Forest Aquatic Restoration Project
NEPA Compliance and Implementation Checklist

Summit & Bosenberg Subwatersheds Road Restorations

Project Number: 0404-2019 **Date:** 04/18/2018 **Location:** See implementation plan
Category: Category 1 fish passage restoration; Category 2 large wood, boulder and gravel; Category 11 road and trail erosion control; Category 14 riparian vegetation planting.
Project Description: Roads Restoration – road decommissioning (see implementation plan)

Heritage (to be completed by heritage specialist)

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

Botany (to be completed by botany specialist)

Y	N	Initial	
☑	☐	AH	Specific PDC for Botany addressed (Sensitive Plant Surveys).
☐	☐	AH	Specific PDC for Nox. Weeds addressed.

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

Y	N	Initial		Y	N	Initial	
☐	☒	RH	4A Big Game Winter range	☐	☒	gwo	9 Research Natural Areas
☐	☒	gwo	6A & 6BWilderness	☐	☒	gwo	10 Semi-Primitive Non-Motorized Recreation Areas
☐	☒	gwo	7 Scenic Area	☒	☐	gwo	22/22A Wild and Scenic River
☐	☒	gwo	8 Special Interest Areas	☐	☒	gwo	Inventoried Roadless Areas

Comments:

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

I have reviewed this project and have determined it is compliant with the Forest Plan and Aquatic EA Project Design Criteria identified for my resource.			
Resource	**Signature**	**Date**	**Comments** (additional PDCs may be noted if necessary)
Heritage	Robert Dickerson	5/1/2018	NO GROUND DISTURBANCE TO OCCUR PRIOR TO RECEIVING SECTION 106/SHPO CONCURRENCE. PLEASE INCLUDE HERITAGE IN PROJECT IMPLEMENTATION/DESIGN.
Botany		11/14/2018	No effect, No Sensitive species observed
Invasive Plants		11/14/2018	Follow PDCs
Wildlife		4/24/2018	No additional PDCs ~~necessary~~ Please include wildlife on any large trees used for stor
Fish*		04/18/2018	
Hydrology*	Hazel Owens	5/1/18	
Range		5/2/18	
Soils	Ruby K. Mitchell	12-4-19	SEE ATTACHED MESSAGES
Recreation		5/8/18	Dispersed campsites exist on these roads in places. Be prepared for public backlash. ~~Also impacts to designated snowmobile trails.~~ Please consider continuity.
Special Uses		11/19/18	No Lands SUPs identified
Lands		11/19/18	No known concerns.
Mining		11/30/18	No mine claims will be affected.
Engineering		11/28/18	Follow Engineering marke up.
Fuels / Fire		5/2/18	No Effect
Silviculture		5/2/18	No Known Effect

* Ensure that an experienced fisheries biologist or hydrologist is involved in the design of all projects covered by Aquatic Restoration Biological Opinion II. The experience should be commensurate with technical requirements of a project.

District Environmental Coordinator: _____ Date: 6/18/2019

Line Officer Signature: _____ Date: 6/18/19

Forest Aquatic Restoration Project
NEPA Compliance and Implementation Checklist

Summit & Bosenberg Subwatersheds Road Restorations

Project Number: 0405-2019 **Date:** 04/18/2018 **Location:** See implementation plan
Category: Category 1 fish passage restoration; Category 2 large wood, boulder and gravel; Category 11 road and trail erosion control; Category 14 riparian vegetation planting.
Project Description: Roads Restoration – Aquatic organism passage improvements (see implementation plan)

Heritage (to be completed by heritage specialist)

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

Botany (to be completed by botany specialist)

Y	N	Initial	
☒	☐		Specific PDC for Botany addressed (Sensitive Plant Surveys).
☒	☐		Specific PDC for Nox. Weeds addressed.

