

## Forest Aquatic Restoration Project NEPA Compliance and Implementation Checklist

**Project Number:** \_\_\_\_\_

**Date:** July 2017

**Category:** Road and Trail Erosion Control, Fish Passage Restoration, Channel Reconstruction/Relocation, Streambank Restoration, Riparian Vegetation Planting

**Location:** Calamity Creek, Emigrant Creek RD, Malheur NF T19S R32E S12 NE¼ SE¼ 43.937141 -118.817550

**Project Description:** Calamity Creek Restoration Project

**Heritage**

x - Specific PDC for Heritage addressed (Heritage Surveys; Avoidance areas).

**Botany**

- Specific PDC for Botany addressed (Sensitive Plant Surveys).
- Specific PDC for Nox. Weeds addressed.

**Land Management Consistency**

- 4A Big Game Winter range
- 6A & 6B Wilderness
- 7 Scenic Area
- 8 Special Interest Areas
- 9 Research Natural Areas
- 10 Semi-Primitive Non-Motorized Recreation Areas
- 22 Wild and Scenic River
- Inventoried Roadless Area

I have reviewed this project and have determined it is within the Project Design Criteria identified for my resource.			
Resource	Signature	Date	Comments
Heritage	/s/ Pete Cadena	03/21/17	R2017060402006 – Wood culvert placed away from camp; site avoidance in decom road
Botany/Weeds	/s/ Lisa Foster	02/01/17	Plan to survey before implementation
Wildlife	/s/ Roy Sutcliffe	01/30/17	No issues
Fish*	/s/ Craig Hemping	01/27/17	No issues
Hydrology*	/s/ Jordan Van Sickle	01/27/17	Ensure either Fish Biologist or Hydrologist is present during implementation
Range	/s/ Joe Lee	02/01/17	We called the permitted he is ok with decommissioning the 378 road
Soils	/s/ Jordan Van Sickle	01/27/17	Beneficial. No existing exceeding detrimental impacts
Recreation	/s/ Eric Amsted	02/07/17	Slope for creek crossing should be gradual on both sides to allow trailer crossing
Lands and Special Uses/Minerals	/s/ Stacia Kimbell /s/ Hannah Grist	02/13/17	No Lands Special Uses were located within the proposed project vicinity. No mine claims present. No paleo resources present.
Engineering	/s/ John Laliberte	02/13/17	Complete an AD-112 form after the 378 is decommissioned so the road can be removed from the real property inventory. Report when the culverts have been removed so INFRA can be updated to reflect the road has been placed in long term storage.
Fuels / Fire	/s/ Tim Boyce	02/13/17	No issues
Silviculture	/s/ Travis Swaim	02/07/17	Looks good

\* 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.

Line Officer Signature: 

Date: March 21, 2017

# Calamity Creek Restoration Project

Emigrant Creek Ranger District, Malheur National Forest

Anticipated Project Start Date: July 2017

## Action Plan

The goal of this project is to restore hydrologic processes and aquatic habitat along Calamity Creek in compliance with the National Environmental Policy Act (NEPA) under the Aquatic Restoration Environmental Analysis (tiered to ARBO II). The specific objectives are:

- Remove and restore the adverse effects of closed roads along Calamity Creek
- Decommission the closed road 1705378 and restore channel function along the stream corridor
- Improve stream water quality by restoring springs created by road cut and eliminating erosion associated with the closed roads
- Remove three perched and/or undersized culverts located on closed roads 1705146, 1705101 and 1705088 and restore channel morphology
- Stabilize incised stream channel to re-establish water storage capacity, flood control, aquatic organism passage and habitat
- Improve/increase riparian and aquatic vegetation for fish and wildlife habitat by planting/seeding when necessary.

Potential treatment impacts include:

- Short term in-stream sedimentation during road ripping and culvert removal
- Soil and wildlife disturbances from heavy machinery and ground disturbance along road corridor
- Detrimental impacts to sensitive plants along road corridor during decommission

Mitigation measures include (described in detail in the Project Design Criteria section of the EA):

- Administer treatments during low flow and minimal soil moisture conditions
- Establish sediment control filters, both natural and artificial, along downstream reaches
- Stream re-routing during culvert removal if needed



*A grader outfitted with a ripper will be used to restore and re-contour the road prism where needed*



