Attachment 2
Design Criteria for the Fremont-Winema Programmatic Restoration Projects Decision

Implementation Process

- Prepare a complete project description and map of the project and associated work areas. Review the design criteria for the categories that fit the action to develop the description/design of the action. The project "check list" can be used for identifying the type of work elements associated with the action. (O:\NFS\FremontWinema\Program\Planning-1900\SONEPA\02-NEPA Process\2-project development\Description development Activity type tables) Include all mitigations/project design features/BMPs used to lessen impacts and identify any permits needed. Show a well thought out project description. (see content of project description)
- Review the project area and any associated areas (like for acquiring large wood or gravel) for sensitive species and provide specific protection measures as needed. The project needs to be consistent with either a no impact or may impact individuals but not trend toward listing.
- Survey the project area for cultural resources and clear with the SHPO.
- Review the project area for impacts to special use permits or other permits or contracts. Notify the permit holder or contractor about the project and any expected impacts to the permitted use. When making the decision to implement the action allow permittees 251 appeal rights to challenge the decision should they feel the action would impact the use permit.
- Review the project area for invasive plants and determine which Forest Invasive Species Prevention Practices would be needed as well as any other appropriate mitigation to avoid the introduction and spread of invasive plants. An invasive species prevention plan will be needed for each project.
- For projects in Northwest Forest Plan Lands, use site-specific information to determine what, if any surveys or management of known sites would be required.
- Consult with Klamath Tribes during development of the restoration action.
- Network the action to the public for notification and comments. Review the comments to determine if there is controversy or uncertain impacts that would be better covered by its own NEPA process.
- Line officer signs a letter or check list indicating the action is consistent with the Programmatic decision and coordination with others has been completed.
- For monitoring and disclosure purposes provide a listing of all projects that used the programmatic restoration decision and when it was implemented. Activities will be tracked by 5^{th} field watershed.

Design Criteria for Activity Categories

The following design criteria will be utilized in formulating a project proposal or activity. Activity adherence to these criteria assures that the action will fit within the impacts disclosed for the specific restoration activity. Field review when developing the project design may indicate the need for specific

resource protection measures that need to be incorporated into the proposal. These are the mitigation measures, project design features, or BMPs necessary for the reduction or elimination of impacts. When an action involves multiple activity categories follow the associated design criteria and conservation measures for those as well when developing the project description.

1. Installation of Instream Structures using Large Wood, Boulder, and Gravel Placement (Includes tree removal for large wood projects) for fish habitat.

1.1 Large Wood, Boulder, and Gravel Placement

a. Place LW and boulders only in those areas where they would naturally occur and in a manner that closely mimic natural accumulations for that particular stream type.

b. LW includes whole conifer and hardwood trees, logs, and root wads. LW 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 2.0 x bankfull width. Structures may partially or completely span stream channels or be positioned along stream banks.

c. No conifers should be felled in the riparian area for in-channel large wood placement unless conifers are fully stocked and are consistent with project design criteria in vegetation treatment categories. Felled hazard trees can be used for in-channel wood placement.

d. Key boulders (footings) or LW can be buried into the stream bank or channel but shall not constitute the dominant placement method of boulders and LW.

e. Anchoring Large Wood– Anchoring large wood with cable should be used sparingly, primarily for the protection of infrastructure and in consideration of downstream landowner concerns. Before using cable, attempt to use, when feasible, the following anchoring alternatives in preferential order: (1) use of adequate sized wood sufficient for stability (2) oriented and place wood in such a way that movement is limited (3) ballasting (gravel and/or rock) is used to increase the mass of the structure to resist movement (4) use large boulders as anchor points for the large wood, and (5) wood is pinned with rebar to large rock to increase its weight

f. Gravel augmentation should only occur in areas where the natural supply has been eliminated or significantly reduced through anthropogenic means. 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. After gravel placement, allow the stream to naturally sort and distribute the material.

1.2 Boulder Weirs

a. Full channel spanning boulder weirs 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.

b. Install boulder weirs low in relation to channel dimensions so that they are completely overtopped during channel-forming flow events (approximately a 1.5-year flow event). If larger boulders are needed to withstand bankfull flows, boulder size should be determined through site

specific analysis—such as shear stress analysis—and should not promote bank scouring and channel routing around the structure.

c. Boulder weirs are to be placed diagonally across the channel or in more traditional upstream pointing "V" or "U" configurations with the apex oriented upstream. Boulder weirs are to be constructed to allow upstream and downstream passage of all native fish species and life stages that occur in the stream. This can be accomplished by providing plunges no greater than 6" in height, allowing for juvenile fish passage at all flows.
d. The use of gabions, cable or other means to prevent the movement of individual boulders in a boulder weir is not allowed.
e. Rock for boulder weirs shall be durable and of suitable quality to assure permanence 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
f. The project designer or an inspector experienced in these structures should be present during installation.
g. Full spanning boulder weir placement should be coupled with measures to improve habitat complexity and protection of riparian areas to provide long-term inputs of LWD.

2. Restoration to establish natural hydrologic functions.

2.1 Headcut Repair-Rock and Organic Material Placement

a. Armor head-cut with sufficiently sized and amounts of material to prevent continued up-stream movement. Materials can include both rock and organic materials which are native to the area.
b. Focus stabilization efforts in the plunge pool, the head cut, as well as a short distance of stream above the headcut.
c. Minimize lateral migration of channel around head cut ("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.
d. In streams with current or historic fish presence, provide fish passage over stabilized head-cut through a series of log or rock weir structures as described in part ii below.
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 head cut 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 weirs as described in 2.2 below to expedite channel aggradation.

2.2 Use of Rock and Log Weirs

a. Construct weirs in a 'V' shape, oriented with the apex upstream, and lower in the center to direct flows to the middle of channel.
b. Key weirs into the stream bed to minimize structure undermining due to scour, preferably at least 2.5x their exposure height. The weir should also be keyed into both banks, if feasible greater than 8 feet.
c. If several structures will be used in series, space the weirs at the appropriate distances to promote fish passage of all life stages of native fish. Incorporate state fish passage criteria (jump height, pool depth, etc.) in the design of weir structures. Recommended weir spacing should be no closer than the net drop divided by the channel slope (for example, a one-foot high weir in a stream with a two-percent gradient will have a minimum spacing of 50-feet (1 ft/0.02)).
d. Include fine material in the weir material mix to help seal the weir/channel bed, thereby preventing subsurface flow. Geotextile material can be used as an alternative approach to prevent subsurface flow.

2.3 Large Roughness Elements (Wood and Boulder Placements)

a. Rock and wood structures should mimic natural colluvial features, such as debris flow or landslide deposits, to provide channel stabilization.
b. Rock and wood should be sized so that it is not mobile during the design flood. An engineering technical note regarding buoyancy is available through NRCS (http://www.or.nrcs.usda.gov/technical/engineering/eng-notes.html).
c. To promote or maintain fish passage, ensure that structures contain enough spaces to allow for up and downstream movement of fish.

2.4 Stream bank restoration

a. Work will focus on eroding stream banks, primarily the outside edge of meander bends.
b. Limit bank restoration projects to those sites where existing channel conditions are at or near reference channel conditions— radius of curvature, etc. To the extent possible, use bank stabilizing materials that would naturally occur at that site (such as LW, woody and herbaceous plantings, native sedge/rush mats, and native rock).
c. Banks may be reshaped and sloped where the objective is to reduce blank slope angle to provide more favorable planting surfaces. Such work should not change the location of the bank toe.
d. Jute matting or other biodegradable material can be used with plantings to help prevent erosion of affected banks.

2.5 Floodplain Overburden Removal

a. Create floodplain characteristics—elevation, width, gradient, length, and roughness—that mimic, to the greatest degree possible, those that would naturally occur at that stream and valley type.
b. Overburden or fill comprised of native materials, which originated from the project area, can be used to reshape the floodplain, placed in small mounds on the floodplain, used to fill anthropogenic holes, buried on site, and/or disposed into upland areas.
c. To the greatest degree possible, non-native fill material, originating from outside the project area shall be removed from the floodplain to an upland site.
d. Where it is not possible to remove all portions of dikes and berms, create openings with culverts and/or breaches. Place culverts through or remove portions of such structures to pass high flows—bankfull or greater— into floodplain areas. The width of a culvert or breach should be equal to or greater than the bankfull width of the stream. Culverts and breaches should be located at a depositional area of the channel. Design for proper number and location of culvert and breach sites as to help prevent fish stranding as high flows recede.
e. Conduct a contaminant survey for mine tailing removal projects prior to project implantation. If contaminants are found above levels set by the Environmental Protection Agency a separate consultation is required.
f. Consider decompaction of soils once overburden material is removed.

2.6 Removal of Legacy Structures

a. If the structure being removed contains material (i.e. large wood, boulders, etc) not typically found within the stream or floodplain at that site, remove material from the 100-year floodplain.
b. If the structure being removed contains material (i.e. large wood, boulders, etc) that is typically found within the stream or floodplain at that site, the material can be reused to implement habitat improvements described under Large Wood, Boulder, and Gravel Placement activity, category 1.1, and must follow the associated design criteria for the category.

c. If the structure being removed is keyed into the bank, fill in "key" holes with native materials as 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.
d. When removal of buried (keyed) structures may result in significant disruption to riparian vegetation and/or the floodplain, consider using a chainsaw to extract the portion of log within the channel and leaving the buried sections within the streambank.
e. 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. The following document can serve as guides to assessing the potential for headcuts: Castro, J. 2003. Geomorphologic Impacts of Culvert Replacement and Removal: Avoiding Channel Incision. FWS, Portland, OR, and/or the Dichotomous Key to Evaluate the Potential for Stream Incision at Sites Being Considered for Culvert Replacement or Removal Projects, FWS, Lacey, WA (Appendix C). If headcutting and channel incision are likely to occur due to structure removal, additional measures must be taken to reduce these impacts (see grade control options described under Headcut Stabilization activity category).
f. If the structure is being removed because it has caused an over-widening of the channel, consider implementing other restoration categories to decrease the width to depth ratio of the stream at that location to a level commensurate with upstream and downstream (within the same channel type).

3. Hydrologic modifications to stream side channels

a. Excavated material removed from side-channels or alcoves shall be hauled to an upland site or spread across the adjacent floodplain in a manner that does not restrict floodplain capacity.
b. Design and construct side-channels in such a manner as to prevent the capture and relocation of the main channel.
c. Design project to naturally maintain inlet and outlet connections with the main stream channel (i.e. placement of LW to increase local scour).
d. Should fish rescue occur, use fish handling criteria listed as a conservation measure under activity category 21

4. Development of off-channel refuge areas

a. Use applicable design criteria for 1.1, 2.3, 2.4, 2.5, 3, 14, 15, and 22

5. Reshaping ditched/straightened stream channels, abandoning and/or plugging straightened reaches, and/or relocation of streams to historic channels.

a. Use applicable design criteria for 1.1, 2.4, 2.5, 3, 14, and 22

6. Installation of steambank stabilization and sedimentation/erosion reduction structures.

a. Use applicable design criteria for 1.1, 2.4, 14, and 22

7. Installation of soil and slope stabilization structures

a. Use applicable design criteria for 2.4 and 14

8. Restoration or enhancement of natural wetlands

a. Use applicable design criteria for 2.1, 2.4, 14

9. Creation and/or management of wetlands

a. Use applicable design criteria for 2.4, 14

10. Installation or development of wildlife foraging, breeding, nesting, and basking structures

a. Use applicable design criteria for 1.1, 14, 15, 22

11. Installation of streambank and/or cross pasture fencing for livestock exclusion and/or control of grazing management, off-channel livestock facilities, livestock stream crossings.

a. Fence placement should allow for lateral movement of a stream.
b. Minimize vegetation removal, especially potential large wood recruitment sources, when constructing fence lines.
c. When constructing livestock crossings at streams and/or water gaps, use the following design criteria:
    1. Locate crossings and/or water gaps where stream banks are naturally low.
    2. When possible, crossings and gaps should not be constructed within known or suspected spawning areas (e.g. pool tailouts where spawning may occur).
    3. Fences at stream crossings and water gaps should not inhibit up or downstream movement of fish and or significantly impede bedload movement. Where appropriate, construct fences at water gaps as to allow passage of large wood and other debris.
    4. If necessary, the stream bank and approach lanes can be stabilized with native vegetation and/or angular rock to reduce chronic sedimentation. The stream crossing or water gap should be armored with up to cobble-size rock, and use angular rock if natural substrate is not of adequate size.
    5. Livestock crossings or water gaps must not be located in areas where compaction or other damage may occur to sensitive soils and vegetation (*e.g.* wetlands) due to congregating livestock.
    6. The maximum width of a water gap or stream crossing should be no less than 10 feet and no more than 20 feet wide in the upstream-downstream direction (NRCS, 2001).
    7. When using pressure treated lumber for fence posts only, complete all cutting/drilling offsite so that treated wood chips and debris does not enter water or flood prone areas.
d. If other aquatic restoration activities included in this ARBA are used as complementary actions, follow the associated design criteria and conservation measures.

12. Installation of livestock fenceing and/or cross fencing for grazing management or livestock watering facilities.

a. Use applicable design criteria for 11

13. Drainage improvements on roads

a. For road removal projects within riparian areas, recontour the affected area to mimic natural floodplain contours and gradient to the greatest degree possible.
b. When obliterating or removing segments immediately adjacent to the stream, consider using sediment control barriers between the project and the stream.
c. Drainage features used for stormproofing and treatment projects should be spaced as to hydrologically disconnect road surface runoff from stream channels.
d. Dispose of slide and waste material in stable sites out of the flood prone area. Waste material other than hardened surface material (asphalt, concrete, etc) may be used to restore natural or near-natural contours.

e. Minimize disturbance of existing vegetation in ditches and at stream crossings to the greatest extent possible.
f. Conduct activities during dry-field conditions—low to moderate soil moisture levels
g. When removing a culvert from a first or second order, non-fishing bearing stream, project specialists shall determine if culvert removal should follow conservation measures under Design Criteria 21 – **Replacement of culverts with bridges**. Culvert removal on fish bearing streams shall adhere to the conservation measures under Design Criteria 21 – **Replacement of culverts with bridges**
h. Any road closure or decommissioning action requires public notification. Controversial system road removal will need its own planning process.

14. Planting native vegetation

Riparian planting

a. An experienced silviculturist, botanist, ecologist, or associated technician shall be involved in designing vegetation treatments.
b. No roads or landings will be constructed.
c. Species to be planted must be of the same species that naturally occurs in the project area.
d. Tree and shrub species as well as sedge and rush mats to be used as transplant material shall come from outside the bankfull width, typically in abandoned flood plains, and where such plants are abundant.
e. Sedge and rush mats should be sized as to prevent their movement during high flow events.
f. Concentrate plantings above the bankfull elevation.
g. If other aquatic restoration activities included in this ARBA are used as complementary actions, follow the associated design criteria and conservation measures.

15. Silviculture treatments

15.1 Hardwood, Riparian, and Upland Vegetation Treatments

a. An experienced silviculturist, botanist, ecologist or associated technician, and wildlife biologist shall be involved in designing vegetation treatments.
b. In RHCAs or Riparian Reserves silvicultural prescriptions will be applied when needed to acquire desired riparian vegetation characteristics needed to attain riparian objectives. Trees cut will be left in place or used for other restoration needs. Fuel loads after treatments will meet Forest Plan standards and guidelines. If material is needing to be removed to reach fuel standards, it is not appropriate to be proposed under the programmatic restoration decision.
c. Thin conifers to accelerate attainment of late-seral conditions. A project example is thinning areas in the ecosystem initiation or competitive exclusion developmental stages (Cary and Cuertis 1996) within plantations (i.e. where even-aged stands are growing because of previous silvicultural prescriptions, wildfire, or disease.)
d. Thin dense understories to maintain survival of late-seral trees. A project example is thinning dense understory stands of early to mid-seral ponderosa pine which have become established as a result of fire exclusion. There will be no removal of trees associated with this action. If fuel loads indicate a need to remove trees, including broadcast burning, the action will not be prepared under the programmatic restoration decision.
e. Restore meadow sites along stream corridors or adjacent uplands through cutting and leaving of conifers which have become established as a result of fire exclusion or other anthropogenic causes and follow-up meadow burning, if prescribed. If removal of conifers is needed, the action will not be prepared under the programmatic decision.

f. Treatments will not include felling of conifer and/or hardwood trees (if above natural stocking levels) to create planting gaps.
g. Trees felled within riparian area will be used to restore aquatic and terrestrial habitat by returning large and coarse woody debris levels to within the range of natural variability (RNV). Treatments that create down material in excess of the RNV and would require removal of burning of excess material are not appropriate for this programmatic decision.
h. After treatment fuel loads will meet Forest Plan standards and guidelines. Fire maintained ecosystems such as grasslands and hardwoods may have surface fire type treatments to rejuvenate the vegetation and trees. Large scale (greater than 5 acres) stand level (conifer) treatments are not appropriate.
i. Any actions determined to have a "may effect" on ESA listed species will require consultation

17. Re-engineering of diversion structures

a. All fish screens must be sized to match the landowner's documented or estimated historic water use and legal water right(s) which ever is less.
b. Irrigation 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 irrigation system.
c. Screens, including screens installed in temporary and permanent pump intakes, must meet NMFS fish screen criteria. NMFS fish screen criteria applies to federally listed salmonid species under their jurisdiction as well as bull trout, Oregon chub, shortnose sucker, Lahontan cutthroat trout, Lost River sucker, and Warner sucker under FWS jurisdiction.
d. Size of bypass structure should be big enough to pass kelt steelhead and migratory bull trout back into the stream.
e. Abandoned ditches and other similar structures will be plugged or backfilled, as appropriate, to prevent fish from swimming or being entrained into them.
f. When making improvements to pressurized irrigation systems, 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.
g. For diversion removal projects, use conservation measures under Category #23 – Replacement of Culverts and Bridges.
h. If other aquatic restoration activities included in this ARBA are used as complementary actions, follow the associated design criteria and conservation measures.

c) Conservation Measures – For diversion removal, follow the appropriate conservation measures described in Category #21 – Replacement of Culverts and Bridges.

18. External and/or internal modifications to culverts

a. Use applicable design criteria for 2.4, 14

19. Realignment of culverts

a. Use applicable design criteria for 2.4, 14, 21

20. Replacement of undersized culverts

a. Use applicable design criteria for 2.4, 14, 21

21. Replacement/removal of culverts with bridges

a. Fish passage projects should be designed by an experienced engineer with design input from an experienced fisheries biologist and hydrologist. Such personnel shall oversee or review the project during construction to ensure that project designs and conservation measures are being properly implemented.
b. Forest Service Design Assistance Teams or the BLM and Coquille Indian Tribe equivalent will provide design review for projects that exceed $100,000 in cost or will result in structures that are greater than 20' in width.
c. Assess sites for a potential to headcut below the natural stream gradient. Along with field surveys, refer to the following document as a guide to assess headcut potential: Castro, J. 2003. *Geomorphologic Impacts of Culvert Replacement and Removal: Avoiding Channel Incision*. FWS, Portland, OR and/or the Dichotomous Key to Evaluate the Potential for Stream Incision at Sites Being Considered for Culvert Replacement or Removal Projects, FWS, Lacey, WA (Appendix C) Projects that lead to headcutting below the natural stream gradient are excluded from this consultation.
d. Fish passage design features:

1. Structure Type – Structure types include closed-bottomed culverts, open-bottomed arch culverts, and bridges. Structure material must be concrete or metal.
2. Structure Width – The structure width shall never be less than the bankfull channel width. (The stream width inside the culvert or between bridge footings shall be equal to or greater than the bankfull width.) The minimum structure width and height for a closed bottom culvert shall be 6 feet to allow manual placement of stream simulation material. Structures must accommodate a 100-year flood flow while maintaining sediment continuity (similar particle size distribution) within the culvert as compared to the upstream and downstream reaches. To meet this requirement, unconfined channel types (Rosgen C, E, and B channel types, Rosgen 1996) may require structures wider than bankfull and/or the addition of flood relief culverts or other comparable flood relief methods.
3. When possible, flood relief culverts will be designed to restore and maintain access to off-channel holding areas for juvenile and adult fish. Therefore, existing floodplain channels should be the first priority for location of flood relief culverts and installed in a manner that match floodplain gradient and does not lead to scour at the outlet.
4. Channel Slope – The structure slope shall approximate the average channel gradient of the natural stream up and downstream of the structure. The maximum slope for closed-bottomed culverts shall not exceed 6% because of difficulties in retaining substrate in the culvert at higher gradients. Open-bottom arches can be placed in channel gradients that exceed 6%.
5. Embedment – If a closed culvert is used, the bottom of the culvert shall be buried into the streambed not less than 20% and not more than 50% of the culvert height. For open-bottomed arches and bridges, the footings or foundation shall be designed to be stable at the largest anticipated scour depth. Substrate and habitat patterns within the culvert should mimic stream patterns that naturally occur above and below the culvert. Coarser material may be incorporated to create velocity breaks during high flows, thereby improving fish passage, and to provide substrate stability.
6. Rip Rap – The use of riprap is permissible above bankfull height to protect the inlet or outlet of new culverts or openbottomed arches. If the use of riprap is required for culvert stability, then an additional analysis may be required to ensure that the structure is not undersized. Rip rap may only be placed below bankfull height when necessary for protection of abutments and pilings for bridges. However, the amount and placement of rip rap around the abutments and/or pilings should not constrict the bankfull flow.

7. Grade Control Structures – Grade control structures are permitted to prevent headcutting above or below the culvert or bridge. Grade control typically consists of boulder structures that are keyed into the banks, span the channel, and buried in the substrate.
8. Road Dips – Where applicable, incorporate road dips into crossing design, to ensure catastrophic flood events will transport overflow back into the stream channel instead of onto the road bed.

e. Structures containing concrete must be sufficiently cured or dried before they come into contact with stream flow.
f. In cases of structure removal or when removing an existing structure and replacing it with a bridge, restore the stream channel and reconnect the floodplain at the site using applicable restoration categories.
g. When removing woody debris from the road-crossing inlet, place the debris downstream of the road crossing.
h. Monitor structures after high flow events, which occur during the first fall/winter/spring after project completion. Assess the following parameters: headcutting below natural stream gradient, substrate embeddedness in the culvert, scour at the culvert outlet, and erosion from sites associated with project construction. If necessary, apply remedial actions (using project design criteria and conservation measures) if projects do not meet the intended goals.
i. If other aquatic restoration activities included in this ARBA are used as complementary actions, follow the associated design criteria and conservation measures.
j. For culvert removal projects, restore natural drainage patterns and when possible promote passage of all fish species and life stages present in the area. Evaluate channel incision risk and construct in-channel grade control structures when necessary.

Conservation Measures – Along with the General Conservation Measures, the following conservation measures will be used to minimize sediment and turbidity and effects of fish handling/transport.

i. Isolate Construction Area and Remove Fish from Project Area

a. All fish capture, removal, and handling activities shall be conducted by an experienced fisheries biologist or technician.
b. Isolate Capture Area – Install block nets at up and downstream locations and leave in a secured position to exclude fish from entering the project area. Leave nets secured to the stream channel bed and banks until fish capture and transport activities 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.
c. Fish Capture Alternatives
    1. Collect fish by hand or dip nets, as the area is slowly dewatered.
    2. Seining – Use seine with mesh of such a size to ensure entrapment of the residing ESA-listed fish.
    3. Minnow traps – Traps will be left in place overnight and in conjunction with seining.
    4. Electrofishing – Prior to dewatering, use electrofishing only where other means of fish capture may not be feasible or effective. The protocol for electrofishing includes the following:
    5. If fish are observed spawning during the in-water work period, electrofishing shall not be conducted in the vicinity of spawning adult fish or active redds.
    6. Only Direct Current (DC) or Pulsed Direct Current (PDC) shall be used.

7. Conductivity <100 use voltage ranges from 900 to 1100. Conductivity from 100 to 300 then use voltage ranges from 500 to 800. Conductivity greater than 300 then use voltage to 400.
8. 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.
9. 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 below. Dark bands on the fish indicate injury, suggesting a reduction in voltage and pulse width and longer recovery time.

ii. **Handling and Release** –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. As rapidly as possible (especially for temperature sensitive bull trout), but after fish have recovered, release fish upstream of the isolated reach in a pool or area that provides cover and flow refuge. Document all fish injuries or mortalities and include in annual report.

iii. **Dewater Construction Site** –Upstream of the isolated construction area, divert flow around the construction site with a coffer dam (built with non-erosive materials) and an associated pump or a by-pass culvert. Diversions constructed with material mined from the streambed or floodplain is not permitted. Small amounts of instream material can be moved to help seal and secure diversion structures. Pumps must have fish screens and be operated in accordance with NMFS fish screen criteria *(*NMFS 1995). Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. If diversion allows for downstream fish passage (i.e. is not screened), place diversion outlet in a location to promote safe reentry of fish into the stream channel, preferably into pool habitat with cover. When necessary, pump seepage water from the dewatered 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.

iv. **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 increase in stream turbidity. Monitor downstream during re-watering to prevent stranding of aquatic organisms below the construction site.

22. Remove and use of Large Trees for instream and riparian restoration actions.

a. A wildlife biologist must be fully involved in all "Individual Tree Removal" planning efforts, and be involved in making decisions on whether individual trees are suitable for nesting or have other important listed bird habitat value. This coordination is especially critical when cutting trees withinLate Successional Reserves, suitable nesting or dispersal habitat for Northern Spotted Owl (NSO) and or bald eagle management areas.
b. No trees larger than 21 inches will be cut or removed from stands. If trees larger than 21 inches are needed for a restoration project, it will be a hazard tree adjacent to a Forest Road or Danger Tree from a recreational site.
c. Individual trees or small groups of trees (<5) should come from the periphery of permanent openings (roads etc) or from the periphery of non-permanent openings (e.g. plantations, along recent clear-cuts etc). Skidding of large wood should be avoided, trees should be located where

they can be lifted and loaded onto trucks from an existing road or disturbed site or directly picked up by helicopter for placement.

d. Single tree removal may only be removed from the first two lines of trees adjacent to openings described in d, above.
e. When removing LW from an area burned by a wildfire, consult a wildlife biologist to determine the latitude in which trees can be removed and for determining the location and number of trees that can be acquired.
f. Trees selected for LW restoration projects must be spaced at least one site potential tree height apart and at least one crown width from any trees with potential nesting structure for ESA listed bird species.
g. No conifers should be felled in the riparian area for in-channel large wood placement unless conifers are over stocked for the riparian vegetation management objectives and are consistent with project design criteria in vegetation treatment categories.

Forest Wide mitigation

Botanical Mitigations: The following mitigations will be incorporated as needed into project proposals.

1. Notify Eastside or Westside Botanist at least 30 days prior to any off-road equipment operating within the project area to ensure that any botany sites that are to be avoided are properly flagged.
2. Use Tables 2, 4 and 5 of the Botany BE and Specialist Report to recommend any additional species-specific mitigation after surveys have been completed.

Wildlife:

1. The follow timing restrictions will apply to all projects. Restrictions may be waived if surveys by a wildlife biologist indicate nesting is not occurring in that year.
    - 0.25 miles of active goshawk nest sites from March 1 – Aug. 31.
    - 0.25 miles of active bald or golden nest sites from Feb. 1 – August 31.
    - 0.25 miles of active raptor nest sites from February 1 – August 31.
    - 0.25 miles of active pileated woodpecker nest sites from March 1 – July 31.
    - 0.25 miles of active three-toed woodpecker nest sites from April 15 – July 15.
    - 0.25 miles of active black-backed woodpecker nest sites from April 15 – July 15.
    - 0.25 miles of active white-headed woodpecker nest sites from April 15 – July 15.
    - 0.25 miles of active Lewis' woodpecker nest sites from April 15 – July 15.
    - 770 yards of active peregrine falcon nests from Feb. 1 – Aug. 31.
2. If projects are proposed within occupied spotted frog habitat, a pre-implementation site visit will be conducted by a Forest Service wildlife biologist and the project leader to determine measures needed to protect the frogs. Measures may include adjustment of treatment methods, timing, or location.
3. If projects are proposed within occupied yellow habitat near Fourmile Spring, a pre-implementation site visit will be conducted by a Forest Service wildlife biologist and the project leader to determine measures needed to protect habitat. Measures may include adjustment of treatment methods, timing, or location.

Fisheries

Mitigation measures are not necessary for the species or habitat addressed in this assessment. Measures needed to minimize effects to these species and their habitats have been incorporated into the proposed project as design criteria.