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

Y	N	Initial		Y	N	Initial	
☐	☒	RH	4A Big Game Winter range	☐	☒		9 Research Natural Areas
☐	☒		6A & 6BWilderness	☐	☒		10 Semi-Primitive Non-Motorized Recreation Areas
☐	☒		7 Scenic Area	☒	☐		22/22A Wild and Scenic River
☐	☒		8 Special Interest Areas	☐	☒		Inventoried Roadless Areas

Comments:

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

I have reviewed this project and have determined it is compliant with the Forest Plan and Aquatic EA Project Design Criteria identified for my resource.			
Resource	**Signature**	**Date**	**Comments** (additional PDCs may be noted if necessary)
Heritage		5/1/18	NO GROUND DISTURBING TO occur PRIOR TO SECTION 106 / SHPO CONCURRENCE. PLEASE INCLUDE HERITAGE WHEN DESIGNING PROJECT IMPLEMENTATION.
Botany		11/14/18	NO SENSITIVES, NO effect
Invasive Plants		11/14/18	Follow PDCs, INVASIVES do occur along roads
Wildlife		4/20/2018	some culverts are ingress-out area, no overlap whin-stream window identified
Fish*		04/18/2018	
Hydrology*		5/1/18	
Range		5/2/18	all fences will be repaired or replaced if damaged
Soils		5-2-18	LITTLE HEAVY EQUIPMENT OFF ROAD PRISM.
Recreation		5/8/18	Replacing culverts will have limited impacts to recreational use; temporary.
Special Uses		11/19/18	No lands, SUPs identified.
Lands		11/19/18	NO known concerns.
Mining		11/30/18	NO mine claims will be affected.
Engineering		11/28/18	Follow Engineering Review write up.
Fuels / Fire		5/2/18	No Effect
Silviculture		5/2/18	No Known Effect

* Ensure that an experienced fisheries biologist or hydrologist is involved in the design of all projects covered by Aquatic Restoration Biological Opinion II. The experience should be commensurate with technical requirements of a project.

District Environmental Coordinator: _____ Date: 6/18/2019

Line Officer Signature: _____ Date: 6/18/19

Implementation Description:

Summit and Bosenberg subwatersheds aquatic restoration projects
Roads restoration

Category 1 – Fish Passage Restoration Category 2 – Large Wood, Boulder, and Gravel Category 11 – Road and Trail Erosion Control Category 14 – Riparian Vegetation Planting	Lead Preparer: Hazel Owens / Jeffrey V. Ojala
Applicant: Prairie City Aquatics	NEPA Reference: Decision notice for Aquatic Restoration Project
Location: See Table 1 below for project specific location information. See also Figure 1 below for project area general location within the forest	Lease/ /Case File/ Serial #: na (Reference #):na
Begin Date: 02/26/2018	Due Date: Checklist for each implementation year to be signed by April 15 to ensure implementation during the field season (June-September)

NOTE REGARDING IMPLEMENTATION PLANS AND CHECKLISTS

This implementation plan is part of a larger landscape level implementation plan associated with the Summit and Bosenberg-Malheur River subwatersheds. This larger document is on record at the PCRD office and will be updated as project details and funding are identified over the next five-ten years. For ease of analysis, implementation plans are broken out by project type and/or anticipated implementation windows.

This implementation plan is associated with the following checklist(s):

- ***0401-2019 (roads decommission)***
- ***0402-2019 (AOP improvements)***
- ***0403-2019 (railroad grade improvements)***

This implementation plan describes 3 project types, all associated with roads work in the Summit and Bosenberg subwatersheds. Checklists were managed separately so as to isolate analysis issues for each separate checklist. Checklists will be uploaded to the web separately, as appropriate and based on readiness for implementation.

Purpose/Need:

