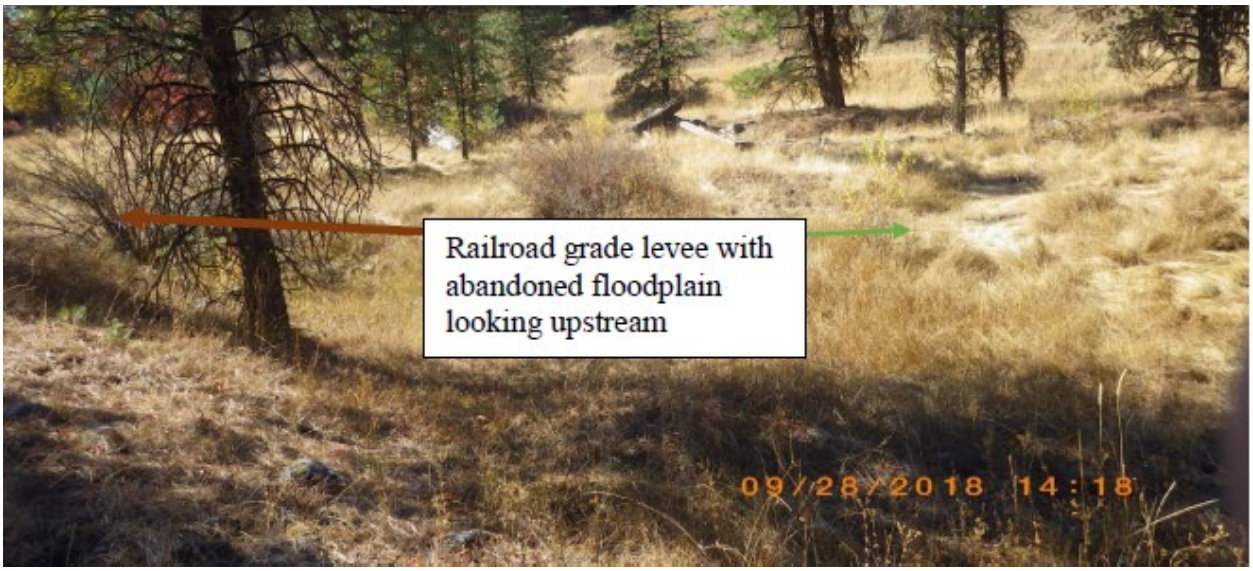

Figure 13. General characteristics of abandoned and separated floodplain due to railroad grade levee, Camp Creek reach 5. Railroad levee is on the left, floodplain is on the right.

Figure 14. Railroad grade levee with wildlife exclosure fence, Camp Creek reach 4 (west side of stream)

Figure 15. Floodplain on the east side of the wildlife exclosure, Camp Creek reach 4

Figure 16. Abandoned floodplain on west side of railroad grade outside wildlife exclosure, Camp Creek reach 4 (wildlife exclosure is proposed to be expanded to valley toe slope)

