

**Tinker Creek
Aquatic Restoration Checklist
USDA Forest Service
Blue Mountain Ranger District, Malheur National Forest
Grant County, Oregon**

Implementation Description

Project Information

Project Information
Category 2: Large Wood, Boulder, and Gravel Placement; including tree removal for large wood placement Category 3: Dam and Legacy Structure Removal Category 5: Off- and Side-Channel Habitat Restoration Category 6: Streambank Restoration Category 9: Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering Category 11: Road and Trail Erosion Control Category 14: Riparian Vegetative Planting Category 16: Beaver Habitat Restoration
Lead Preparer: Dan Armichardy and Lindsay Davies
Location: T12S-R32E, Section 5, East Fork Beech Creek 170702010802, Start -118.897, 44.55 decimal degrees, End -118.889, 44.558 decimal degrees. See Figure 1 for vicinity map.
Lease/ Case File/ Serial number: 01012021
Begin Date: 12/15/2020
Due Date: 2/28/2021

Please see <http://www.fs.usda.gov/detailfull/malheur/landmanagement/?cid=STELPRD3817723&width=full>.

Purpose and Need

The purpose of this project is to improve riparian and aquatic habitat, including critical habitat for threatened Middle Columbia River steelhead, and regionally sensitive interior redband trout and westslope cutthroat trout. There is a need to improve aquatic habitat in Tinker Creek to support all life stages of threatened steelhead populations and other aquatic species.

Currently, Tinker Creek is lacking habitat complexity. The stream channel has cut down through the wide valley bottom and is now confined in a narrow, inset floodplain. This channel incision caused a subsequent drop in the water table which resulted in a smaller riparian area and allowed lodgepole pine to encroach onto the historical floodplain. In addition, there is little to no instream wood in the creek.

Historical beaver presence is evident within the project area. At one time, beaver likely contributed to a diversity of stream habitats and a highly connected floodplain throughout the project area. Collectively, the channel incision, inset floodplain, lack of instream wood, and loss of beaver are impacting channel form, causing a reduction in pool habitat and water and sediment storage. These are important for high-

quality fish habitat, late season flows, and reducing stream energy. Instream large wood also serves as cover for fish, and influences water temperature and floodplain connectivity. Water temperature and instream large wood are important aquatic habitat features (riparian management objectives) identified in the Malheur Forest Plan, as amended by PACFISH (USDA and USDI 1995).

The current inset floodplain has a well-established sedge community; however, riparian shrubs are heavily browsed by wildlife and livestock, and banks have become over-widened in places due to trampling. The project area is within an active allotment with permitted livestock use. Currently the designated critical habitat is surrounded by electric fence to prevent access by ungulates. The electric fence is temporary to allow shrubs to reach above browse height and become seed sources for future shrubs. Because of the lack of shrubs and encroachment of lodgepole, access to the stream by livestock is readily available.

Downstream of the project area, the stream has become intermittent during low-flow periods (August through September). At the watershed scale, intermittent sections of Tinker Creek, East Fork Beech Creek, Clear Creek, and other tributaries within the watershed currently limit juvenile rearing capacity.

Increasing water storage for gradual release would improve the survival of rearing salmonids. With increased amounts of instream wood, this channel has the potential to become a rearing stream once again. Downstream flows could be sustained later into the season as restoration of the stream channel allows for capture and storage of sediment and water, as well as development of banks, braided channels, and a sedge community. Restoration work in the headwaters of Tinker Creek would be an initial step in recovering Tinker Creek and would carry improvements downstream to more degraded areas.

The desired conditions for the proposed treatment areas include improved (1) floodplain connectivity, (2) channel and habitat complexity, (3) stream temperatures, and (4) habitat to support viable populations of anadromous Middle Columbia River steelhead, resident fish, and beaver. The desired condition is a state that would provide ecological resiliency to disturbances such as climate change.

The desired condition of Tinker Creek within the identified area is to maintain or restore the diversity and complexity of wide valley features, ensuring the protection of the stream networks and aquatic key areas to which species, populations, and communities are uniquely adapted. Aquatic habitat would be maintained and managed in a manner that ensures viability and persistence of threatened and sensitive fish species within Tinker Creek.

Reaching the desired condition for Tinker Creek requires improvements in riparian vegetation, hardwood abundance, channel condition, and habitat complexity to enhance stream shade, valley floor and floodplain connectivity, channel complexity, and fish passage. There is a high potential for success in increasing rearing capacity of juvenile fish within Tinker Creek.

Land Use Plan Conformance

The project falls under management area 3B “Anadromous Riparian Areas” and management area 14 “Visual Corridors” of the Malheur National Forest Land and Resource Management Plan. The goal of management area 3B is to “Manage riparian areas to protect and enhance their value for wildlife, anadromous fish habitat and water quality... Design and conduct management in all riparian areas to maintain or improve water quality and beneficial uses.” The goal of management area 14 is to “Manage viewshed corridors with primary consideration given to their scenic quality and the growth of large diameter trees. Visual quality objectives of retention, partial retention, and modification will be applied while providing for other uses and resources.” (USDA Forest Service 1990)

Tinker Creek is within a category 1 riparian habitat conservation area (fish-bearing stream) as designated by PACFISH/INFISH¹, and contains designated critical habitat for Middle Columbia River steelhead by the National Marine Fisheries Service. Approximately 2.3 miles of Middle Columbia River steelhead critical habitat is designated on Tinker Creek from its confluence with East Fork Beech Creek upstream.

Proposed Action and Implementation Plan

To attain the desired conditions, the Forest Service is proposing the following actions: (1) channel and floodplain restoration (including tree tipping, jackstrawing, and wood placement in streams); (2) beaver habitat restoration (including installation of beaver dam analogs, wood placement or weaving, and tree planting); (3) culvert and roadbed removal and headcut repair (including removal of culverts, active road decommissioning, and headcut filling); and (4) concrete water gauging dam removal (including removal, haul, and disposal of dam). See Figure 2 for a map of proposed activities.

Heavy equipment use will facilitate some of these actions, as described in the Equipment section. The public will be notified as described in the Public Notice section. In-channel restoration would occur during the instream work window from July 15 to August 31, unless an instream work variance is granted.

Channel and Floodplain Restoration

Tree tipping and felling would primarily include lodgepole pine that are encroaching into the floodplain or western larch stands. Trees would either be tipped within the road prism or felled by hand with chainsaws, then placed within the ordinary high water mark of 0.67 miles of Tinker Creek using an excavator. Tree tipping and felling would follow a prescription determined by silviculture staff. No excavation or earth-moving would occur on the floodplain outside the road prism.

Placement of large or coarse wood is needed to restore floodplain connectivity and channel complexity, and move the streams towards PACFISH riparian management objectives. Jackstrawing² lodgepole over the stream channel and adjacent floodplain is anticipated to further reduce browse and allow riparian hardwoods and sedge communities to become established or expand. Bank integrity would also be restored. Wide depositional valley bottoms with deep fine topsoil that contain streams are highly susceptible to the impacts of ungulates. An electric fence would be used in conjunction with large wood additions to minimize livestock access to sensitive riparian areas until disturbed areas have recovered, in an estimated 3 years. After that time, use of electric fencing would be suspended so the efficacy of the jackstraw treatment can be evaluated. To meet objectives, recovered streambanks would need 80 percent deep-rooted riparian vegetation. If the jackstrawing does not prove an effective management tool to meet riparian management objectives, additional management options such as reinstalling the electric fencing, installing permanent wire or buck and pole fencing, or change in time of use would be explored. Approximately 5.7 acres are identified for tree tipping and thinning, mostly with chainsaws. Leave trees include western larch, ponderosa pine, and Douglas-fir. No more than 400 trees per stream mile would be placed within the channel following ARBO II (USDI FWS 2013) guidelines.

