Decision Notice for Aquatic Restoration Project

US Forest Service
Malheur National Forest
Baker, Crook, Grant, Harney and Malheur Counties

Introduction

The Aquatic Restoration Environmental Assessment (EA) includes a number of individual actions that, when grouped together, represent an overall watershed and fish habitat restoration program that may occur at many individual sites across the Malheur National Forest, including those National Forest system lands on the Ochoco National Forest administered by the Malheur National Forest. The specific restoration actions can occur on a routine basis or sporadically and over an extended period, starting in 2015. A general plan for implementation will tier to the national priority subwatersheds and regional focus watersheds that have been identified on the Malheur National Forest utilizing the Regional Aquatic Restoration Strategy (USDA, 2007) and the Watershed Condition Framework (USDA, 2011) and the Malheur National Forest Accelerated Vegetation Schedule and Collaborative Forest Landscape Restoration Project Area.

This site-specific project design criteria approach provides each Malheur National Forest administrative unit with a consistent methodology to design, implement, monitor, and document watershed and aquatic restoration activities.

Proposed Action

The Malheur National Forest proposes aquatic restoration on private and public lands within the boundary of the Malheur National Forest and/or adjacent lands where restoration activities would aid in the recovery of aquatic species and impaired water bodies. Aquatic restoration activities would be accomplished through the use of project specific design criteria using a consistent methodology to design, implement, monitor, and document watershed and aquatic restoration activities. Regional aquatic restoration goals and objectives (USDA Forest Service, Pacific Northwest Region, 2007) would be achieved when administered by following guidelines within the following aquatic restoration categories:

1 Fish Passage Restoration
2 Large Wood, Boulder, and Gravel Placement; including tree removal for large wood placement
3 Dam and Legacy Structure Removal
4 Channel Reconstruction/Relocation
5 Off- and Side-Channel Habitat Restoration
6 Streambank Restoration
7 Set-back or Removal of Existing Berms, Dikes, and Levees
8 Reduction/Relocation of Recreation Impacts
9 Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering

10 Piling and other Structure Removal
11 Road and Trail Erosion Control
12 Juniper Removal
13 Riparian Vegetation Treatment (controlled burning)
14 Riparian Vegetative Planting
15 Bull Trout Protection
16 Beaver Habitat Restoration
17 Fisheries, Hydrology, Geomorphology Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration

Complete details of each of these activities and the associated project design criteria are located in Appendix A of the EA, attached to this decision, and made part of this Decision Notice.

Decision

After review of the Aquatic Restoration Environmental Assessment and comments received during the scoping and 30 day notice and comment periods related to this project as well as the analysis included in the 2013 Aquatic Restoration Biological Assessment and associated Biological Opinion I have found the actions to be well defined and evaluated on their impacts to the environment. The actions of this decision are consistent with the categories used for consultation with regulatory agencies under the programmatic consultation process with the Fish and Wildlife Service and the National Marine Fisheries Service. I am incorporating all of Appendix A of the EA as part of this decision in order to ensure activities are implemented with site specific impacts considered and to ensure projects are implemented with continued public input and knowledge. In addition I am including project design, implementation, monitoring and documentation as described in Chapter 2 of the EA. Appendix A: Project Categories, Program Administration, General Aquatic Conservation Measures, Project Category Design Criteria, and Resource Design Criteria, is included as part of this decision document.

Overall Process to Implement

Design:

Activities will be developed and prioritized at the Forest and District level.

Activities will include written specific action descriptions and design criteria as identified in Appendix A of the EA and this decision notice.

Activities will be finalized and approved on an annual basis.

Validation and Collaboration Period:

The Project Implementation Checklist (Appendix B of the EA and this decision notice) will be used to ensure each activity is consistent with the analysis and within the criteria of the decision.

Pre-project notification will be posted on the Forest's web site at http://www.fs.usda.gov/land/malheur/landmanagement. An aquatic restoration activity list will

be mailed to those who have requested notification at least 30 days prior to implementation of any activity.

Pre-project notification will be reported to all required regulatory agencies at least 60 days prior to implementation of any activity.

Activities may be discussed with collaborative groups, working groups, local and state governments, and private stakeholders based on potential interest as determined by District Rangers or Forest Supervisor.

Consultation and Implementation:

Pre-implementation surveys will be conducted for Endangered Species Act and sensitive species, invasive species, and cultural resources. If threatened or sensitive species or cultural sites are found during pre-implementation surveys or during activity implementation the appropriate mitigation will be incorporated into the activity design. Any cultural resource findings will be coordinated with the State Historical Preservation Office. Each activity will have an invasive species plan.

Four strategies will be used to prioritize locations and timing of implementation: watershed condition, corresponding accelerated vegetation restoration projects, Collaborative Forest Landscape Restoration projects, and an opportunistic approach as needed (EA – page 21-25).

Monitoring:

Monitoring will be conducted as appropriate for a specific action during and after a project to track effects and compliance with this decision and analysis. I am choosing to implement the monitoring as described in the Environmental Assessment (EA – page 25).

Documentation:

Post project notification will be posted on the Forest website and reported to all required regulatory agencies.

Rationale for Decision

The impacts of these aquatic restoration activities are well known by our experience with past projects. There is a need for the Forest to be able to respond to simple actions when partners propose to sponsor a project on the Forest or the Forest needs to respond quickly to take advantage of available funds. In the past the Forest took a lengthy period of time and funds to document an activity before implementation could occur. These actions were previously analyzed and documented within the authority of a categorical exclusion and tend to be well supported by the community as noted in many of the comments received from the public during the 30 day notice and comment period. The impacts are not significant on their own and are not expected to be highly concentrated in a particular area of any watershed. If for some reason actions do get concentrated in an area of a watershed, the line officer will make adjustments in the design phase and prioritize to distribute activities over time and space.

I considered comments received during scoping and the 30 day notice and comments periods. The project received supportive comments as well as comments that question the overall scale of the project. Those who questioned the project wanted to be more involved in implementation of each activity or in specific types of activities. To address increased collaboration with the public we have determined that the Forest will not only post the activities on the internet, as first stated in the EA, but will also mail the project list to those who have requested notification by means other than the internet (EA page 21).

Additional project design criteria were developed for tree tipping and felling, juniper treatments, tree hauling, prescribed burning, and snag retention (Appendix A, pages 30 – 33). These additional design criteria were developed to address public concerns over implementation consistency over time.

One concern was based on diameter sizes of trees to be felled in various locations: aspen stands, riparian areas, and juniper trees. Because this project covers the entire forest I chose not to limit diameter sizes within any of these areas. I did include additional project design criteria focusing on tree selection within riparian areas (Appendix A, page 30). The interdisciplinary team further documented best available science supporting treatment in aspen stands (EA page 26, 91).

Upland juniper removal was also a concern presented. I considered where I could justify setting a limit on juniper removal and determined that, based on the varying terrain and juniper encroachment areas, it would be unreasonable to set a specific limit or zone across the Forest. Based on public comment I added additional criteria and guidance for treatment of juniper areas (Appendix A, page 31).

I considered limiting the amount of work in any given year as one commenter suggested. The 2007 Biological Opinion did set a limit of 10 projects per watershed. I did not want to incorporate this limit into the Aquatic Restoration Project on the Malheur. The 2013 Biological Opinion did not set an implementation limit for stream reach or watershed. Setting this type of limit across the forest or in a single watershed would limit the work that could be accomplished. Work will be accomplished based on funding and personnel.

There is a need to increase riparian area restoration rates along with the Forest's drive to accelerate vegetative restoration across the Forest and northeast region of the state. The benefits of implementing this decision are the increased actions that can occur on the ground without the delay and added cost of redundant NEPA analysis. I also believe this project will give us another opportunity to work with our stakeholders in getting action done on the ground that we identify and implement together. This project can continue developing relationships with our communities and partners. With this decision the Forest will be able to more holistically support restoration needs identified across multiple land ownerships in a timely manner. This may include the use of Forest Service funds to accomplish actions on private lands.

Other Alternatives Considered

The no action alternative would continue the current practice of preparing NEPA analysis on a project by project basis. Managing resources this way has been frustrating to the community, our resource specialists, our line officers and our partners because the Forest's inability to quickly respond has

prevented us from being able to take advantage of implementation funds when they are available. Under the no action alternative the aquatic restoration opportunities would be limited and the Forest would not have the ability to take the opportunity to move across the landscape along with the vegetation restoration program (EA page 55). Under the no action alternative it is expected that plant diversity would diminish in the riparian areas and juniper encroachment would continue in both the uplands and riparian areas (EA page 115).

Other alternatives presented through the comment process but eliminated from detailed analysis include: removal of forest products for commercial use, altering range management, and setting diameter limits for trees cut within riparian areas or juniper stands (EA page 25-26).

Public Involvement

The Aquatic Restoration Project was first published in the Malheur National Forest Schedule of Proposed Actions (SOPA) in January 2014. Scoping information was mailed to 131 individuals, groups, other government agencies, and Tribes, on January 17, 2014. The preliminary Environmental Assessment was sent to all those who responded to the scoping letter, Tribes, local governments, and allotment permittees. Four letters were received during the 30 day notice and comment period. Members of the interdisciplinary team and line officers met with interested individuals who had questions about the activities described within this project. From the 30 day notice and comment period any additional issues and possible alternatives were discussed. Further details of the meetings and responses to the comments received during the development of this project can be found in the project record.

Issues

During the scoping process the Forest received 8 letters with comments ranging from requesting more detailed description of categories to concerns of impacts to various resources. In addition, the interdisciplinary team considered impacts to resources and compliance with standards and guidelines and desired future conditions as outlined in the Land and Resource Management Plans for the Malheur and Ochoco National Forests. No key issues were identified that would drive the development of an additional action alternative. Analysis issues were developed to document compliance with the Forest Plans and other laws, policy, and regulation. (EA Page 7-9)

Findings Required by Law, Regulation, and Policy

On the basis of the information and analysis disclosed in the Finding of No Significant Impact (EA page 138) it is my determination that implementation of the Aquatic Restoration Project and the individual activities associated with this decision does not constitute a major federal action significantly affecting the quality of the human environment; therefore an environmental impact statement is not required.

National Forest Management Act and Forest Plan Consistency

This decision is also tiered to the Final Environmental Impact Statements and Record of Decisions for the Malheur National Forest Land and Resource Management Plan and the Ochoco National Forest Land and Resource Management Plan. This decision to implement aquatic restoration activities is consistent with the intent of the Forest Plans' long term goals and desired future conditions. Project design criteria were added to ensure compliance with standards and guidelines in each of the Forest's Plans. The

analysis found no loss of viability in management indicator species habitat across the Forest (EA Pages 70, 85, 93, 111, 118, 121, 126, 135, and 137).

This decision complies with:

Endangered Species Act,
Clean Water Act,
Wilderness Act, Inventoried Roadless Rule, Wild and Scenic Rivers Act,
National Environmental Policy Act,
Clean Air Act,
Magnuson-Stevens, Fishery Conservation and Management Act,
American Indian Religious Freedom Act,
National Historic Preservation Act,
Archeological Resource Protection Act.

Administrative Review and Objection Rights

This decision was subject to objection pursuant to 36 CFR Part 218. The objection period opened following the publication of the Legal Notice to Object in the *Blue Mountain Eagle* newspaper on August 6, 2014.

Implementation

No objections were filed within the 45-day time period. Implementation of the decision may occur 5 days after the close of the objection filing period of September 22, 2014.

Contact

For further information concerning the Aquatic Restoration Project, you may contact the Forest Fish Biologist Steve Namitz by telephone at 541 -575-3167, by email to smnamitz@fs.fed.us, in writing to Malheur National Forest , PO Box 909, John Day Oregon 97845, or at the Malheur National Forest Headquarters Office at 431 Patterson Bridge Road, John Day, OR.

The EA supporting documents and Decision Notice are available for review on the internet at: http://www.fs.usda.gov/projects/malheur/landmanagement/projects.

Teresa Raaf

TERESA RAAF
Forest Supervisor

9/30/14
Date

Appendix A

Project Categories

1. Fish Passage Restoration (Stream Simulation Culvert and Bridge Projects; Headcut and Grade Stabilization; Fish Ladders; Irrigation Diversion Replacement/Relocation and Screen Installation/Replacement).
2. Large Wood, Boulder, and Gravel Placement (Large Wood and Boulder Projects; Engineered Logjams; Porous Boulder Weirs and Vanes, Gravel Augmentation; Tree Removal for Large Wood Projects).
3. Dam, Tide gate, and Legacy Structure Removal.
4. Channel Reconstruction/Relocation.
5. Off- and Side-Channel Habitat Restoration.
6. Streambank Restoration.
7. Set-back or Removal of Existing Berms, Dikes, and Levees.
8. Reduction/Relocation of Recreation Impacts.
9. Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering.
10. Piling and other Structure Removal.
11. Road and Trail Erosion Control
12. Juniper Removal.
13. Riparian Vegetation Treatment (controlled burning).
14. Riparian Vegetative Planting.
15. Bull Trout Protection.
16. Beaver Habitat Restoration.
17. Fisheries, Hydrology, Geomorphology Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration.

Program Administration

1. Integration of Project Design Criteria (PDC) and Conservation Measures and Terms and Conditions into Project Design and Contract Language

The Action Agencies shall incorporate appropriate aquatic and terrestrial conservation measures along with Project Design Criteria listed in the aquatic restoration BA along with any terms and conditions included in the subsequent Aquatic Restoration Biological Opinion (ARBO II, 2013) into contract language or force-account implementation plans.

2. Project Notification

Streamlining Level 1 teams will review and discuss aquatic restoration projects planned for implementation during an upcoming work season through their team-specific processes. The Action Agencies shall provide a project Notification Form7 to ARBO.nwr@noaa.gov and the NMFS Level 1 Aquatics members 30 days prior to implementation and will include the following information:

a. Action identifier – The same unique identification number is necessary for each project's Action Notification and Project Completion reports.
b. Project name – Use the same project name from notification to completion (*e.g.*, Jones Creek, Tillamook Co., Oregon, culvert replacement).

c. Location – 6th field HUC (hydraulic unit code), stream name, and latitude and longitude (decimal degrees)
d. Agency contact – Agency and project lead name
e. Timing – Project start and end dates
f. Activity category – As listed above in section 1.3.
g. Project description – Brief narrative of the project and objectives
h. Extent – Number of stream miles or acres to be treated
i. Species affected – Listed Fish and or Wildlife species, Critical Habitat, and or EFH affected by project
j. Date of submittal
k. For any action requiring a site assessment for contaminants, include a copy of the report explaining the likelihood that contaminants are present at the site.
l. For any action requiring NMFS fish passage and Restoration Review Team reviews, attach a copy of the approval correspondence.
m. Verification – Check box that verifies that all appropriate General Aquatic Conservation Measures, Wildlife Conservation Measures, Project Design Criteria for Aquatic Restoration Activity Categories, and Project Design Criteria for Terrestrial Species and Habitats have been thoroughly reviewed and will be incorporated into project design, implementation, and monitoring.
n. SOD project notification requirements (see PDC 39h-i) as an attachment to notification form

3. Minor Variance Process

Because of the wide range of proposed activities and the natural variability within and between stream systems, some projects may be appropriate for minor variations from criteria specified herein. NMFS branch chiefs will authorize variances when there is a clear conservation benefit or there are no additional adverse effects (especially incidental take) beyond that covered by the ARBO II. Minor variances may be requested as part of the above notification process and must:

a. Cite ARBO II identifying number.
b. Cite the relevant criterion by page number.
c. Define the requested variance.
d. Explain why the variance is necessary.
e. Provide a rationale why the variance will either provide a conservation benefit or,
f. at a minimum, not cause additional adverse effects.
g. Include as attachments any necessary approvals by state agencies.

4. NMFS Fish Passage Review and Approve

The NMFS Level 1 team member will coordinate NMFS fish passage review and approval for the following types of project:

a. Dewatering construction sites by pumping at a rate that exceeds 3 cubic feet per second (cfs) will require fish screen review.
b. Fish passage culverts and bridges that do not meet width standards.
c. Headcut stabilization and channel spanning non-porous rock structures that create discrete longitudinal drops > 6 inches.
d. Fish ladders.
e. Engineered log jams that occupy >25% of the bankfull area.
f. Irrigation diversion replacement/relocation & screen installation/replacement.
g. Dam removal.
h. Channel reconstruction/relocation projects.

i. Off- and side-channel reconstruction when the proposed side channel will contain >20% of the bankfull flow.

5. Restoration Review Team

The following types of project require Restoration Review Team review:

a. Dam removal.
b. Channel reconstruction/relocation projects.
c. Precedent or policy setting actions, such as the application of new technology. The Restoration Review Team will be comprised of highly skilled interagency (BLM, Forest Service, BIA, NMFS, USFWS) fisheries biologists, hydrologists, geomorphologists, soil scientists, or engineers to review and help select project designs. The Restoration Review Team will have a four member core group—one individual from each of the following agencies: Forest Service, BLM, NMFS, and USFWS. The designated Forest Service and BLM ARBO II contacts will serve as core group members. Additional technical experts from these agencies will be recruited depending on the project to be reviewed. The Restoration Review Team reviews will help ensure that projects: (1) Meet the obligations set forth in the BA and subsequent ARBO II; (2) maximize ecological benefits of restoration and recovery projects; (3) maximize efficient and effective use of limited financial resources; and (4) ensure consistent use and implementation throughout the geographic area covered by this opinion. Any Restoration Review Team concerns must be described in detail, referencing underlying scientific (based on peer-reviewed science) or policy rationale, and include recommended changes to the proposed project to address the specific concerns. When requested, Restoration Review Team will provide an estimate of the time necessary to complete the review based on the complexity of the proposed action and work load considerations at the time of the request. Approval may be delayed if a substandard design is submitted for review during the post-design or action implementation stage and significant revision is necessary. The Restoration Review Team will keep a record of each review, including any recommended clarifications, changes, or interpretations. The Restoration Review Team does not replace any existing review process, nor shall it slow down project implementation unless significant technical, policy, or program concerns with a particular restoration approach are identified.

6. Project Completion Report

Level 1 teams will discuss and review aquatic restoration projects completed during a previous season. Each BLM, Forest Service, or BIA field office that completes a project will submit a Project Completion Report to ARBO.nwr@noaa.gov and their USFWS and NMFS Level 1 Team counterparts. Reports are due 60 days after project completion. Reports will include the following information:

a. Action identifier (same number as in notification).
b. Action name (same name as in notification).
c. Location – 6th field HUC, stream name, latitude and longitude.
d. Agency contact – Agency and project lead name.
e. Date of submittal.
f. Timing – Actual project start and end dates.
g. Activity category – As listed above in section 1.3.
h. Project description – Brief narrative of the completed project and objectives.
i. Extent – Number of stream miles or acres treated.
j. Species affected – Fish and or wildlife species, critical habitat, or EFH affected by the project.
k. Fish pursuit and capture – If fish are pursued or captured during salvage operations, the project biologist will describe removal methods, stream conditions, and the number of fish handled, injured, or killed, and reasons for the fish mortality. This report will likely be limited to fish passage, dam removal, and channel restoration/relocation projects.

l. State-specific Clean Water Act section 401 certification monitoring results. If protocol conditions were not met, describe effects and any remedial actions.
m. Post Project Assessment – Remedial actions taken, including any dates work ceased due to high flows.
n. SOD project completion requirements (see PDC 39h-ii; Table 6) as an attachment
o. to project completion form.

7. Annual Program Report

The Action Agencies will provide an annual program report to NMFS and USFWS by February 15 of each year that describes projects funded or carried out under ARBO II. The report will include the following information:

a. An assessment of overall program activity.
b. A map showing the location and category of each project carried out under ARBO II.
c. A list of any projects that were funded or carried out by the Action Agencies using the ARBO II, including the name of the Action Agency designated as the lead agency for each project for ESA purposes.
d. Data or analyses that the Action Agencies deem necessary or helpful to assess habitat trends as a result of actions carried out under the ARBO II.
e. Totals for amount of incidental take and for each extent of take indicator by recovery domain.
f. Requests for variance and their disposition and a description of Restoration Review Team activity.
g. SOD project annual report requirements (see PDC 39h-iii).

General Aquatic Conservation Measures

8. Technical Skill and Planning Requirements

a. Ensure that an experienced fisheries biologist or hydrologist is involved in the design of all projects covered by this opinion. The experience should be commensurate with technical requirements of a project.
b. Planning and design includes field evaluations and site-specific surveys, which may include reference-reach evaluations that describe the appropriate geomorphic context in which to implement the project. Planning and design involves appropriate expertise from staff or experienced technicians (e.g., fisheries biologist, hydrologist, geomorphologist, wildlife biologist, botanist, engineer, silviculturist, fire/fuels specialists).
c. The project fisheries biologist/hydrologist will ensure that project design criteria are incorporated into implementation contracts. If a biologist or hydrologist is not the Contracting Officer Representative, then the biologist or hydrologist must regularly coordinate with the project Contracting Officer Representative to ensure the project design criteria and conservation measures are being followed.

9. Climate Change

Consider climate change information, such as predictive hydrographs for a given watershed or region, when designing projects covered by this opinion.

10. In-water Work Period

Follow the appropriate state (ODFW 2008; WDFW 2010) or most recent guidelines for timing of in-water work. If work occurs in occupied Oregon chub habitat, in-water work will not occur between June 1 and August 15. In those few instances when projects will be implemented in California, Idaho, or Nevada, follow appropriate state guidelines. The Action Agencies will request exceptions to in-water work

windows through Level 1 NMFS or USFWS representatives as well as essential state agencies. [10] For National Forests in the state of Washington, the Forest Service will work with Washington Department of Fish and Wildlife (WDFW) to determine in-water work periods, using the process contained in the 2012 Memorandum of Understanding between the WDFW and USDA-Forest Service, Pacific Northwest Region regarding hydraulic projects conducted by the Forest Service (WDFW and USDA-Forest Service 2012).

11. Fish Passage

Fish passage will be provided for any adult or juvenile fish likely to be present in the action area during construction, unless passage did not exist before construction, stream isolation and dewatering is required during project implementation, or where the stream reach is naturally impassible at the time of construction. After construction, adult and juvenile passage that meets NMFS's fish passage criteria (NMFS 2011e) will be provided for the life of the structure.

12. Site Assessment for Contaminants

In developed or previously developed sites, such as areas with past dredge mines, or sites with known or suspected contamination, a site assessment for contaminants will be conducted on projects that involve excavation of >20 cubic yards of material. The action agencies will complete a site assessment to identify the type, quantity, and extent of any potential contamination. The level of detail and resources committed to such an assessment will be commensurate with the level and type of past or current development at the site. The assessment may include the following:

a. Review of readily available records, such as former site use, building plans, records of any prior contamination events.
b. Site visit to observe the areas used for various industrial processes and the condition of the property.
c. Interviews with knowledgeable people, such as site owners, operators, occupants, neighbors, local government officials, etc.
d. Report that includes an assessment of the likelihood that contaminants are present at the site.

13. Pollution and Erosion Control Measures

Implement the following pollution and erosion control measures:

a. Project Contact: Identify a project contact (name, phone number, an address) that will be responsible for implementing pollution and erosion control measures.
b. List and describe any hazardous material that would be used at the project site, including procedures for inventory, storage, handling, and monitoring; notification procedures; specific clean-up and disposal instructions for different products available on the site; proposed methods for disposal of spilled material; and employee training for spill containment.
c. Temporarily store any waste liquids generated at the staging areas under cover on an impervious surface, such as tarpaulins, until such time they can be properly transported to and treated at an approved facility for treatment of hazardous materials.
d. Procedures based on best management practices to confine, remove, and dispose of construction waste, including every type of debris, discharge water, concrete, cement, grout, washout facility, welding slag, petroleum product, or other hazardous materials generated, used, or stored on-site.
e. Procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities. Ensure that materials for emergency erosion and hazardous materials control are onsite (e.g., silt fence, straw bales, oil-absorbing floating boom whenever surface water is present).

f. Best management practices to confine vegetation and soil disturbance to the minimum area, and minimum length of time, as necessary to complete the action, and otherwise prevent or minimize erosion associated with the action area.
g. No uncured concrete or form materials will be allowed to enter the active stream channel.
h. Steps to cease work under high flows, except for efforts to avoid or minimize resource damage.

14. Site Preparation

a. **Flagging sensitive areas** – Prior to construction, clearly mark critical riparian vegetation areas, wetlands, and other sensitive sites to minimize ground disturbance.
b. **Staging area** – Establish staging areas for storage of vehicles, equipment, and fuels to minimize erosion into or contamination of streams and floodplains.
    i. No Topographical Restrictions – place staging area 150 feet or more from any natural water body or wetland in areas where topography does not restrict such a distance.
    ii. Topographical Restrictions –place staging area away from any natural water body or wetland to the greatest extent possible in areas with high topographical restriction, such as constricted valley types.
c. **Temporary erosion controls** – Place sediment barriers prior to construction around sites where significant levels of erosion may enter the stream directly or through road ditches. Temporary erosion controls will be in place before any significant alteration of the action site and will be removed once the site has been stabilized following construction activities.
d. **Stockpile materials** – Minimize clearing and grubbing activities when preparing staging, project, and or stockpile areas. Any large wood, topsoil, and native channel material displaced by construction will be stockpiled for use during site restoration. Materials used for implementation of aquatic restoration categories (*e.g.,* large wood, boulders, fencing material) may be staged within the 100-year floodplain.
e. **Hazard trees** – Where appropriate, include hazard tree removal (amount and type) in project design. Fell hazard trees when they pose a safety risk. If possible, fell hazard trees within riparian areas towards a stream. Keep felled trees on site when needed to meet coarse large wood objectives.

15. Heavy Equipment Use

a. **Choice of equipment** – Heavy equipment will be commensurate with the project and operated in a manner that minimizes adverse effects to the environment (e.g., minimally-sized, low pressure tires, minimal hard turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils).

b. Fueling and cleaning and inspection for petroleum products and invasive weeds

i. All equipment used for instream work will be cleaned for petroleum accumulations, dirt, plant material (to prevent the spread of noxious weeds), and leaks repaired prior to entering the project area. Such equipment includes large machinery, stationary power equipment (e.g., generators, canes), and gas-powered equipment with tanks larger than five gallons.

ii. Store and fuel equipment in staging areas after daily use.

iii. Inspect daily for fluid leaks before leaving the vehicle staging area for operation.

iv. Thoroughly clean equipment before operation below ordinary high water or within 50 feet of any natural water body or areas that drain directly to streams or wetlands and as often as necessary during operation to remain grease free.

c. **Temporary access roads** – Existing roadways will be used whenever possible. Minimize the number of temporary access roads and travel paths to lessen soil disturbance and compaction and impacts to vegetation. Temporary access roads will not be built on slopes where grade, soil, or other features suggest a likelihood of excessive erosion or failure. When necessary, temporary access roads will be obliterated or revegetated. Temporary roads in wet or flooded areas will be restored by the end of the applicable in-water work period. Construction of new permanent roads is not permitted.

d. **Stream crossings** – Minimize number and length of stream crossings. Such crossings will be at right angles and avoid potential spawning areas to the greatest extent possible. Stream crossings shall not increase the risk of channel re-routing at low and high water conditions. After project completion, temporary stream crossings will be abandoned and the stream channel and banks restored.

e. **Work from top of bank** – To the extent feasible, heavy equipment will work from the top of the bank, unless work instream would result in less damage to the aquatic ecosystem.

f. **Timely completion** – Minimize time in which heavy equipment is in stream channels, riparian areas, and wetlands. Complete earthwork (including drilling, excavation, dredging, filling and compacting) as quickly as possible. During excavation, stockpile native streambed materials above the bankfull elevation, where it cannot reenter the stream, for later use.

16. Site Restoration

a. **Initiate rehabilitation** – Upon project completion, rehabilitate all disturbed areas in a manner that results in similar or better than pre-work conditions through removal of project related waste, spreading of stockpiled materials (soil, large wood, trees, *etc.*) seeding, or planting with local native seed mixes or plants.

b. **Short-term stabilization** – Measures may include the use of non-native sterile seed mix (when native seeds are not available), weed-free certified straw, jute matting, and other similar techniques. Short-term stabilization measures will be maintained until permanent erosion control measures are effective. Stabilization measures will be instigated within three days of construction completion.

c. **Revegetation** – Replant each area requiring revegetation prior to or at the beginning of the first growing season following construction. Achieve reestablishment of vegetation in disturbed areas to at least 70% of pre-project levels within three years. Use an appropriate mix of species that will achieve establishment and erosion control objectives, preferably forb, grass, shrub, or tree species native to the project area or region and appropriate to the site. Barriers will be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

d. **Planting manuals** – All riparian plantings shall follow Forest Service direction described in the Regional letter to Units, Use of Native and Nonnative Plants on National Forests and Grasslands May 2006 (Final Draft), and or BLM Instruction Memorandum No. OR-2001-014, Policy on the Use of Native Species Plant Material.

e. **Decompact soils** – Decompact soil by scarifying the soil surface of roads and paths, stream crossings, staging, and stockpile areas so that seeds and plantings can root.

17. Monitoring

Monitoring will be conducted by Action Agency staff, as appropriate for that project, during and after a project to track effects and compliance with this opinion.

a. Implementation

i. Visually monitor during project implementation to ensure effects are not greater (amount, extent) than anticipated and to contact Level 1 representatives if problems arise.

ii. Fix any problems that arise during project implementation.
iii. Regular biologist/hydrologist coordination if biologist/hydrologist is not always on site to ensure contractor is following all stipulations.

b. **401 Certification** – To minimize short-term degradation to water quality during project implementation, follow current 401 Certification provisions of the Federal Clean Water Act for maintenance or water quality standards described by the following: Oregon Department of Environmental Quality (Oregon BLM, Forest Service, and BIA); Washington Department of Ecology (Washington BLM); and the Memorandum of Understanding between the Washington Department of Fish and Wildlife and Forest Service regarding Hydraulic Projects Conducted by Forest Service, Pacific Northwest Region (WDFW and USDA-Forest Service 2012); California, Idaho, or Nevada 401 Certification protocols (BLM and Forest Service).

c. **Post project** – A post-project review shall be conducted after winter and spring high flows.
   i. For each project, conduct a walk through/visual observation to determine if there are post-project affects that were not considered during consultation. For fish passage and revegetation projects, monitor in the following manner:
   ii. Fish Passage Projects – Note any problems with channel scour or bedload deposition, substrate, discontinuous flow, vegetation establishment, or invasive plant infestation.
   iii. Revegetation – For all plant treatment projects, including site restoration, monitor for and remove invasive plants until native plants become established.
   iv. In cases where remedial action is required, such actions are permitted without additional consultation if they use relevant PDC and aquatic conservation measures and the effects of the action categories are not exceeded.

18. Work Area Isolation, Surface Water Withdrawals, and Fish Capture and Release

Isolate the construction area and remove fish from a project site for projects that include concentrated and major excavation at a single location within the stream channel. This condition will typically apply to the following aquatic restoration categories: Fish Passage Restoration; Dam, Tidegate, and Legacy Structure Removal; Channel Reconstruction/Relocation.

a. **Isolate capture area** – Install block nets at up and downstream locations outside of the construction zone to exclude fish from entering the project area. Leave nets secured to the stream channel bed and banks until construction activities within the stream channel are complete. If block nets or traps remain in place more than one day, monitor the nets and or traps at least on a daily basis to ensure they are secured to the banks and free of organic accumulation and to minimize fish predation in the trap.

b. **Capture and release** – Fish trapped within the isolated work area will be captured and released as prudent to minimize the risk of injury, then released at a safe release site, preferably upstream of the isolated reach in a pool or other area that provides cover and flow refuge. Collect fish in the best manner to minimize potential stranding and stress by seine or dip nets as the area is slowly dewatered, baited minnow traps placed overnight, or electrofishing (if other options are ineffective). Fish must be handled with extreme care and kept in water the maximum extent possible during transfer procedures. A healthy environment for the stressed fish shall be provided—large buckets (five-gallon minimum to prevent overcrowding) and minimal handling of fish. Place large fish in buckets separate from smaller prey-sized fish. Monitor water temperature in buckets and well-being of captured fish. If buckets are not being immediately transported, use aerators to maintain water quality. As rapidly as possible, but after fish have recovered, release fish. In cases where the stream is intermittent upstream, release fish in downstream areas and away from the influence of the construction. Capture and release will be supervised by a fishery biologist experienced with work area isolation and safe handling of all fish.

c. **Electrofishing** – Use electrofishing only where other means of fish capture may not be feasible or effective. If electrofishing will be used to capture fish for salvage, NMFS's electrofishing guidelines will be followed (NMFS 2000).
   i. Reasonable effort should be made to avoid handling fish in warm water temperatures, such as conducting fish evacuation first thing in the morning, when the water temperature would likely be coolest. No electrofishing should occur when water temperatures are above 18°C or are expected to rise above this temperature prior to concluding the fish capture.
   ii. If fish are observed spawning during the in-water work period, electrofishing shall not be conducted in the vicinity of spawning fish or active redds.
   iii. Only Direct Current (DC) or Pulsed Direct Current shall be used.
   iv. Conductivity <100, use voltage ranges from 900 to 1100. Conductivity from 100 to 300, use voltage ranges from 500 to 800. Conductivity greater than 300, use voltage to 400.
   v. Begin electrofishing with minimum pulse width and recommended voltage and then gradually increase to the point where fish are immobilized and captured. Turn off current once fish are immobilized.
   vi. Do not allow fish to come into contact with anode. Do not electrofish an area for an extended period of time. Remove fish immediately from water and handle as described above (PDC 20b). Dark bands on the fish indicate injury, suggesting a reduction in voltage and pulse width and longer recovery time.
   vii. If mortality is occurring during salvage, immediately discontinue salvage operations (unless this would result in additional fish mortality), reevaluate the current procedures, and adjust or postpone procedures to reduce mortality.

d. **Dewater construction site** –When dewatering is necessary to protect species or critical habitat, divert flow around the construction site with a coffer dam (built with non-erosive materials), taking care to not dewater downstream channels during dewatering. Pass flow and fish downstream with a by-pass culvert or a water-proof lined diversion ditch. Diversion sandbags can be filled with material mined from the floodplain as long as such material is replaced at end of project. Small amounts of instream material can be moved to help seal and secure diversion structures. If ESA listed-fish may be present and pumps are required to dewater, the intake must have a fish screen(s) and be operated in accordance with NMFS fish screen criteria described below (in part e.iv) of this section. Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. If diversion allows for downstream fish passage, place diversion outlet in a location to promote safe reentry of fish into the stream channel, preferably into pool habitat with cover. Pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel.

e. Surface water withdrawals
   i. Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate. Where ESA-listed fish may be present, diversions may not exceed 10% of the available flow and fish screen(s) will be installed, operated, and maintained according to NMFS's fish screen criteria (NMFS 2011e).
   ii. For the dewatering of a work site to remove or install culverts, bridge abutments *etc.*, if ESA-listed fish may be present, a fish screen that meets criteria specified by NMFS (2011e) must be used on the intake to avoid juvenile fish entrainment. If ESA-listed salmon, steelhead, eulachon, or green sturgeon may be present, the Action Agencies will ensure that the fish screen design is reviewed and approved by NMFS for consistency with NMFS (2011e) criteria if the diversion (gravity or pump) is at a rate greater than 3 cfs. NMFS approved fish screens have the following specifications: a) An automated cleaning device with a minimum effective surface area of 2.5 square feet per cfs, and a nominal maximum approach velocity of 0.4 feet per second (fps), or no automated

cleaning device, a minimum effective surface area of 1 square foot per cfs, and a nominal maximum approach rate of 0.2 fps; and b) a round or square screen mesh that is no larger than 2.38 mm (0.094 inches) in the narrow dimension, or any other shape that is no larger than 1.75 mm (0.069 inches) in the narrow dimension.

f. **Stream re-watering** – Upon project completion, slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden release of suspended sediment. Monitor downstream during re-watering to prevent stranding of aquatic organisms below the construction site.

Project Design Criteria for Aquatic Restoration Activity Categories

The 17 aquatic restoration activity categories will be designed and implemented to help restore watershed processes. These projects will improve channel dimensions and stability, sediment transport and deposition, and riparian, wetland, floodplain and hydrologic functions, as well as water quality. As such, these improvements will help address limiting factors—related to spawning, rearing, migration, and more—for ESA-listed and other native fish species. Aquatic habitat restoration and enhancement projects are conducted within stream channels, adjacent riparian/floodplain areas, wetlands, and uplands. Work may be accomplished using manual labor, hand tools (chainsaws, tree planting tools, augers, shovels, and more), all-terrain vehicles, flat-bed trucks, and heavy equipment (backhoes, excavators, bulldozers, front-end loaders, dump trucks, winch machinery, cable yarding, *etc.*). Helicopters will be used for many large wood and salmon carcass placement projects.

1. 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

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).

2. Large Wood, Boulder, and Gravel Placement includes large wood and boulder placement, engineered log jams, porous boulder structures and vanes, gravel placement, and tree removal for large wood projects. Such activities will occur in areas where channel structure is lacking due to past stream cleaning (large wood removal), riparian timber harvest, and in areas where natural gravel supplies are low due to anthropogenic disruptions. These projects will occur in stream channels and adjacent floodplains to increase channel stability, rearing habitat, pool formation, spawning gravel deposition, channel complexity, hiding cover, low velocity areas, and floodplain function. Equipment such as helicopters, excavators, dump trucks, front-end loaders, full-suspension yarders, and similar equipment may be used to implement projects.

a. **Large Wood and Boulder Projects**

i. Place large wood and boulders in areas where they would naturally occur and in a manner that closely mimic natural accumulations for that particular stream type. For example, boulder placement may not be appropriate in low gradient meadow streams.
ii. Structure types shall simulate disturbance events to the greatest degree possible and include, but are not limited to, log jams, debris flows, windthrow, and tree breakage.
iii. No limits are to be placed on the size or shape of structures as long as such structures are within the range of natural variability of a given location and do not block fish passage.

iv. Projects can include grade control and bank stabilization structures, while size and configuration of such structures will be commensurate with scale of project site and hydraulic forces.
v. The partial burial of large wood and boulders is permitted and may constitute the dominant means of placement. This applies to all stream systems but more so for larger stream systems where use of adjacent riparian trees or channel features is not feasible or does not provide the full stability desired.
vi. large wood includes whole conifer and hardwood trees, logs, and rootwads. large wood size (diameter and length) should account for bankfull width and stream discharge rates. When available, trees with rootwads should be a minimum of 1.5x bankfull channel width, while logs without rootwads should be a minimum of 2.0x bankfull width.
vii. Structures may partially or completely span stream channels or be positioned along stream banks.
viii. Stabilizing or key pieces of large wood must be intact, hard, with little decay, and if possible have root wads (untrimmed) to provide functional refugia habitat for fish. Consider orienting key pieces such that the hydraulic forces upon the large wood increases stability
ix. Anchoring large wood – Anchoring alternatives may be used in preferential order:

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

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

i. **NMFS fish passage review and approve** – For engineered log jams that occupy >25% of the bankfull area, the Action Agencies will ensure that the action is individually reviewed and approved by NMFS for consistency with criteria in Anadromous Salmonid Passage Facility Design (NMFS 2011e).
ii. Engineered log jams will be patterned, to the greatest degree possible, after stable natural log jams.
iii. Grade control engineered log jams are designed to arrest channel down-cutting or incision by providing a grade control that retains sediment, lowers stream energy, and increases water elevations to reconnect floodplain habitat and diffuse downstream flood peaks.
iv. Stabilizing or key pieces of large wood that will be relied on to provide streambank stability or redirect flows must be intact, solid (little decay). If possible, acquire large wood with untrimmed rootwads to provide functional refugia habitat for fish.
v. When available, trees with rootwads attached should be a minimum length of 1.5 times the bankfull channel width, while logs without rootwads should be a minimum of 2.0 times the bankfull width.

vi. The partial burial of large wood and boulders may constitute the dominant means of placement, and key boulders (footings) or large wood can be buried into the stream bank or channel

vii. Angle and Offset – The large wood portions of engineered log jam structures should be oriented such that the force of water upon the large wood increases stability. If a rootwad is left exposed to the flow, the bole placed into the streambank should be oriented downstream parallel to the flow direction so the pressure on the rootwad pushes the bole into the streambank and bed. Wood members that are oriented parallel to flow are more stable than members oriented at 45 or 90 degrees to the flow.

viii. If large wood anchoring is required, a variety of methods may be used. These include buttressing the wood between riparian trees, the use of manila, sisal or other biodegradable ropes for lashing connections. If hydraulic conditions warrant use of structural connections, such as rebar pinning or bolted connections, may be used. Rock may be used for ballast but is limited to that needed to anchor the large wood.

c. Porous Boulder Structures and Vanes

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

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

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

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

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

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

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

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

d. Gravel Augmentation

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

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

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

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

e. Tree Removal for Large Wood Projects

i. Live conifers and other trees can be felled or pulled/pushed over in a Northwest Forest Plan (USDA and USDI 1994a) Riparian Reserve or PACFISH/INFISH (USDA-Forest Service 1995 ; USDA and USDI 1994b) riparian habitat conservation areas (RHCA), and upland areas (e.g., late successional reserves or adaptive management areas for northern spotted owl and marbled murrelet critical habitat) for in-channel large wood placement only when conifers and trees are fully stocked. Tree felling shall not create excessive stream bank erosion or increase the likelihood of channel avulsion during high flows.
ii. Danger trees and trees killed through fire, insects, disease, blow-down and other means can be felled and used for in-channel placement regardless of live-tree stocking levels.
iii. Trees may be removed by cable, ground-based equipment, horses or helicopters.
iv. Trees may be felled or pushed/pulled directly into a stream or floodplain.
v. Trees may be stock piled for future instream restoration projects.
vi. The project manager for an aquatic restoration action will coordinate with an action-agency wildlife biologist in tree-removal planning efforts.

3. Dam, Tidegate and Legacy Structure Removal includes removal of dams, tidegates, channel-spanning weirs, legacy habitat structures, earthen embankments, subsurface drainage features, spillway systems, outfalls, pipes, instream flow redirection structures (e.g., drop structure, gabion, groin), or similar devices used to control, discharge, or maintain water levels. Projects will be implemented to reconnect stream corridors, floodplains, and estuaries, reestablish wetlands, improve aquatic organism passage, and restore more natural channel and flow conditions. Any instream water control structures that impound substantial amounts of contaminated sediment are not proposed. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

a. Dam Removal

i. Design review

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

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

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

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

2. A minimum of three cross-sections – one downstream of the structure, one through the reservoir area upstream of the structure, and one upstream of the reservoir area (outside of the influence of the structure) to characterize the channel morphology and quantify the stored sediment.
3. Sediment characterization to determine the proportion of coarse sediment (>2mm) in the reservoir area.
4. A survey of any downstream spawning areas that may be affected by sediment released by removal of the water control structure or dam. Reservoirs with a d35 greater than 2 mm (i.e., 65% of the sediment by weight exceeds 2 mm in diameter) may be removed without excavation of stored material, if the sediment contains no contaminants; reservoirs with a d35 less than 2 mm (i.e., 65% of the sediment by weight is less than 2 mm in diameter) will require partial removal of the fine sediment to create a pilot channel, in conjunction with stabilization of the newly exposed streambanks with native vegetation.
5. If a project involves the removal of multiple barriers on one stream or in one watershed over the course of a work season, remove the most upstream barrier first if possible.

b. **Tide Gate Removal** – This action includes the removal of tide gates.

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

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

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

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

e. If the structure being removed contains material (e.g., large wood, boulders) that is typically found within the stream or floodplain at that site, the material can be reused to implement habitat improvements described under the Large Wood, Boulder, and Gravel Placement activity category in this opinion.

f. If the structure being removed is keyed into the bank, fill in "key" holes with native materials to restore contours of stream bank and floodplain. Compact the fill material adequately to prevent washing out of the soil during over-bank flooding. Do not mine material from the stream channel to fill in "key" holes.

g. When removal of buried log structures may result in significant disruption to riparian vegetation or the floodplain, consider using a chainsaw to extract the portion of log within the channel and leaving the buried sections within the streambank.

h. If a project involves the removal of multiple barriers on one stream or in one watershed over the course of a work season, remove the most upstream barrier first if possible. i. If the legacy structures (log, rock, or gabion weirs) were placed to provide grade control, evaluate the site for potential headcutting and incision due to structure removal. If headcutting and channel incision are likely to occur due to structure removal, additional measures must be taken to reduce these impacts.

j. If the structure is being removed because it has caused an over-widening of the channel, consider implementing other ARBO II restoration categories to decrease the width to depth ratio of the stream to a level commensurate with the geomorphic setting.

4. 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

5. Off- and Side-Channel Habitat Restoration projects will be implemented to reconnect historic side-channels with floodplains by removing off-channel fill and plugs. Furthermore, new side-channels and alcoves can be constructed in geomorphic settings that will accommodate such features. This activity

category typically applies to areas where side channels, alcoves, and other backwater habitats have been filled or blocked from the main channel, disconnecting them from most if not all flow events. These project types will increase habitat diversity and complexity, improve flow heterogeneity, provide long-term nutrient storage and substrate for aquatic macroinvertebrates, moderate flow disturbances, increase retention of leaf litter, and provide refuge for fish during high flows. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

a. **Review and approve** – When a proposed side channel will contain >20% of the bankfull flow,16 the Action Agencies will ensure that the action is reviewed by the Restoration Review Team and reviewed and approved by NMFS for consistency with criteria in NMFS (2011e).

b. **Data requirements** – Data requirements and analysis for off- and side-channel habitat restoration include evidence of historical channel location, such as land use surveys, historical photographs, topographic maps, remote sensing information, or personal observation.

c. **Allowable excavation** – Off- and side-channel improvements can include minor excavation (< 10% of volume) of naturally accumulated sediment within historical channels. There is no limit as to the amount of excavation of anthropogenic fill within historic side channels as long as such channels can be clearly identified through field or aerial photographs. Excavation depth will not exceed the maximum thalweg depth in the main channel. Excavated material removed from off- or side-channels shall be hauled to an upland site or spread across the adjacent floodplain in a manner that does not restrict floodplain capacity.

6. Streambank Restoration 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.

7. Set-back or Removal of Existing Berms, Dikes, and Levees will be conducted to reconnect historic fresh-water deltas to inundation, stream channels with floodplains, and historic estuaries to tidal influence as a means to increase habitat diversity and complexity, moderate flow disturbances, and provide refuge for fish during high flows. Other restored ecological functions include overland flow during flood events, dissipation of flood energy, increased water storage to augment low flows, sediment and debris deposition, growth of riparian vegetation, nutrient cycling, and development of side channels and alcoves. Such projects will take place where estuaries and floodplains have been disconnected from adjacent rivers through drain pipes and anthropogenic fill. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

a. **Floodplains and Freshwater Deltas**

i. Design actions to restore floodplain characteristics—elevation, width, gradient, length, and roughness—in a manner that closely mimics, to the extent possible, those that would naturally occur at that stream and valley type.
ii. Remove drain pipes, fences, and other capital projects to the extent possible.
iii. To the extent possible, remove nonnative fill material from the floodplain to an upland site.
iv. Where it is not possible to remove or set-back all portions of dikes and berms, or in areas where existing berms, dikes, and levees support abundant riparian vegetation, openings will be created with breaches. Breaches shall be equal to or greater than the active channel width to reduce the potential for channel avulsion during flood events. In addition to other breaches, the berm, dike, or levee shall always be breached at the downstream end of the project or at the lowest elevation of the floodplain to ensure the flows will naturally recede back into the main channel thus minimizing fish entrapment.
v. Elevations of dike/levee setbacks shall not exceed the elevation of removed structures
vi. When necessary, loosen compacted soils once overburden material is removed. Overburden or fill comprised of native materials, which originated from the project area, may be used within the floodplain to create set-back dikes and fill anthropogenic holes provided that floodplain function is not impeded.

b. **Estuary Restoration**

i. Project implementation shall be conducted in a sequence that will not preclude repairing or restoring estuary functions once dikes/levees are breached and the project area is flooded.
ii. Culverts and tide gates will be removed using the design criteria and conservation measures, where appropriate, as described in Work Area Isolation, Surface Water Withdrawals, & Fish Capture and Release (PDC 20) and Fish Passage Restoration (PDC 21) above.
iii. Roads within the project area should be removed to allow free flow of water. Material either will be placed in a stable area above the ordinary high water line or highest measured tide or be used to restore topographic variation in wetlands.
iv. To the extent possible, remove segmented drain tiles placed to drain wetlands. Fill generated by drain tile removal will be compacted back into the ditch created by removal of the drain tile.
v. Channel construction may be done to recreate channel morphology based on aerial photograph interpretation, literature, topographic surveys, and nearby undisturbed channels. Channel dimensions (width and depth) are based on measurements of similar types of channels and the drainage area. In some instances, channel construction is simply breaching the levee. For these sites, further channel development will occur through natural processes. When required, use PDC in Channel Reconstruction/Relocation (PDC 24).

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

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

a. Design remedial actions to restore floodplain characteristics—elevation, width, gradient, length, and roughness—in a manner that closely mimics, to the extent possible, those that would naturally occur at that stream and valley type.

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

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

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

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

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

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

9. Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering Facilities projects will be implemented by constructing fences to exclude riparian grazing, providing controlled access for walkways that livestock use to transit across streams and through riparian areas, and reducing livestock use in riparian areas and stream channels by providing upslope water facilities. Such projects promote a balanced approach to livestock use in riparian areas, reducing livestock impacts to riparian soils and vegetation, streambanks, channel substrates, and water quality. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

a. **Livestock Fencing**

i. Fence placement must allow for lateral movement of a stream and to allow establishment of riparian plant species. To the extent possible, fences will be placed outside the channel migration zone.
ii. Minimize vegetation removal, especially potential large wood recruitment sources, when constructing fence lines.
iii. Where appropriate, construct fences at water gaps in a manner that allows passage of large wood and other debris.

b. **Livestock Stream Crossings**

i. The number of crossings will be minimized.

ii. Locate crossings or water gaps where streambanks are naturally low. Livestock crossings or water gaps must not be located in areas where compaction or other damage can occur to sensitive soils and vegetation (e.g., wetlands) due to congregating livestock.
iii. To the extent possible, crossings will not be placed in areas where ESA listed species spawn or are suspected of spawning (e.g., pool tailouts where spawning may occur), or within 300-feet upstream of such areas.
iv. Existing access roads and stream crossings will be used whenever possible, unless new construction would result in less habitat disturbance and the old trail or crossing is retired.
v. Access roads or trails will be provided with a vegetative buffer that is adequate to avoid or minimize runoff of sediment and other pollutants to surface waters.
vi. Essential crossings will be designed and constructed or improved to handle reasonably foreseeable flood risks, including associated bedload and debris, and to prevent the diversion of streamflow out of the channel and down the trail if the crossing fails.
vii. If necessary, the streambank and approach lanes can be stabilized with native vegetation or angular rock to reduce chronic sedimentation. The stream crossing or water gap should be armored with sufficient sized rock (e.g., cobble-size rock) and use angular rock if natural substrate is not of adequate size.
viii. Livestock crossings will not create barriers to the passage of adult and juvenile fish. Whenever a culvert or bridge—including bridges constructed from flatbed railroad cars, boxcars, or truck flatbeds—is used to create the crossing, the structure width will tier to project design criteria listed for Stream Simulation Culvert and Bridge Projects under Fish Passage Restoration (PDC 21).
ix. Stream crossings and water gaps will be designed and constructed to a width of 10 to 15 feet in the upstream-downstream direction to minimize the time livestock will spend in the crossing or riparian area.
x. When using pressure treated lumber for fence posts, complete all cutting/drilling offsite (to the extent possible) so that treated wood chips and debris do not enter water or flood prone areas.
xi. Riparian fencing is not to be used to create livestock handling facilities or riparian pastures.

c. **Off-channel Livestock Watering Facilities**

i. The development of a spring is not allowed if the spring is occupied by ESA-listed species.
ii. Water withdrawals must not dewater habitats or cause low stream flow conditions that could affect ESA-listed fish. Withdrawals may not exceed 10% of the available flow.
iii. Troughs or tanks fed from a stream or river must have an existing valid water right. Surface water intakes must be screened to meet the most recent version of NMFS fish screen criteria (NMFS 2011e)(NMFS 2011e)(NMFS 2011e)(NMFS 2011e)(NMFS 2011e)(NMFS 2011e)(NMFS 2011e), be self-cleaning, or regularly maintained by removing debris buildup. A responsible party will be designated to conduct regular inspection and as-needed maintenance to ensure pumps and screens are properly functioning.
iv. Place troughs far enough from a stream or surround with a protective surface to prevent mud and sediment delivery to the stream. Avoid steep slopes and areas where compaction or damage could occur to sensitive soils, slopes, or vegetation due to congregating livestock.
v. Ensure that each livestock water development has a float valve or similar device, a return flow system, a fenced overflow area, or similar means to minimize water withdrawal and potential runoff and erosion.
vi. Minimize removal of vegetation around springs, wet areas.
vii. When necessary, construct a fence around the spring development to prevent livestock damage.

10. Piling and other Structure Removal includes the removal of untreated and chemically treated wood pilings, piers, boat docks as well as similar structures comprised of plastic, concrete, and other material. Piling and other structure removal from waterways will improve water quality by eliminating chronic sources of toxic contamination and associated impacts to riparian dependent species. Pilings and other structures occur in estuaries, lakes, and rivers and are typically used in association with boat docks and other facilities. Equipment such as boats, barges, excavators, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

a. **When removing an intact pile:**

i. Install a floating surface boom to capture floating surface debris.
ii. To the extent possible, keep all equipment (e.g., bucket, steel cable, vibratory hammer) out of the water, grip piles above the waterline, and complete all work during low water and low current conditions.
iii. Dislodge the piling with a vibratory hammer, whenever feasible. Never intentionally break a pile by twisting or bending.
iv. Slowly lift piles from the sediment and through the water column.
v. Place chemically-treated piles in a containment basin on a barge deck, pier, or shoreline without attempting to clean or remove any adhering sediment. A containment basin for the removed piles and any adhering sediment may be constructed of durable plastic sheeting with sidewalls supported by hay bales or another support structure to contain all sediment.
vi. Fill the holes left by each piling with clean, native sediments located from the project area.
vii. Dispose of all removed piles, floating surface debris, any sediment spilled on work surfaces, and all containment supplies at a permitted upland disposal site.

b. **When removing a broken pile:**

i. If a pile breaks above the surface of uncontaminated sediment, or less than 2 feet below the surface, every attempt short of excavation will be made to remove it entirely. If the pile cannot be removed without excavation, excavate sediments and saw the stump off at least 3 feet below the surface of the sediment.
ii. If a pile breaks above contaminated sediment, saw the stump off at the sediment line; if a pile breaks within contaminated sediment, make no further effort to remove it and cover the hole with a cap of clean substrate appropriate for the site.
iii. If dredging is likely in the area of piling removal, use a global positioning device (GPS) to note the location of all broken piles for future use in site debris characterization.

11. 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 steams; 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.

12. Juniper Tree Removal will be conducted in riparian areas and adjoining uplands to help restore plant species composition and structure that would occur under natural fire regimes. Juniper removal will occur in those areas where juniper have encroached into riparian areas as a result of fire exclusion, thereby replacing more desired riparian plant species such as willow, cottonwood, aspen, alder, sedge, and rush. This action will help restore composition and structure of desired riparian species, thereby improving ground cover and water infiltration into soils. Equipment may include chainsaws, pruning shears, winch machinery, feller-bunchers, and slash-busters. The following measures will apply:

a. Remove juniper to natural stocking levels where BLM and Forest Service determines that juniper trees are expanding into neighboring plant communities to the detriment of other native riparian vegetation, soils, or streamflow.
b. Do not cut old-growth juniper, which typically has several of the following features: 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 (Miller et al. 2005).
c. Felled trees may be left in place, lower limbs may be cut and scattered, or all or part of the trees may be used for streambank or wetland restoration (e.g., manipulated as necessary to protect riparian or wetland shrubs from grazing by livestock or wildlife or otherwise restore ecological function in floodplain, riparian, and wetland habitats).
d. Where appropriate, cut juniper may be placed into stream channels and floodplains to provide aquatic benefits. Juniper can be felled or placed into the stream to promote channel aggradation as

long as such actions do not obstruct fish movement and use of spawning gravels or increase width to depth ratios.
e. On steep or south-facing slopes, where ground vegetation is sparse, leave felled juniper in sufficient quantities to promote reestablishment of vegetation and prevent erosion.
f. If seeding is a part of the action, consider whether seeding would be most appropriate before or after juniper treatment.
g. When using feller-buncher and slash-buster equipment, operate equipment in a manner that minimizes soil compaction and disturbance to soils and native vegetation to the extent possible. Equipment exclusion areas (buffer area along stream channels) should be as wide as the feller-buncher or slash-buster arm.

13. Riparian Vegetation Treatment (controlled burning) includes reintroduction of low and moderate-severity fire into riparian areas to help restore plant species composition and structure that would occur under natural fire regimes in dry forest types east of the Cascade mountains and in southwestern Oregon. Additionally, controlled burns may be implemented in localized lowland areas in western Oregon, i.e., oak woodlands. Conifer thinning may be required to adjust fuel loads for moderate-severity burns to regenerate deciduous trees and shrubs. Equipment would include drip torches and chainsaws, along with fire suppression vehicles and equipment.

a. **Low and Moderate Severity Burns**

i. Experienced fuels specialists, silviculturists, fisheries biologist, and hydrologists shall be involved in designing prescribed burn treatments.
ii. Prescriptions will focus on restoring the plant species composition and structure that would occur under natural fire regimes.
iii. Burn plans are required for each action and shall include, but not be limited to the following: a description of existing and desired future fire classifications, existing and target stand structure and species composition (including basis for target conditions); other ecological objectives, type, severity, area, and timing of proposed burn; and measures to prevent destruction of vegetation providing shade and other ecological functions important to fish habitat.
iv. Low-severity burns will be used except where the objective is to restore deciduous trees, as describe below under part "v.", with a goal of creating a mosaic pattern of burned and unburned landscape. Low severity burns are characterized by the following: Low soil heating or light ground char occurs where litter is scorched, charred, or consumed, but the duff is left largely intact. large wood accumulation is partially consumed or charred. Mineral soil is not changed. Minimal numbers of trees, typically pole/saplings, will be killed.
v. Moderate-severity burns are permitted only where needed to invigorate decadent aspen stands, willows, and other native deciduous species and may be targeted in no more than 20% of the area within RHCAs or Riparian Reserves/6th field HUC/year. Such burns shall be contained within the observable historical boundaries of the aspen stand, willow site, other deciduous species, and associated meadows; additional area outside of the "historical boundaries" may be added to create controllable burn boundaries. Moderate severity are characterized by the following: Moderate soil heating or moderate ground char occurs where the litter on forest sites is consumed and the duff is deeply charred or consumed, but the underlying mineral soil surface is not visibly altered. Light colored ash is present. large wood is mostly consumed, except for logs, which are deeply charred.
vi. Fire lines will be limited to five feet in width, constructed with erosion control structures, such as water bars, and restored to pre-project conditions before the winter following the controlled fire. To the extent possible, do not remove vegetation providing stream shade or other ecological functions that are important to streams.
vii. Ignition can occur anywhere within the Riparian Reserve and RHCAs area as long as project design criteria are met.

viii. Avoid water withdrawals from fish bearing streams whenever possible. Water drafting must take no more than 10% of the stream flow and must not dewater the channel to the point of isolating fish. Pump intakes shall have fish screens consistent with NMFS fish screening criteria (NMFS 2011e).

b. **Non-commercial Thinning Associated with Moderate-severity Burns**

i. Non-commercial tree thinning and slash removal is allowed only as required to adjust fuel loads to implement a moderate-severity burn to promote growth of deciduous trees and shrubs, such as aspen, cottonwood, willow, other deciduous species, and associated meadows.
ii. Thinning is allowed only in dry forest types, i.e., east of the Cascade mountains and southwestern Oregon, and in localized lowland areas in western Oregon, i.e., oak woodlands.
iii. To protect legacy trees, thinning from below is allowed. If conifers are even-aged pole, sapling, or mid-seral with no legacy trees, thin existing trees to the degree necessary to promote a moderate-severity burn.
iv. No slash burning is allowed within 30-feet of any stream. To the extent possible, avoid creating hydrophobic soils when burning slash. Slash piles should be far enough away from the stream channel so any sediment resulting from this action will be unlikely to reach any stream.
v. Apply PDC in National Fire Plan salmonid criteria (USDI-Bureau of Land Management 2005) for limits on mortality to residual overstory vegetation.
vi. Only hand equipment—chain saws, axes, Pulaski's, etc.—may be used for felling.
vii. Where livestock or wildlife grazing could be a threat to restoration of aspen, cottonwood, willow, alder, and other deciduous vegetation and an immediate moderate-severity burn would consume large amounts of felled trees, consider delaying the burn and leaving felled trees in place to create grazing barriers to help assure plant growth.
viii. If in an existing grazing allotment, projects in this category shall be accompanied by livestock grazing practices that promote the attainment of moderate-severity burn objectives.

14. Riparian Vegetation Planting includes the planting of native riparian species that would occur under natural disturbance regimes. Activities may include the following: planting conifers, deciduous trees and shrubs; placement of sedge and or rush mats; gathering and planting willow cuttings. The resulting benefits to the aquatic system can include desired levels of stream shade, bank stability, stream nutrients, large wood inputs, increased grasses, forbs, and shrubs, and reduced soil erosion. Equipment may include excavators, backhoes, dump trucks, power augers, chainsaws, and manual tools.

a. Experienced silviculturists, botanists, ecologists, or associated technicians shall be involved in designing vegetation treatments.
b. Species to be planted will be of the same species that naturally occur in the project area. Acquire native seed or plant sources as close to the watershed as possible.
c. Tree and shrub species, willow cuttings, as well as sedge and rush mats to be used as transplant material shall come from outside the bankfull width, typically in terraces (abandoned flood plains), or where such plants are abundant.
d. Sedge and rush mats should be sized to prevent their movement during high flow events.
e. Concentrate plantings above the bankfull elevation.
f. Removal of native and non-native vegetation that will compete with plantings is permitted.
g. Exclosure fencing to prevent utilization of plantings by deer, elk, and livestock is permitted.

15. Bull Trout Protection includes the removal of brook trout or other non-native fish species via electrofishing or other manual means to protect bull trout from competition or hybridization.

a. For brook trout or other non-native fish species removal, staff experienced in the specific removal method shall be involved in project design and implementation.

b. When using electrofishing for removal of brook trout or other non-native fish species, use the following guidelines:

i. Electrofishing shall be conducted using the methods outlined in the NMFS's guidelines (NMFS 2000).
ii. Electrofishing equipment shall be operated at the lowest possible effective settings to minimize injury or mortality to bull trout.
iii. To reduce adverse effects to bull trout, electrofishing shall only occur from May 1 (or after emergence occurs) to July 31 in known bull trout spawning areas. No electrofishing will occur in any bull trout habitat after August 15.
iv. Electrofishing shall not be conducted when the water conditions are turbid and visibility is poor. This condition may be experienced when the sampler cannot see the stream bottom in 1 foot of water.
v. Electrofishing will not be conducted within core areas that contain 100 or fewer adult bull trout.
vi. Other removal methods, such as dip netting, spearing, and other means can be used.

16. Beaver Habitat Restoration includes installation of in-channel structures to encourage beavers to build dams in incised channels and across potential floodplain surfaces. The dams are expected to entrain substrate, aggrade the bottom, and reconnect the stream to the floodplain.

a. **In-channel Structures**

i. Consist of porous channel-spanning structures comprised of biodegradable vertical posts (beaver dam support structures) approximately 0.5 to 1 meter apart and at a height intended to act as the crest elevation of an active beaver dam. Variation of this restoration treatment may include post lines only, post lines with wicker weaves, construction of starter dams, reinforcement of existing active beaver dams, and reinforcement of abandoned beaver dams (Pollock et al. 2012).
ii. Place beaver dam support structures in areas conducive to dam construction as determined by stream gradient or historical beaver use.
iii. Place in areas with sufficient deciduous shrub and trees to promote sustained beaver occupancy.

b. **Habitat Restoration**

i. Beaver Restoration activities may include planting riparian hardwoods (species such as willow, red osier dogwood, and alder) and building exclosures (such as temporary fences) to protect and enhance existing or planted riparian hardwoods until they are established (Malheur National Forest and the Keystone Project 2007).
ii. Maintain or develop grazing plans that will ensure the success of beaver habitat restoration objectives.
iii. As a means to restore desired vegetation (e.g., aspen, willow, alder, and cottonwood) associated with quality beaver habitat, follow project design criteria in the *Riparian Vegetation Treatment (controlled burning) b. Noncommercial thinning associated with Moderate-severity burns* category.

17. Fisheries, Hydrology, Geomorphology, Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration include assessments and monitoring projects that could or are associated with planning, implementation, and monitoring of aquatic restoration projects covered by this opinion. Such support projects may include surveys to document the following aquatic and riparian attributes: fish habitat, hydrology, channel geomorphology, water quality, fish spawning, fish presence19, macro invertebrates, riparian vegetation, wildlife, and cultural resources (including excavating test pits <1 m2 in

size). This also includes effectiveness monitoring associated with projects implemented under ARBO II, provided the effectiveness monitoring is limited to the same survey techniques described in this section.

a. Train personnel in survey methods to prevent or minimize disturbance of fish. Contract specifications should include these methods where appropriate.
b. Avoid impacts to fish redds. When possible, avoid sampling during spawning periods.
c. Coordinate with other local agencies to prevent redundant surveys.
d. Locate excavated material from cultural resource test pits away from stream channels. Replace all material in test pits when survey is completed and stabilize the surface.
e. Does not include research projects that have or should obtain a permit pursuant to section 10(a) of the ESA.

Project Design Criteria by Resource

The following design criteria provide additional direction for project implementation to ensure compliance with Forest Plan standards, guidelines and desired future conditions.

Fisheries and Hydrology

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

Additional Aquatic project design criteria were developed for the following elements: Tree Tipping and Felling, Juniper Treatments, Tree Hauling, and Prescribed Burning.

General For Inside Riparian Habitat Conservation Areas

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

Tree Tipping and Tree Felling for Large Wood Projects

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

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

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

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

The trees are located on a south facing slope (175-185 degree azimuth) and therefore do not provide stream shade;
An appropriate level of analysis is completed and documented, such as shade modeling, using site-specific characteristics to determine the primary shade tree width; and or
Field monitoring or measurements are completed to determine the width where optimum Angular Canopy Density (65% or greater) is achieved (see TMDL Implementation Strategies).
If trees are being felled for safety reasons they can be felled towards the stream.

Source trees should come from but are not limited to: over or fully stocked upland and riparian stands, hazard trees, trees generated from administrative sites (maintenance, expansion, or new construction), and hardwood restoration.

There is no DBH (diameter at breast height) restriction for large wood, but consider the following before removing and placing trees:

Diameter

The key to establishing a logjam is utilizing larger diameter wood that resists decay. These pieces of wood are often called "key pieces," and serve as the anchors for the logjam structure. Wood can improve fish habitat only if the wood is large enough to stay, influence flow patterns, and sediment sorting. Larger diameter wood retains its size longer as abrasion and decay occurs over the years. Larger diameter wood is more effective in creating pools and complex channels that improve fish populations. The minimum diameter required for a key piece of wood depends on the bankfull width of the stream is found in the following table.

Table 2 Bankfull widths and minimum diameter of logs to be considered key pieces.

Bankfull Width* - Feet	Minimum Diameter* - Inches
0 to 10	10
10 to 20	16
20 to 30	18
Over 30	22

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

Length

The length of the wood is also important to stability. To be considered a key piece a log with a rootwad still attached should be at least one and one-half times (1.5X) the bankfull or a log without a rootwad should be twice (2X) the length of the stream's bankfull width. As the best fish habitat is formed around jams composed of 3 to7 logs, at least 2 key pieces should be used at each structure.

Mimic natural accumulations of large woody debris based on stream type, valley setting, and community type and ensure future large woody debris recruitment

Tailholds as part of tree tipping operations are permitted across perennial, intermittent and ephemeral streams but the use of protective straps will be required to prevent tree damage.

Juniper Treatments

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

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

Utilize the "Western Juniper Field Guide: Asking the Right Questions to Select the Appropriate Management Actions. (Bates et al. 2007, Circular 1321)
http://pubs.usgs.gov/circ/1321/pdf/circ1321.pdf

Tree and Boulder Hauling

Apply mitigation and best management practices for dust abatement (water, lignosulfonate, Calcium and Magnesium Chlorides) dry conditions, and erosion control as directed by physical scientist or road engineer (See Road Maintenance project design criteria #6 for application).
Haul on gravel and native-surface roads will be limited to dry conditions.
Haul Restrictions to Prevent Fine Sediment Delivery to Streams
Haul or maintenance is permitted on roads under the following conditions:
- During haul, weather conditions are monitored daily for the chance of precipitation by the Hydrologist or Fish Biologist.
- No rutting of the road surface is occurring, indicating the subsurface is wet.
- Frozen ground conditions.
- Haul will cease at any time when the travelway of the road is wet and turbid water or fines are observed moving off the road surface to ditchlines that deliver to stream channels regardless of time of year.

<u>Roads Exempt from Haul Restrictions include (Do to no mechanism for sediment delivery):</u>

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

Prescribed Burning and Related Activities

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

<u>For perennial and fish-bearing stream channels:</u>

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.

<u>For intermittent, non-fish-bearing stream channels:</u>

Within 50' of the stream channel backing fire is preferred.

<u>For the maintenance and use of water sources and draft sites:</u>

Minimize disturbance of existing riparian vegetation to the greatest extent practical; in particular, maintain shade, bank stability, and large woody material recruitment potential.

Use sediment control measures such as straw bales, filter cloth, or sediment fences when conditions warrant.

Maximize maintenance activities during late summer and early fall to best avoid wet conditions.

Do not pump from streams that do not have continuous surface flow. When pumping water in all situations from streams, ensure that at least one-half of the original streamflow remains below the pump site.

Refuel power equipment, or use absorbent pads for immobile equipment, and prepare concrete at least 150 feet (or as far as possible from the water body where local site conditions do not allow a 150 foot setback) from water bodies to prevent direct delivery of contaminants into associated water bodies.

Fisheries, hydrology or other qualified personnel must work with engineering/fire personnel to review proposed activities to minimize potential effects to fish, stream channel conditions, and water quality.

Use and develop off-channel ponds outside of stream channels were feasible and appropriate. Work with fire folks to prioritize and decommission unnecessary in-stream drafting sites.

Water withdrawal equipment must have a fish screen installed, operated and maintained in accordance to NOAA Fisheries guidelines.

Wildlife

Threatened, Endangered or Sensitive Species

If wolves become established (denning) while project implementation is occurring, measures will be taken to avoid activity in that vicinity

If any evidence of wolverines is discovered during project implementation, measures will be taken to provide protection. If a den is found we would protect it from human disturbance.

Raptors

No activities will occur within currently known goshawk or other raptor nest stands. To conserve nesting habitat and to minimize disturbance to nesting individuals, restrictions would be executed according to the requirements of the species involved.

With all newly discovered raptor nests, a buffer zone would be established by the wildlife biologist to restrict activities near the nest area during occupancy.

Where possible, retain trees with inactive nests that may be important to secondary nesters (e.g. Great Gray Owl).

Any snags in riparian areas or uplands will be protected from disturbance, removal, or use in stream restoration activities unless deemed a safety hazard at a specific work site.

Big Game

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

Botany

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

Rare and Sensitive Plants and Habitats

Pre-Implementation: Proposed restoration projects shall be completely surveyed early in the implementation planning process by a qualified botanist or rare plant technician, to identify and assess any sensitive or rare plant populations or habitats.

Pre-Implementation: Proposed restoration projects shall develop restoration plans for degraded sensitive species habitats and/or mitigation plans in areas where sensitive plant populations are documented. This shall be accomplished by a journey-level Forest Service botanist in collaboration with the interdisciplinary team and other stakeholders.

Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, recreation sites, prescribed fires, fire lines, and other operational activities shall not be allowed in any documented sensitive plant sites unless it is for the demonstrated benefit or protection of the site. All sensitive plant populations should be buffered 100 ft. from all operational activities where topography does not restrict such a distance. Sensitive plant sites and associated buffers shall be identified as Areas to Protect (ATPs).

Sensitive and Unique Habitats

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

Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, recreation sites, prescribed fires, fire lines, and other operational activities shall not occur within, or at the interface of lithosols (scablands).

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

Groundwater-Dependent Ecosystems

The integrity of groundwater-dependent ecosystems (GDE) shall be maintained. Spring developments shall not dewater GDEs. Spring developments shall not be allowed if the spring is occupied by rare or sensitive plant species, or in peatlands, fens, or where histic soils are present. These sites should be buffered 100 ft. from all operational activities where topography does not restrict such a distance, and be identified as Areas to Protect (ATPs).

Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, fire lines, and other operational activities shall not be allowed in springs, seeps, or any other GDE, unless it is for the benefit or protection of the GDE or development of the spring.

Spring developments should not disturb the spring orifice (point where water emerges). Spring head boxes should be placed in a location that will cause the least amount of disturbance to the soils and vegetation of the GDE. Preferable locations for spring head boxes should be in an established channel downstream from the orifice or a location where flowing water becomes subsurface.

When necessary, construct fenced exclosures around spring developments to prevent damage from wild ungulates and livestock.

Spring developments shall have a return flow system to minimize the diversion of surface and subsurface water from the catchment area. Consider using a float valve or similar device to reduce the amount of water withdrawn from the GDE.

When developing springs, place troughs far enough away from GDEs, wetlands, and other sensitive or unique habitats to prevent erosion, compaction, or degradation to sensitive soils and vegetation due to livestock congregation.

Invasive Plant Species

Pre-Implementation: Proposed restoration projects shall be surveyed for invasive plants early in the implementation planning process by a qualified invasive plant specialist /technician, to identify and assess any undocumented invasive plant infestation.

Pre-Implementation: For project areas that overlap or are adjacent to invasive plant infestations, assure that there is sufficient time prior to develop a long-term site strategy for control, eradication, and revegetation of the site. This shall be accomplished by a qualified invasive plant specialist in collaboration with the interdisciplinary team and other stakeholders.

All activities shall be conducted in a manner as to minimize or prevent the potential spread or establishment of invasive species.

Actions conducted on National Forest System Lands that will operate outside the limits of the road prism, require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering the National Forest. Cleaning will be inspected and approved by the forest officer in charge of administering the project.

Assure that all materials are weed-free. Use weed-free straw and mulch for all projects conducted or authorized by the Forest Service on National Forest System Lands. If State certified straw and/or mulch is not available, individual Forests should require sources certified to be weed-free using the North American Weed Free Forage Program standards or a similar certification process.

Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, and/or rock that are judged to be weed free by District or Forest weed specialists.

Prohibit heavy equipment operation, vehicle travel, staging areas, fire-control lines, and any other operational activities in invasive plant infestations, unless the activities are for the express purpose of eradicating the infestation or INV1 and INV2 have been completed.

Conduct post-implementation monitoring for invasive plants. Continue monitoring, treating, and removing invasive plants until all infestations are eradicated and native plant species are well established.

Native Plant Materials and Revegetation

Pre-Implementation: Where the need for native plant materials is anticipated, assure that there is sufficient time for the plant materials specialist to develop a native plant materials plan and/or prescription prior to implementation of planned revegetation, rehabilitation, and restoration projects. This may include allowing for enough time to harvest and store hardwood cuttings, produce suitable quantities of native seed, and/or grow-out container stock.

Locally adapted, genetically appropriate native plant materials are the first choice for use in revegetation, restoration and rehabilitation, where timely natural regeneration of the native plant community is not likely to occur. Use a diverse assemblage of species that have the potential to naturally occur in the project area. Acquire native seed or plant sources as close to the watershed as possible. Examples of areas that may need treatment include: habitat restoration efforts, log decks, staging areas, landing zones, temporary roads, slash piles, culvert replacements, severely burned areas, skid trails, decommissioned roads, invasive species treatments, and other disturbances.

Non-native, non-invasive plant species may be used in the following situations: (1) when needed in emergency conditions to protect basic resource values (e.g., soil stability, water quality, and to help prevent the establishment of invasive species), (2) as an interim, non-persistent measure designed to aid in the re-establishment of native plants, (3) if native plant materials are not available and/or are not economically feasible, and (4) in permanently altered plant communities.

Under no circumstances shall non-native invasive plant species and/or noxious weeds be used for revegetation.

Development, review and/or approval of revegetation, rehabilitation, and restoration prescriptions, including species selection, genetic heritage, growth stage, seed mixes, sowing guidelines, and any needed site preparation, shall be accomplished by a plant materials specialist who is knowledgeable and trained or certified in the plant community type where the revegetation will occur.

Concentrate plantings above the bank-full elevation. Sedge and rush mats should be placed and sized to prevent their movement during high flow events.

Newly planted and/or seeded areas should be protected from animals and activities that may prevent, retard, or slow the establishment and recovery of native vegetation. Site-specific measures may

include building fences, piling slash, jackstrawing, closing areas to vehicles, and/or temporarily changing grazing regimes until the desired condition is sufficiently achieved.

Soils

For projects involving heavy machinery off roads, the project proponents shall inspect the site for existing impacts to the soil. If existing impacts appear to be heavy on the Malheur or moderate on the Ochoco, they shall contact a soil scientist, who shall determine what site specific project design criteria are necessary to meet Forest Plan and Forest Service Manual standards and guidelines. (If a soil scientist is not available, a silviculturist or hydrologist can do the work.) If standards and guidelines cannot be met, heavy machinery shall not be used.

Erosion would be minimized by following General Aquatic Conservation Measures and by implementing the appropriate project design criteria based on the type of activity (see appendix A).

Erosion from heavy machinery use would be minimized; by minimizing compaction and puddling, rutting would be minimized.

For Livestock Stream Crossings and Off-Channel Watering Facilities, out-of-channel erosion would be minimized.

For Road Erosion Control, erosion would be minimized.

For Juniper Removal, erosion would be minimized. It is possible that Juniper Removal would increase ground cover within a few years, and thereby reduce erosion.

Prescribed Fire (including for disposal of slash after Juniper removal) can involve only low and moderate severity fire, and erosion from fire lines would be minimized, so erosion from prescribed fire would not be significant.

Fire and Fuels

Mechanical tools may be necessary to prepare fire control lines for these burns, but would be limited, and typically no heavy equipment would be used. Prescribed burns or wildfires could temporarily affect air quality.

The project design criteria for both Juniper Removal and Riparian Vegetation Treatment (controlled burning) would be followed. National, state, and local policies regarding prescribed fire implementation will be met.

Activities that are expected to create smoke emissions would follow the State of Oregon Smoke Management Plan. Prior to burning, approval will be obtained from the Oregon Department of Forestry, who determines compliance with the Clean Air Act. State smoke forecasts, which predict wind direction and smoke mixing height, will be obtained prior to all burning to ensure smoke intrusions will not occur in the local smoke sensitive receptor areas.

Burning will follow the guidance provided by the Oregon Smoke Management Plan (Directive 1-4-1-601, Operational Guidance for the Oregon Smoke Management Program), which is an agreement between federal land management agencies in northeast Oregon and Oregon Department of Forestry limiting smoke emission amounts. Oregon Department of Forestry monitors activity, and if a limit is reached it will shut down prescribed fire activity.

Heritage Resources

Compliance with Section 106 of the National Historic Preservation Act for activities authorized under this analysis will be completed and concurred with by the Oregon State Historic Preservation Office before any ground disturbing action takes place. For each potential activity the District or Zone archaeologist will determine which of the criteria in the 2004 Programmatic Agreement with the Oregon State Historic Preservation Office best fit the particular project. This will vary somewhat project to project based on the scale of the particular activity, the location on the landscape, and the nature of associated cultural resources, if any.

The District or Zone archaeologist will document their findings on a Programmatic Agreement form with a project description, rationale and location map which will be attached to the Forest Service Heritage Event database. The Forest archaeologist will review and sign off on the Programmatic Review form if concurred with. For appendices A, B and C projects as defined in the 2004 Programmatic Agreement, the Forest will retain the documentation and provide the Oregon State Historic Preservation Office with the annual summary of projects as described in the Preservation Act.

For full inventories the District or Zone archaeologist will complete an inventory report meeting current Oregon State Historic Preservation Office standards which will be reviewed by the Forest archaeologist. The Forest archaeologist will forward the completed inventory report to the Oregon State Historic Preservation Office for review and concurrence signature or further discussion as appropriate.

Consultation with Native American tribes is conducted under the terms of the Memorandums of Understanding the Forest has with each individual tribe. The Forest regularly consults with the Burns Paiute Tribe, the Confederated Tribes of the Umatilla Indian Reservation and the Confederated Tribes of Warm Springs Reservation.

For work requiring a full inventory under the terms of the 2004 Programmatic Agreement any identified cultural resources sites will generally be avoided. For cases where site avoidance is impractical mitigation procedures will be developed in consultation with the Oregon SHPO before project work begins.

If any previously unidentified cultural resources are located during project implementation, ground disturbing work will be halted until the resources are evaluated by the District or Zone archaeologist. If the cultural resources are determined to be potentially eligible for listing on the National Register of Historic Places work will either be permanently halted or a mitigation plan will be developed in consultation with the Oregon SHPO before work continues.

Recreation

Motorized aquatic restoration methods would not be used within Wilderness, Wild portions of Wild and Scenic Rivers, and Inventoried Roadless Areas.

Mechanized aquatic restoration methods would not be used within Wilderness or Wild portions of Wild and Scenic Rivers.

Grazing

General

Range and Fire Specialists and permittees would coordinate activities including scheduling of burning activities in grazing units.

Utilize the Forest Post-Fire Interim Grazing Guidelines to aid in determining when to resume grazing activities.

Whenever possible, units to be rested would be burned in the spring of the year to be rested or in the fall prior to the rest year.

If a rest period is required following a burn the permittee has the option to exclude cattle grazing from those portions of a pasture that were burned through the use of fencing and could continue to graze the unburned areas of a unit.

Protection of Government and Permittee Investments

All existing structural range improvements (fences, gates, spring developments, etc) and permanent ecological plots would be contractually protected.

Maintain structural integrity of range improvements.

If structural improvements are damaged during project operations they would be repaired to Forest Service standards prior to livestock scheduled use by the party responsible for causing the damage.

Repairs would be required of the purchaser if damage were done during thinning or fuel treatment contractors or by force account where appropriate.

Three or more splices to a single wire within a distance of 20 feet will be replaced with a single splice.

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

Aspen Restoration

New aspen exclosure fences would have gates installed in proper locations to allow for removal of stray livestock. Aspen fences would be maintained each year and repaired whenever necessary. Plans for aspen exclosures will define when restoration of the protected stand has been achieved and who has responsibility for maintenance of the structure. When fences are no longer needed, aspen fences should be removed.

Alternate livestock water sources to those being used in aspen stands would be developed off-site before fencing aspen or re-evaluate fencing of the aspen site. Coordinate with range specialist and permittee.

Notification

During planning stage of each individual project all potentially impacted grazing permittees will have notice of action and opportunity to provide input that may lessen impacts to their livestock operation well in advance of implementation.

Prior to implementation all potentially impacted grazing permittees will be given notice of dates when work will start.

Appendix B

Aquatic Restoration Activity List and Project Compliance Checklist

Activities will be posted to the internet on an annual basis. The current location for activity list conducted under the Aquatic Restoration Project Environmental Assessment and September 2014 Decision Notice can be located at http://www.fs.usda.gov/land/malheur/landmanagement.

Aquatic Restoration Project - Compliance and Implementation Checklist

Activity Notification: 2011, Malheur National Forest, Blue Mountain Ranger District

Activity #	Activity Name	Contact	Stream Name & County	Implementation (Start and End dates: xx/xx/xxxx)	Miles Treated or Acres Treated
1	West Fork Lick Culvert Replacement	Holly Bentz, hbentz@fs.fed.us, 541-575-3012	West Fork Lick Creek, Grant County	7/15/2010- 8/15/2010	2.8 miles
2	Cougar Creek Culvert Replacement	Holly Bentz, hbentz@fs.fed.us, 541-575-3012	Cougar Creek, Grant County	7/15/2010- 8/15/2010	2.4 miles
3	Camp Creek Log Weir Removal Project (Phase 2)	Allen Taylor, allentaylor@fs.fed.us, (541) 575-3394	Lick Creek, Camp Creek, Grant County	7/15/2011-8/15/2011	7 miles
4	Lower Camp Creek Exclosure Fence 2011	Kelly Ware, kware@fs.fed.us, (541)-575-3432 or Nick Stiner, nstiner@fs.fed.us, (541)-575-3496	Lower Camp Creek, Grant County	6/20/2011-11/01/2011	1 mile
5	Lower Camp Creek Riparian Planting	Allen Taylor, allentaylor@fs.fed.us, (541) 575-3394	Lower Camp Creek, Grant County	6/20/2011-11/01/2011	1 mile

Aquatic Restoration EA and Decision Notice

Activity Specific Review of Project Design Criteria and Forest Plan Compliance

Activity Number: 5 (Lower Camp Creek Riparian Planting) **Date: 4/1/2011**

Category: 14 - Riparian Planting **Location:** Lower Camp Creek; N 44.692,W118.794,End:N44.685,W118.798

Project Description: **Riparian Planting** - Locally collected willows and cottonwoods planted along the bankfull zone of Camp Creek. Plantings are expected to grow and increase shade and bank stability for portions of Camp Creek. Other benefits are to create overhanging habitat for insects, thus enhancing the food supply for fish, and provide food and material for dam construction for beaver.

Heritage

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

Comments: Activity was reviewed and is consistent with the goals, objectives and standards and guidelines of the Malheur NF Land and Resource Management Plan. The project does not fall within any of the above checked land management areas. The project does occur within big game winter range but will be implemented outside of the seasonal restrictions.

Table 2. Projects Design Criteria and Forest Plan compliance checklist.

I have reviewed this activity and have determined it is within the Project Design Criteria identified for my resource.			
Resource	**Signature**	**Date**	**Comments**
Heritage	/s/ Don Hann	(4/1/2011)	Site was reviewed on 3/9/2011. Heritage clearance has occurred, there are no avoidance areas within the project area.
Botany	/s/ Joe Rausch	(4/1/2011)	Botany surveys occurred on 3/12/2011, no sensitive plans were documented within the project area. Native plants were collected within the project eco-zone and propagated at Clarno nursery in 2009. native material is being utilized within the project. Project is consistent with Noxious weeds PDC's.
Wildlife	/s/ Clark Reams	(4/1/2011)	No concerns, outside the raptor breeding season and does not impact winter range.
Fish*	/s/ Steve Namitz	(4/1/2011)	Project is consistent with Aquatic Objectives and is consistent with ARBO II PDC's.
Hydrology*	/s/ Tom Friedrichsen	(4/1/2011)	Project is consistent with meeting Water Quality objectives, and is expected to restore hydrologic functions and watershed/riparian processes.
Range	/s/ Ernie Gipson	(4/1/2011)	No comment
Soils	/s/ Hersh McNeil	(4/1/2011)	No Comment
Recreation	/s/ Rob St. John	(4/1/2011)	No Comment
Lands and Special Uses	/s/ Stacia Kimbell	(4/1/2011)	Project does not impact lands and special uses.
Engineering	/s/ Holly Bentz	(4/1/2011)	No Comment
Fuels / Fire	/s/ Dana Skelly	(4/1/2011)	No Comment
Silviculture	/s/ Larry Amell	(4/1/2011)	No Comment

* 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: /s/ John Gubel; District Ranger BMRD Date: 4/1/2011

Aquatic Restoration EA and Decision Notice
2011: Malheur National Forest, Blue Mountain Ranger District

Activity 4 and 5, Riparian Planting within the Middle Camp Creek Exclosure.