Figure 17. Active beaver dam complex within exclosure, Camp Creek reach 4

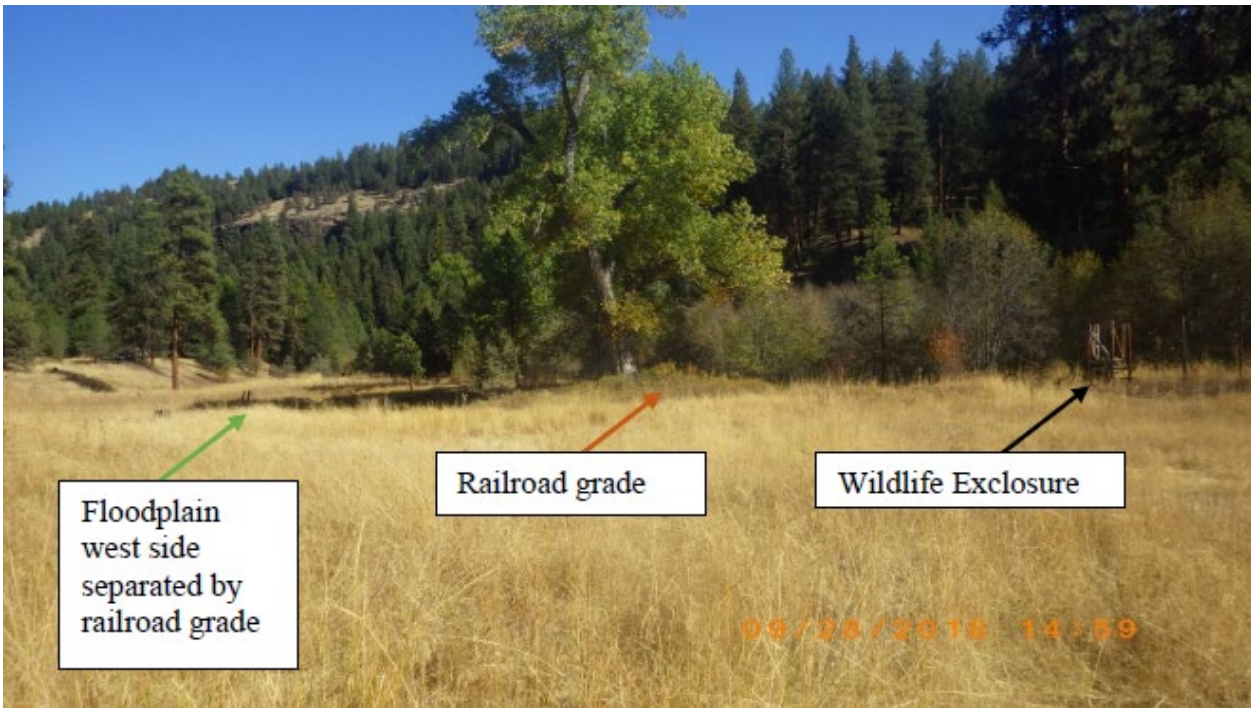

Figure 18. Camp Creek reach 4, west side of valley floodplain separated by railroad grade (Camp Creek is located where all the vegetation is)

Figure 19. Railroad grade levee going up the middle of valley, Camp Creek reach 4