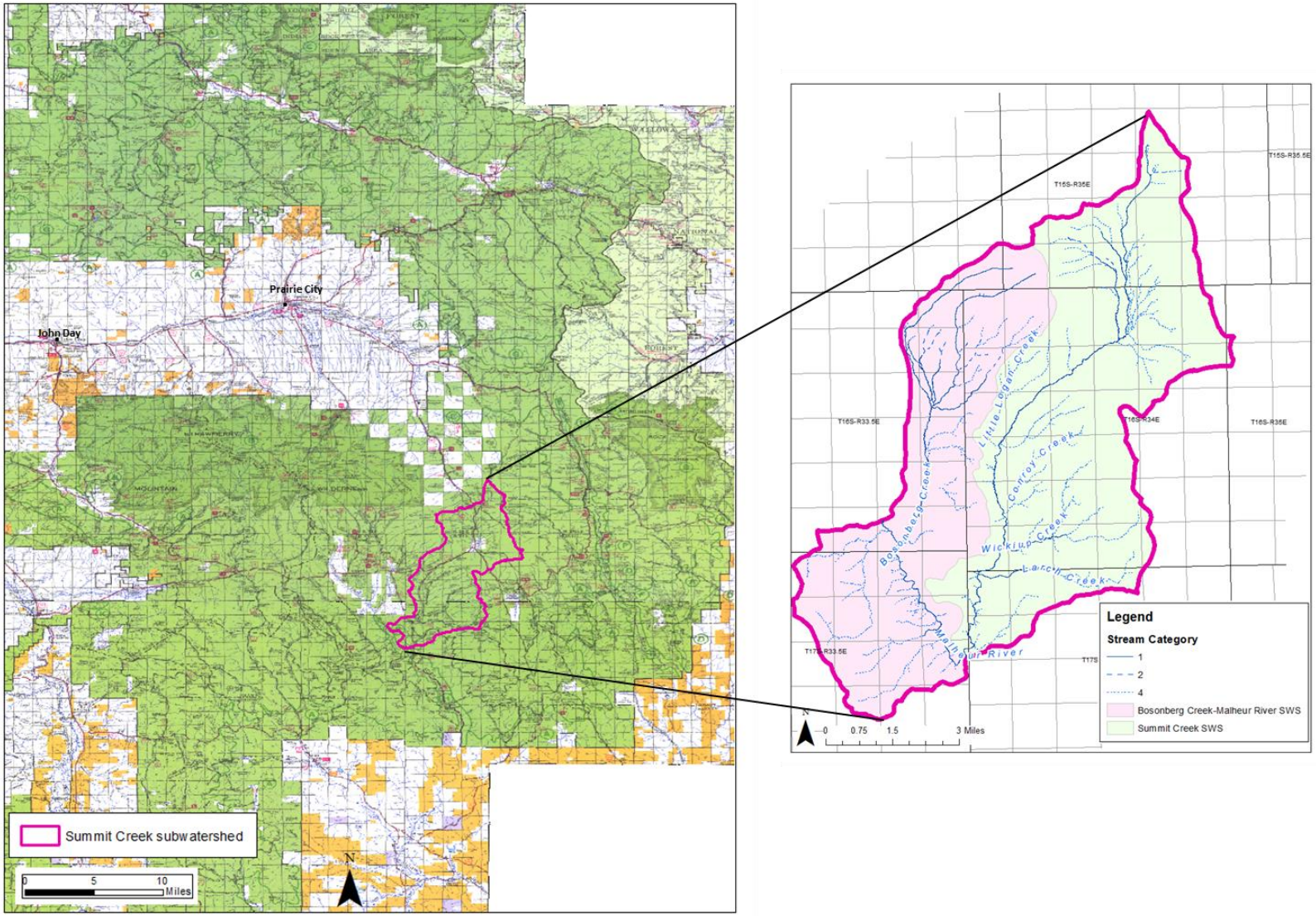
Please refer to the Aquatic Restoration EA[1] for the Purpose and Need of these actions.

Location:

These projects are located in the Summit Creek (HUC 170501160104) and Bosenberg Creek-Malheur River (170501160103) subwatershed in the Headwaters Malheur River watershed (1705011601). See Figure 1 for subwatershed location within the Malheur National Forest. See maps and tables below for location information by specific project.

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

Figure 1. subwatershed locations within the Malheur National Forest.



