Implementation Description:

Camp Creek Headwaters Restoration Project

Category 2: Large Wood, Boulder, and Gravel Placement, including tree removal for large wood placement Category 3: Dam and Legacy Structure Removal Category 14: Riparian Vegetative Planting Category 16: Beaver Habitat Restoration	Lead Preparer: Dan Armichardy/Bob Hassmiller
Applicant: Blue Mountain Fisheries/ Hydrology	NEPA Reference: DN For Aquatic Restoration EA (http://www.fs.usda.gov/detailfull/malheur/landmanagement/?cid=STELPRD3817723&width=full)
Location: T. 11 S., R. 32 E., sec. 28, 33, 34 and 35; T. USGS Quad: Cougar Rock	Lease/ /Case File/ Serial #: N/A (Reference #): N/A
Begin Date: 1/15/16	Due Date: 5/01/16

Purpose/Need:

Beaver were historically abundant on Camp Creek and their dams had a strong influence on the vegetative productivity of the riparian corridor and streamflow regime during low flows. Beaver trapping was pervasive through the Middle Fork John Day Subbasin and channel incision created a narrow strip of alder dominated riparian vegetation. As a result, water is quickly flushed through Camp Creek and habitat for juvenile steelhead is limited from excessive water temperatures on mainstem Camp Creek. The purpose of the activities proposed within the project area is to add beaver dam analogues to mimic beaver dams and raise the water table partially upstream of the structure. The objective of BDA is multifold: (1) provide for increased growth of riparian vegetation and improved shade, (2) attenuate peak flows to increase water storage later into the summer, (3) induce sediment deposition immediately upstream of the BDA, (4) provide more miles of high quality juvenile steelhead habitat downstream. Photos of existing condition, proposed structure design and of equipment proposed for actions are attached.

Land Use Plan Conformance:

The project falls under Management Area (MA) 3B "Anadromous Riparian Areas" of the Malheur National Forest Land and Resource Management Plan (LRMP). The goal of MA3B is to "Manage riparian areas to protect and enhance their value for wildlife, anadromous fish habitat and water quality… Design and conduct management in all riparian areas to maintain or improve water quality and beneficial uses" (USDA Forest Service, 1990). Camp Creek is within a Category 1 Riparian Habitat Conservation Area (fish-bearing stream) as designated by PACFISH/INFISH and is listed as designated critical habitat for Mid-Columbia River steelhead by the National Marine Fisheries Service (NMFS).

Proposed Action:

Project activities are located in the Upper Camp Creek-Middle Fork John Day River (HUC 170702030205) subwatershed. The proposed action includes addition of large and coarse wood and installation of post vanes and picket baffles.

The addition of large and coarse wood is to create fish habitat and hydrological complexity through increasing roughness instream and within the floodplain and to provide additional anchor points for beaver dams.

The installation of Post Vanes is to facilitate erosional processes (meandering) that will provide a source of depositional material (in particular spawning gravels) and fine organic sediment that would be deposited within the large and coarse wood, picket baffles, and BDAs. The fine soil will provide a rich growing medium for riparian plants and facilitate riparian recovery within newly wetted floodplains. Post Vanes will also facilitate the formation of undercut banks for fish habitat and shade within the meadow reaches as the stream channel narrows.

Picket baffles will be installed to facilitate formation of point bars and to establish riparian vegetation (willow weaves). As the vegetation becomes established these baffles will deflect water flow towards the opposite streambank creating undercut banks and erosional areas.

Riparian planting of willow stems (~2000) deep within elevated floodplains and around placed wood would occur using a mini excavator and stinger. These plantings would be "patches" located within the most sensitive areas to thermal loading. An additional 10,000 willow whips would be weaved within the BDAs, picket baffles and post vanes in the fall.

The estimated time to achieve a response is 1-5 years. There is a high likelihood of long-term success associated with these restoration actions. Similar actions have been proven in the Bridge Creek Intensively Monitored Watershed (IMW on the lower John Day River) to provide beneficial improvements in riparian vegetation, water quality and fish abundance.

Implementation Plan:

The Malheur National Forest proposes to construct beaver dam analogues, add large and coarse wood, and use bioengineering techniques such as post vanes, picket baffles and wicker weirs throughout reaches 8 and 9 of Camp Creek.

- **BDA (Beaver Dam Analogs)**

The BDAs will be constructed to achieve a pool-riffle regime length of 70-30% in Reach 8 and 40-60% in Reach 9 (4 miles; map of both reaches in Figure 9). A mini-excavator, mid- size excavator and a wheeled power pac (Figure 2, Figure 6, and Figure 7) will insert the BDAs into the stream bed and onto portions of the floodplain whereas half of the pole length will extend up from the ground surface. Willow will be woven within the posts and packed with silty-gravelly loam from streambed. The loamy soils will be taken from the active channel near the simulated beaver dam to more effectively back water into the floodplain soils. The top of the BDAs will extend to the top of the floodplain (Figure 1) and the shape of the feature will be convex or concave (Figure 1). Conifer species will be tipped with an excavator until a density 438 trees/mile is attained (Figure 2). Post Vanes and picket baffles will be constructed using the hand held hydraulic post pounder, mid-size excavator and mini excavator (Figure 3, Figure 4, Figure 5, Figure 6, Figure 7). Riparian hardwoods will be planted by hand and with mini excavator along the streambank using a variety of planting techniques to accelerate vegetative recovery. Hardwoods may be planted with plastic vented tube shelters. Willows will be planted in consideration of existing species composition, historic species composition, and habitat suitability.

Beaver dam support structures are built with 2 m long, 7-10 cm diameter, untreated lodge pole pine (pinus contorta) posts that were stripped of their bark. Using a chainsaw, a point is made at one end of the post. Posts are spaced 0.5-1m apart and driven into the active channel and inset floodplain with a handheld hydraulic post pounder or a hydraulic post pounder mounted on a mini-excavator. A series of these structures up to 3 are often located together to prevent under scour in upstream structures.

- **Post Vanes**

Post vanes are straight edged structures protruding from the streambank into the oncoming current at an angle from the streambank not exceeding 20°. The top edge of the vane dips downward at an angle from horizontal, beginning at the bankfull level ending at bed elevation mid channel (Figure 4). Vanes consist of straight posts 4-7 inches in diameter at the butt end and 4-6 feet long. Posts are pounded into the stream bed 3-5 feet and spaced about 12 inches apart. A string is run from the bankfull elevation to the stream bed and posts marked to delineated proper level for cutting. Post vanes will be utilized to facilitate point bar formation. Ecologically, vanes facilitate the establishment of streambank vegetation by providing optimum seedbed conditions and sheltering newly established plants from flood forces until they become well established.

- **Picket Baffles (deflector)**

The purpose of a baffle is to accelerate erosion of the opposite bank creating lateral erosion (undercut banks) and deposition on opposite bank. This results in the deposition being colonized by vegetation reinforcing the deflection. The most effective shape for baffles is a 30-60° right triangle (Figure 3and Figure 5). The triangle baffle is configured so that the short leg protrudes outward from the bank toward mid channel (width); the long leg forms the base of the structure parallel to the bank (length); and the hypotenuse forms the face of the structure which serves to deflect flow or wedge flow toward the opposite bank. To emulate the vertical dimensions of a point bar the upper surface of the baffle must taper downward from the edge of the streambank to mid channel. At the bank the top of the baffle should be level with bankfull and the tip should be no higher than a third maximum bankfull channel depth. The correct surface profile and height is essential for performance of the baffle, it is to initiate point bar formation. The key feature is that floods having greater depths than bankfull flow smoothly over the surface of the baffle with minimal turbulence otherwise an eddy will be created below the baffle that would wash away sediments. Entrained sediments must be able to wash across the baffle at velocities less than the deflected flow.

The ecological role of the baffle is to provide a substrate for colonizing vegetation, pools with undercut banks, which form opposite the baffle. Sediments deposited on evolving point bars provide seedbeds for colonizing riparian vegetation such as sedges, rushes, willows, and cottonwoods. As vegetation density increases, overflow velocities decrease, allowing for the deposition of fine textured particles such as silt, clays, and organics that build fertile topsoils to support more vegetation.

- **Large and coarse wood placement/Log weir removal (single and multiple piece jams)**

The purpose of large and coarse wood is to increase within channel and floodplain roughness thus increasing fish habitat and geomorphic complexity. Large wood would be placed at key points (Figure 14) and interwoven with coarse wood to create debris jams that create point bars, increase lateral movement, and activate secondary channels (Figure 12). The activation of secondary channels and reconnection of the floodplain would alleviate shear stress during high flow events on BDAs and any beaver that colonize the area. Floodplain roughness is very important within reach 8 and 9 as evidenced by Figure 13. There is a short term risk that the BDAs may take the higher stream power and stress and cause additional channel incision until the riparian vegetation gets fully established. Use of large and coarse wood is expected to alleviate this concern. Deposition of fine sediment within the secondary channels and the floodplain in conjunction with elevated water levels (BDAs) is anticipated to provide the optimum seedbed for riparian plants thus increasing the likelihood of beaver colonization.

Trees would be tipped/pushed using an excavator. The majority of trees would come from within the floodplain. If trees are not of adequate size or length as described within the PDCs for large wood placement trees may be obtained immediately upslope or along the toe slope of the floodplain following the criteria with Category 2: Large wood and boulder placement (e) Tree removal for large wood projects.

Log weirs are currently dissipating shear stress that would otherwise be resulting in erosional banks on outside bends and are preventing lateral movement of the stream channel. Additionally an over-widened stream channel is being maintained below these weirs and preventing vegetative colonization (channel narrowing, Figure 14). An excavator would be used to remove the buried portions of the weirs and remove the high berms of dirt and rock that were placed on top of the weirs within the floodplain when the weirs were constructed. Usually this does not require excavation and the excavator may simply grab one end of the weir and slide it out of the bank.

- **Riparian Hardwood Planting/ Willow Weaves**

Deep riparian hardwood planting with a stinger would occur in the fall using a mini excavator using tree shelters/cages would be placed around approximately 2,500 willow and an additional 10,000 willow would be interwoven by hand (laborers) within the BDAs, post vanes, and picket baffles which were constructed during the instream work window. Willow plantings would be strategically located within tipped conifers on the floodplain and adjacent to the stream channel.

Although willow seeds have small mass and are well adapted for aerial transport, approximately 90% reduction in seed rain density has been documented within 200 m (656 feet) of parental plants (Gage and Cooper 2005). Therefore caged “patches” would be no further than 656 feet apart within the most thermally sensitive zones to facilitate seed propagation downwind of these sites for willow. The sites for patches are located within wide valley bottoms with fine soils and gravels. These areas are suitable willow establishment areas (Carex Working Group Report 2015).

Aquatic Actions within Camp Creek Reach 8 and 9 related to BDAs, post vanes, picket baffles, and wood placement would build on the capacity of these actions to retain and build coarse and fine soils surrounding the structures (Osei et. al. 2014) and propagate willow expansion and

seedbank formation from the core thermally sensitive patches of caged/tubed willows proposed for planting in fall 2016.

Use of the vented tree tubes will facilitate increased survival up to 5X (Hall et. al. 2015) and ensure the obtainment of suitable heights for dispersion. The cages will prevent the browse of terminal buds and provide additional protection on lateral buds once the tubes are removed < 5 years after planting

Patches of caged/tubed willows (covering 0.4 miles out of 4 miles) would be planted within the most thermally sensitive areas (related to vegetation) as identified thru modelling with NetMap and TMDL curves along inside bends, point bars, and straight channel sections to facilitate erosion, provide shade, create undercut banks, provide depositional soil for completed structures downstream, increase sinuosity, and create a willow seed source. Maps delineating exact locations of “willow patches” along with most thermally sensitive sections of reach 8 and 9 as they pertain to desired vegetation are available upon request.

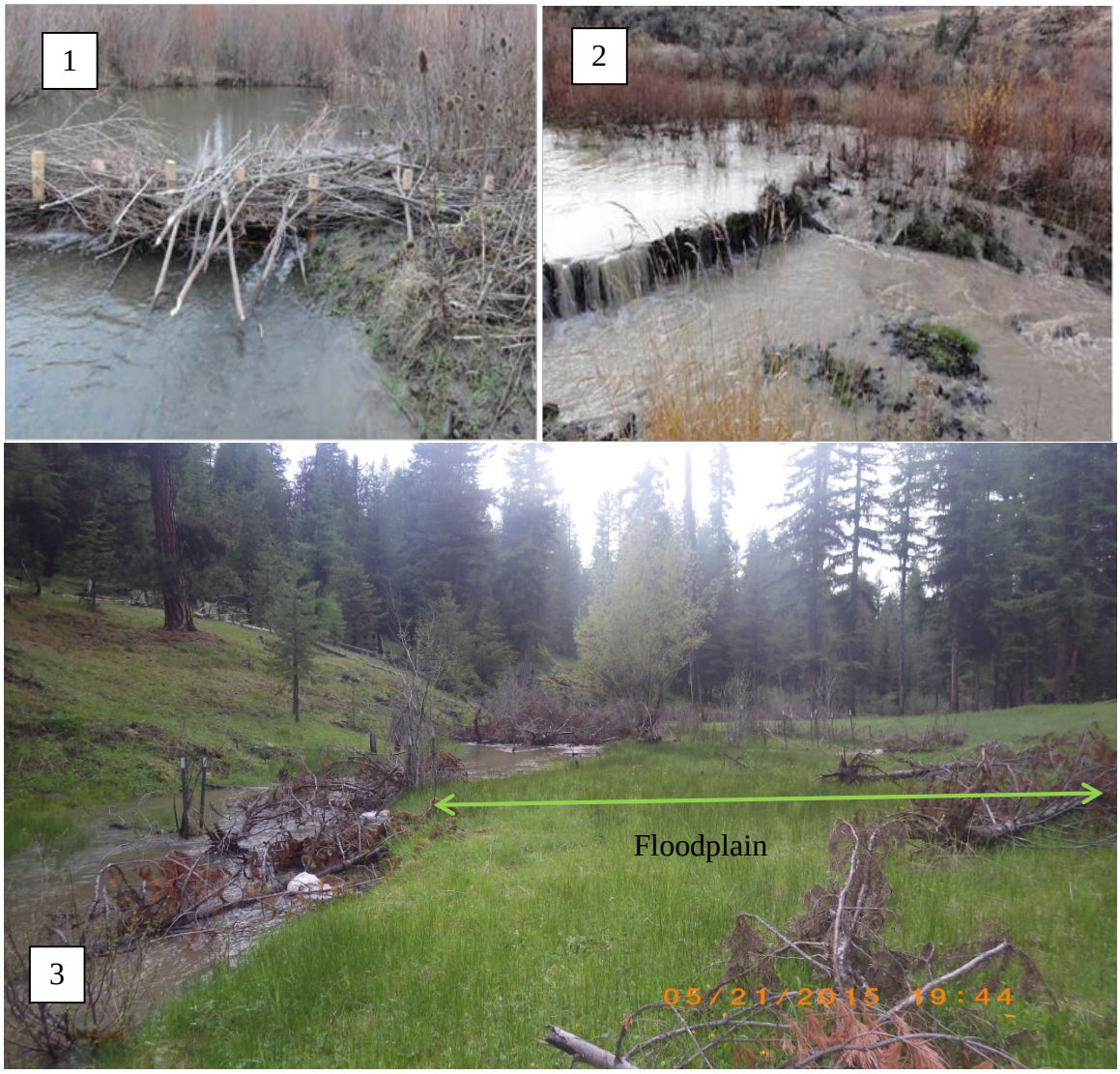

Figure 1 Example Beaver dam analog (BDA) (1, 2). Old beaver meadow with floodplain reactivated using large and coarse wood placed with excavator (primarily lodgepole) Uppermost Camp Creek reach 9 after 2014 work (3).

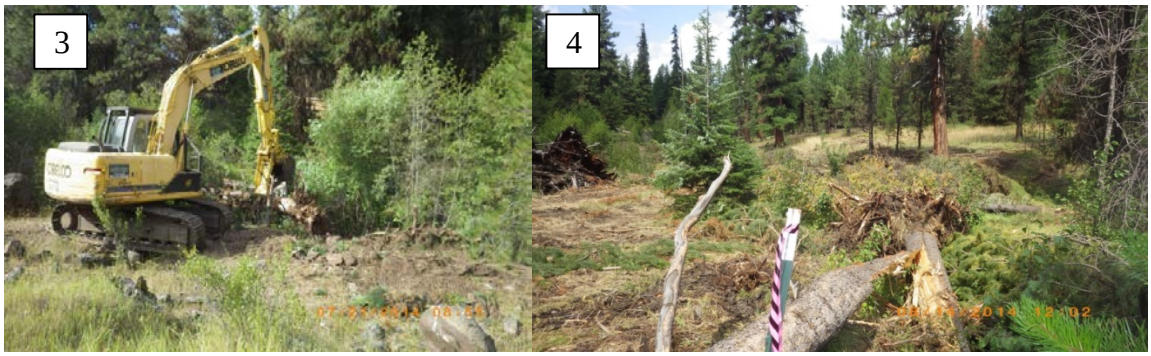

Figure 2 Removal of logs weirs before (1) and after (2). Placement of large and coarse wood (3, 4)

Figure 3 Illustration of a picket baffle with willow weave and an excavator placing posts

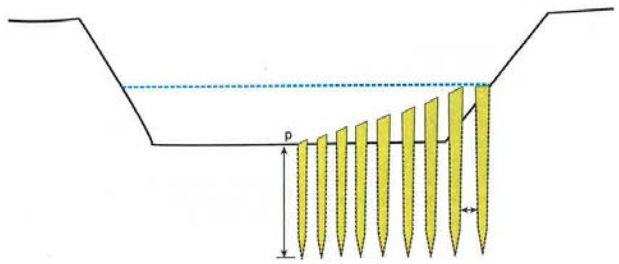

Figure 4 Illustration of a Post Vane

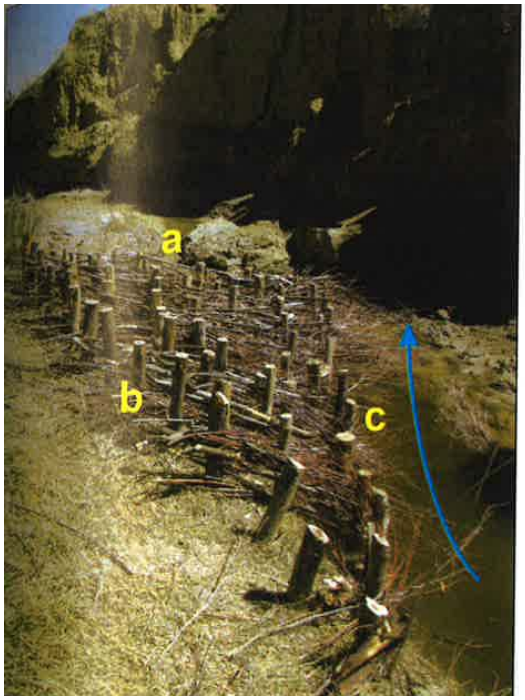

Figure 5 Illustration of a picket baffle with willow weave (right triangle)

Figure 6 Hand held hydraulic post pounder with power pack used for placing posts (BDAs, Picket Baffle)

Figure 7 Mini-excavator with post pounder adapter

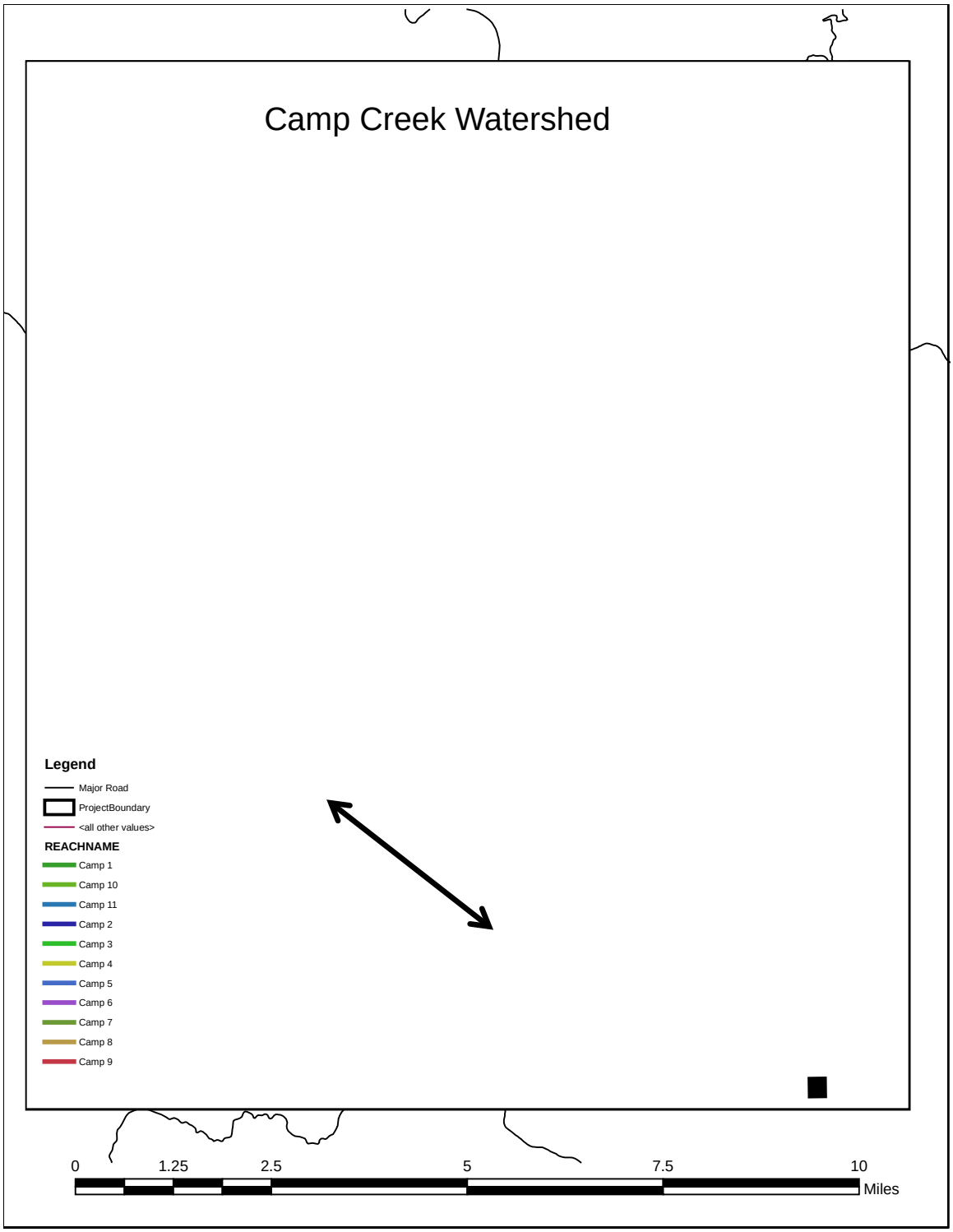

Figure 8 Location of Camp Creek reach 8 and 9 within Camp Creek watershed (Black arrow).

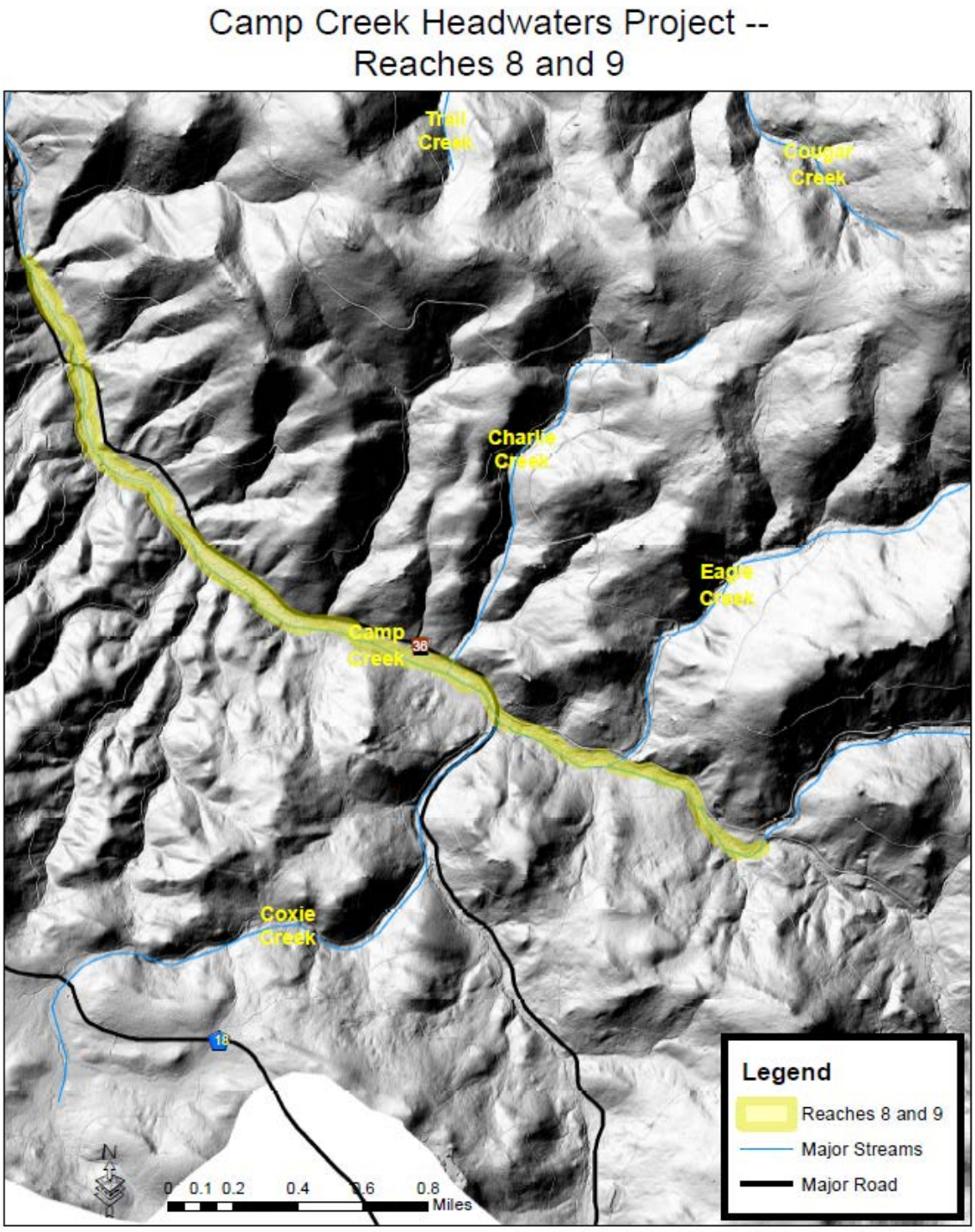

Figure 9 Project Area Map Camp Creek Reach 8 and 9 along with primary tributaries

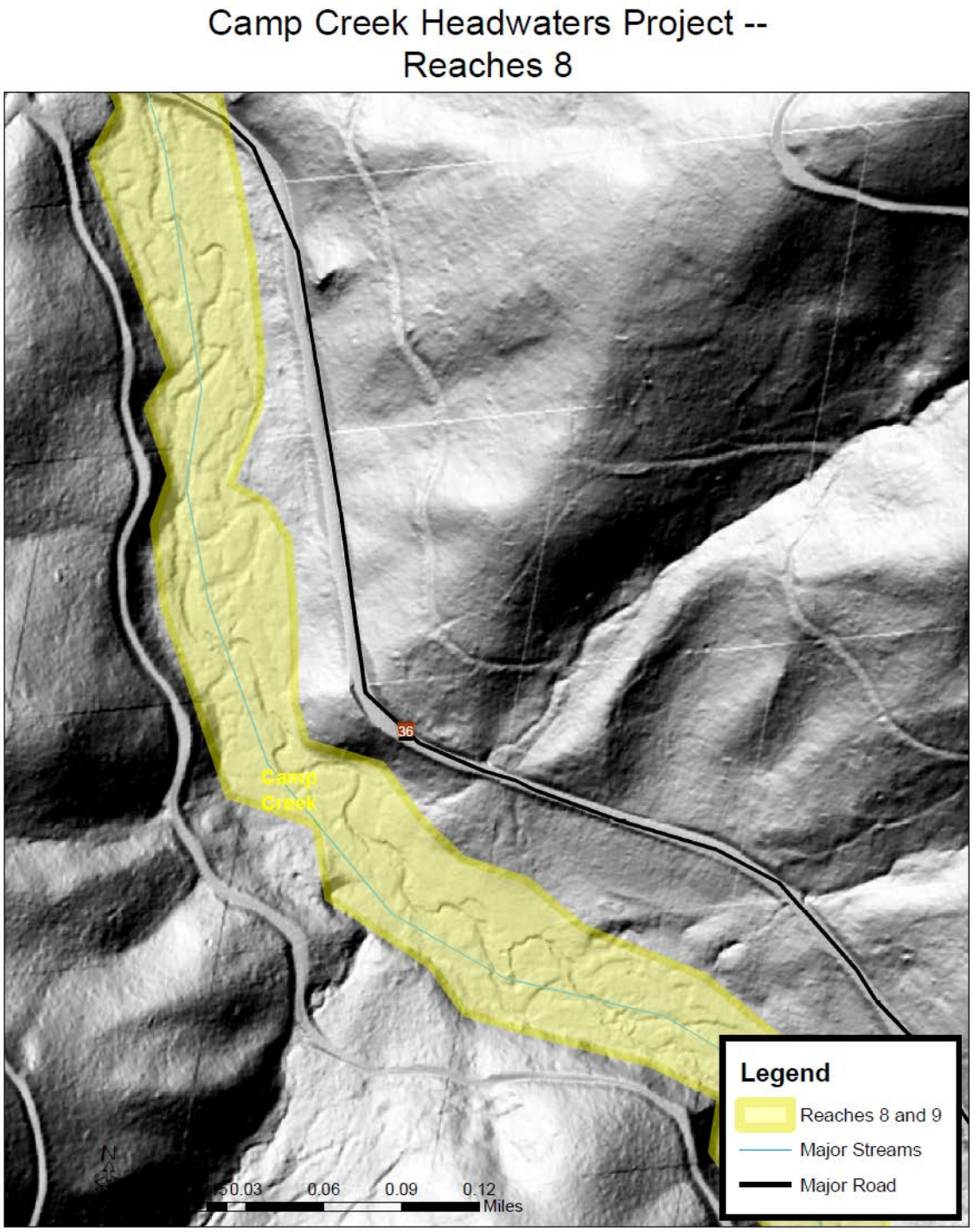

Figure 10 Example of wide floodplain and multiple side channels within Camp Creek reach 8

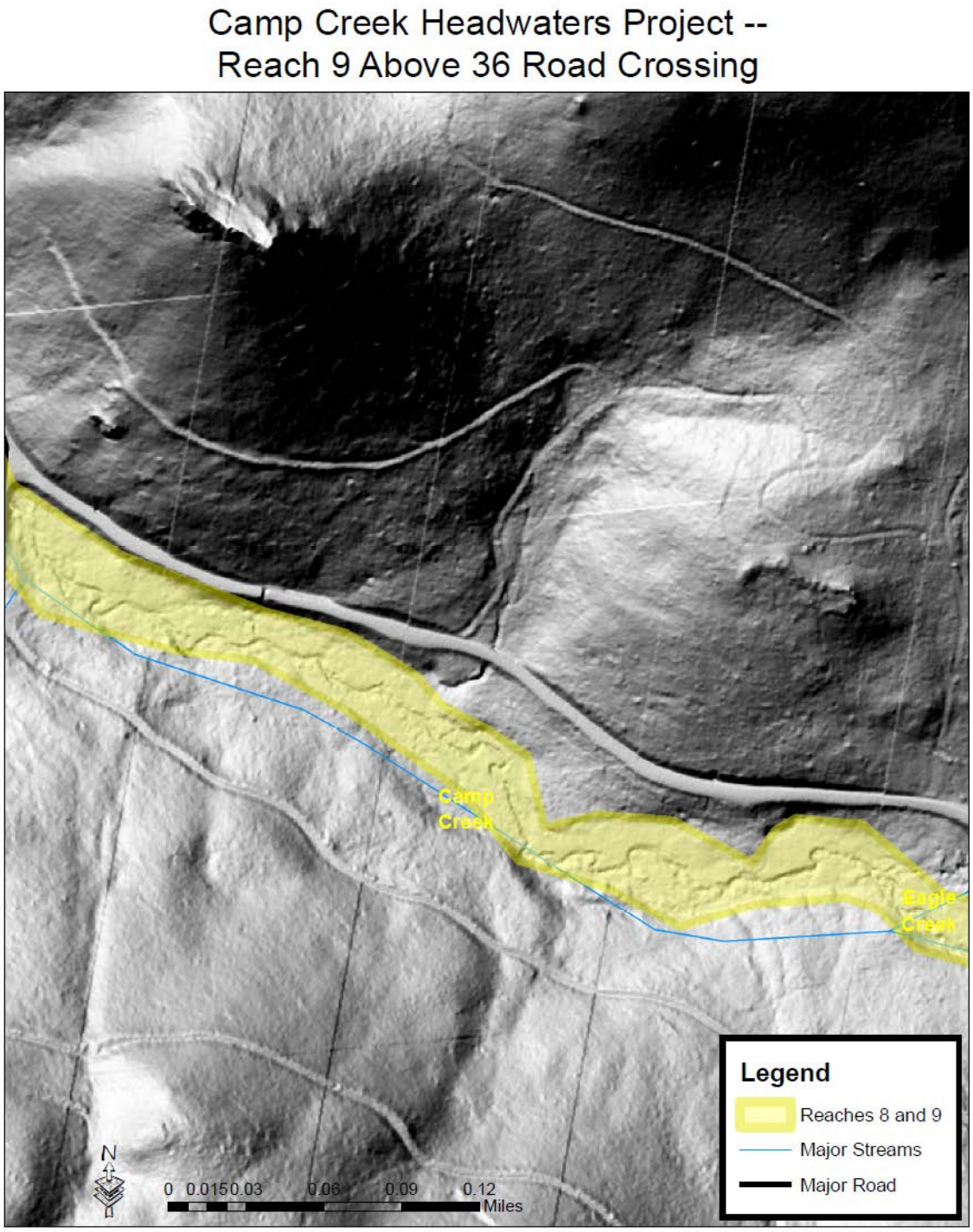

Figure 11 Example of slightly more constrained valley and slight increase in slope within reach 9 as compared to reach 8