*An excavator or backhoe will be used to remove problematic culverts*

## **Project Description**

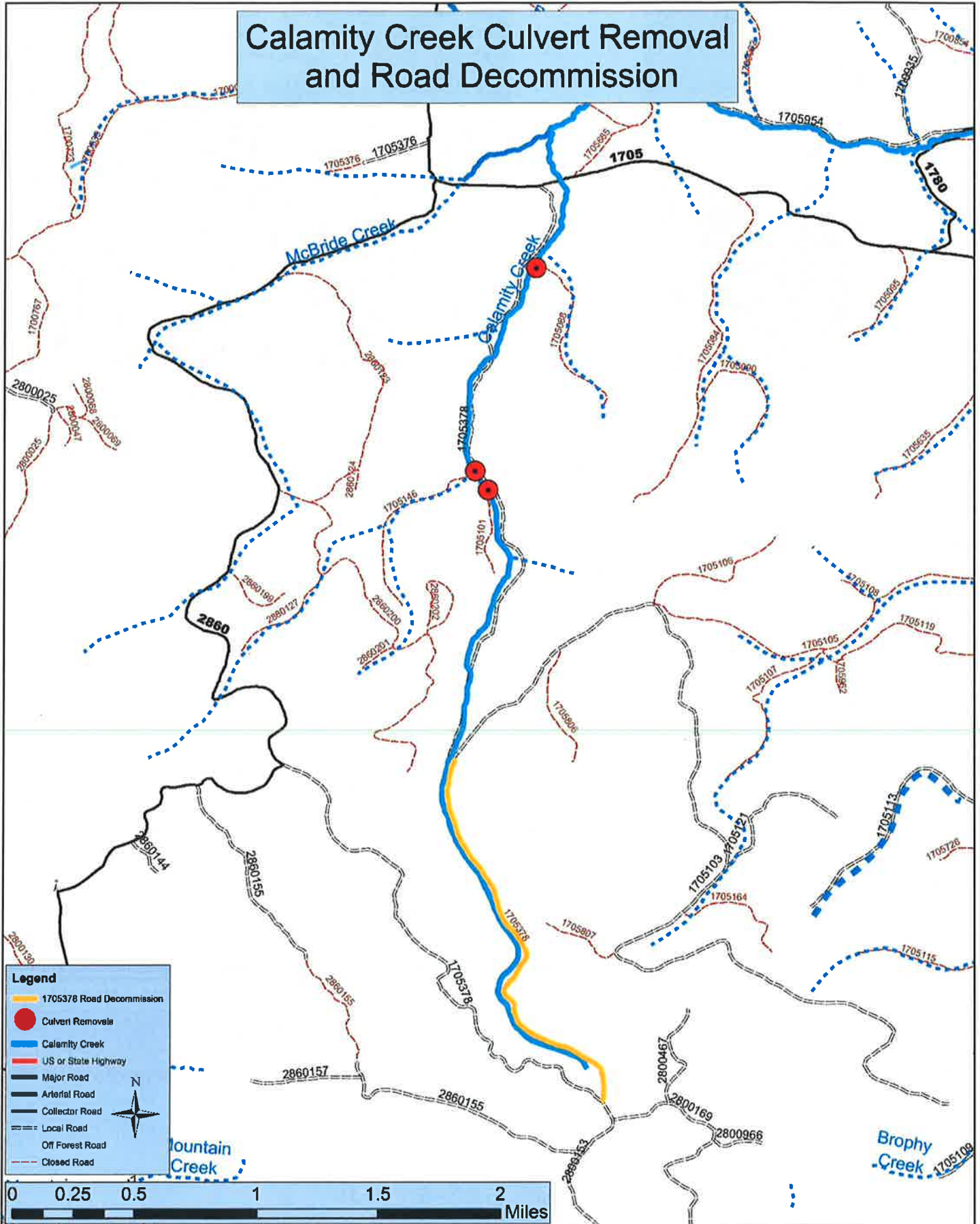
This project is intended to enhance stream function and aquatic habitat by removing passage issues and reducing negative impacts on water quality. Along Calamity Creek, there are three culvert removals being proposed that either restrict aquatic organism passage and/or diminish natural stream function. In addition, a closed road (1705378) runs adjacent to Calamity Creek for 1.7 miles will be decommissioned. This road negatively effects water quality, aquatic habitat and stream processes. By not decommissioning or maintaining closed roads proximal to streams, the drainage network of a stream significantly increases. Roads directly affect the channel morphology of streams by accelerating erosion and sediment delivery and by increasing the magnitude of peak flow. Indirectly, if current conditions degrade then habitat for aquatic species will also degrade.

The road prism restricts natural lateral movement along the stream course causing stream steepening and accelerated erosion. Road cuts constructed too close to the stream expose the water table forming seeps, which causes erosion, rutting, and sediment entrainment. Direct road-stream interactions accelerate erosion, increase fine sediment entering the stream, and exacerbate an imbalance in aquatic habitat. Despite mitigation measures that are planned during implementation, the road and culvert removal may result in some degree of short-term adverse effects to fish or their habitat by creating point-source pollution (sediment in the stream). However, the long-term outcomes of this project will alleviate the current perpetual point-source pollution. By decommissioning the upper end of 1705378, this project will directly improve water quality, habitat access, stream channel conditions, flow hydrology and overall watershed condition in the long term. Detrimental culverts needing removal are located on closed roads 1705088, 1705146 and 1705101. The closed road 1705088 accesses a dispersed campsite ~100 ft away along the stream, while the other two roads are unused and re-establishing soil stability and productivity. Access to this dispersed campsite will not be retarded by culvert removal because a low rock ford will replace the culvert. All of these activities will promote growth of riparian vegetation, thus improving riparian conditions in the long term.

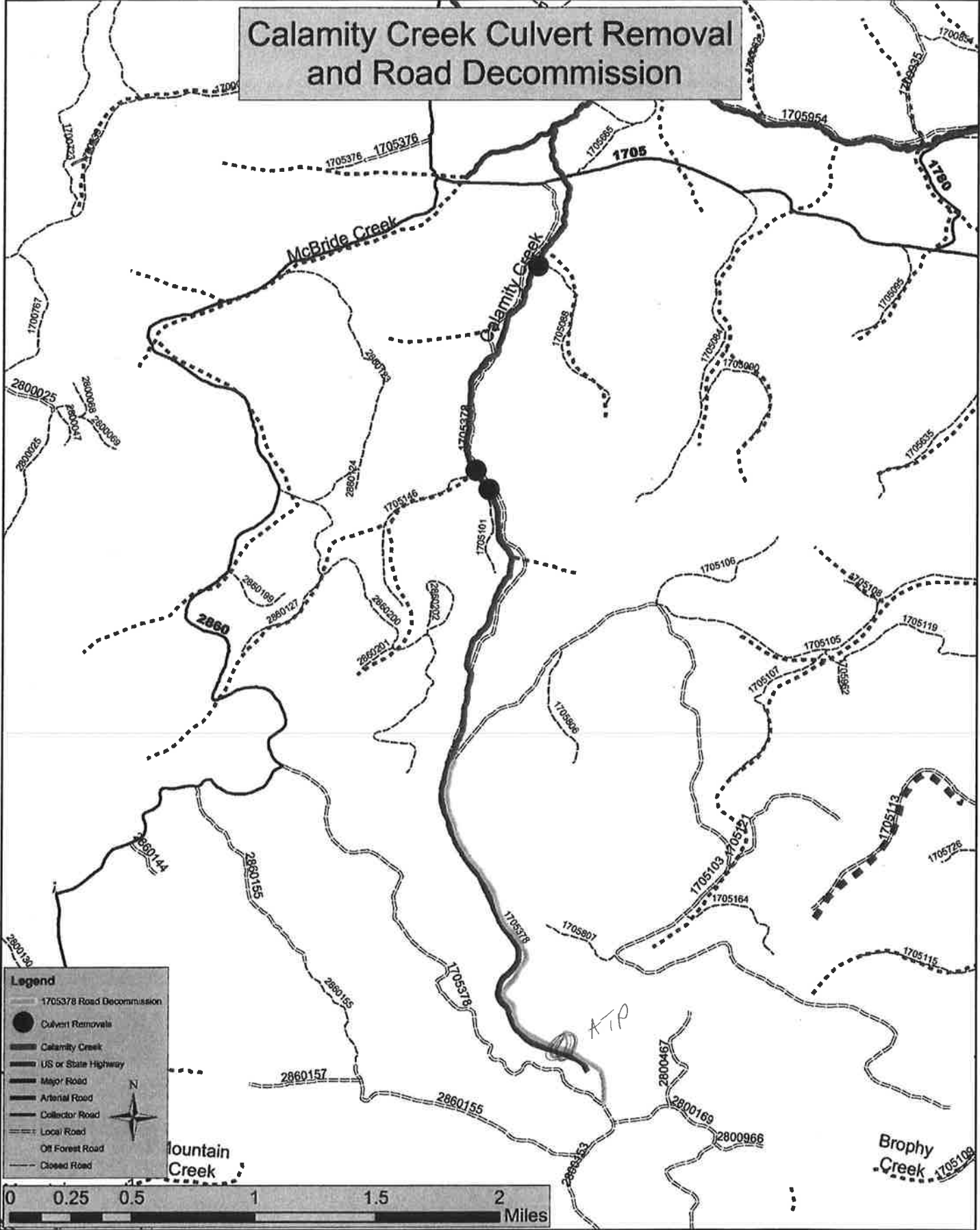
Direct questions/comments to Jordan Van Sickle (541) – 573 – 4313