Implementation Plan by Project Type

Table 1: Project type, location, and activity category for each project

Project Type	Location(s)	Activity Categories
Culvert replacements	▪ Culvert 1 (Summit Creek @ 6200598 road) ▪ Culvert 2 (North Summit Creek @ 6200000 road) ▪ Culvert 3 (West Summit Creek @ 6200135 road) ▪ Culvert 4 (Near West Summit Creek @ 6200135 road) ▪ Culvert 6 (Bosenberg Creek @ 1649000 road) ▪ Culvert 7 (Bosenberg Creek @ 1649000 road) ▪ Culvert 8 (Bosenberg trib @ 1648000 road) ▪ Culvert 9 (Bosenberg trib @ 6200198 road) ▪ Culvert 10 (Wickiup Creek @ 1651000 road) ▪ Culvert 11 (Wickiup Creek @ 1410364 road)	▪ Category 1 – Fish Passage Restoration ▪ Category 11 – Road and Trail Erosion Control ▪ Category 4- Channel Restoration/Relocation
Railroad Grade stream crossing improvements	▪ Bosenberg subwatershed (FS road 1649070, 1648062, 1648308) ▪ Frazier Creek (not a FS system road) ▪ Diamond Dot Gulch (FS road 1643440)	▪ Category 11 – Road and Trail Erosion Control ▪ Category 2 – Large Wood, Boulder, and Gravel ▪ Category 14 – Riparian Vegetation Planting
RHCA roads decommission	▪ 1410218 (0.3 miles) ▪ 1410367 (0.2 miles) ▪ 1450725 (0.2 miles) ▪ 1600493 (1.3 miles) ▪ 1600701 (0.2 miles) ▪ 6200206 (0.7 miles) ▪ 1649103 (0.3 miles) ▪ 1648056 (1.0 miles) ▪ 1649109 (0.9 miles) ▪ 1410348 (0.2 miles) ▪ 1410372 (0.5 miles) ▪ 1643392 (1.4 miles) ▪ 1643410 (0.5 miles) ▪ 1643413 (0.1 miles)	▪ Category 11 – Road and Trail Erosion Control ▪ Category 14 – Riparian Vegetation Planting ▪ Category 2 – Large Wood, Boulder, and Gravel

Project Type	Location(s)	Activity Categories
	▪ 6200198 (0.2 miles) ▪ 1643415 (0.5 miles) ▪ 1649113 (1.0 miles) ▪ 1648308 (1.4 miles) ▪ 1643406 (0.5 miles) ▪ 1660636 (0.2 miles) ▪ 1630385 (0.3 miles) ▪ 1630510 (0.5 miles) ▪ 1649000 (1.3 miles)	

Land Use Plan Conformance:

These projects fall under Management Area (MA) 3A "Non-Anadromous Riparian Areas" of the Malheur National Forest Land and Resource Management Plan (LRMP; USDA Forest Service, 1990). All projects are also within the RHCA as designated by PACFISH/INFISH. RHCA categories may vary by project, but include category 1, 2, 3, and 4. Some streams (e.g. Bosenberg Creek and Malheur River) are also listed as designated critical habitat for bull trout by the USFWS (US Fish and Wildlife Service).

Management areas adjacent to the RHCA are Fore-Ground Visual Corridor, General Forest- Rangeland, and Middle Ground Visual Corridor Land and resource management goals as it pertains to the projects listed in this implementation plan are listed below.

See Tables 2-4 for land use management designations for each specific project.

Land and Resources Management Plan Goals (USDA 1990):

MA1- General Forest

Emphasize timber production on a sustained yield basis while providing for other resources and values. Develop equal distribution of age classes to optimize sustained timber production. Manage at levels and intensities consist with the schedules described in this Plan to provide for other multiple uses and resources.

MA3A- Non-Anadromous Riparian Areas

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

MA14- Visual Corridors

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.

In regards to the General Forest- Rangeland Management Areas, (MA1), this restoration is management that will directly "provide for other multiple uses and resources" through the improvement of areas adjacent to riparian habitat. Resources that will benefit from this management will include improved habitat for fish and wildlife and improved ecosystem services.

For Visual Corridor Management Areas (MA14) restoration projects will retain a roadside tree buffer and treatments would retain the natural character of the meadow

system by using untreated materials and mimicking naturally-occurring meadow features (beaver dams, wood structures).