Beaver Habitat Restoration

Beaver dam analogues would be installed along approximately 0.38 miles of Tinker Creek and slash would be obtained from thinned lodgepole within proximity of installation sites. Lodgepole from 4 to 12 inches diameter at breast height would be felled and placed within and adjacent to beaver dam analogues. Lodgepole slash would be weaved or crushed between posts. Beaver dam analogues would be designed following guidelines from Low-tech Process-based Restoration of Riverscapes Design Manual (Wheaton

¹ USDA and USDI 1995 and USDA Forest Service 1995

² Jackstrawing is defined as a process where trees are strategically felled across each other to create a barrier.

et al. 2019) using slash from lodgepole felling and existing sedge plugs harvested from areas that would become inundated by the structure.

Willows would be woven into beaver dam analogues as they are built, then heavier planting of hardwood trees within dispositional areas would follow after the first spring (high flow event) following construction. Willow cuttings would also be placed in areas where roadbed and culverts are removed using bioengineering techniques for streambank stabilization (Hoag and Fripp 2002).

Culvert and Roadbed Removal and Headcut Repair

On National Forest System Road 3620000 (Figure 3), the existing culvert would be replaced with an aquatic organism passage culvert. This culvert replacement is already authorized under a signed 2019 Aquatic Restoration Decision checklist, but is discussed in this checklist because it will be implemented concurrently with the work described in this checklist, within the project area, and by the same contractor using the same equipment.

On National Forest System (closed) Road 3620646 (Figure 8 and Figure 9), the existing undersized culvert would be removed along with a small section of the roadbed to allow natural stream meander. The existing stream crossing would be hardened to continue use of the closed road as a recreation bike trail and livestock crossing. The earthen berm closing that road would be removed during implementation, then replaced once work is completed. If native rock material is present from either culvert or roadbed removal, excess can be hauled and used for the hardened crossing. If native rock is not present, rock meeting the requirements and specifications for ARBO II would be hauled in and placed.

Approximately 20 cubic yards of rock may be needed for the hardened crossing on the recreation bike trail and livestock crossing. The nearest rock pit (Four Corners) is located approximately 2.2 miles east of the project area, just off National Forest System Road 1800731, and is a potential alternate rock source.

A culvert on a decommissioned road would also be removed (Figure 11 through Figure 13). While this decommissioned road is no longer a part of the National Forest System, an undersized culvert was left in place after it was passively decommissioned. The culvert has become blocked, creating a complete barrier to fish passage, and forcing Tinker Creek to run over the roadbed, creating a headcut. The culvert and associated roadbed would be removed from the floodplain with equipment (active decommissioning) to allow natural meander of the stream. Tipped trees and roadbed fill material would be placed for use within the ordinary high-water mark to restore stream gradient in the headcut and where the roadbed was removed.

In all cases, work and excavation with equipment (including tree tipping) would occur within the existing road prism.

Concrete Water Gauging Dam removal

A concrete dam and associated wooden platform (Figure 4) would be removed using an excavator, hauled out, and disposed of by a 10-yard dump truck or similar equipment. Large woody debris would be placed along with coarse woody debris where the dam was removed to help reestablish the grade from upstream to downstream of where the dam had been.

Equipment

A tracked excavator and operator would be provided by Oregon Department of Fish and Wildlife as part of a Good Neighbor Authority agreement for wood placement, tree tipping, beaver dam analogue installation, roadbed and legacy berm (skid trail) removal, headcut filling, incised streambank grading, placement of legacy berm material to rebuild the channel, and concrete dam removal.

A 10-yard dump truck or similar equipment would be used to haul and dispose of removed culverts, as well as move rock for the hardened crossing on National Forest System (closed) Road 3620646 (livestock and recreation trail).

All equipment would be located onsite as part of the culvert replacement occurring on National Forest System Road 3620000.

Public Notice

A notice of road closure would be posted before the narrow blacktop section of National Forest System Road 3620000 to prevent campers and trailers from entering. An alternate route for Magone Lake would be available and signed to notify the public.

Project-Specific Design Criteria

- For all pieces of large woody debris installed within 500 feet upstream of a culvert or bridge, the length of each piece of large woody debris with a rootwad should be less than 50 percent of the effective culvert or bridge opening width (or less than 75 percent of the opening width if no rootwad is attached).
- Inform engineering staff when culverts have been removed and roadwork has been completed for reporting.
- Ensure Malheur National Forest road rules and maintenance specifications are followed for the project, especially if any equipment loads, unloads, or operates on open roads.
- Coordinate with timber staff to ensure culvert replacement does not inhibit the Coxie timber sale.
- A heritage monitor shall be present for the roadbed removal, tree tipping, and culvert activities.
- Notify, in a timely manner, the Pacific Northwest Research Station hydrologists that the concrete dam associated with the Range Evaluation Project – Tinker Creek monitoring site is scheduled for removal.
- This project is proposed upstream of the culvert replacement on Tinker Creek at National Forest System Road 3620000 authorized under the Blue Mountain Ranger District Fish Passage Restoration 2019 Checklist. Because it will be implemented concurrently with the work described in this checklist, within the project area, and by the same contractor using the same equipment, consideration shall be given to transitioning between the two project areas to minimize the possibility of unexpected impacts following intense storms, rapid snowmelt, or persistent spring or fall rains which are typically associated with runoff events on the Blue Mountain Ranger District.
- Where feasible under the previously completed checklist for Blue Mountain Ranger District Fish Passage Restoration 2019 Checklist, consider placing large or coarse woody debris jams upstream of the replacement culvert to mimic energy dissipation and water dispersal associated with historic jams.
- Where feasible, use proposed placement of coarse and large woody debris in this checklist to reinforce existing stream meandering or “nudge” additional meandering to broaden the meander belt, enhance the “well-established sedge community” within in the current inset floodplain, and promote recovery of over-widened stream banks, particularly in proximity to culvert and dam removals and headcut repairs.
- When removing the culvert on National Forest System closed road 3620646, fill shall be removed and hardening placed for the approximate width of the estimated, post-restoration meander band (e.g. amplitude of the meanders), approaches shall be ramped and both areas shall be hardened with appropriately sized and graded material. Adequate wood shall be selected and positioned downstream to trap sediment mobilized by post-activity stream adjustment in this stream segment.
 - This project design criteria, except for the hardening requirement, shall also apply at the location where removal of a culvert on a decommissioned road is proposed.

- Please report any material use from rock pits to minerals staff, both quantity and type of material.
- If previously unidentified improvements are discovered during project development or implementation, the improvement(s) shall be protected and potential disturbance activities will cease until the Forest Service can validate ownership and associated rights.
- The board of Eastern Oregon Trail Alliance should be informed about this project and provided a timeline of activity.
- During the work periods, Tinker Bell trail would need to be closed to public use. Signage shall be posted at trail access points in advance of the closure.
- Currently the project description states, “Disturbance of existing recreation trail by equipment would be minimized to the extent possible and any ruts or tracks would be smoothed out prior to project completion.” Off-road segments should be avoided completely, and on-road reparations should return the trail corridor to pre-project state.
- The beaver dam analogue complex should avoid inundating the roadbed or trail segments.
- Disturbance of existing recreation trail by equipment would be minimized to the extent possible and any ruts or tracks would be smoothed out prior to project completion.
- As special uses can change during project development, prior to project implementation, project leads shall verify special uses within the project vicinity and coordinate with the Lands Program Manager for applicable special use holder(s) project notification.
- All special use authorizations within planning areas shall be protected from project activities, when possible. If not feasible, the Forest Service shall work directly with affected special use permit holder(s) for resolution in accordance with permit terms.
- Best management practices should be used to reduce visual impacts, including:
 - Burn piles should be located to minimize visual impacts.
 - Slash should be removed within 1 year.
 - Stumps should be cut flush or close to the ground.
 - Trees should be marked on the side facing away from travel corridors.
- As with recreation, impacts resulting from the use of heavy equipment should be avoided or mitigated.
- Wildlife fencing should be designed with the district wildlife biologist prior to construction.

Figures

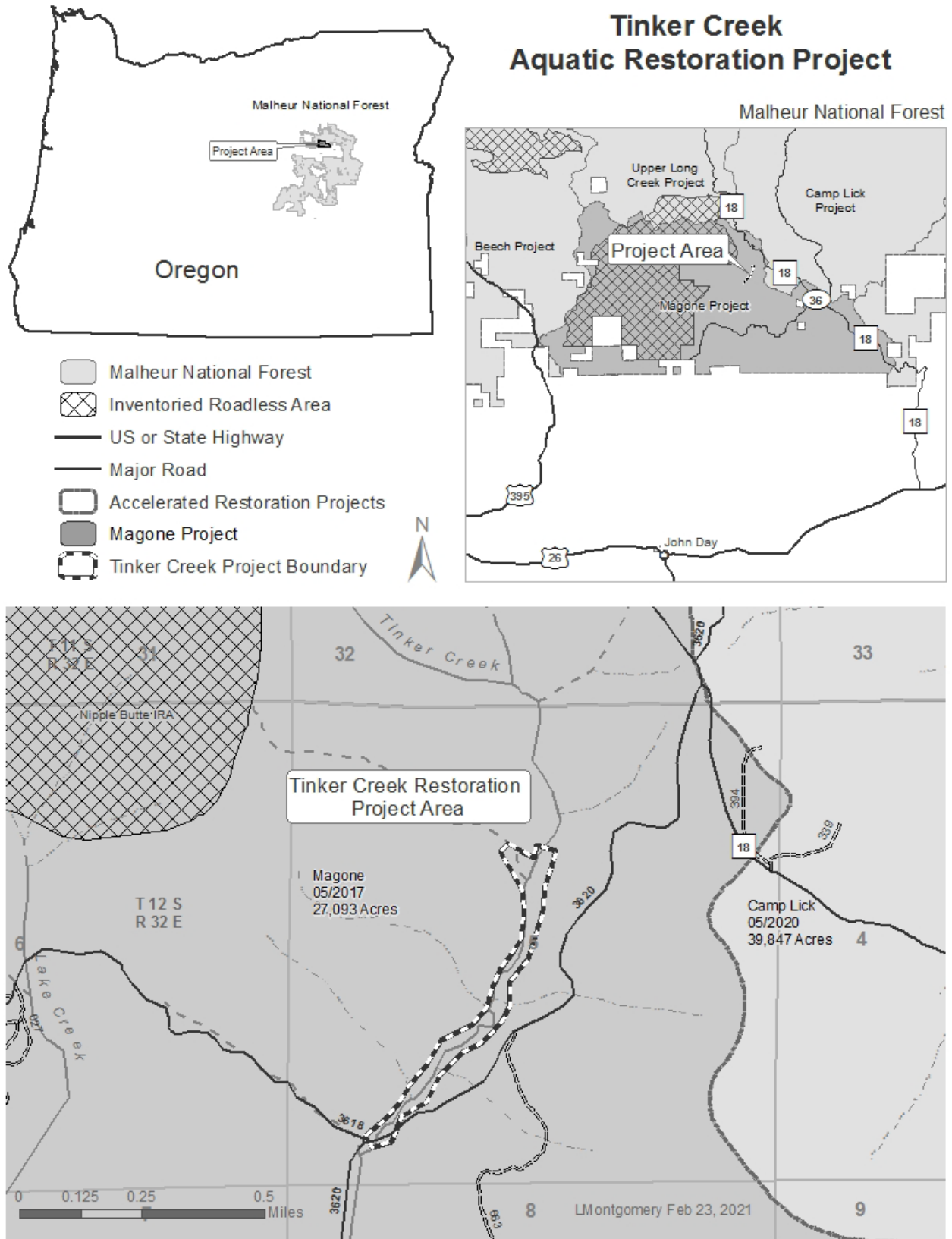


Figure 1. Tinker Creek vicinity map in relation to Oregon, the Malheur National Forest, and the Magone Project (2017)