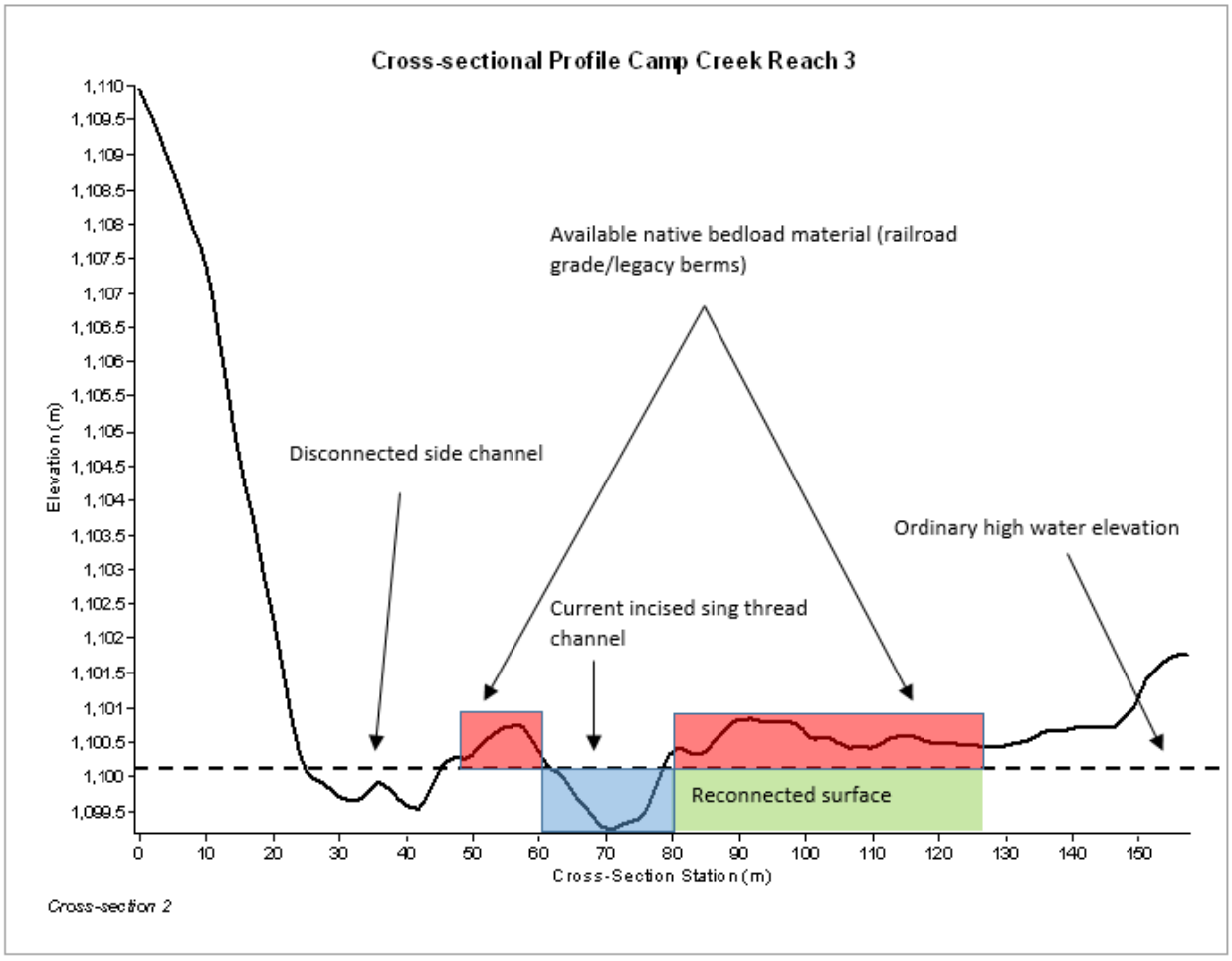

Figure 20. Cross-sectional illustration of incised channel confined by legacy berms and disconnected from the historical floodplain on Camp Creek reach 3

References Cited

Middle Fork IMW Working Group. 2017. Middle Fork John Day River Intensively Monitored Watershed Final Summary Report.

NMFS (National Marine Fisheries Service). 2009. Middle Columbia River steelhead distinct population segment ESA recovery plan. National Marine Fisheries Service, Northwest Region.

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Project Review

Malheur National Forest Aquatic Restoration Project
NEPA Compliance and Implementation Checklist

Project Number: 01032020 **Date:** 1/27/2020 **Location:** T10S, R32E, sec. 25, 35, and 36; T11S, R32E, sec. 2, and 10. USGS Quad: Cougar Rock, Susanville
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 6: Streambank Restoration
Category 7: Set-back or Removal of Existing Berms, Dikes, and Levees
Category 8: Reduction/Relocation of Recreation Impacts
Category 9: Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering
Category 14: Riparian Vegetative Planting
Category 16: Beaver Habitat Restoration
Project Description: See Proposed Action and Implementation Plan section

Heritage (to be completed by heritage specialist)

Y / N	Initial	
Y	*KW*	Avoidance areas will be flagged with orange/black striped flagging prior to implementation. A map with avoidance areas will be supplied to the project lead. Post-implementation monitoring required by SHPO concurrence.

Botany (to be completed by botany specialist)

Y / N	Initial	
Y	*JLB*	Specific PDC for botany addressed (sensitive plant surveys).
Y	*JLB*	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	*LEM*	4A big game winter range	**N**	*LEM*	9 research natural areas
N	*LEM*	6A and 6B wilderness	**N**	*LEM*	10 semi-primitive non-motorized recreation areas
N	*LEM*	7 scenic area	**N**	*LEM*	22/22A wild and scenic river
N	*LEM*	8 special interest areas	**N**	*LEM*	inventoried roadless areas

Comments: See Land Use Plan Conformance section above for management area compliance.

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

Table 3. Projects design criteria and Malheur Forest Plan compliance checklist

Resource	Signature	Date	**Comments** (additional PDCs may be noted if necessary) *May continue on
Heritage	*/s/ Katee R. Withee*	3/25/2020	See PDCs above. Inventory completed by AINW and submitted to SHPO by BPA (lead federal agency). SHPO concurrence required for implementation. Mitigation via MOU will be negotiated after SHPO concurrence.

Resource	Signature	Date	**Comments** (additional PDCs may be noted if necessary) *May continue on
Botany	*/s/ Jessi Brunson*	3/12/2020	Follow PDCs to avoid impacts to rare plants.
Invasive Plants	*/s/ Jessi Brunson*	3/12/2020	Follow PDCs to avoid spreading invasive plants.
Wildlife	*/s/ Dustin Hollowell*	4/8/2020	Follow established PDC, particularly avoiding loss of snags.
Fish*	*/s/ Dan Armichardy*	2/27/2020	Project is consistent with MNF Aquatic Restoration EA and ARBO II. Short term negative effects to ESA threatened steelhead and critical habitat with an overall long term benefit for floodplain connectivity, habitat complexity, riparian vegetation, and water temperatures.
Hydrology*	*/s/ Mary Lou Welby*	5/14/2020	Road Inspection and Repair PDC shall be incorporated. The document titled "(PARTIAL) ANALYSIS of ALTERED STREAM FLOWS in CAMP CREEK DRAINAGE (MFJDR)," dated May 14, 2020, and emailed to B. Parker on May 14, 2020 shall be incorporated into the Project Record. Project improves watershed conditions including shade and water temperature, including for Clean Water Act 303(d) listed segments, overall.
Range	*/s/ Nick Stiner*	4/15/2020	Range will be involved in the design of fenced areas. Permittees will not be responsible for additional fences created. After 5 years, the fences will be assessed for need and/or removed. Buck and pole aspen fences will be maintained five years after installation and then left to deteriorate. Effort will be made to construct the fence out of buck and pole material. Livestock use monitoring will not occur in the project area during the year of project implementation.
Soils	*/s/ Leslee Crawford*	4/6/2020	Follow established PDCs below. If possible, a Soil Scientist or other qualified individual should be present during railroad berm soil relocation operations to ensure damage to soil resources are kept to a practical minimum. Avoid heavy machinery travel ("HMT") on slopes steeper than 35 percent, where feasible. No heavy equipment shall be allowed on highly erodible soil. "Highly erodible soil" generally means areas larger than 50 feet diameter, and either: (1) steeper than 30 percent, with less than 75 percent ground cover, (2) 20-30 percent slope with less than 50 percent ground cover, (3) 10-19 percent slope with less than 25 percent ground cover, or (4) with signs of current erosion, such as pedestaling or rilling. For tree-tipping or removal for LWD projects ---- On areas where existing skid trails spaced 100 to 140 feet apart can be reused, reuse the old skid trails. Otherwise, space HMT travel ways about 120 feet apart where practical, using existing skid trails where possible and appropriate. Travel ways ("trails") should average less than 14 feet wide. Low ground pressure equipment (less than 8.5 pounds per square inch [psi]) can be allowed off trails on dry, snow-covered, or frozen soil. For soil protection practices "dry" means July through September, or obviously dry in 6 of the top 10 inches in other months; "snow-covered" means sufficient snow strength and depth to prevent compaction; "frozen" means the soil is frozen at least through the top 4 inches. Tree tipping trails shall be covered with slash to reduce runoff and erosion.

Resource	Signature	Date	**Comments** (additional PDCs may be noted if necessary) *May continue on
Recreation	*/s/ Kevin Green*	3/16/2020	No impacts to developed recreation resources or Forest Plan recreation standards.
Special Uses	*/s/ Stacia Kimbell*	3/26/2020	Buried utility line located within FSR 3600 road prism/right-of-way. Contact the Forest Lands Special Uses Administrator for the specific location within the project area. Contact 811 prior to any excavation or ground disturbing activities within FSR 3600 right-of-way vicinity to locate buried utility and protect the 20' buried utility right-of-way from project disturbances.
Lands	*/s/ Stacia Kimbell*	3/26/2020	All projects shall have legal access identified and secured prior to project implementation or contractual obligations. Project Leads shall work directly with Engineering and Forest Land Zone to verify and secure. Ensure compliance with the National Forest Boundary Line Policy prior to project implementation and all adjacent landowners are adequately notified of project activities.
Mining	*/s/ Hannah Grist*	3/30/2020	No mine claims will be effected by the proposed activities. Please report any material used from MNF rock quarries.
Engineering	*/s/ Matthew Smith*	4/9/2020	Follow Malheur Road Rules and Road Maintenance Specifications during and after operations. Do not construct fence within 6 feet of road ditch or road cut slope and do not construct fence across any road without installing a gate or cattle guard. Do not construct new road barriers, including earth berms, without approval from engineering.
Fuels / Fire	*/s/ Ed Clark*	2/10/2020	No impact to Fire and Fuels. Follow IFPL standards and request waivers when necessary to continue work.
Silviculture	*/s/ Amanda Lindsay*	4/9/2020	No effects to forest vegetation.

* 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/ Bethany Parker* Date: 5/14/2020

Line Officer Signature: */s/ Robert Foxworth* Date: 5/15/2020

Appendix to the Aquatic Restoration EA

Implementation Description

Project name: Camp Valley Restoration (Phase 2)

Project number: 01032020

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 6: Streambank Restoration
Category 7: Set-back or Removal of Existing Berms, Dikes, and Levees
Category 8: Reduction/Relocation of Recreation Impacts
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 – 01032020
    b. Project name – Camp Valley Restoration (Phase II)
    c. Location – T10S, R32E, sec. 25, 35, and 36; T11S, R32E, sec. 2 and 10

Table 4. Project location information

Project Location	Camp Valley Restoration (Phase 2)	
Stream Name	Camp Creek	
6th field HUC	Camp Creek	
Location	Latitude (decimal degrees)	Longitude (decimal degrees)
Camp Creek reach 5 (Top)	44.633	-118.847
Camp Creek reach 5 (bottom)	44.635	-118.845

Camp Creek reach 4 (Top)	44.648	-118.837
Camp Creek reach 4 (bottom)	44.664	-118.81
Camp Creek reach 3 (Top)	44.666	-118.808
Camp Creek reach 3 (bottom)	44.673	-118.801
Cottonwood Creek Reach 1 (Top)	44.654	-118.833
Cottonwood Creek Reach 1 (Bottom)	44.654	-118.828

d. Agency contact – Dan Armichardy, daniel.armichardy@usda.gov
e. Timing – Start date: 6/15/2020 End date: 10/31/2020
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 6: Streambank Restoration
Category 7: Set-back or Removal of Existing Berms, Dikes, and Levees
Category 8: Reduction/Relocation of Recreation Impacts
Category 9: Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering
Category 14: Riparian Vegetative Planting
Category 16: Beaver Habitat Restoration

g. Project description – Project description is available in the Proposed Action and Implementation Plan section above.
h. Species affected –
    i. Listed species: Middle Columbia River steelhead
    ii. Critical Habitat: Middle Columbia River steelhead
    iii. MIS Species: Steelhead and redband trout
i. Date of submittal – To be completed in Spring 2020, at least 30 days prior to implementation.
j. Site assessments – Assessment for contaminants is not required at these locations.
k. Review – NMFS fish passage review and Restoration Review Team review are not required.
l. Verification –
m. SOD project notification –

3. Minor Variance: Minor variances may be requested during Oct. 15- Nov. 15 to allow planting of riparian hardwoods on newly activated floodplains and off channels with equipment.
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 does require review by the restoration review team.
6. Project Completion Report: To be completed after implementation
7. Annual Program Report: This project would be completed within 1 year, completion and annual reporting would occur in the winter of FY21 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 ºC 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 reds.

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.

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

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

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

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

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

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

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

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.

a. **Dam removal:**

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 criteria in NMFS (2011e).

2. **Restoration review team:** The action agencies will ensure that the action is individually reviewed by the restoration review team.

ii. Dams greater than 10 feet in height require a long-term monitoring and adaptive management plan that will be developed between the services and the action agency.

iii. At a minimum, the following information will be necessary for review:

3. A longitudinal profile of the stream channel for 20 channel widths downstream of the structure and 20 channel widths upstream of the reservoir area (outside of the influence of the structure) shall be used to determine the potential for channel degradation.

4. A minimum of three cross-sections – one downstream of the structure, one through the reservoir area upstream of the structure, and one upstream of the reservoir area (outside of the influence of the structure) to characterize the channel morphology and quantify the stored sediment.

5. Sediment characterization to determine the proportion of coarse sediment (greater than 2 millimeters) in the reservoir area.

6. A survey of any downstream spawning areas that may be affected by sediment released by removal of the water control structure or dam. Reservoirs with a d35 greater than 2 millimeters (65 percent of the sediment by weight exceeds 2 millimeters in diameter) may be removed without excavation of stored material, if the sediment contains no contaminants; reservoirs with a d35 less than 2 millimeters (65 percent of the sediment by weight is less than 2 millimeters in diameter) will require partial removal of the fine sediment to create a pilot channel, in conjunction with stabilization of the newly exposed streambanks with native vegetation.

7. 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.

b. **Tide gate removal:** This action includes the removal of tide gates.

i. **NMFS fish passage review and approve:** For projects that constrain tidal exchange, the action agencies will ensure that the action is individually reviewed and approved by the NMFS for consistency with criteria in NMFS (2011e).

ii. Follow Work Area Isolation, Surface Water Withdrawals, and Fish Capture and Release (PDC 20). If a culvert or bridge will be constructed at the location of a removed tide gate, then the structure should be large enough to allow for a full tidal exchange.

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 poolriffle 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, 16 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.

6. Streambank Restoration

Streambank restoration will be implemented through bank shaping and installation of coir logs or other soil reinforcements as necessary to support riparian vegetation; planting or installing large wood, trees, shrubs, and herbaceous cover as necessary to restore ecological function in riparian and floodplain habitats; or a combination of the above methods. Such actions are intended to restore banks that have been altered through road construction, improper grazing, invasive plants, and more. Benefits include increased amounts of riparian vegetation and associated shading, bank stability, and reduced sedimentation into stream channels and spawning gravels. Equipment such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

a. Without changing the location of the bank toe, restore damaged streambanks to a natural slope and profile suitable for establishment of riparian vegetation. This may include sloping of unconsolidated bank material to a stable angle of repose or the use of benches in consolidated, cohesive soils.
b. Complete all soil reinforcement earthwork and excavation in the dry. When necessary, use soil layers or lifts that are strengthened with biodegradable fabrics and penetrable by plant roots.
c. Include large wood to the extent it would naturally occur. If possible, large wood should have untrimmed root wads to provide functional refugia habitat for fish. Wood that is already within the stream or suspended over the stream may be repositioned to allow for greater interaction with the stream.
d. Rock will not be used for streambank restoration, except as ballast to stabilize large wood.
e. Use a diverse assemblage of vegetation species native to the action area or region, including trees, shrubs, and herbaceous species. Vegetation, such as willow, sedge, and rush mats, may be gathered from abandoned floodplains, stream channels, etc.
f. Do not apply surface fertilizer within 50 feet of any stream channel.
g. Install fencing as necessary to prevent access to revegetated sites by livestock or unauthorized persons.
h. Conduct post-construction monitoring and treatment or removal of invasive plants until native plant species are well established.

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.

b. **Estuary restoration:**

i. Project implementation shall be conducted in a sequence that will not preclude repairing or restoring estuary functions once dikes/levees are breached and the project area is flooded.

ii. Culverts and tide gates will be removed using the design criteria and conservation measures, where appropriate, as described in Work Area Isolation, Surface Water Withdrawals, & Fish Capture and Release (PDC 20) and Fish Passage Restoration (PDC 21) above.

iii. Roads within the project area should be removed to allow free flow of water. Material either will be placed in a stable area above the ordinary high water line or highest measured tide, or be used to restore topographic variation in wetlands.

iv. To the extent possible, remove segmented drain tiles placed to drain wetlands. Fill generated by drain tile removal will be compacted back into the ditch created by removal of the drain tile.

v. Channel construction may be done to recreate channel morphology based on aerial photograph interpretation, literature, topographic surveys, and nearby undisturbed channels. Channel dimensions (width and depth) are based on measurements of similar types of channels and the drainage area. In some instances, channel construction is simply breaching the levee. For these sites, further channel development will occur through natural processes. When required, use PDC in Channel Reconstruction/Relocation (PDC 24).

vi. Fill ditches constructed and maintained to drain wetlands. Some points in an open ditch may be over-filled, while other points may be left as low spots to enhance topography and encourage sinuosity of the developing channel.

8. Reduction/Relocation of Recreation Impacts

Reduction/relocation of recreation impacts is intended to close, better control, or relocate recreation infrastructure and use along streams and within riparian areas. This includes removal, improvement, or relocation of infrastructure associated with designated campgrounds, dispersed camp sites, day-use sites, foot trails, and off-road vehicle roads/trails in riparian areas. The primary purpose is to eliminate or reduce recreational impacts to restore riparian areas and vegetation, improve bank stability, and reduce sedimentation into adjacent streams. Equipment such as excavators, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

a. Design remedial 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.

b. To the extent possible, non-native fill material shall be removed from the floodplain to an upland site.

c. Overburden or fill comprised of native materials, which originated from the project area, can be used to reshape the floodplain, placed in small mounds on the floodplain, used to fill anthropogenic holes, buried on site, or disposed into upland areas.

d. For recreation relocation projects—such as campgrounds, horse corrals, off-road vehicle trails—move current facilities out of the riparian area or as far away from the stream as possible.

e. Consider de-compaction of soils and vegetation planting once overburden material is removed.

f. Place barriers—boulders, fences, gates, etc.—outside of the bankfull width and across traffic routes to prevent off-road vehicle access into and across streams.

g. For work conducted on off-road vehicle roads and trails, follow relevant PDC in Road and Trail Erosion Control and Decommissioning (PDC 32) below.

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.

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.

Project Design Criteria by Resource

Fisheries and Hydrology

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

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

General For Inside Riparian Habitat Conservation Areas

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

Tree Tipping and Tree Felling for Large Wood Projects

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

Table 5. 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 6. Bankfull widths and minimum diameter of logs to be considered key pieces

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

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

Length:

- The length of the wood is also important to stability. To be considered a key piece a log with a rootwad still attached should be at least 1 1/2 times (1.5 times) the bankfull or a log without a rootwad should be twice (2 times) the length of the stream's bankfull width. As the best fish habitat is formed around jams composed of three to seven logs, at least two key pieces should be used at each structure.
- Mimic natural accumulations of large woody debris based on stream type, valley setting, and community type and ensure future large woody debris recruitment
- Tailholds as part of tree tipping operations are permitted across perennial, intermittent and ephemeral streams, but the use of protective straps will be required to prevent tree damage.

Juniper Treatments

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

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

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

Tree and Boulder Hauling

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

Haul Restrictions to Prevent Fine Sediment Delivery to Streams

- Haul or maintenance is permitted on roads under the following conditions:
  - ♦ During haul, weather conditions are monitored daily for the chance of precipitation by the hydrologist or fish biologist.
  - ♦ No rutting of the road surface is occurring, indicating the subsurface is wet.
  - ♦ Frozen ground conditions.

- Haul will cease at any time when the travelway of the road is wet and turbid water or fines are observed moving off the road surface to ditchlines that deliver to stream channels regardless of time of year.

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

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

Prescribed Burning and Related Activities

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

For Perennial and Fish-Bearing Stream Channels:

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

Wildlife

Threatened, Endangered or Sensitive Species

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

Raptors

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

Big Game

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

Botany

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

Rare and Sensitive Plants and Habitats

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

Sensitive and Unique Habitats

- The integrity of unique habitats shall be maintained. Unique habitats [may] include meadows, rimrock, talus slopes, cliffs, animal dens, wallows, bogs [fens], seeps and springs. This shall be accomplished by incorporating cover buffers approximately 100 feet in width.
- Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, recreation sites, prescribed fires, fire lines, and other operational activities shall not occur within, or at the interface of lithosols (scablands).

- Cutting of old-growth juniper shall be prohibited. Old-growth characteristics include: sparse limbs, dead limbed or spiked-tops, deeply furrowed and fibrous bark, branches covered with bright-green arboreal lichens, noticeable decay of cambium layer at base of tree, and limited terminal leader growth in upper branches.

Groundwater-Dependent Ecosystems

- The integrity of groundwater-dependent ecosystems shall be maintained. Spring developments shall not dewater groundwater-dependent ecosystems. Spring developments shall not be allowed if the spring is occupied by rare or sensitive plant species, or in peatlands, fens, or where histic soils are present. These sites should be buffered 100 feet from all operational activities where topography does not restrict such a distance, and be identified as areas to protect.
- Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, fire lines, and other operational activities shall not be allowed in springs, seeps, or any other groundwater dependent ecosystem, unless it is for the benefit or protection of the groundwater dependent ecosystems or development of the spring.
- Spring developments should not disturb the spring orifice (point where water emerges). Spring head boxes should be placed in a location that will cause the least amount of disturbance to the soils and vegetation of the groundwater dependent ecosystems. Preferable locations for spring head boxes should be in an established channel downstream from the orifice or a location where flowing water becomes subsurface.
- When necessary, construct fenced exclosures around spring developments to prevent damage from wild ungulates and livestock.
- Spring developments shall have a return flow system to minimize the diversion of surface and subsurface water from the catchment area. Consider using a float valve or similar device to reduce the amount of water withdrawn from the groundwater dependent ecosystems.
- When developing springs, place troughs far enough away from groundwater-dependent ecosystems, wetlands, and other sensitive or unique habitats to prevent erosion, compaction, or degradation to sensitive soils and vegetation due to livestock congregation.

Invasive Plant Species

- ***Pre-Implementation:*** Proposed restoration projects shall be surveyed for invasive plants early in the implementation planning process by a qualified invasive plant specialist /technician, to identify and assess any undocumented invasive plant infestation.
- ***Pre-Implementation****:* For project areas that overlap or are adjacent to invasive plant infestations, assure that there is sufficient time prior to develop a long-term site strategy for control, eradication, and revegetation of the site. This shall be accomplished by a qualified invasive plant specialist in collaboration with the interdisciplinary team and other stakeholders.
- All activities shall be conducted in a manner as to minimize or prevent the potential spread or establishment of invasive species.
- Actions conducted on National Forest System Lands that will operate outside the limits of the road prism, require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering the Malheur National Forest. Cleaning will be inspected and approved by the forest officer in charge of administering the project.
- Assure that all materials are weed-free. Use weed-free straw and mulch for all projects conducted or authorized by the Forest Service on National Forest System Lands. If State certified straw or mulch is not available, individual national forests should require sources certified to be weed-free using the North American Weed Free Forage Program standards or a similar certification process.

- Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, or rock that are judged to be weed free by District or Forest weed specialists.
- Prohibit heavy equipment operation, vehicle travel, staging areas, fire-control lines, and any other operational activities in invasive plant infestations, unless the activities are for the express purpose of eradicating the infestation or INV1 and INV2 have been completed.
- Conduct post-implementation monitoring for invasive plants. Continue monitoring, treating, and removing invasive plants until all infestations are eradicated and native plant species are well established.

Native Plant Materials and Revegetation

- ***Pre-Implementation**:* Where the need for native plant materials is anticipated, assure that there is sufficient time for the plant materials specialist to develop a native plant materials plan and/or prescription prior to implementation of planned revegetation, rehabilitation, and restoration projects. This may include allowing for enough time to harvest and store hardwood cuttings, produce suitable quantities of native seed, and/or grow-out container stock.
- Locally adapted, genetically appropriate native plant materials are the first choice for use in revegetation, restoration, and rehabilitation, where timely natural regeneration of the native plant community is not likely to occur. Use a diverse assemblage of species that have the potential to naturally occur in the project area. Acquire native seed or plant sources as close to the watershed as possible. Examples of areas that may need treatment include: habitat restoration efforts, log decks, staging areas, landing zones, temporary roads, slash piles, culvert replacements, severely burned areas, skid trails, decommissioned roads, invasive species treatments, and other disturbances.
- Non-native, non-invasive plant species may be used in the following situations: (1) when needed in emergency conditions to protect basic resource values (for example, soil stability, water quality, and to help prevent the establishment of invasive species), (2) as an interim, non-persistent measure designed to aid in the re-establishment of native plants, (3) if native plant materials are not available or not economically feasible, and (4) in permanently altered plant communities.
- Under no circumstances shall non-native invasive plant species or noxious weeds be used for revegetation.
- Development, review, and/or approval of revegetation, rehabilitation, and restoration prescriptions, including species selection, genetic heritage, growth stage, seed mixes, sowing guidelines, and any needed site preparation, shall be accomplished by a plant materials specialist who is knowledgeable and trained or certified in the plant community type where the revegetation will occur.
- Concentrate plantings above the bank-full elevation. Sedge and rush mats should be placed and sized to prevent their movement during high flow events.
- Newly planted or seeded areas should be protected from animals and activities that may prevent, retard, or slow the establishment and recovery of native vegetation. Site-specific measures may include building fences, piling slash, jackstrawing, closing areas to vehicles, and/or temporarily changing grazing regimes until the desired condition is sufficiently achieved.

Soils

- For projects involving heavy machinery off roads, the project proponents shall inspect the site for existing impacts to the soil. If existing impacts appear to be heavy on the Malheur National Forest or moderate on the Ochoco National Forest, they shall contact a soil scientist, who shall determine what site specific project design criteria are necessary to meet Forest Plan and Forest Service

Manual standards and guidelines. (If a soil scientist is not available, a silviculturist or hydrologist can do the work.) If standards and guidelines cannot be met, heavy machinery shall not be used.

- Erosion would be minimized by following General Aquatic Conservation Measures (see section, above) and by implementing the appropriate project design criteria based on the type of activity (see Appendix A).
- Erosion from heavy machinery use would be minimized; by minimizing compaction and puddling, rutting would be minimized.
- For Livestock Stream Crossings and Off-Channel Watering Facilities, out-of-channel erosion would be minimized.
- For Road Erosion Control, erosion would be minimized.
- For Juniper Removal, erosion would be minimized. It is possible that juniper removal would increase ground cover within a few years, and thereby reduce erosion.
- Prescribed fire (including for disposal of slash after juniper removal) can involve only low- and moderate-severity fire, and erosion from fire lines would be minimized, so erosion from prescribed fire would not be significant.

Fire and Fuels

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

Notification

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