For Non-anadromous Riparian Areas (MA3A) these actions will allow the Forest Service to directly "manage riparian areas to protect and enhance their value" as well as "maintain or improve water quality and beneficial uses".

Desired Conditions

Fish-bearing streams and critical habitat:

While the specific channel dimensions, riparian hardwood species composition, elevation, aspect, etc. of each stream may vary, the general desired conditions for fish-bearing streams are the same. The general desired conditions for these fish-bearing streams are described below:

- A riparian area with vigorous and abundant hardwood communities (including a diversity of willows, dogwoods, aspen, cottonwood, and/or alder) to provide forage and habitat for a variety of wildlife species, to increase shade, bank stabilization, and habitat complexity within the stream, and to deliver leafy material to the stream to support aquatic food webs. The floodplain would also contain a variety of hydric graminoids (sedges, rushes, grasses, etc.) with rooting zones that store water and stabilize the floodplain during high flow events. The width of the desired vegetation corridor would extend to the floodprone width of the floodplain (to the toe slope or base of an abandoned terrace).

- A floodplain with maximum capacity to store water for slow release through the dry season. Water table elevations would approach the ground surface elevation of the floodplain for the majority of the dry season, except at naturally occurring high spots, mounds, and abandoned terraces. Stream channels would have floodplain connectivity during high flows to allow inundation of the floodplain for sediment and nutrient deposition and energy dissipation.

- Fish habitat to support all life stages of native fish species, particularly bull trout (threatened under the ESA [endangered species act]) and increase the competitive advantage of bull trout over invasive brook trout. The stream channel would be a Rosgen C or E type channel with deep pools and channel complexity (containing wood, shrub roots, undercut banks, etc.) for hiding cover and forage.

- Water quality would be high; the channel would be shaded by shrubs, stream temperatures would be suitable for bull trout spawning and rearing (9º C), and fine sediment would be stored on the channel margin and outside of sensitive spawning areas. Spawning gravels would be abundant and channels would have low width /depth ratios (below 10; USDA Forest Service, 1990).

- Habitat to support the natural expansion and reintroduction of beaver throughout the Summit and Bosenberg subwatersheds. Evidence of present or historic beaver activity has been observed throughout the entire watershed and within the streams listed above. Beaver are a keystone species defined as "a plant or animal that plays a unique and crucial role in the way an ecosystem functions. Without keystone species, the ecosystem would be dramatically different or cease to exist altogether" (*education.nationalgeographic.org/encyclopedia/**keystone-species**/)* The recovery of active beaver within these streams would provide long term maintenance of these habitats to support hardwood riparian communities, fish and wildlife diversity, and store cool water in the floodplain.

Culverts and road crossings would provide:

- Fish passage for all life stages of bull trout and redband trout
- Adequate passage of streamflow at all stages, including floodstage (sizing for a 50-100 year flood)
- Adequate passage for sediment and debris
- Provide passage for facultative riparian mammals at low flows.
- A road-stream crossing that does not degrade water quality and water storage capacity or contribute to channel incision

Non-fish-bearing intermittent channels:

- A riparian area with vigorous aspen and/or other hardwood communities (willows, dogwoods, and alder) to provide forage and habitat for a variety of wildlife species, to increase shade, bank stabilization, and habitat complexity within the stream, and to deliver leafy material to the stream to support aquatic food webs. The floodplain would also contain a variety of hydric graminoids (sedges, rushes, grasses, etc.) with rooting zones that store water and stabilize the floodplain during high flow events. The width of the desired vegetation corridor would extend to the floodprone width of the floodplain (to the toe slope or base of an abandoned terrace).

- A floodplain with maximum capacity to store water for slow release through the dry season. Water table elevations would approach the ground surface elevation of the floodplain for the majority of the dry season, except at naturally occurring high spots, mounds, and abandoned terraces. Stream channels would have floodplain connectivity during high flows to allow inundation of the floodplain for sediment and nutrient deposition and energy dissipation.

- Water quality would be high; the channel would be shaded by shrubs, stream temperatures would be as low as possible. