Forest Aquatic Restoration Project
NEPA Compliance and Implementation Checklist

Clear Creek Restoration

Project Number: 0409-2019 **Date:** 03/05 **Location:** T10S, R35E, S34; T12S, R35E, S3
Category: Category 2: Large wood, boulder, and gravel placement; including tree removal for large wood placement; Category 3: Dam, tidegate, and legacy structure removal; Category 7: Set-back or removal of existing berms, dikes, and levees; Category 9: Livestock fencing, stream crossings, and off-channel livestock watering facilities; Category 14: Riparian vegetation planting
Project Description: This project will remove 10 legacy structures which are acting as juvenile migration barriers allow fish access to quality aquatic habitat upstream of the project area. We will also add large wood structures to the channel and floodplain to increase frequency of floodplain inundation, in-channel habitat complexity and re-invigorate the riparian hardwood community.

Heritage (to be completed by heritage specialist)

Y	N	Initial	
☒	☐	ZAD	Specific PDC for Heritage addressed (Heritage Surveys; Avoidance areas).

Botany (to be completed by botany specialist)

Y	N	Initial	
☐	☐	JB	Specific PDC for Botany addressed (Sensitive Plant Surveys).
☐	☐	JB	Specific PDC for Nox. 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	
☐	☒	JN	4A Big Game Winter range	☐	☒	JN	9 Research Natural Areas
☐	☒	JN	6A & 6BWilderness	☐	☒	JN	10 Semi-Primitive Non-Motorized Recreation Areas
☐	☒	JN	7 Scenic Area	☐	☒	JN	22/22A Wild and Scenic River
☐	☒	JN	8 Special Interest Areas	☐	☒	JN	Inventoried Roadless Areas

Comments:

Table 1. Projects Design Criteria and Forest Plan compliance checklist.

I have reviewed this project and have determined it is compliant with the Forest Plan and Aquatic EA Project Design Criteria identified for my resource.			
Resource	**Signature**	**Date**	**Comments** (additional PDCs may be noted if necessary)
Heritage		4/18/2019	NO GROUND DISTURBING ACTIVITIES PRIOR TO SHPO CONCURRENCE.
Botany		4/3/2019	will need surveys Spring/Summer 2019
Invasive Plants		4/3/2019	follow PDCs to prevent new infestations
Wildlife		3/27/2019	make sure Bio is present during tree tipping operations
Fish*		3/14/2019	Consistent with relevant PDCs for Fisheries.
Hydrology*	Hazel Wood	3/14/Read	consistent" " Hydrology
Range		3/9/19	Work with Range to determine if fencing is required
Soils		3/26/19	NELSON SAYS "EXISTING IMPACTS ARE GENERALLY MINOR
Recreation		3/19/19	
Special Uses		3/20/19	See attached
Lands		3/20/19	See attached.
Mining		4.2.19	No mining claims in project area.
Engineering		3/28/19	
Fuels / Fire		4/5/19	No concerns
Silviculture		4/1/19	Would like to see where land is being brought from - Otherwise no concerns

* 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: _____ Date: _____

Line Officer Signature: _____ Date: 4/19/19

Implementation Description:

Clear Creek Restoration
Project Number: 0405-2019

Category 2: Large wood, boulder, and gravel placement; including tree removal for large wood placement **Category 3:** Dam, tidegate, and legacy structure removal **Category 7:** Set-back or removal of existing berms, dikes, and levees **Category 9:** Livestock fencing, stream crossings, and off-channel livestock watering facilities **Category 14:** Riparian vegetation planting	Lead Preparer: Jeff Nelson
Applicant: Prairie City Fisheries	NEPA Reference: DN for Aquatic Restoration Project
Location: Prairie City Ranger District	Lease/ /Case File/ Serial #: NA Special Use Permit #: NA
Begin Date: 11/7/2018	Due Date: 4/15/2019

Purpose/Need:

Please refer to the Aquatic Restoration EA[1] for the Purpose and Need of these actions.

Location:

See Figures 1 and 2 for mapped location within the Malheur National Forest.

TR Location	*T10S, R35E, S34; T12S, R35E, S3*
USGS quad	*Austin*
Lat/Long	*44.570074,-118.489963*
Subwatershed	*170702030104 Clear Creek*

T: Pathway

Geospatial information for the Clear Creek Restoration Project is located here:
T:\FS\NFS\Malheur\Project\AquaticRestoration2014\GIS\Implementation\PCRD\FY19\Clear_Cr

[1] The Aquatic Restoration EA is available online at http://www.fs.usda.gov/detailfull/malheur/landmanagement/?cid=STELPRD3817723&width=full

Implementation Plan

Existing Conditions

Clear Creek is a perennial stream which flows into the Middle Fork John Day River (MFJDR) roughly 1.5 miles north of Austin Junction, OR. Beaver removal, past timber harvest, and associated railroad grade and road construction within the floodplain of Clear Creek led to channel incision which have reduced the floodplain inundation frequency and connectivity of the creek to an extensive side-channel network.

Weirs were installed in the late 1970's and have acted to confine the stream channel, limiting stream meandering within the valley bottom and dissipating energy from the stream that would be used to create meander bends, side channels and quality pools. Although initially these structures likely met the original intent of creating pools and halting active channel incision, they did not take into account the natural hydrological and geomorphic processes operating at the watershed scale that form pools and stream channel complexity. There were many unexpected consequences, such as a significant increase in the width/depth ratio downstream of weirs and creation of juvenile fish passage barriers. Some weirs may also be adult passage barriers with jump heights of over 1.5 feet.

Clear Creek is an important cool water tributary to the MFJDR and contains 9 miles of critical habitat for Mid-Columbia steelhead, 11.7 miles of critical habitat for bull trout as well as 3.2 miles of quality Chinook salmon habitat. Recovery plans specifically identified removal of passage barrier weirs as key actions on Clear Creek to recover bull trout and steelhead.

Incised sections of Clear Creek are characterized as step-pool systems which currently have simple bedforms and increased width-to-depth ratios. Clear Creek in the proposed project reach is, overall, an unconfined valley type with interspersed valley constrictions. Secondary flow paths are present throughout the reach but are typically elevated 1.5 to 2 feet above the active channel and are not accessible except infrequently at the highest flows. Riparian vegetation would have historically consisted of diverse sedge and rush communities as well as a diverse assemblage of hardwoods. Current condition is one of encroachment by conifers which are shading out a sparse alder and dogwood community. Riprap and berms are concentrated in the upper portion of the project reach, and were constructed to protect a road within the Clear Creek floodplain. Where materials from these activities are directly adjacent to the stream channel, the effect is cobble-armored banks which Clear Creek does not have the stream power to re-sort or re-distribute.