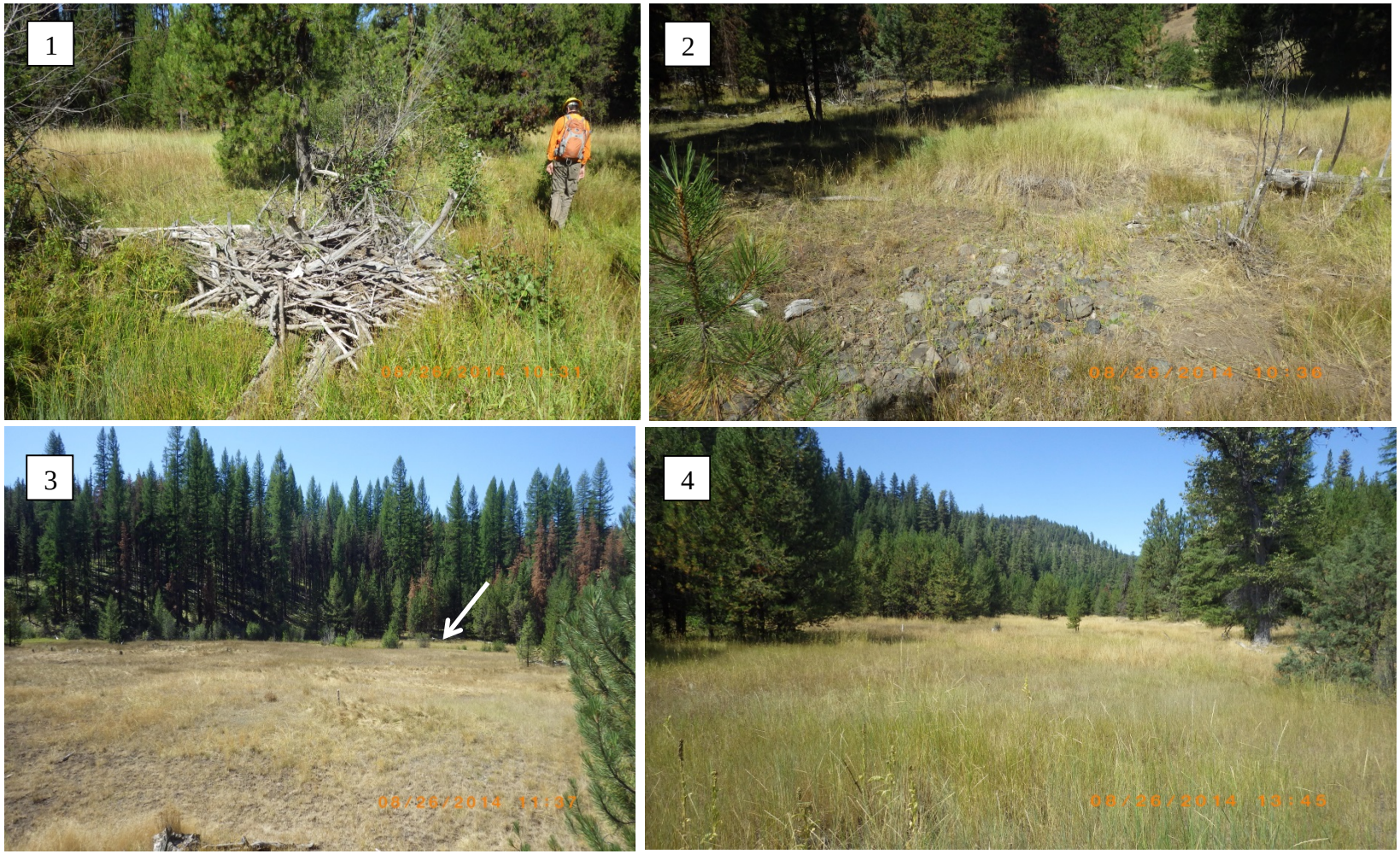

Figure 12 Debris jam (1) composed of large and coarse wood (Reach 9). Photo of abandoned channel meander (2) Reach 9. Example of wide valley bottom, abandoned floodplain and slightly incised channel pushed to valley toe slope reach 8 (3). General vegetative conditions within reach 8 (4).

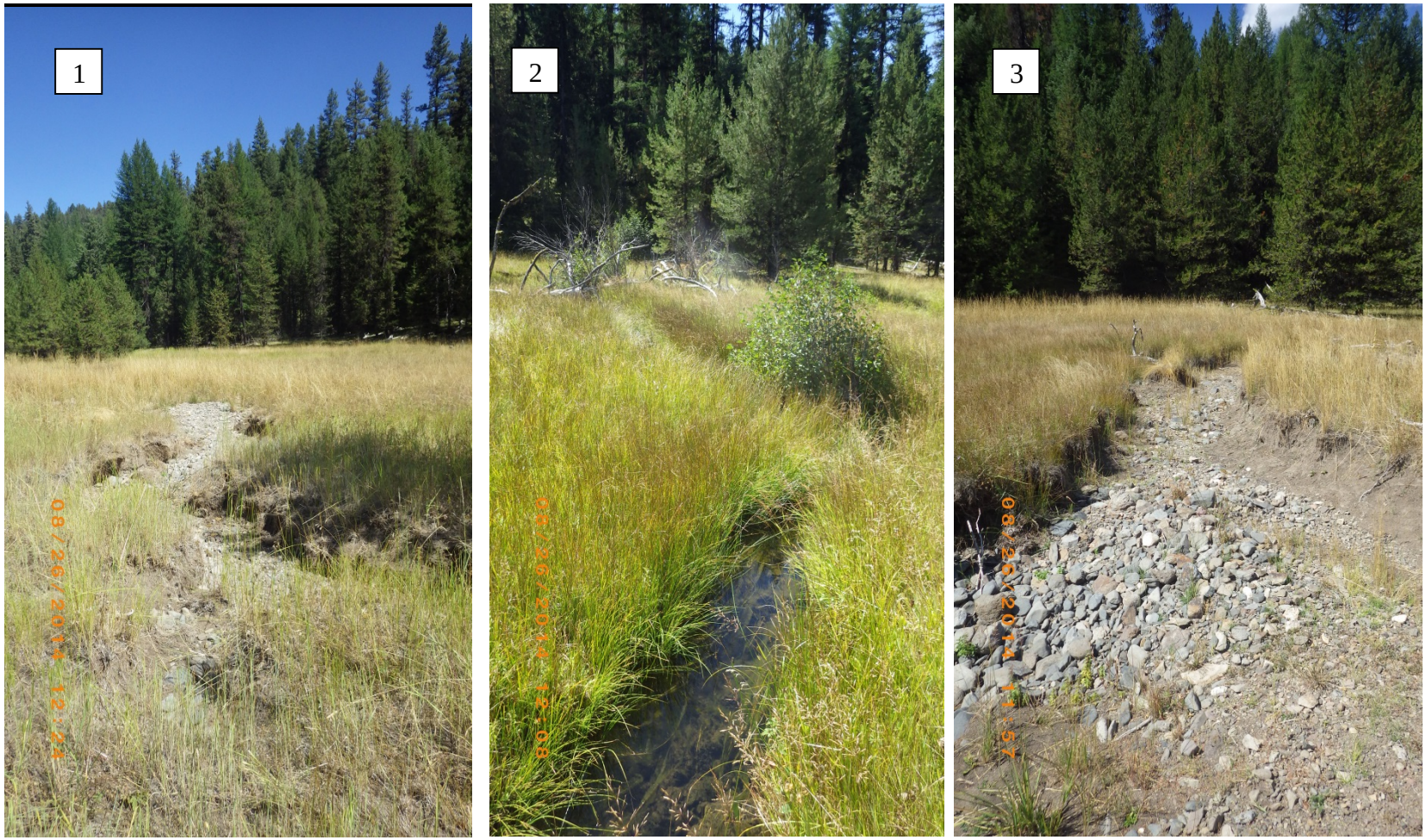

Figure 13 Photos of the impacts of a floodplain consisting of mesic grasses and forbs with limited floodplain roughness (1, 2) Camp Creek reach 8. Example of desired vegetation and channel width within incised channel (2) Camp Creek reach 8.

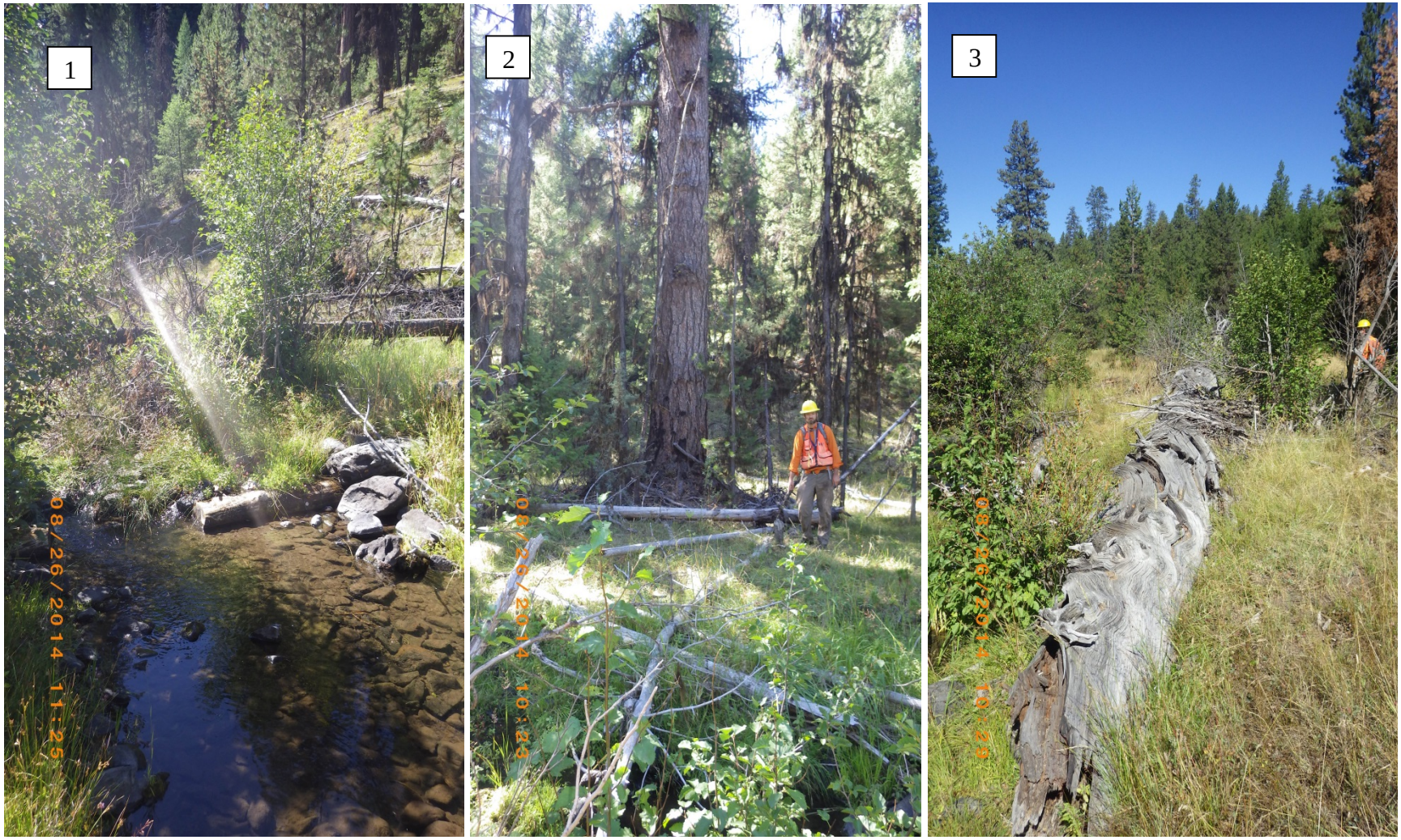

Figure 14 Center of log weir removed with chainsaw (1) Camp Creek reach 8. Examples of large wood within floodplain (larch) Camp Creek reach 9.

Appendix to the Aquatic Restoration EA
Implementation Description

Project Title: Camp Creek Headwaters Restoration Project
Project Number: 01092016

Category 2: Large Wood, Boulder and Gravel Placement, including tree removal for large wood placement.
Category 3: Dam and Legacy Structure Removal
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 (PDCs) are met under this guiding document.

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 BA as well as ARBO II.
2. Project notification: The following information will be provided to the NMFS Level 1 Aquatics members 30 days prior to implementation as a Project Notification Form 7.
    a. Action identifier –01092016
    b. Project name – Camp Creek Headwaters Restoration Project
    c. Location –

Project	Camp Creek Headwaters Project
Stream Name	Camp Creek Reach 8 and 9
6th field HUC	170702010301
Latitude (Decimal Degrees)	Start:-118.854,End:-118.826
Longitude (Decimal Degrees)	Start:44.587, End:44.56

    d. Agency contact – Dan Armichardy, darmichardy@fs.fed.us, (541) 575-3391, or Bob Hassmiller, rjhassmiller@fs.fed.us, (541)575-3433.
    e. Timing – Work will occur when ground conditions allow for excavation while maintain a minimal impact to the surrounding resources. All instream work with equipment would occur from July 15-August 15, 2016.
    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 14: Riparian Vegetative Planting

Category 16: Beaver Habitat Restoration

g. Project description – Project description is available in the Implementation Description under the section "Implementation Plan" above.
h. Work will occur within Camp Creek reach 8 and 9 within the Middle Fork John Day Watershed along FS 3600
i. Species affected –
    i. Listed species: Mid-Columbia River Steelhead
    ii. Critical Habitat: Mid -Columbia River Steelhead
    iii. MIS Species: Mid-Columbia Steelhead, Interior Columbia Redband Trout
j. Date of submittal – To be completed in Spring of 2016, at least 30 day prior to implementation
k. Site assessments – Assessment for contaminants is not required at this location.
l. Review – NMFS fish passage review and Restoration Review Team review are not required.
m. Verification – _____
n. SOD project notification – _____

3. Minor Variance: No variances from the criteria specified in the aquatic restoration document are being considered.
4. NMFS Fish Passage Review and Approval: This work does not require review by the NFMS level 1 team member.
5. Restoration Review Team: This work does not require review by the restoration review team.
6. Project Completion Report: To be completed after implementation
7. Annual Program Report: This project will be completed within one year, completion and annual reporting will occur in the winter of FY17 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: July 15-August 15.
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 >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 containments are present at the 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 (e.g., 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, and 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 (e.g., large wood, boulders, 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 (e.g., minimally-sized, low pressure tires, minimal hard turn paths for tracked vehicles, 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 (e.g., generators, canes), and gas-powered equipment with tanks larger than five 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
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% 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 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 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; 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 and 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 18ºC or are expected to rise above this temperature prior to concluding the fish capture.

ii. If fish are observed spawning during the in-water work period, electrofishing shall not be conducted in the vicinity of spawning fish or active redds.
iii. Only Direct Current (DC) or Pulsed Direct Current shall be used.
iv. Conductivity <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.
vi. 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 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% 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 cfs. NMFS approved fish screens have the following specifications: a) 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 b) 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** includes **large wood** and boulder placement, engineered log jams, porous boulder structures and **vanes**, gravel placement, and tree removal for large wood projects. Such activities will occur in areas where channel structure is lacking due to past stream cleaning (large wood removal), riparian timber harvest, and in areas where natural gravel supplies are low due to anthropogenic disruptions. These projects will occur in stream channels and adjacent floodplains to increase channel stability, rearing habitat, pool formation, spawning gravel deposition, channel complexity, hiding cover, low velocity areas, and floodplain function. Equipment such as helicopters, excavators, dump trucks, front-end loaders, full-suspension yarders, and similar equipment may be used to implement projects.

a. Large Wood and Boulder Projects

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

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

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

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

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

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

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

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

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

e) Tree Removal for Large Wood Projects

i. Live conifers and other trees can be felled or pulled/pushed over in a Northwest Forest Plan (USDA and USDI 1194a) Riparian Reserve or PACFISH/INFISH (USDA-Forest Service 1995; USDA and USDI 1994b) riparian habitat conservation area (RHCA), and upland areas (e.g., 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 streambank 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 into the stream or floodplain.
v. Trees may be stockpiled 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** includes removal of dams, tidegates, **channel-spanning weirs**, legacy habitat structures, earthen embankments, subsurface drainage features, spillway systems, outfalls, pipes, instream flow redirection structures (e.g., drop structure, gabion, 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, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

c. **Removal of legacy structures** –This action includes the removal of past projects, such as large wood, boulder, rock gabions, and other in-channel and floodplain structures.

d. If the structure being removed contains material (large wood, boulders, concrete, etc.) not typically found within the stream or floodplain at that site, remove material from the 100-year floodplain.

e. If the structure being removed contains material (e.g., large wood, 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.

14. **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 and or rush mats; 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** includes installation of in-channel structures to encourage beavers to build dams in incised channels and across potential floodplain surfaces. The dams are expected to entrain substrate, aggrade the bottom, and reconnect the stream to the floodplain.

a. **In-channel Structures**

i. Consist of porous channel-spanning structures comprised of biodegradable vertical posts (beaver dam support structures) approximately 0.5 to 1 meter apart and at a height intended to act as the crest elevation of an active beaver dam. Variation of this restoration treatment may include post lines only, post lines with wicker weaves, construction of starter dams, reinforcement of existing active beaver dams, and reinforcement of abandoned beaver dams (Pollock et al. 2012).

ii. Place beaver dam support structures in areas conducive to dam construction as determined by stream gradient or historical beaver use.

iii. Place in areas with sufficient deciduous shrub and trees to promote sustained beaver occupancy.

b. **Habitat Restoration**

i. Beaver Restoration activities may include planting riparian hardwoods (species such as willow, red osier dogwood, and alder) and building exclosures (such as temporary fences) to protect and

enhance existing or planted riparian hardwoods until they are established (Malheur National Forest and the Keystone Project 2007).

ii. Maintain or develop grazing plans that will ensure the success of beaver habitat restoration objectives.

iii. As a means to restore desired vegetation (e.g., 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. In the Camp Creek Headwaters Restoration Project design criteria for tree tipping and felling apply.

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 falling) as part of this project for instream restoration will not be harvested from within the primary shade zone.

Table 1 Primary shade zone width, based on adjacent hill slope.

	Hill Slope less than 30%	Hill Slope 30% to 60%	Hill Slope greater than 30%
Primary Shade Zone Width (slope distance)	50 ft.	55 ft.	60ft.

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

The trees are located on the south facing slope (175-185 degree azimuth) and therefore do not provide stream shade;

An appropriate level of analysis is completed and documented, such as shade modelling, 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% 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 2 Bankfull widths and minimum diameter of logs to be considered key pieces.

Bankfull Width* -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 wood is also important to stability. To be considered a key piece a log with a rootwad still attached should be at least one and half times (1.5X) the bankfull or a log without a rootwad should be twice (2X) the length of the streams bankfull width. As the best fish habitat is formed around jams composed of 3 to 7 logs, at least 2 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 wood 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.

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 (e.g. 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.

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 ft. 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 ft. 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 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 and/or mulch is not available, individual 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, and/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.

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 or moderate on the Ochoco, 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 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.

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[1] 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 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.

Grazing

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

[1] Archaeology field work may be done by the Oregon Department of Fish and Wildlife per the approval of the Forest Archaeologist.

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 (6ft either side of fence), trails, other developments and access to them would be cleared of slash produced by project activities.

Notification

- During 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.