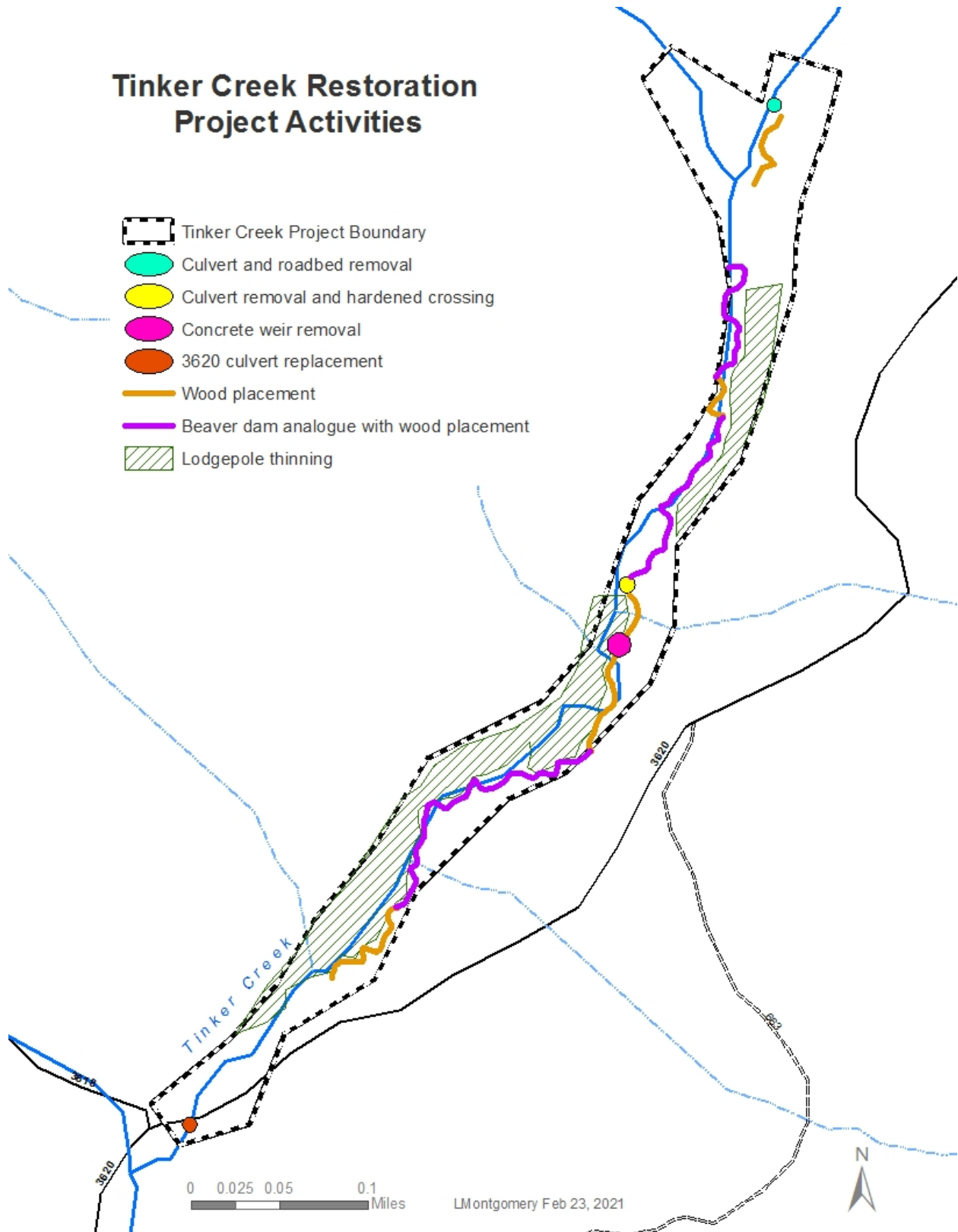


Figure 2. Map of the Tinker Creek project area aquatic restoration actions



Figure 3. National Forest System Road 3620000 aquatic organism passage culvert replacement (looking upstream) that will be completed under a 2019 Aquatic Restoration Decision checklist



Figure 4. Tinker Creek gauging station and associated wooden structure proposed for removal



Figure 5. General riparian conditions within 1 mile of proposed work area



Figure 6. General riparian conditions within 1 mile of proposed work area



Figure 7. General riparian conditions within 1 mile of proposed work area



Figure 8. Proposed National Forest System (closed) Road 3620646. Culvert removal looking upstream.



Figure 9. Proposed National Forest System (closed) Road 3620646. Culvert removal looking downstream.



Figure 10. Meadow at upstream end of project area, just below decommissioned road culvert



Figure 11. Decommissioned road crossing that needs to be removed from the Tinker Creek floodplain. Yellow dashed line highlights the old roadbed crossing the valley floor. The plugged culvert (complete fish passage barrier) and sediment delta are beyond the roadbed in the picture.



Figure 12. Headcut moving through decommissioned roadbed because of plugged culvert (current stream channel over roadbed).



Figure 13. Decommissioned roadbed with undersized culvert still in place (downstream side).

References

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Project Review

Malheur National Forest Aquatic Restoration Project NEPA Compliance and Implementation Checklist

Project Number: 01012021 **Date:** 12/30/2020 **Location:** Township 12 South, Range 32 East, Section 5, East Fork Beech Creek 170702010802, Start -118.897,44.55 DD, End -118.889,44.558 DD

Category: 2, 3, 5, 6, 9, 11, 14, 16

Project Description: See above

Heritage (to be completed by heritage specialist)

Y / N Initial

Y KW Specific PDC for heritage addressed (heritage surveys; avoidance areas).

Botany (to be completed by botany specialist)

Y / N Initial

Y JB Specific PDC for botany addressed (sensitive plant surveys).

Y JB Specific PDC for noxious weeds addressed.

Land Management Consistency (is the proposed project within the management area? Check yes or no. If yes, comments should indicate whether proposed actions are consistent with the standards for the management area.)

Y / N Initial

N BSP 4A big game winter range

N BSP 6A and 6B wilderness

N BSP 7 scenic area

N BSP 8 special interest areas

Y / N Initial

N BSP 9 research natural areas

N BSP 10 semi-primitive non-motorized recreation areas

N BSP 22/22A wild and scenic river

N BSP inventoried roadless areas

Comments: Closest wilderness area is the Strawberry Wilderness approximately 12.7 miles south of the project area. Closest research natural area is Dixie Butte approximately 12.8 miles east of the project area. Closest inventoried roadless area is Nipple Butte approximately 0.7 miles west of the project area.

I have reviewed this project and have determined it is compliant with the Malheur Forest Plan and Aquatic Restoration environmental assessment project design criteria identified for my resource.

Table 1. Projects design criteria and Malheur Forest Plan compliance checklist

Resource	Signature	Date	Comments (additional PDCs may be noted if necessary) *May continue on next page
Botany	<u>/s/ Jessi Brunson</u>	1/19/2021	No effect to sensitive species or habitat. Surveys conducted on Tinker Creek in 2015, and no known sensitive plants were documented in the project area.
Engineering	<u>/s/ Matthew Smith</u>	2/18/2021	For all pieces of large woody debris installed within 500 feet upstream of a culvert or bridge, the length of each piece of LWD with a rootwad should be less than 50% of the effective culvert or bridge opening width, and the length of each piece of LWD without a rootwad should be less than 75% of the effective culvert or bridge opening width. Inform Engineering when culverts have been removed and roadwork has been completed for INFRA reporting. Ensure Malheur road rules and maintenance specifications are followed for the project, especially if any equipment loads, unloads, or operates on open roads. Coordinate with timber to ensure AOP replacement does not inhibit Coxie Veg Project.

Resource	Signature	Date	Comments (additional PDCs may be noted if necessary) *May continue on next page
Fish*	<u>/s/ Dan Armichardy</u>	1/29/2021	Short term negative effect to MCR steelhead critical habitat with a long- term benefit. Adherence to ARBO II and MNF Aquatic EA PDCs would minimize effects.
Fuels / Fire	<u>/s/ Ed Clark</u>	1/4/2021	No effect to Fire/Fuels
Heritage	<u>/s/ Katee R. Withee</u>	2/2/2021	No effects to Historic Properties. Covered under R2018060401010 & R2019060401005. PDCs are required for implementation.
Hydrology*	<u>/s/ Mary L. Welby</u>	2/19/2021	See email to B. Parker on 2/19/21 for “Tinker Creek Aquatic Restoration Checklist – Project-Specific Watershed Project Design Criteria”
Invasive Plants	<u>/s/ Jessi Brunson</u>	1/19/2021	Canada thistle (<i>Cirsium arvense</i>) documented in project area. Follow included PDCs to mitigate potential effects. (See Project Design Criteria by Resource under Botany for Invasive Plant Species)
Lands	<u>/s/ Stacia Kimbell</u>	1/4/2021	No issues identified. If previously unidentified improvements are discovered during project development or implementation, the improvement(s) will be protected and potential disturbance activities will cease until the Forest Service can validate ownership and associated rights.
Mining	<u>/s/ Hannah Grist</u>	2/17/2021	No mine claims will be affected. Please report any material use from rock pits, both quantity and type of material.
Range	<u>/s/ Nick Stiner</u>	1/4/2021	Range is coordinating with aquatics on the aquatic restoration proposed. Permittee has been involved in proposal.
Recreation	<u>/s/ Jared Bowman</u>	2/2/2021	Please see comments submitted below this table.
Soils	<u>/s/ Robert C. McNeil</u>	2/12/2021	Dan Armichardy reports that soils are compacted in the vicinity of road crossings and existing roads. Also some individual skid trails are visible, and portions of tributary fans appear compacted. However, presumably these detrimental impacts are localized enough and have recovered enough that less than 10% of the activity area is detrimentally impacted. Three things indicate that this project would comply with Forest Plan soil protection standards: The existing condition described above; Compliance with "Soil Protection Guidance for Aquatic Restoration Projects Using Heavy Equipment Off Roads" (attached to a 4/4/18 e-mail from Tom Friedrichsen); Much of the excavator traffic would be on existing roadbeds.
Special Uses	<u>/s/ Stacia Kimbell</u>	1/4/2021	No effects to Lands Special Uses identified. As special uses can change during project development, prior to project implementation, project leads will verify special uses within the project vicinity. They shall coordinate with the Lands Program Manager for applicable special use holder(s) project notification. All special use authorizations within planning areas shall be protected from project activities, when possible. If not feasible, the Forest Service shall work directly with affected special use permit holder(s) for resolution in accordance to permit terms.
Silviculture	<u>/s/ Amanda Lindsay</u>	1/8/2021	Beneficial effect to forest vegetation. Follow the Tinker Creek Silviculture prescription for tipping and felling trees.
Visuals	<u>/s/ Jared Bowman</u>	2/2/2021	Please see comments submitted below this table.

Resource	Signature	Date	Comments (additional PDCs may be noted if necessary) *May continue on next page
Wildlife	<u>/s/ Colleen Malaney</u>	1/26/2021	No TES wildlife populations are expected to be impacted by this project. Some short term impacts, with long term benefits to habitat are expected as a result of this project. Wildlife fencing should be designed with the district wildlife biologist prior to construction. Wildlife Friendly Fencing Guidelines are available in the project record.

* 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.

Comments on Recreation and Visuals

General Comments on Recreation: This project will directly impact 0.75 miles of the Tinker Bell road-to-trail conversion hike and bike trail developed on the National Forest System Road 3620646. The goal of road-to-trail conversions is to decrease the wide road feel and establish a smaller, single-track corridor. A 24- to 36-inch trail corridor has been established directly on the roadbed or within 50 feet of the road on either side. Nearly all work on this new trail was conducted by volunteer groups, including Eastern Oregon Trail Alliance and Blue Mountain Land Trust. Additionally, Oregon Parks and Recreation has approved funding for sections of this trail system through a Recreational Trails Program grant.

- Heavy equipment use on the roadbed and adjacent areas has the potential to damage the trail tread, remove natural barriers placed to limit off-trail riding, broaden the visual corridor, and generally re-establish a road-like trail experience.
- The hardened crossing at National Forest System Road 3620646 is a viable solution for retaining trail passage. It has the potential to improve the biking experience. Impacts to the hiking experience will vary seasonally.

General Comments on Visuals: This project will directly impact visual foreground (sensitivity level 2) associated with the Magone Lake Recreation Area and County Road 18. Magone Lake Recreation Area is one of the Forest’s highest use and priority sites. According to the Malheur Forest Plan (as amended), the foreground areas are to have partial retention and the visual condition can be moderately altered. No viewshed corridor plan is known to exist for this area.

Table 2. Disclosure of the level of impacts to recreation and visual resources by activities.

ACTION	Recreation Impact	Visuals Impact
Heavy Equipment Use [General]	High	Moderate to Low
Culvert Replacement (NFS road 3620000)	Limited or none	Limited or none
Culvert Removal with Crossing Hardening (NFS road 3620646)	Moderate	Limited
Culvert and Roadbed Removal (decommissioned road)	Limited or none	Limited or none
Concrete Weir Removal	Limited or none	Limited or none
Lodgepole Thinning: Unit 1	Limited	Moderate
Lodgepole Thinning: Unit 2	Limited	Moderate
Focus Area: Beaver Dam Analogue Complex	Limited or none	Limited
Focus Area: Wood Placement	Limited or none	Limited

District Environmental Coordinator: /s/ Bethany Parker Date: 2/22/2021

Line Officer Signature: /s/ Robert Foxworth Date: 2/26/2021

Appendix to the Aquatic Restoration EA

Implementation Description

Project name: Tinker Creek

Project number: 01012021

Category 2: Large Wood, Boulder, and Gravel Placement; including tree removal for large wood placement

Category 3: Dam and Legacy Structure Removal

Category 5: Off- and Side-Channel Habitat Restoration

Category 6: Streambank Restoration

Category 9: Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering

Category 11: Road and Trail Erosion Control

Category 14: Riparian Vegetative Planting

Category 16: Beaver Habitat Restoration

The following information will guide actions for this project that is taking place within the bounds of the Decision Notice for the 2014 Malheur National Forest Aquatic Restoration Environmental Analysis to maintain that all conservation measures, guidelines, and project design criteria are met under this guiding document.

Much of the information below is reproduced from the Decision Notice for Aquatic Restoration Project Appendix A (pages 7 through 44), and may cite project design criteria (PDC) numbers, literature, or other documents not referenced further in this proposal document. Please refer to the Decision Notice for more information.

Program Administration

1. Integration of project design criteria and conservation measures and terms and conditions into project design and contract language
 - a. This document is to outline the conservation measures and PDCs that will be used during project implementation to remain compliant with the aquatic restoration biological assessment as well as ARBO II.
2. Project notification: The following information will be provided to the National Marine Fisheries Service (NMFS) Level 1 aquatics members 30 days prior to implementation as a Project Notification Form 7.
 - a. Action identifier – 01012021
 - b. Project name – Tinker Creek
 - c. Location – Township 12 South, Range 32 East, Section 5, Start -118.897,44.55DD, End - 118.889,44.558 DD

Table 3. Project Location

Stream name	Tinker Creek
6th field HUC	EF Beech Creek 170702010802
Latitude (decimal degrees)	See above
Longitude (decimal degrees)	See above

- d. Agency contact – Dan Armichardy, Daniel.armichardy@usda.gov
- e. Timing – Start date: 6/15/2021 End date: 8/31/2021
- f. Activity category –

Category 2: Large Wood, Boulder, and Gravel Placement; including tree removal for large wood placement

Category 3: Dam and Legacy Structure Removal

Category 5: Off- and Side-Channel Habitat Restoration

Category 6: Streambank Restoration

Category 9: Livestock Fencing, Stream Crossings and Off-Channel Livestock Watering

Category 11: Road and Trail Erosion Control

Category 14: Riparian Vegetative Planting

Category 16: Beaver Habitat Restoration

- g. Project description – Project description is available in the Proposed Action and Implementation Plan section above.
 - h. Species affected –
 - i. Listed species: Mid-Columbia River Steelhead, Interior Redband Trout, Westslope Cutthroat Trout
 - ii. Critical Habitat: Yes
 - iii. MIS Species: Yes
 - i. Date of submittal – To be completed prior to March of 2021, and at least 30 day prior to implementation
 - j. Site assessments – Assessment for contaminants is not required at these locations.
 - k. Review – NMFS fish passage review and Restoration Review Team review are not required.
3. Minor Variance: No variances are proposed for this project.
 4. NMFS Fish Passage Review and Approval: This work does not require review by the NFMS level 1 team member.
 5. Restoration Review Team: This work does not require review by the restoration review team.
 6. Project Completion Report: To be completed after implementation
 7. Annual Program Report: This project would be completed within 1 year, completion and annual reporting would occur in the winter of FY21 before February 15th.

General Aquatic Conservation Measures

1. **Technical skill and planning requirements:**
 - a. An appropriately qualified fisheries biologist or hydrologist will be involved in the design of this project.
 - b. The scope of this project is limited in both space and context. Field evaluations and site-specific surveys will require little work. Appropriate time will be allotted for these actions, prior to implementation. Planning and design will involve appropriate expertise.
 - c. The assigned fisheries biologist or hydrologist will make sure that any applicable conservation measures and project design criteria are met through the contracting process.
2. **Climate change:** due to the small scale of this work, future climate changes impacts will not have dramatic effects on this work
3. **In-water work period:** Instream activities will occur between July 15th and August 31st.
4. **Fish passage:** Not applicable.
5. **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 greater than 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 site.
6. **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 (for example, 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.
7. **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, 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 (for example, large wood, boulders, and 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.
8. **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 (for example, minimally-sized, low pressure tires, minimal hard turn paths for tracked vehicles, or 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 (for example, generators and canes), and gas-powered equipment with tanks larger than 5 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.
9. **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 percent 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 Bureau of Land Management (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.
10. **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 (WDFW) 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.
11. **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; and 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 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 less than 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 Endangered Species Act (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 percent 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 cubic feet per second (cfs). NMFS approved fish screens have the following specifications: (1) 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 (2) a round or square screen mesh that is no larger than 2.38 mm (0.094 inches) in the narrow dimension, or any other shape that is no larger than 1.75 mm (0.069 inches) in the narrow dimension.

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

Applicable Project Design Criteria

Project Design Criteria for Aquatic Restoration Activity Categories

2. Large Wood, Boulder, and Gravel Placement

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 mimics 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 1.5 times bankfull channel width, while logs without rootwads should be a minimum of 2.0 times 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 (less than 12) an additional 60 percent 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 greater than 25 percent 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.

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 1995b and USDA and USDI 1994b) riparian habitat conservation areas (RHCA), and upland areas (for example, 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

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 (for example, drop structure, gabion, and 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, bulldozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

- c. **Removal of legacy structures:** This action includes the removal of past projects, such as large wood, boulder, rock gabions, and other in-channel and floodplain structures.
- d. If the structure being removed contains material (large wood, boulders, concrete, etc.) not typically found within the stream or floodplain at that site, remove material from the 100-year floodplain.
- e. If the structure being removed contains material (for example, large wood or 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.

5. Off- and Side-Channel Habitat Restoration

Off- and side-channel habitat restoration projects will be implemented to reconnect historical 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, bulldozers, 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 greater than 20 percent of the bankfull flow, 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 (less than 10 percent of volume) of naturally accumulated sediment within historical channels. There is no limit as to the amount of excavation of anthropogenic fill within historical 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

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, bulldozers, 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.

9. Livestock Watering Facilities

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, bulldozers, 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 (for example, 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 (for example, 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 (for example, 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 or 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.

11. Road and Trail Erosion Control

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

14. Riparian Vegetation Planting

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, rush mats, or both; and 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 floodplains), or where such plants are abundant.
- d. Sedge and rush mats should be sized to prevent their movement during high flow events.
- e. Concentrate plantings above the bankfull elevation.
- f. Removal of native and non-native vegetation that will compete with plantings is permitted.
- g. Exclosure fencing to prevent utilization of plantings by deer, elk, and livestock is permitted.

16. Beaver Habitat Restoration

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 (for example, aspen, willow, alder, and cottonwood) associated with quality beaver habitat, follow project design criteria in the *Riparian Vegetation Treatment (controlled burning) b. Noncommercial thinning associated with Moderate-severity burns* category.

Project Design Criteria by Resource

Fisheries and Hydrology

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

Additional Aquatic project design criteria were developed for the following elements: tree tipping and felling, juniper treatments, tree hauling, and prescribed burning.

General For Inside Riparian Habitat Conservation Areas

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

Tree Tipping and Tree Felling for Large Wood Projects

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

Table 4. Primary shade zone width slope distance (feet), based on adjacent hillslope (percent)

Hillslope less than 30 percent	Hillslope 30 to 60 percent	Hillslope greater than 30 percent
50 feet	55 feet	60 feet

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

- The trees are located on a south facing slope (175 to 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 percent 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 5. Bankfull widths and minimum diameter of logs to be considered key pieces

Bankfull width* (in feet)	Minimum diameter* (inches)
0 to 10	10
10 to 20	16

Bankfull width* (in feet)	Minimum diameter* (inches)
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 1 1/2 times (1.5 times) the bankfull or a log without a rootwad should be twice (2 times) the length of the stream's bankfull width. As the best fish habitat is formed around jams composed of three to seven logs, at least two 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).

Tree and Boulder Hauling

- Apply mitigation and best management practices for dust abatement (water, lignosulfonate, calcium, and magnesium chlorides) dry conditions, and erosion control as directed by physical scientist or road engineer (see road maintenance project design criteria #6 for application).
 - ♦ Haul on gravel and native-surface roads will be limited to dry conditions.

Haul Restrictions to Prevent Fine Sediment Delivery to Streams

- Haul or maintenance is permitted on roads under the following conditions:
 - ♦ During haul, weather conditions are monitored daily for the chance of precipitation by the hydrologist or fish biologist.
 - ♦ No rutting of the road surface is occurring, indicating the subsurface is wet.
 - ♦ Frozen ground conditions.
 - ♦ Haul will cease at any time when the travelway of the road is wet and turbid water or fines are observed moving off the road surface to ditchlines that deliver to stream channels regardless of time of year.

Roads Exempt from Haul Restrictions Include (Due to No Mechanism for Sediment Delivery):

- Paved roads
- Surfaced Ridge top roads
- Surfaced outloped roads with no ditch or stream crossings

Prescribed Burning and Related Activities

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

For Perennial and Fish-Bearing Stream Channels:

- Avoid removing trees along stream banks (for example, don't cause bank instability or increase erosion).
- Within primary shade zone retain 100 percent of the overstory canopy closure with the exception of hardwood treatment.
- For intermittent, non-fish-bearing stream channels:
 - ◆ Within 50 feet of the stream channel backing fire is preferred.
- For the maintenance and use of water sources and draft sites:
 - ◆ Minimize disturbance of existing riparian vegetation to the greatest extent practical; in particular, maintain shade, bank stability, and large woody material recruitment potential.
 - ◆ Use sediment control measures such as straw bales, filter cloth, or sediment fences when conditions warrant.
 - ◆ Maximize maintenance activities during late summer and early fall to best avoid wet conditions.
 - ◆ Do not pump from streams that do not have continuous surface flow. When pumping water in all situations from streams, ensure that at least one-half of the original streamflow remains below the pump site.
 - ◆ Refuel power equipment, or use absorbent pads for immobile equipment, and prepare concrete at least 150 feet (or as far as possible from the water body where local site conditions do not allow a 150 foot setback) from water bodies to prevent direct delivery of contaminants into associated water bodies.
 - ◆ Fisheries, hydrology or other qualified personnel must work with engineering/fire personnel to review proposed activities to minimize potential effects to fish, stream channel conditions, and water quality.
 - ◆ Use and develop off-channel ponds outside of stream channels were feasible and appropriate. Work with fire folks to prioritize and decommission unnecessary instream 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 (for example, great gray owl).
- Any snags in riparian areas or uplands will be protected from disturbance, removal, or use instream 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.

Fence Design

Fences are one tool often used to protect critical fish habitat from impacts caused by livestock. Those miles of fence protecting critical fish habitats can also create hazards and barriers for wildlife, from big game to birds. By tailoring fence design and placement, injuries to wildlife and damage to fence can be reduced. Fencing should allow relatively easy passage for animals to jump over or crawl under and be highly visible for both ungulates and birds. The following field tested design recommendation have been shown to control livestock in most situations and allow for easier wildlife passage. These design modifications shall be used for barb wire fence construction to reduce wildlife injuries and decrease damage to fences:

Construction.