Clear Creek provides habitat for Mid-Columbia River spring run Chinook salmon, Mid-Columbia River steelhead, and bull trout. However, populations of these species are considerably lower than historic levels and both steelhead and bull trout are listed as threatened under the Endangered Species Act with designated Critical Habitat. Juvenile fish summer rearing habitat has been identified as the primary limiting factor acting upon fish populations in the Middle Fork John Day River Subbasin, so removing barriers that

prevent fish migration upstream into cooler waters during the summer is a key action to recover at-risk fish populations. This is certainly the case for Clear Creek which currently has a TMDL established for water temperature. Long term temperature monitoring indicates a 7 day ADM of 63.6 degrees F within the project reach but a much cooler 51.2 degrees F at a monitoring site approximately 4 miles upstream of the project reach. Even in unconfined floodplains, the log weirs prevent the channel from attaining higher levels of sinuosity and stream channel complexity. The resulting lack of pools, which provide essential rearing habitat, is also a limiting factor for fish in these reaches.

Furthermore, pool tail-outs associated with suitable spawning substrate are lacking and could be a primary reason for low numbers of spawning sites due to the imbalance of depositional and erosional processes facilitated by the weirs. The short-term goal of the project is remove the legacy log structures and berms and place large woody debris to enhance stream complexity, retain substrate accumulated above the weirs, and address the potential for headcutting associated with weir removal. Long term this will allow the stream to reduce its width/depth ratio, improve water quality (temperature), increase sinuosity, promote point bar formation, promote spawning gravel deposition and retention in pool tail-outs, and restore juvenile fish passage.

Desired Conditions

The desired condition for Clear Creek includes improved (1) connectivity (aquatic organism passage), (2) increased habitat complexity and quality, and (3) a frequently inundated floodplain and a frequently activated secondary channel network.

The Clear Creek Restoration Project will restore juvenile fish passage access to 3.2 miles of quality Chinook salmon rearing and spawning habitat, 9 miles of quality steelhead spawning and rearing designated critical habitat, and 11.7 miles of bull trout spawning and rearing designated critical habitat. This will occur through the removal of 10 juvenile fish passage barrier log weirs within the 1.25 mile project reach, some with a vertical jump height of over 1.5 feet. In addition, large wood would be added in 46 key locations to retain bedload accumulated upstream of the log weirs, reactivate and enhance connectivity of Clear Creek to an extensive network of nearly a mile of secondary flow paths, and increase salmonid habitat complexity.

Addition of large wood will not only increase deposition of gravels and increase spawning habitat but also restore a complex scour pattern to Clear Creek causing an increase in pool frequency and quality. Restoration of pools and side channels will create quality cool water refugia habitat that will be available to rearing steelhead, Chinook salmon, and bull trout which will be able to access Clear Creek through newly restored fish passage.

Reactivation of the extensive side channel network (nearly a mile in length) and placement of coarse wood within side channels will have an immediate benefit of creating productive, slow water rearing habitat in these secondary flow paths. The reduced shear stress caused by side channel reactivation and coarse wood placement will

also increase deposition of fine sediments, creating a growth medium for the existing riparian hardwood communities to expand, causing an increase in stream shading and a long-term reduction or maintenance of already low stream temperatures. Removal of berms and riprap along roughly 600 feet of streambank will also restore floodplain connectivity, reduce shear stress, and aid in deposition of fine sediments. Planting of native riparian hardwoods will speed recovery of disturbed areas, as well as provide direct stream shading and allochthonous inputs for robust food webs.

Implementation Plan:

The desired condition for the proposed treatment area includes improved juvenile fish passage, more frequent floodplain inundation, and increased in-channel complexity. To attain the desired condition we propose the following activities:

- Legacy structure removal- Log weirs are currently preventing lateral channel migration and maintaining an over-widened channel below the structures. Weirs are also acting as juvenile fish migration barriers. 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 weir logs during construction. Usually this does not require excavation of previously undisturbed material and the excavator may simply grab one end of the weir and slide it out of the bank. Substrate material aggraded upstream of the weir and constructed berms associated with the weirs will be graded to match proximal bank and stream bed elevations. Ten log weirs will be removed throughout the 1.25 mile project reach. Large wood will be placed in former weir locations to maintain pool scour, stabilize the vertical drop created by the removal of the weir log and allow for re-distribution of sediments trapped upstream of weirs.

- Large wood placement- Placement of large and coarse wood is needed to restore floodplain connectivity, channel complexity and move the streams towards PACFISH riparian management objectives. Large wood structures will be designed to activate historic side channels and floodplains surfaces, scour pools and deposit spawning sized gravels in pool tails, or to encourage the formation of point bars and encourage lateral migration of the stream as appropriate throughout the project area. Trees will be tipped onsite and placed in the stream, in secondary flow paths and on the floodplain with root wads attached. Approximately 46 large wood structures consisting of 5-7 trees each will be constructed throughout the 1.25 mile project reach. Trees will be tipped by excavator from the floodplain in proximity to the structure locations. Legacy activities have resulted in stream side tree stands which are characterized by dense second growth and do not meet objectives for wood recruitment and wood volume in the Clear Creek floodplain. Trees selected for tipping and placement would be primarily selected from secondary growth and selected to promote growing space for large, old and early seral trees. Gaps may occur where there is potential for re-establishment of remnant hardwood shrub communities.

- Set-back or removal of existing berms, dikes, and levees- Riprap and berms exist in the lower end of the project reach but are primarily concentrated in the upper end of the project area and were constructed to protect a road and other infrastructure within the Clear Creek floodplain. Berms will be set back and berms and riprap will be removed from approximately 600 feet of streambank through the project area. Stream banks will be recontoured to restore floodplain characteristics that mimic the dimensions of naturally occurring floodplains as appropriate for local stream and valley type. Appropriately sized material from the berms may be re-distributed on to the floodplain or used to fill incised sections of channel as appropriate. Excess material and material deemed inappropriate for channel fill may be stockpiled along the valley toe slope matching proximal slope and contours.

- Livestock fencing, stream crossings and off-channel livestock watering facilities- Existing pasture fences on both the eastern and western side of the riparian areas will be maintained and re-constructed where necessary to exclude the project area from livestock use. Currently there is no livestock use authorized on Clear Creek but unauthorized use and trespass cattle have been an ongoing problem in the Clear Creek area. It is expected that use of the Sullens Allotment will be expanded in the next several years. Maintained pasture fences would protect the project area from use when the Bridge Creek or Highway pasture is being utilized in the Sullens Allotment.

- Riparian vegetation planting –Willow and dogwood will be planted to move riparian areas toward their natural potential vegetation. Hardwoods would be planted by hand or heavy equipment within the floodplain concentrated in newly re-activated side channels and floodplain surfaces as well as around areas of heavy disturbance such as weir removal sites. Livestock fencing will protect planted hardwoods from browse by domesticated ungulates and plantings will be assessed annually to determine if additional protection is needed from wild ungulates to allow plantings to become established above browse height.

Land Use Plan Conformance:

This project falls under Management Area (MA) 3B "Anadromous Riparian Areas" of the Malheur National Forest Land and Resource Management Plan (LRMP; USDA Forest Service, 1990). The project is within the Riparian Habitat Conservation Area (RHCA) as designated by PACFISH/INFISH. Clear Creek is listed as a Category 1 – Fish-bearing stream. The RHCA extends 300 feet of slope distance from each side of the channel for a total width of 600 feet plus the width of the channel.

Management areas adjacent to the RHCA are Fore-Ground Visual Corridor, Old Growth and Middle Ground Visual Corridor; resource management goals as it pertains to this project are listed below.

Land and Resources Management Plan Goals (USDA 1990):

MA3B- Anadromous Riparian Areas

Manage riparian areas to protect and enhance their value for wildlife, anadromous fish habitat and water quality. Manage timber, grazing, and recreation to give preferential consideration to anadromous fish on that portion of the management area "suitable" for timber management, grazing, or recreation. Design and conduct management in all riparian areas to maintain or improve water quality and beneficial uses.

MA13 – Old Growth

Provide suitable habitat for old growth dependent wildlife species, ecosystem diversity and preservation of aesthetic qualities.

MA14F and MA14M- Visual Corridors (foreground and middle ground)

Manage viewshed corridors with primary consideration given to their scenic quality and the growth of large diameter trees. Visual quality objectives of retention, partial retention, and modification will be applied while providing for other uses and resources.

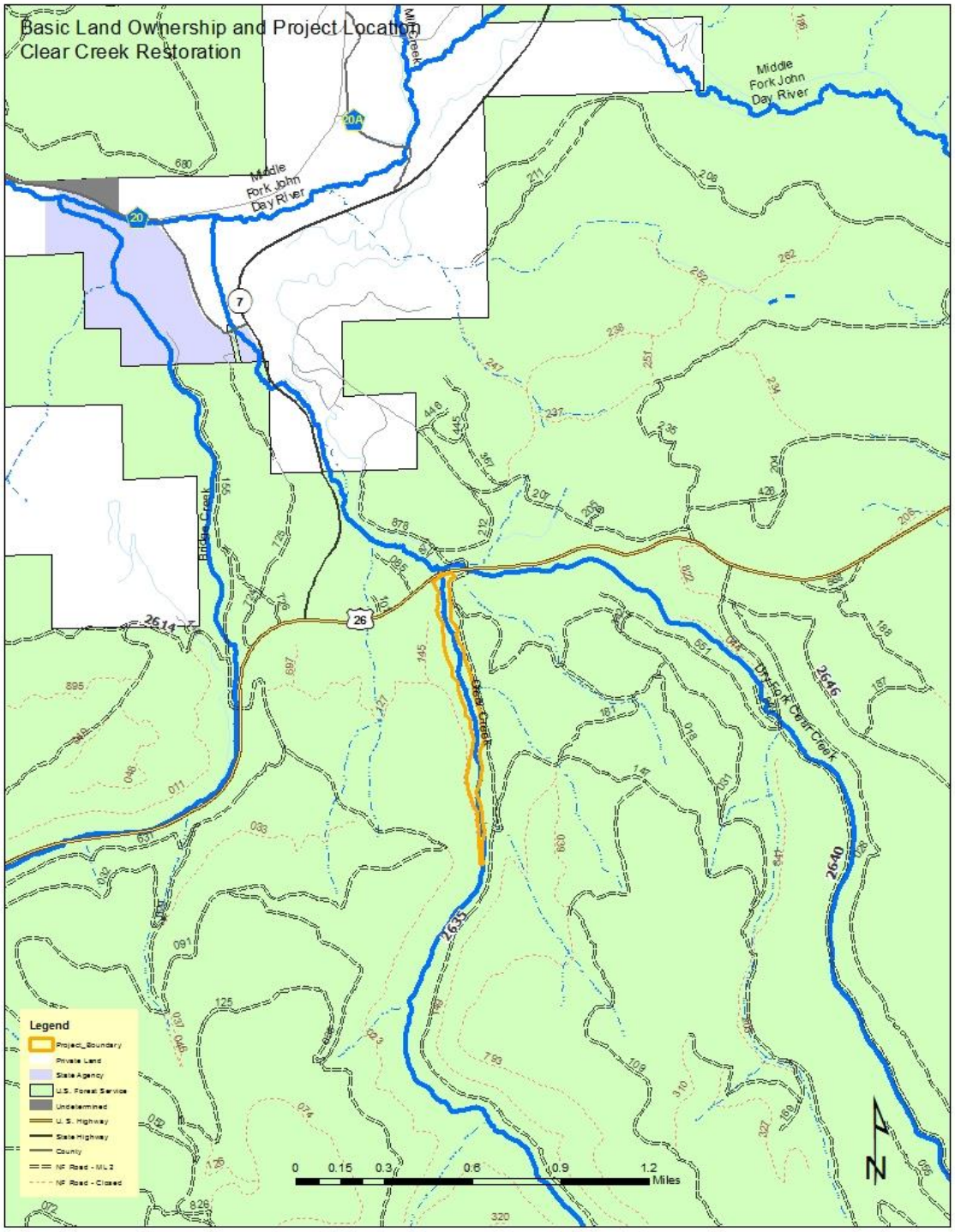

Figure 1: Basic land ownership and project area location of the Clear Creek Restoration Project.

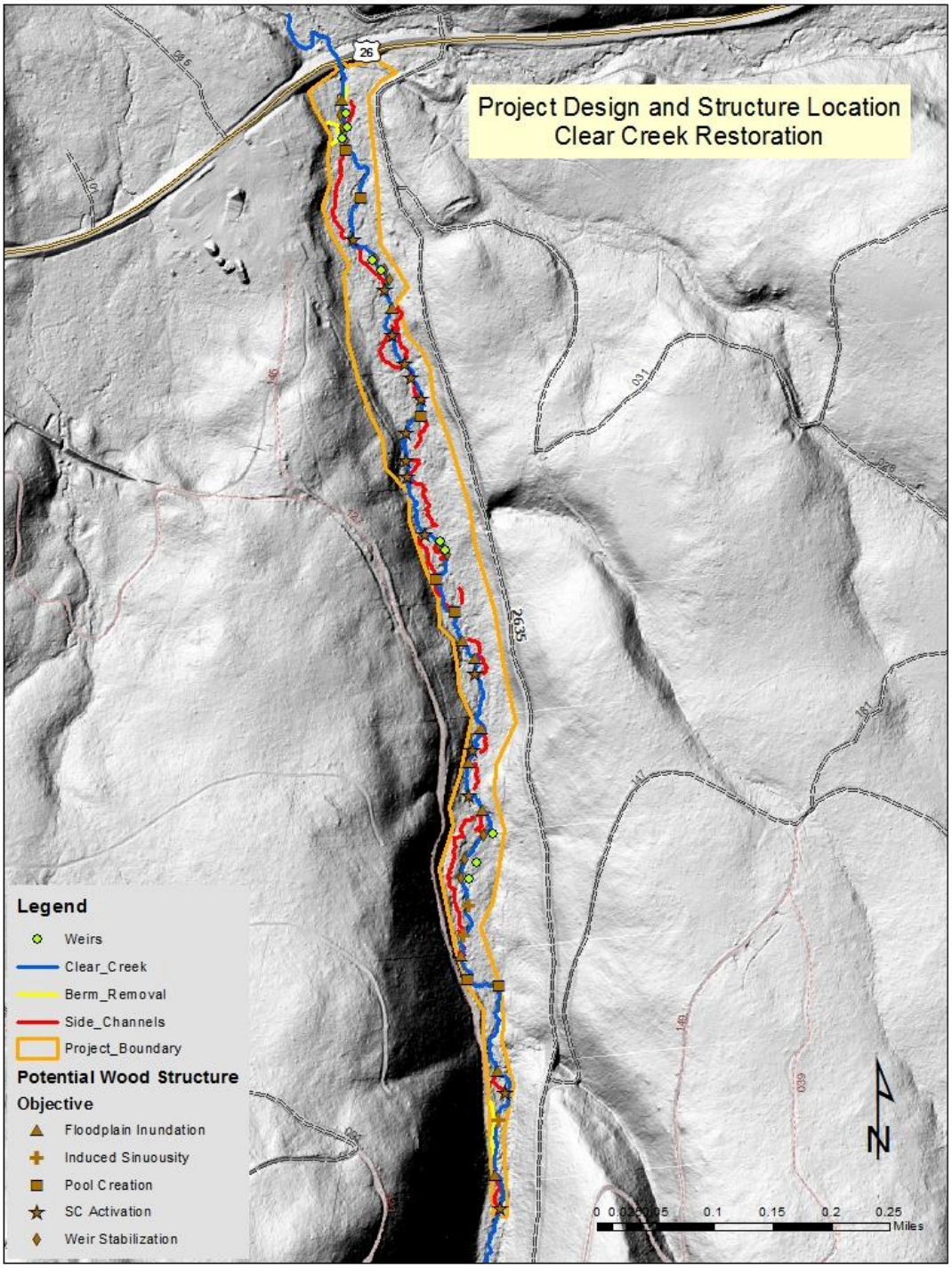

Figure 2: Project design and large wood structure design of Clear Creek Restoration Project.

Clear Creek – Existing Conditions 2018

Figure 3: Typical log weir installed on Clear Creek within the project area, note the ~15-18" jump height, over-widened and straightened channel form downstream of the structure and riprap berms on both stream banks holding the log in place.

Figure 4: Typical log weir installed on Clear Creek within project area. The jump height on this weir is reduced but two other weirs in close proximity to this location have jump heights greater than 12". Note the legacy water development infrastructure on the floodplain immediately adjacent to the stream.

Figure 5: Evidence of past land management practices within the project area.

Figure 6: Typical vegetation condition in infrequently activated secondary flow paths. Note that flow paths typically still have wetland obligate and facultative vegetation present. More frequent and longer durations of inundation will allow for the expansion of these riparian plant communities throughout the floodplain.

Figure 7: Typical channel form of Clear Creek where induced sinuosity type wood structures are proposed. Note simple, overwidened channel form with little habitat complexity or pool development.

Figure 8: Stream banks armored with concrete panels and rip rap near the upstream end of the proposed project reach on Clear Creek. Berms and rip rap are associated with an abandoned water development just downstream from this location.

Pool Formation: Conceptual design of a Pool Formation wood jam. The design is intended to create new pools or enhance the quality of existing pools and to induce sinuosity in straighten areas of homogenous channel form.

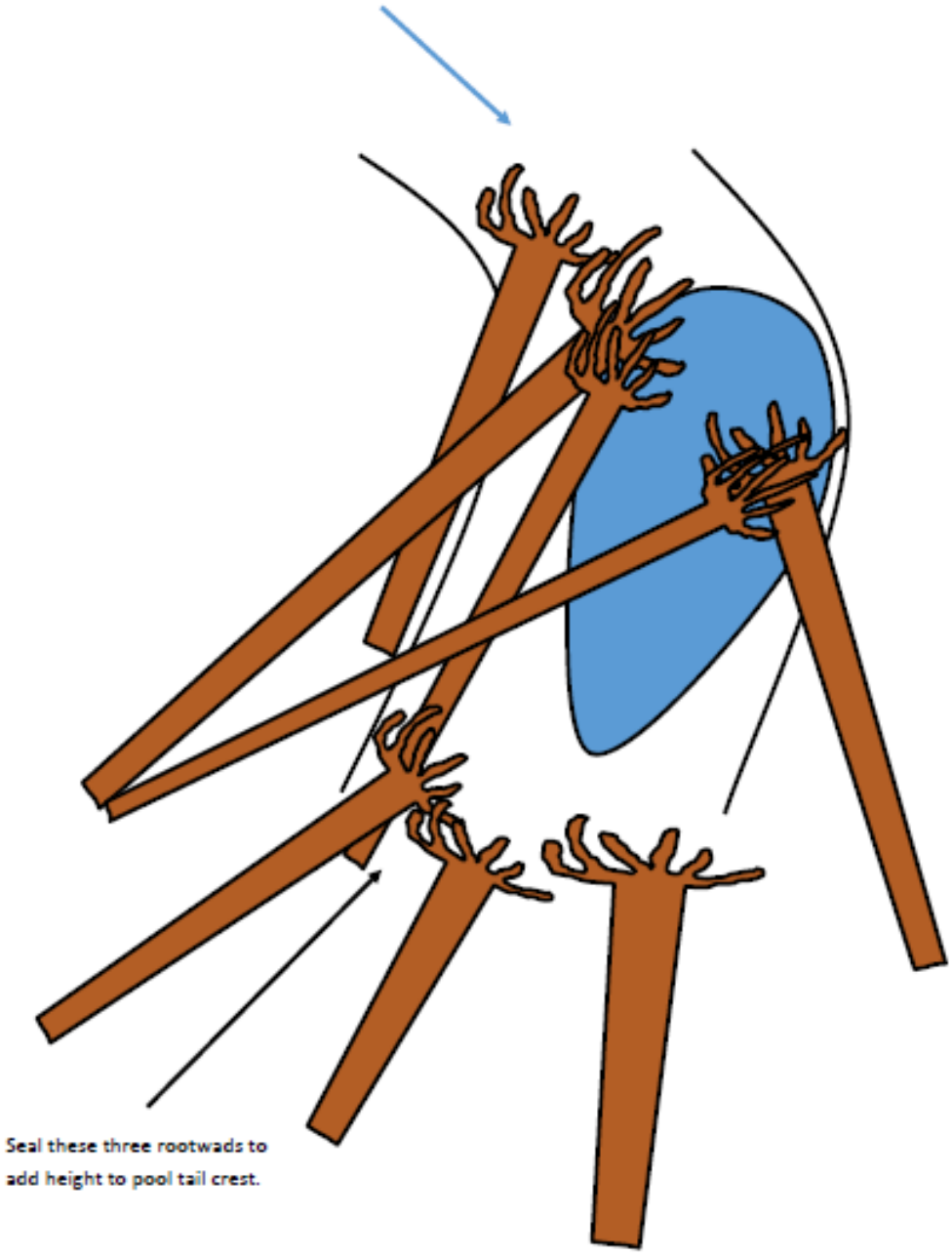

Figure 9: Conceptual pool formation structure.

Floodplain Inundation: Conceptual design of a Floodplain Inundation woodjam. Structure is design to disperse water as widely as possible across the floodplain. Logs will be sealed against the stream bed and/or keyed into banks to aggrade the streambed and activate or maintain secondary flowpaths.

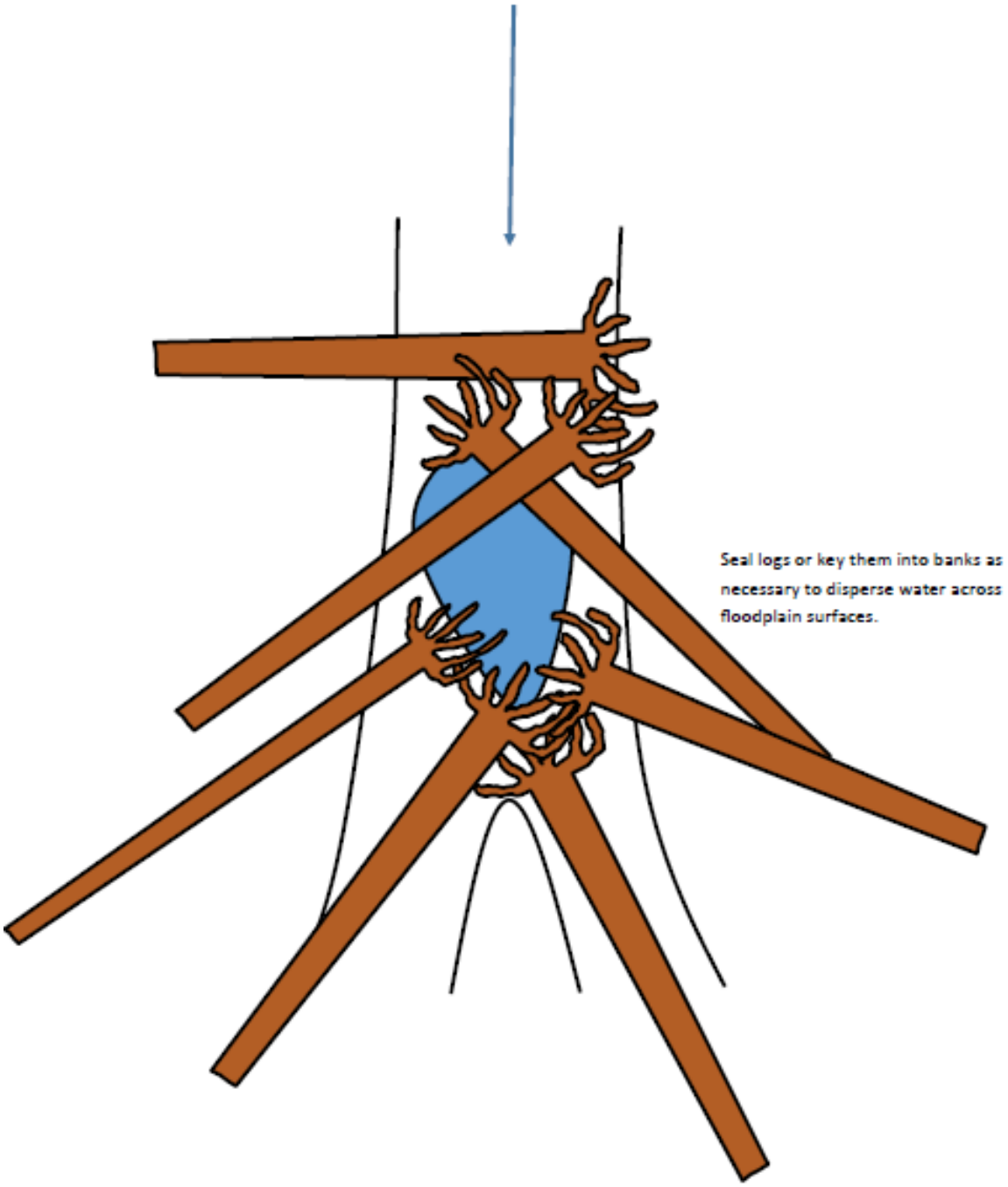

Figure 10: Conceptual floodplain inundation structure.

Side Channel Activation: Conceptual design of a Side Channel Activation woodjam. Rootwads will divert high flows into secondary flow paths as well as enhance scour patterns in the main channel to enhance or create deep water habitat.

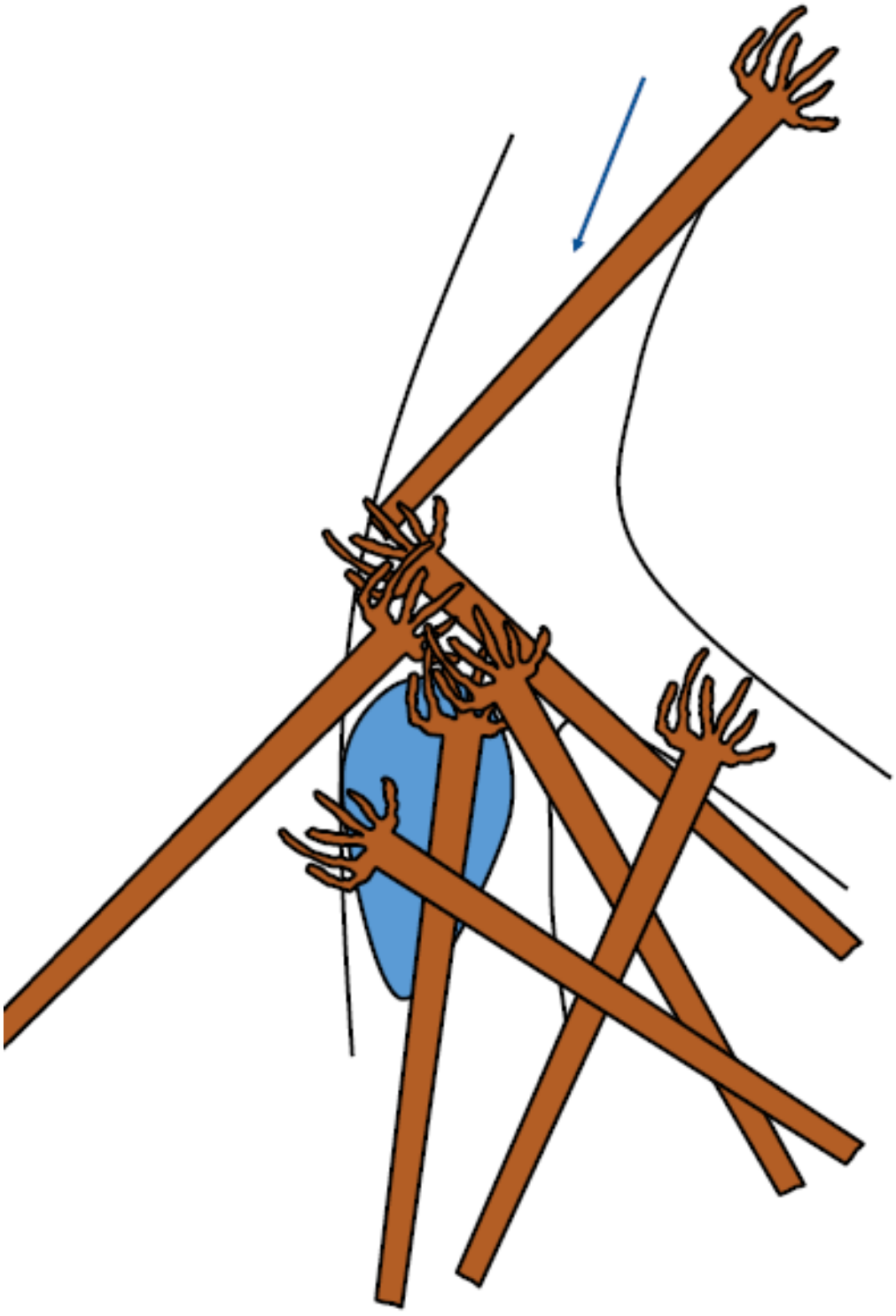

Figure 11: Conceptual sidechannel activation structure.

Induced Sinuosity: Conceptual design of an Induced Sinuosity woodjam. Design is intended to encourage pool formation and lateral migration in straight stretches of homogenous channel form. Spacing of trees will be between 10-40 feet and a single "structure" may cover several hundred feet of channel length.

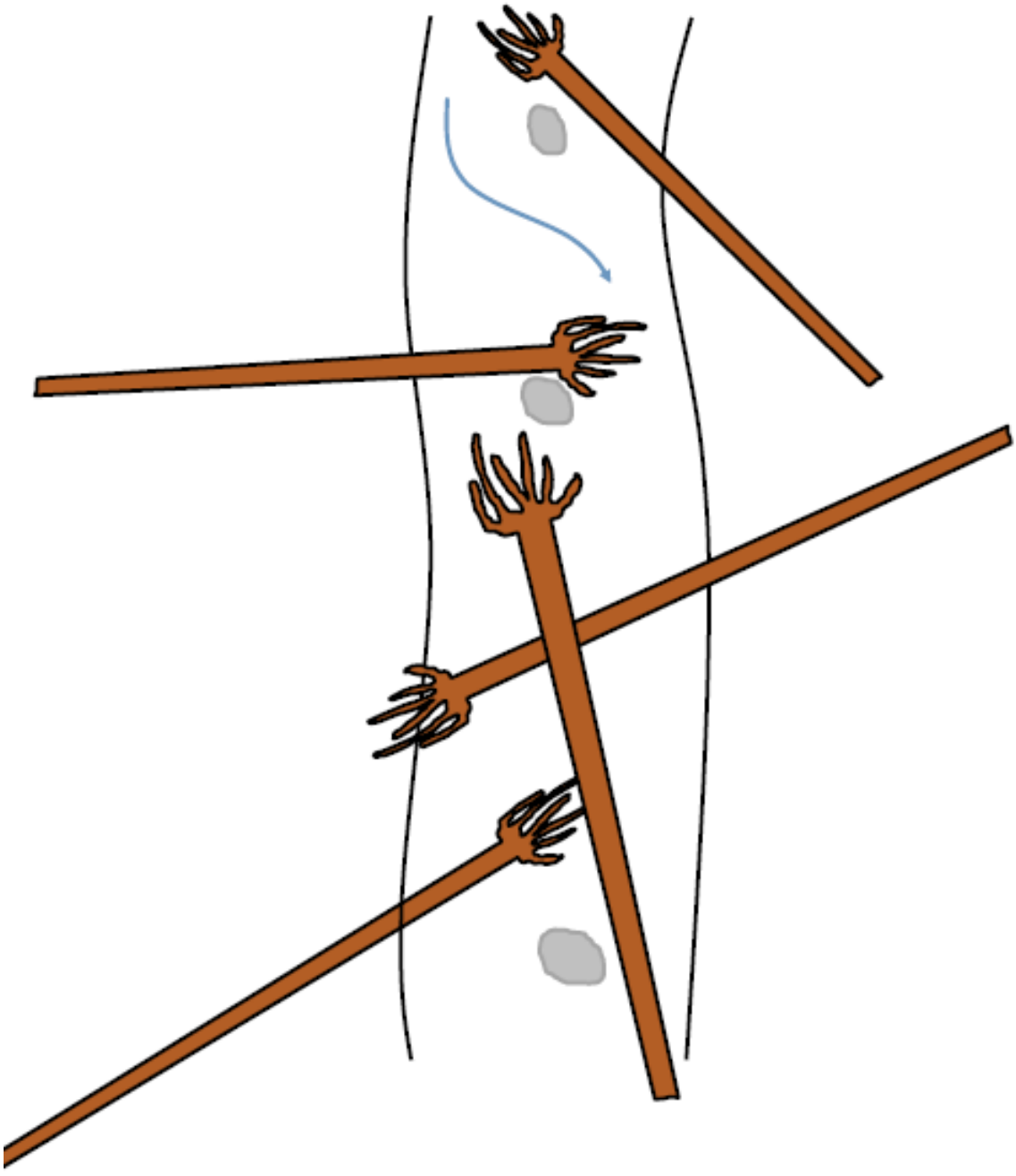

Figure 12: Conceptual induced sinuosity structure.

Weir Stabilization: Conceptual design of a Weir Stabilization woodjam. Design will stabilize vertical drop but allow for some redistribution of finer sediments and gravels trapped upstream of weirs. Logs and larger boulders from berms will be used to maintain scour through existing pool habitat. Material from berms will also be used to rebuild overwidened banks downstream of existing structures.

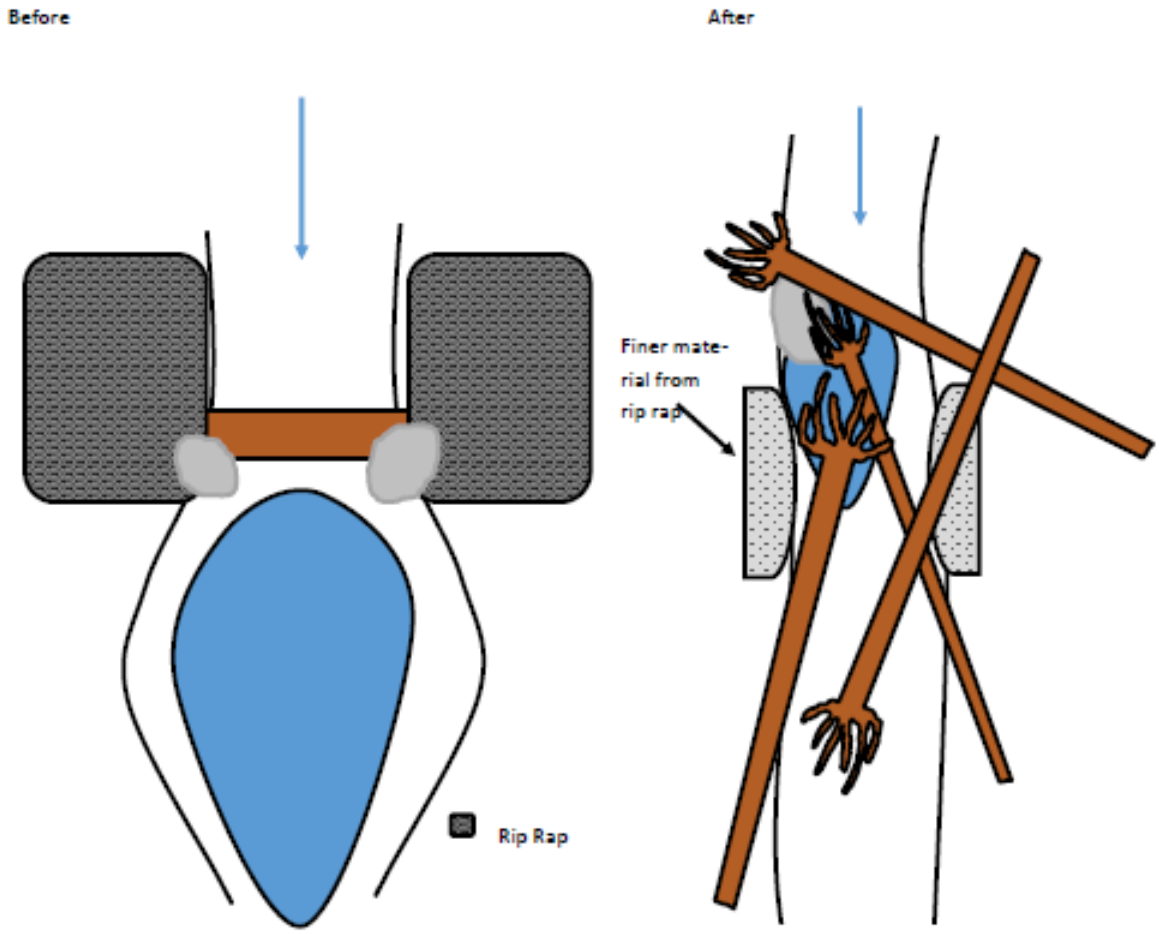

Figure 13: Conceptual weir stabilization structure.

Clear Creek Restoration
Project Number: **0405-2019**

Category 2: Large wood, boulder, and gravel placement; including tree removal for large wood placement
Category 3: Dam, tidegate, and legacy structure removal
Category 7: Set-back or removal of existing berms, dikes, and levees
Category 9: Livestock fencing, stream crossings, and off-channel livestock watering facilities
Category 14: Riparian vegetation planting

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- 0405-2019
    b. Clear Creek Restoration-
    c. Location-

Project	*Clear Creek Restoration*
Stream Name	*Clear Creek*
6th field HUC	*170702030104- Clear Creek*
Latitude (Decimal Degrees)	*44.570074*
Longitude (Decimal Degrees)	*-118.489963*

    d. Agency contact- *PCRD Fisheries*
    e. Timing- *All in-stream work will occur between July 15 and August 15, 2019. Out of water activities including tree tipping and staging, site rehab, fencing and planting may occur before or after this window.*
    f. Activity category-
    Category 2: Large wood, boulder, and gravel placement; including tree removal for large wood placement
    Category 3: Dam, tidegate, and legacy structure removal
    Category 7: Set-back or removal of existing berms, dikes, and levees

Category 9: Livestock fencing, stream crossings, and off-channel livestock watering facilities
Category 14: Riparian vegetation planting

g. Project description- *Remove 10 weirs from Clear Creek which act as migration barriers for resident and anandromous fishes and construct 46 large woody debris jams to activate side channels, inundate floodplain surfaces and scour pools,*
h. Extent- *Project will move ~1.25 miles of Clear Creek towards meeting Riparian Management Objectives and will improve access to 3.2 miles of Chinook salmon habitat, 9 miles of steelhead designated critical habitat, and 11.7 miles of bull trout designated critical habitat.*
i. Species affected-
    i. Listed species: *bull trout (Salvelinus confluentus) and Mid-Columbia River steelhead (Oncorhynchus mykiss)*
    ii. Critical Habitat: Yes
j. Date of submittal- *To be completed in 2018, at least 30 day prior to July 15, 2019.*
k. Site assessments- *Assessment for contaminants will not be required on this project*
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 will occur on a project by project basis as required.
5. Restoration Review Team: This work does not require review by the restoration review team.
6. Project Completion Report: To be completed after implementation. This project will be completed within three years of implementation initiation.
7. Annual Program Report: annual reporting will occur in the winter of the fiscal year after work was done before February 15th and occur annually until project completion.

Project Design Criteria

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: Although individual activities only affect small areas of the watershed, the impacts of this work as a whole will improve restistance and resilience of the system and biota to climate change through cold-water storage, enhanced biodiversity and improved habitat.
10. In-Water Work Period: In-stream activities will occur between July 15th and August 15th, and work occurring outside the high flow elevation can occur outside of this window.
11. Fish passage: Fish passage will be addressed on a case-by-case basis depending on the actions within a specific checklist.
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
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.

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.

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

i. **NMFS fish passage review and approve** – For engineered log jams that occupy >25% of the bankfull area, the Action Agencies will ensure that the action is individually reviewed and approved by NMFS for consistency with criteria in Anadromous Salmonid Passage Facility Design (NMFS 2011e).
ii. Engineered log jams will be patterned, to the greatest degree possible, after stable natural log jams.
iii. Grade control engineered log jams are designed to arrest channel down-cutting or incision by providing a grade control that retains sediment, lowers stream energy, and increases water elevations to reconnect floodplain habitat and diffuse downstream flood peaks.
iv. Stabilizing or key pieces of large wood that will be relied on to provide streambank stability or redirect flows must be intact, solid (little decay). If possible, acquire large wood with untrimmed rootwads to provide functional refugia habitat for fish.
v. When available, trees with rootwads attached should be a minimum length of 1.5 times the bankfull channel width, while logs without rootwads should be a minimum of 2.0 times the bankfull width.
vi. The partial burial of large wood and boulders may constitute the dominant means of placement, and key boulders (footings) or large wood can be buried into the stream bank or channel
vii. Angle and Offset – The large wood portions of engineered log jam structures should be oriented such that the force of water upon the large wood increases stability. If a rootwad is left exposed to the flow, the bole placed into the streambank should be oriented downstream parallel to the flow direction so the pressure on the rootwad pushes the bole into the streambank and bed. Wood members that are oriented parallel to flow are more stable than members oriented at 45 or 90 degrees to the flow.
viii. If large wood anchoring is required, a variety of methods may be used. These include buttressing the wood between riparian trees, the use of manila, sisal or other biodegradable ropes for lashing connections. If hydraulic conditions warrant

use of structural connections, such as rebar pinning or bolted connections, may be used. Rock may be used for ballast but is limited to that needed to anchor the large wood.

c. Porous Boulder Structures and Vanes

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

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

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

iv. Boulder step structures are to be constructed to allow upstream and downstream passage of all native fish species and life stages that occur in the stream. Plunges shall be kept less than 6 inches in height.

v. The use of gabions, cable, or other means to prevent the movement of individual boulders in a boulder step structure is not allowed.

vi. Rock for boulder step structures shall be durable and of suitable quality to assure long-term stability in the climate in which it is to be used. Rock sizing depends on the size of the stream, maximum depth of flow, planform, entrenchment, and ice and debris loading.

vii. The project designer or an inspector experienced in these structures should be present during installation.

viii. Full spanning boulder step structure placement should be coupled with measures to improve habitat complexity and protection of riparian areas to provide long-term inputs of large wood.

d. Gravel Augmentation

i. Gravel can be placed directly into the stream channel, at tributary junctions, or other areas in a manner that mimics natural debris flows and erosion.

ii. Augmentation will only occur in areas where the natural supply has been eliminated, significantly reduced through anthropogenic disruptions, or used to initiate gravel accumulations in conjunction with other projects, such as simulated log jams and debris flows.

iii. Gravel to be placed in streams shall be a properly sized gradation for that stream, clean, and non-angular. When possible use gravel of the same lithology as found in the watershed. Reference the Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings (USDA-Forest Service 2008) to determine gravel sizes appropriate for the stream.

iv. Gravel can be mined from the floodplain at elevations above bankfull, but not in a manner that would cause stranding during future flood events. Crushed rock is not permitted.
v. After gravel placement in areas accessible to higher stream flow, allow the stream to naturally sort and distribute the material.
vi. Do not place gravel directly on bars and riffles that are known spawning areas, which may cause fish to spawn on the unsorted and unstable gravel, thus potentially resulting in redd destruction
vii. Imported gravel must be free of invasive species and non-native seeds. If necessary, wash gravel prior to placement.

e. Tree Removal for Large Wood Projects

i. Live conifers and other trees can be felled or pulled/pushed over in a Northwest Forest Plan (USDA and USDI 1994a) Riparian Reserve or PACFISH/INFISH (USDA-Forest Service 1995 ; USDA and USDI 1994b) riparian habitat conservation areas (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 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 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.

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:
1. 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.
2. 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.
3. Sediment characterization to determine the proportion of coarse sediment (>2mm) in the reservoir area.
4. 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 mm (i.e., 65% of the sediment by weight exceeds 2 mm in diameter) may be removed without excavation of stored material, if the sediment contains no contaminants; reservoirs with a d35 less than 2 mm (i.e., 65% of the sediment by weight is less than 2 mm 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.
5. 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 (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.

7. 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, bull dozers, 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.

9. 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, bull dozers, 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 (e.g., 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 (e.g., 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 (e.g., 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/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% 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 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.

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 and 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.	60 ft.

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 a 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 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% 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 the 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 one-half times (1.5X) the bankfull or a log without a rootwad should be twice (2X) the length of the stream's bankfull width. As the best fish habitat is formed around jams composed of 3 to7 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 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) http://pubs.usgs.gov/circ/1321/pdf/circ1321.pdf

Tree and Boulder Hauling

Apply mitigation and best management practices for dust abatement (water, lignosulfonate, Calcium and Magnesium Chlorides) dry conditions, and erosion control as directed by physical scientist or road engineer (See Road Maintenance project design criteria #6 for application).

Haul on gravel and native-surface roads will be limited to dry conditions.

Haul Restrictions to Prevent Fine Sediment Delivery to Streams

Haul or maintenance is permitted on roads under the following conditions:

During haul, weather conditions are monitored daily for the chance of precipitation by the Hydrologist or Fish Biologist.

No rutting of the road surface is occurring, indicating the subsurface is wet.

Frozen ground conditions.

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

Roads Exempt from Haul Restrictions include (Do 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 RHCA's.

Use all available fuel treatments and preparation activities as necessary (e.g. 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 (e.g. don't cause bank instability or increase erosion)

Within 100' of the stream channel backing fire is preferred.

Within primary shade zone retain 100% of the over-story canopy closure with the exception of hardwood treatment.

For intermittent, non-fish-bearing stream channels:

Within 50' 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 (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.

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 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 (ATPs).

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 (GDE) shall be maintained. Spring developments shall not dewater GDEs. 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 (ATPs).

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 GDE, unless it is for the benefit or protection of the GDE 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 GDE. 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 GDE.

When developing springs, place troughs far enough away from GDEs, 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.

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 (e.g., 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 and/or are not economically feasible, and (4) in permanently altered plant communities.

Under no circumstances shall non-native invasive plant species and/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 and/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 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.

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.

Additional Soils PDCs added April 2018

Soil Protection Guidance for Aquatic Restoration Projects Using Heavy Equipment Off Roads

Hersh McNeil, Tom Friedrichsen, & Steve Namitz 3-20-18

The following are soil protection practices typically used to minimize adverse effects to the environment, in order to meet desired soil conditions (including Forest Plan standards) as well as Project Design Criteria described in the Aquatic Restoration EA.

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.

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 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 (6ft 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 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.