Or Howard Richburg (541) – 573 – 4322

# Calamity Creek Culvert Removal and Road Decommission




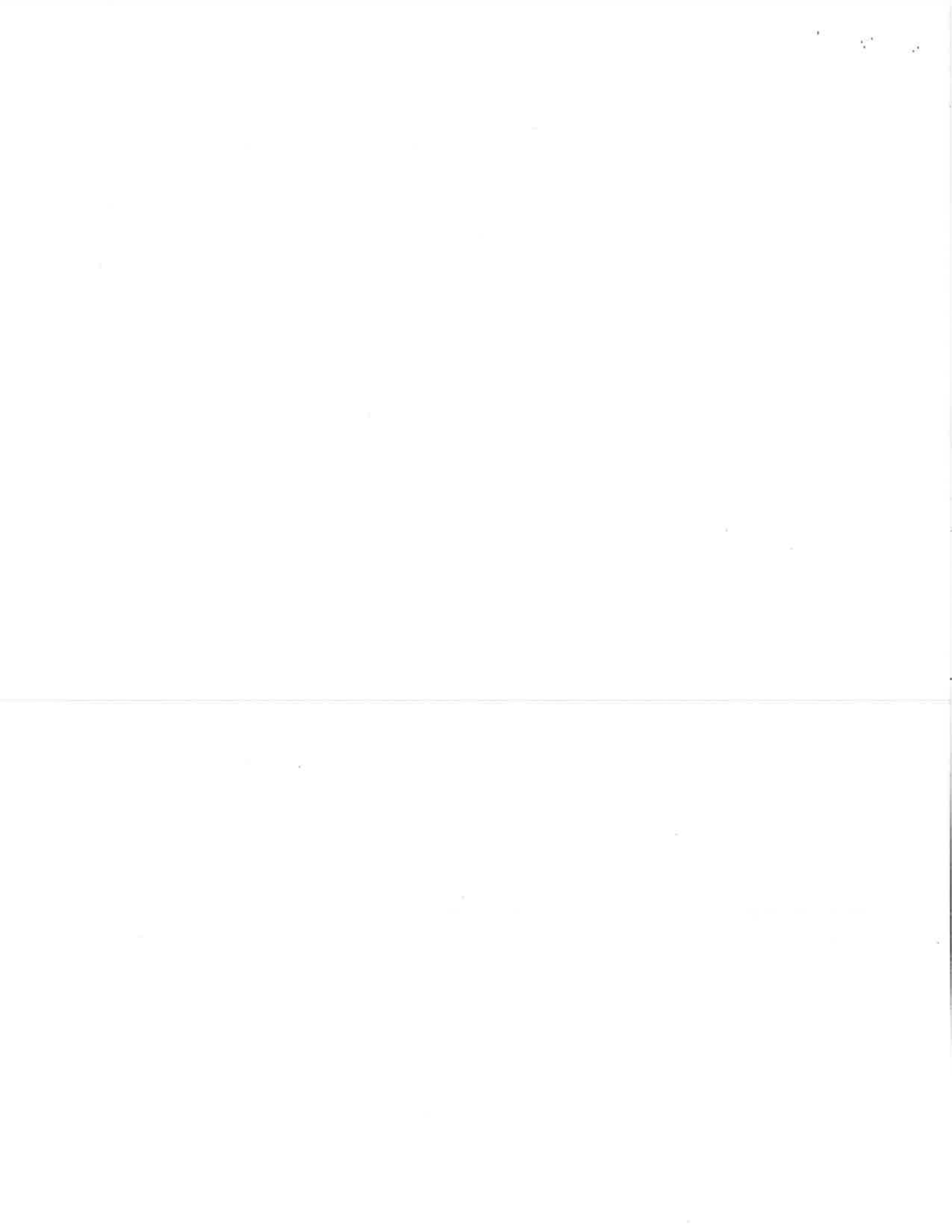
# Calamity Creek Culvert Removal and Road Decommission



**Legend**

- 1705378 Road Decommission
- Culvert Removals
- Calamity Creek
- US or State Highway
- Major Road
- Arterial Road
- Collector Road
- Local Road
- Off Forest Road
- Closed Road





## 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.**

	<b>Hill Slope less than 30%</b>	<b>Hill Slope 30% to 60%</b>	<b>Hill Slope greater than 30%</b>
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 to 7 logs, at least 2 key pieces should be used at each structure.
- Mimic natural accumulations of large woody debris based on stream type, valley setting, and community type and ensure future large 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 outloped 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 project design criteria. Suppression should be used only as a last resort to achieve other project design criteria.

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.

### *Sensitive and Unique Habitats*

- The integrity of unique habitats shall be maintained. Unique habitats [may] include meadows, rimrock, talus slopes, cliffs, animal dens, wallows, bogs [fens], seeps and springs. This shall be accomplished by incorporating cover buffers approximately 100 feet in width.

- Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, recreation sites, prescribed fires, fire lines, and other operational activities shall not occur within, or at the interface of lithosols (scablands).
- Cutting of old-growth juniper shall be prohibited. Old-growth characteristics include: sparse limbs, dead limbed or spiked-tops, deeply furrowed and fibrous bark, branches covered with bright-green arboreal lichens, noticeable decay of cambium layer at base of tree, and limited terminal leader growth in upper branches.

#### *Groundwater-Dependent Ecosystems*

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

#### *Invasive Plant Species*

- **Pre-Implementation:** Proposed restoration projects shall be surveyed for invasive plants early in the implementation planning process by a qualified invasive plant specialist /technician, to identify and assess any undocumented invasive plant infestation.
- **Pre-Implementation:** For project areas that overlap or are adjacent to invasive plant infestations, assure that there is sufficient time prior to develop a long-term site strategy for control, eradication, and revegetation of the site. This shall be accomplished by a qualified invasive plant specialist in collaboration with the interdisciplinary team and other stakeholders.
- All activities shall be conducted in a manner as to minimize or prevent the potential spread or establishment of invasive species.
- Actions conducted on National Forest System Lands that will operate outside the limits of the road prism, require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering the National Forest. Cleaning will be inspected and approved by the forest officer in charge of administering the project.
- Assure that all materials are weed-free. Use weed-free straw and mulch for all projects conducted or authorized by the Forest Service on National Forest System Lands. If State certified straw and/or

mulch is not available, individual Forests should require sources certified to be weed-free using the North American Weed Free Forage Program standards or a similar certification process.

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

### *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, nonpersistent 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.

### ***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 enclosure fences would have gates installed in proper locations to allow for removal of stray livestock. Aspen fences would be maintained each year and repaired whenever necessary. Plans for aspen enclosures will define when restoration of the protected stand has been achieved and who has responsibility for maintenance of the structure. When fences are no longer needed, aspen fences should be removed.
- Alternate livestock water sources to those being used in aspen stands would be developed offsite 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.*

## **Monitoring**

Monitoring will be conducted by District hydrology and/or Fish Biologist, 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.

## **Category and Associated Project Design Criteria**

**Road and Trail Erosion Control** includes hydrologically closing or decommissioning roads and trails, including culvert removal in perennial and intermittent streams; removing, installing or upgrading cross-drainage culverts; upgrading culverts on non-fish-bearing streams; constructing water bars and dips; reshaping road prisms; vegetating fill and cut slopes; removing and stabilizing of sidecast materials; grading or resurfacing roads that have been improved for aquatic restoration with gravel, bark chips, or other permeable materials; contour shaping of the road or trail base; removing road fill to native soils; soil stabilization and tilling compacted surfaces to reestablish native vegetation. Roads closed under Forest Service and BLM/BIA equivalent Travel and Access Management Plans will be subject to these PDC and may be addressed under this opinion. However, such "plans" for road management will require separate consultations. Such actions will target priority roads that contribute sediment to streams, block fish passage, or disrupt floodplain and riparian functions. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

### **a. Road Decommissioning and Stormproofing**

- i. For road decommissioning and hydrologic closure projects within riparian areas, recontour the affected area to mimic natural floodplain contours and gradient to the extent possible.
- ii. When obliterating or removing road segments adjacent to a stream, use sediment control barriers between the road and stream if space is available.
- iii. Dispose of slide and waste material in stable sites out of the flood-prone area. Native material may be used to restore natural or near-natural contours.
- iv. Drainage features used for stormproofing and treatment projects should be spaced as to hydrologically disconnect road surface runoff from stream channels. If grading and resurfacing is required, use gravel, bark, or other permeable materials for resurfacing.
- v. Minimize disturbance of existing vegetation in ditches and at stream crossings.
- vi. Conduct activities during dry-field conditions (generally May 15 to October 15) when the soil is more resistant to compaction and soil moisture is low.
- vii. When removing a culvert from a first or second order, non-fishing bearing stream, project specialists shall determine if culvert removal should include stream isolation and rerouting in project design. Culvert removal on fish bearing streams shall adhere to the measures described in Fish Passage Restoration (PDC 21).
- viii. For culvert removal projects, restore natural drainage patterns and channel morphology. Evaluate channel incision risk and construct in-channel grade control structures when necessary.