- Prior to fence construction range, wildlife and aquatics will conduct a field visit to identify the most appropriate location and passage modification to allow for wildlife passage. Wildlife friendly wire spacing, materials, and other specifications shall be planned for and implemented regardless of the implementation mechanism.
 - A top wire or rail preferably no more than 40” above the ground and absolutely no more than 42”. This should include adjustments for slope.
 - Minimum of 12” between the top two wires.
 - At least 18” between the bottom wire or rail and the ground
 - Smooth wire (double twisted) or rail for the top and smooth wire on bottom. When top wire is barbed second from top wire should be constructed with smooth wire.
 - If stays are necessary wooden, stiff plastic or composite stays will be used. No metal stays or other material that can easily bend and cause three-dimensional hazard shall be used.
 - T-posts at 16.5-foot intervals
 - When possible reduce the number of wires to three. No more than 4 wires shall be used without consulting District Wildlife Biologist.
 - Remove old fences that are in disrepair or no longer in use or functioning. Bale and carry away wire and dispose or recycle properly.
 - Wildlife friendly spacing specifications will be maintained during maintenance over the life of the fence.
- The following additional passage modification shall be used around riparian habitats, water holes, stream corridors, and other high quality habitats:

- Install gates, drop downs and/or drop down rails, adjustable wire fence, lay-down fence, elk jumps or other passages modifications preferably where wildlife concentrate and cross (i.e. trails, known migration routes etc.). Passage modifications will be at placed at minimum of every .25 miles.
 - When adjustable wire fence or lay-down fence is used to create wildlife passage sections will be a minimum of 33 feet in length.
- If enclosure is less than .25 miles, one or more passage modification will be used to allow wildlife passage in and out of enclosure. Passages shall be place directly opposite one another on each side of enclosure.
- Jumps, drop downs or other modifications should not be placed under trees or brush that would make modification unpassable by big game or antelope.
- PVC modification on top and/or bottom wire for big game and pronghorn passage should also be considered.
- Modifications to increase visibility (i.e. high-vis/white ploy-coated wire, markers) should be considered in these important habitats for birds and other wildlife species.
- When possible fence should be constructed entirely of smooth wire around riparian habitats and stream corridors.
- Fence placement will be sited on the ground outside the channel migration zone.
- The following passage modification shall be used around areas where wildlife are known to move or migrate and along swales, gullies ridges:
 - Install gates, drop downs and/or drop down rails, adjustable wire fence, or other passages modifications preferably where wildlife concentrate and cross (i.e. trails, migration routes etc.).
 - If areas of wildlife use are not obvious or known, crossing will be placed at a minimum every .25 miles. If fence is less than .25 miles in length pre side, one or more passage modification will be used to allow wildlife passage in and out of enclosure.
 - Lay-down fence should be considered and let down when pasture is not in use by cattle
- The following passage modification shall be used to adjust for slopes or along ditches or roads edges that increase fence height above 42” for more than .25 consecutive miles:
 - On steep slopes top wire height should be adjusted to account for slope. (Figure 2)
 - Install jumps, dropdowns or other passage modifications at minimum every .25 miles preferably where wildlife concentrate and crosses.
 - Where possible lay-down fence or adjustable wire fence design should be considered on terrain with steep slopes over longer distances. This will allow for easy passage for wildlife during migration periods when livestock are not present.
 - Adjustable wire design; drop the top wire to the level of the second wire, either in sections or along an entire run of fence, to allow wildlife to jump over easily. Raise the lowest wire in the same way to help wildlife crawl under.
- Fence will be let-down, adjusted and gates secured open by permittee as part of their permit conditions when livestock are not present and put up or shut each year before livestock are turned out.
- Flag newly constructed fence in known wildlife migration corridors immediately after construction to protect fence until wildlife and livestock become accustomed to the new barrier
- All modifications shall have a GPS point taken and shared with wildlife following construction for effectiveness monitoring.
- If construction will occur through FS contracting or agreement with partner a district wildlife biologist shall review the final contract specifications prior to solicitation of the bid.

- Fence be constructed of high quality materials to reduce sagging and broken wires that create hazards for wildlife and livestock and to reduce time and costs associated with maintenance. The following fence materials are recommended:
 - Wire
 - Will be new
 - Consists of 2 twisted strands of 12.5-gauge steel wire with Class 3 galvanizing and minimum tensile strength of 170,000 PSI.
 - Fasteners
 - Staples should be 9 gauge or heavier galvanized, or stainless steel, with a minimum length of 1 inch for close grained hardwoods.
 - Staples shall be driven diagonally to the wood's grain at a slight downward angle, (upward if pull is up) to avoid splitting the post and loosening of the staples.
 - Space should be left between the inside crown of the staple and post to permit free movement of high tensile barbed wire.
 - Barbed staples shall be used for wooden posts.
 - Manufacturer's clips or 14-gauge Class 3 galvanized fasteners.
 - Steel Posts
 - Steel line posts shall have the standard "T" section, nominal dimensions of 1 3/8 inches by 1 3/8 inches by 1/8 inch with anchor plate
 - The posts shall be rolled from high carbon steel, weigh at least 1.33 pounds per foot of length and shall be painted with a weather resistant paint for steel, enameled and baked, or hot-dip galvanized (best)
 - Posts should be studded to aid in wire attachment.

Maintenance.

- Annual inspection and maintenance should occur to identify and correct sagging and broken wires that create unnatural manmade hazards for wildlife and livestock. Additionally, regular scheduled maintenance reduced cost of maintaining structure over the long term and improves integrity and success of reaching management goals identified during fence proposal.
 - Maintenance responsibility and objectives to be met prior to removal shall be identified and documented in project record prior to construction of fence.

Passage Modification

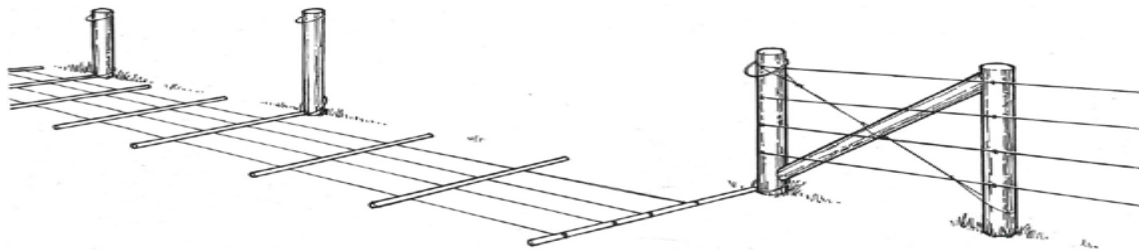


Figure 1. Lay-Down modification allowing passage for wildlife where and when livestock are not present.

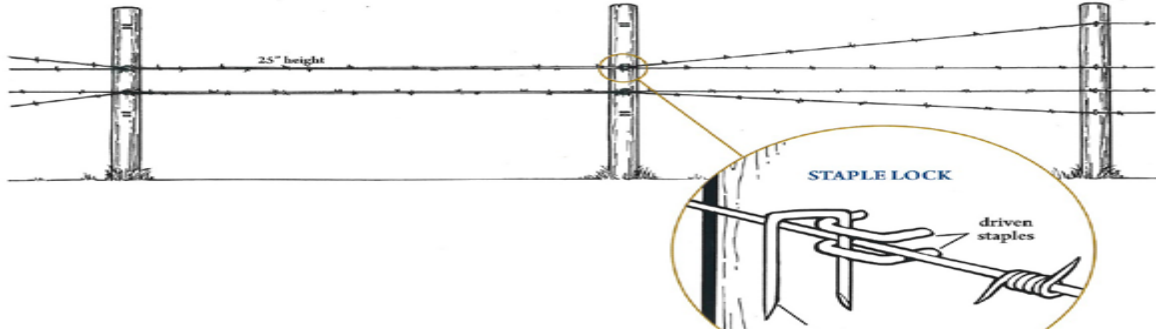


Figure 2. Adjustable fence to allow for wildlife passage around high quality habitats, on steep slopes, swales, gullies, ridges and/or when livestock are not present.

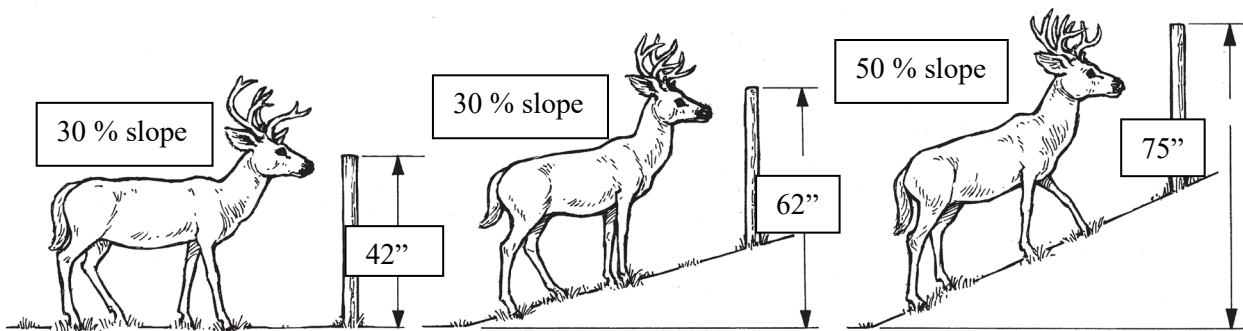


Figure 3. Influence of slope on fence height.

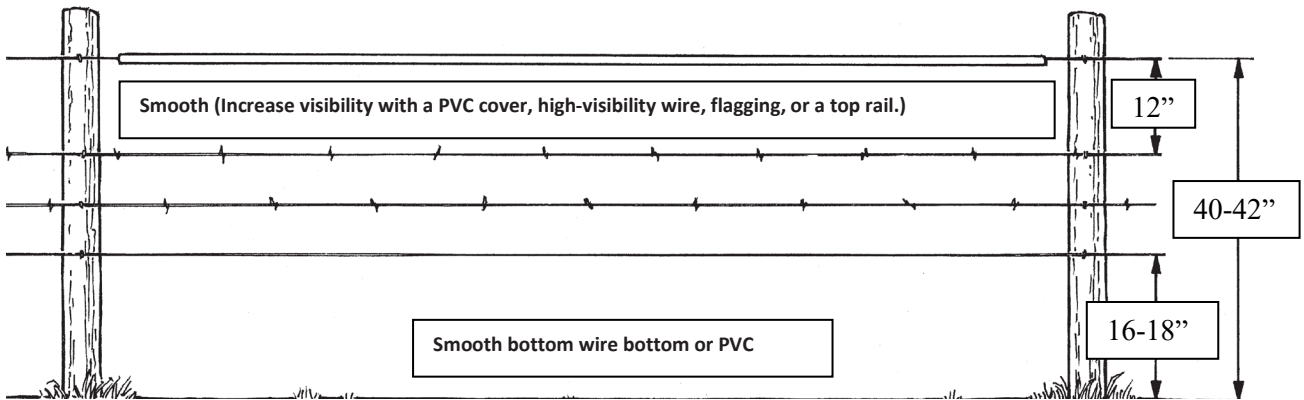


Figure 4. Wire fence with wildlife friendly fencing specifications (flat ground).

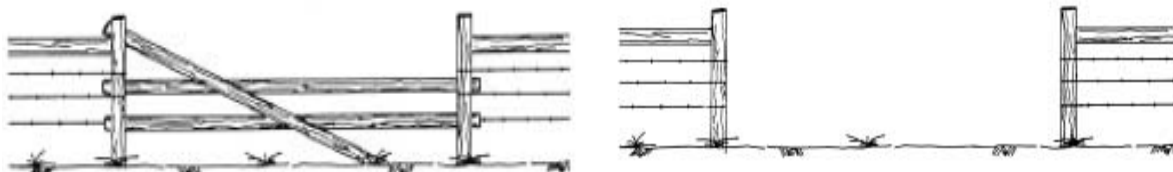


Figure 5. Wildlife jump or gates made of corral poles stacked parallel to the ground. Vertical poles should not be less than 12’ apart. One or more poles can be removed to allow for easy passage.

Fastening Mechanisms for Adjustable Wire Fence

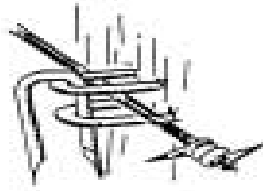


Figure 6. Staple lock. Simple and effective on wood posts. Holds wire tight if standard fence staples are used.



Figure 8. Metal Clip. Excellent on either wood or steel posts. Easy to install, no maintenance and allows fastest wire adjustment. Existing fences easy to modify with this clip. Variations of clip available for both adjustable and/or lay-down fence modifications

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 feet from all operational activities where topography does not restrict such a distance. Sensitive plant sites and associated buffers shall be identified as areas to protect.

Sensitive and Unique Habitats

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

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

Groundwater-Dependent Ecosystems

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

Invasive Plant Species

- **Pre-Implementation:** Proposed restoration projects shall be surveyed for invasive plants early in the implementation planning process by a qualified invasive plant specialist /technician, to identify and assess any undocumented invasive plant infestation.
- **Pre-Implementation:** For project areas that overlap or are adjacent to invasive plant infestations, assure that there is sufficient time prior to develop a long-term site strategy for control, eradication, and revegetation of the site. This shall be accomplished by a qualified invasive plant specialist in collaboration with the interdisciplinary team and other stakeholders.
- All activities shall be conducted in a manner as to minimize or prevent the potential spread or establishment of invasive species.
- Actions conducted on National Forest System Lands that will operate outside the limits of the road prism, require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering the Malheur 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 or mulch is not available, individual national 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, 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 (for example, 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 or not economically feasible, and (4) in permanently altered plant communities.
- Under no circumstances shall non-native invasive plant species 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 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 National Forest or moderate on the Ochoco National Forest, 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 (see section, above) 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 (SHPO) 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 (6 feet either side of fence), trails, other developments and access to them would be cleared of slash produced by project activities.

Aspen Restoration

- New aspen enclosure fences would have gates installed in proper locations to allow for removal of stray livestock. Aspen fences would be maintained each year and repaired whenever necessary. Plans for aspen enclosures will define when restoration of the protected stand has been achieved and who has responsibility for maintenance of the structure. When fences are no longer needed, aspen fences should be removed.
- Alternate livestock water sources to those being used in aspen stands would be developed off-site before fencing aspen or re-evaluate fencing of the aspen site. Coordinate with range specialist and permittee.

Notification

- During the 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.

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