### **b. Road Relocation**

- i. When a road is decommissioned in a floodplain and future vehicle access through the area is still required, relocate the road as far as practical away from the stream.
- ii. The relocation will not increase the drainage network and will be constructed to hydrologically disconnect it from the stream network to the extent practical. New cross drains shall discharge

to stable areas where the outflow will quickly infiltrate the soil and not develop a channel to a stream.

iii. This consultation does not cover new road construction (not associated with road relocation) or routine maintenance within riparian areas.

**Fish Passage Restoration** includes the following: total removal of culverts or bridges, or replacing culverts or bridges with properly sized culverts and bridges, replacing a damaged culvert or bridge, and resetting an existing culvert that was improperly installed or damaged; stabilizing and providing passage over headcuts; removing, constructing (including relocations), repairing, or maintaining fish ladders; and constructing or replacing fish screens for irrigation diversions. Such projects will take place where fish passage has been partially or completely eliminated through road construction, stream degradation, creation of small dams and weirs, and irrigation diversions. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

**a. Stream Simulation Culvert and Bridge Projects** – All road-stream crossing structures shall simulate stream channel conditions per Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road- Stream Crossings (USDA-Forest Service 2008), located at:

[http://stream.fs.fed.us/fishxing/aop\\_pdfs.html](http://stream.fs.fed.us/fishxing/aop_pdfs.html)

i. **Culvert criteria** – Within the considerations of stream simulation, the structure shall, at a minimum, accommodate a bankfull wide channel plus constructed banks to provide for passage of all life stages of native fish species (for more information, reference Chapter 6, page 35 of the USFS Stream Simulation Guide). The following crossing-width guidance applies to specific ranges of entrenchment ratios as defined by Rosgen (1996):

1. **Non-entrenched Streams:** If a stream is not fully entrenched (entrenchment ratio of greater than 1.4), the minimum culvert width shall be at least 1.3 times the bankfull channel width. This is consistent with *Anadromous Salmonid Passage Facility Design* (section 7.4.2 “Stream Simulation Design”) (NMFS 2011e). However, if the appropriate structure width is determined to be less than 1.3 times the bankfull channel width, processes for variances are listed in “iv” and “v” below. 2. **Entrenched Streams:** If a stream is entrenched (entrenchment ratio of less than 1.4), the culvert width must be greater than bankfull channel width, allow sufficient vertical clearance to allow ease of construction and maintenance activities, and provide adequate room for the construction of natural channel banks. Consideration should be given to accommodate the floodprone width. Floodprone width is the width measured at twice the maximum bankfull depth (Rosgen 1996).

ii. **Bridge Design**

1. Bridges with vertical abutments, including concrete box culverts, which are constructed as bridges, shall have channel widths that are designed using the culvert criteria (PDC 21a-i above). This opinion does not cover bridges that require pile driving within a wetted stream channels.
2. Primary structural elements must be concrete, metal, fiberglass, or untreated timber. Concrete must be sufficiently cured or dried before coming into contact with stream flow.
3. Riprap must not be placed within the bankfull width of the stream. Riprap may only be placed below bankfull height when necessary for protection of abutments and pilings. However, the amount and placement of riprap should not constrict the bankfull flow.

### iii. Crossing Design

1. Crossings shall be designed using an interdisciplinary design team consisting of an experienced Engineer, Fisheries Biologist, and Hydrologist/Geomorphologist.
2. Forest Service crossing structures wider than 20 feet or with costs that exceed \$100,000 shall be reviewed by the USDA-Forest Service, Region 6, Aquatic Organism Passage Design Assistance Team.
3. At least one member of the design team shall be trained in a weeklong Aquatic Organism Passage course based *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings* (USDA-Forest Service 2008).
4. Bankfull width shall be based on the upper end of the distribution of bankfull width measurements as measured in the reference reach to account for channel variability and dynamics.

iv. **NMFS fish passage review and approve** – If the structure width is determined to be less than the established width criteria as defined above, a variance must be requested from NMFS for consistency with criteria in NMFS (2011e).

v. **Opportunity for individual consultation** – The Action Agencies have a legal duty under the ESA to consult with NMFS and USFWS on a project specific basis if they prefer to operate outside the conditions in this opinion. The standards provided in this document are conservative for the purpose of this programmatic and may or may not be applicable to projects that undergo individual Level 1 Consultation. The standards in ARBO II are not new defaults to be used universally outside the programmatic arena.

vi. **Headcut and grade stabilization** – Headcuts often occur in meadow areas, typically on Rosgen “C” and “E” channel types. Headcuts develop and migrate during bankfull and larger floods, when the sinuous path of Rosgen E type streams may become unstable in erosive, alluvial sediments, causing avulsions, meander cut-offs, bank failure, and development of an entrenched Rosgen G gully channel (Rosgen 1994).

#### 1. Stabilize Headcuts

- a. In streams with current or historic fish presence, provide fish passage over stabilized headcut through constructed riffles for pool/riffle streams or a series of log or rock structures for step/pool channels as described in part ii below.
- b. Armor headcut with sufficiently sized and amounts of material to prevent continued up-stream migration of the headcut. Materials can include both rock and organic materials which are native to the area. Material shall not contain gabion baskets, sheet pile, concrete, articulated concrete block, and cable anchors.
- c. Focus stabilization efforts in the plunge pool, the headcut, as well as a short distance of stream above the headcut.
- d. Minimize lateral migration of channel around headcut (“flanking”) by placing rocks and organic material at a lower elevation in the center of the channel cross section to direct flows to the middle of channel.
- e. Short-term headcut stabilization (including emergency stabilization projects) may occur without associated fish passage measures. However, fish passage must be incorporated into the final headcut stabilization action and be completed during the first subsequent in-water work period.
- f. In streams without current or historic fish presence, it is recommended to construct a series of downstream log or rock structures as described in part ii below to expedite channel aggradation.

vii. **Grade stabilization to promote fish passage associated with headcut stabilization**

1. **NMFS fish passage review and approve** – If a grade stabilization structure spans the channel and creates one or more discrete longitudinal drops > 6 inches, the Action Agencies will ensure that the action is individually reviewed and approved by the NMFS for consistency with criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2011e).
2. Provide fish passage over stabilized headcut through constructed riffles for pool/riffle streams or a series of log or rock structures for step/pool channels. If large wood and boulder placement will be used for headcut stabilization, refer to Large Wood, Boulder, and Gravel Placement (PDC 22) below.
3. Construct structures in a ‘V’ or ‘U’ shape, oriented with the apex upstream, and lower in the center to direct flows to the middle of channel.
4. Key structures into the stream bed to minimize structure undermining due to scour, preferably at least 2.5x their exposure height. The structures should also be keyed into both banks—if feasible greater than 8 feet.
5. If several structures will be used in series, space them at the appropriate distances to promote fish passage of all life stages of native fish. Incorporate NMFS fish passage criteria (jump height, pool depth, etc.) in the design of step structures. Recommended spacing should be no closer than the net drop divided by the channel slope (for example, a one-foot high step structure in a stream with a two-percent gradient will have a minimum spacing of 50-feet [1/0.02]).
6. Include gradated (cobble to fine) material in the rock structure material mix to help seal the structure/channel bed, thereby preventing subsurface flow and ensuring fish passage immediately following construction if natural flows are sufficient.
7. If a project involves the removal of multiple barriers on one stream or in one watershed over the course of a work season, remove the most upstream barrier first if possible.

#### **b. Fish Ladders**

- i. **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 *Anadromous Salmonid Passage Facility Design* (NMFS 2011e).
- ii. Design preference is based on project type, level of maintenance, and required monitoring essential for reliable fish passage. Typical fishway designs include:
  1. roughened channels/boulder step structures
  2. channel spanning concrete sills
  3. pool and chute, and
  4. pool and weir fishways.

Roughened channel and boulder step structure fishways consist of a graded mix of rock and sediment in an open channel that creates enough roughness and diversity to facilitate fish passage. NMFS’s review will include any appurtenant facilities (*i.e.*, fish counting equipment, pit tag detectors, lighting, trash racks, attraction water) that may be included with the fish ladder design. See: the most recent version of *Anadromous Salmonid Passage Facility Design* (NMFS 2011e) for guidelines and design criteria. Through the NMFS Level 1 team member, collaborate with NMFS engineering staff prior to the conceptual design process of fishway projects to solicit NMFS’s preferred design type.
- iii. 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.

### c. Irrigation Diversion Replacement/Relocation & Screen Installation/Replacement

- i. **NMFS fish passage review and approve** – The Action Agencies will ensure that the action is individually reviewed and approved by National Marine Fisheries Service (NMFS) for consistency with criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2011e).
- ii. Diversion structures—associated with points of diversion and future fish screens— must pass all life stages of threatened and endangered aquatic species that historically used the affected aquatic habitat.
- iii. Water diversion intake and return points must be designed (to the greatest degree possible) to prevent all native fish life stages from swimming or being entrained into the diversion.
- iv. NMFS fish screen criteria (NMFS 2011e) applies to federally listed salmonid species under their jurisdiction. This includes screens in temporary and permanent pump intakes.
- v. All fish screens will be sized to match the irrigator's state water right or estimated historic water use, whichever is less.
- vi. Size of bypass structure should be big enough to pass steelhead kelt into the stream.
- vii. Abandoned ditches and other similar structures will be plugged or backfilled, as appropriate, to prevent fish from swimming or being entrained into them.
- viii. When making improvements to pressurized diversions, install a totalizing flow meter capable of measuring rate and duty of water use. For non-pressurized systems, install a staff gage or other measuring device capable of measuring instantaneous rate of water flow.
- ix. Conversion of instream diversions to groundwater wells will only be used in circumstances where there is an agreement to ensure that any surface water made available for instream flows is protected from surface withdrawal by another water-user.
- x. For the removal of diversion structures constructed of local rock and dirt, the project sponsor will dispose of the removed material in the following manner:
  1. Material more than 60% silt or clay will be disposed in uplands, outside of the active floodplain.
  2. Material with more than 40% gravel will be deposited within the active floodplain, but not in wetlands.
  3. Material with more than 50% gravel and less than 30% fines (silt or clay) may be deposited below the ordinary high water mark (HWM).

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

## a. General Project Design Criteria

### i. Design Review

1. **NMFS fish passage review and approve** – The Action Agencies will ensure that the action is individually reviewed and approved by NMFS for consistency with NMFS (2011e).
2. **Restoration Review Team** – The Action Agencies will ensure that the action is individually reviewed by the Restoration Review Team.

### ii. Design Guidance

1. Construct geomorphically appropriate stream channels and floodplains within a watershed and reach context.
2. Design actions to restore floodplain characteristics—elevation, width, gradient, length, and roughness—in a manner that closely mimics, to the extent possible, those that would naturally occur at that stream and valley type.
3. To the greatest degree possible, remove nonnative fill material from the channel and floodplain to an upland site.
4. When necessary, loosen compacted soils once overburden material is removed. Overburden or fill comprised of native materials, which originated from the project area, may be used within the floodplain where appropriate to support the project goals and objectives.
5. Structural elements shall fit within the geomorphic context of the stream system. For bed stabilization and hydraulic control structures, constructed riffles shall be preferentially used in poolriffle stream types, while roughened channels and boulder step structures shall be preferentially used in step-pool and cascade stream types.
6. Material selection (large wood, rock, gravel) shall also mimic natural stream system materials.
7. Construction of the streambed should be based on Stream Simulation Design principles as described in section 6.2 of Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings or other appropriate design guidance documents (USDA-Forest Service 2008).

iii. **Project documentation** – Prior to the Design Review, the project contact will provide NMFS and the Restoration Review Team with the following documentation:

1. Background and Problem Statement
  - a. Site history.
  - b. Environmental baseline.
  - c. Problem Description.
  - d. Cause of problem.
2. Project Description
  - a. Goals/objectives.
  - b. Project elements.
  - c. Sequencing, implementation.
  - d. Recovery trajectory –how does it develop and evolve?
3. Design Analysis
  - a. Technical analyses.
  - b. Computations relating design to analysis.
  - c. References.
4. River Restoration Analysis Tool – The River Restoration Analysis Tool (restorationreview.com) was created to assist with design and monitoring of aquatic

restoration projects. The following questions taken from the tool must be addressed in the project documentation:

- a. Problem Identification
  - i. Is the problem identified?
  - ii. Are causes identified at appropriate scales?
- b. Project Context
  - i. Is the project identified as part of a plan, such as a watershed action plan or recovery plan? ii. Does the project consider ecological, geomorphic, and socioeconomic context?
- c. Goals & Objectives
  - i. Do goals and objectives address problem, causes, and context? ii. Are objectives measurable?
- d. Alternatives/Options Evaluation
  - i. Were alternatives/options considered? ii. Are uncertainties and risk associated with selected alternative acceptable?
- e. Project Design
  - i. Do project elements collectively support project objectives?
  - ii. Are design criteria defined for all project elements?
  - iii. Do project elements work with stream processes to create and maintain habitat?
  - iv. Is the technical basis of design sound for each project element?
- f. Implementation
  - i. Are plans and specifications sufficient in scope and detail to execute the project?
  - ii. Does plan address potential implementation impacts and risks?
- g. Monitoring & Management
  - i. Does monitoring plan address project compliance?
  - ii. Does monitoring plan directly measure project effectiveness?
- h. Monitoring – Develop a monitoring and adaptive plan that has been reviewed and approved by the Restoration Review Team and the Services. The plan will include the following:
  - i. Introduction
  - ii. Existing Monitoring Protocols
  - iii. Project Effectiveness Monitoring Plan
  - iv. Project Review Team Triggers
  - v. Monitoring Frequency, Timing, and Duration
  - vi. Monitoring Technique Protocols
  - vii. Data Storage and Analysis
  - viii. Monitoring Quality Assurance Plan ix. Literature cited

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

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

**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. Enclosure fencing to prevent utilization of plantings by deer, elk, and livestock is permitted.

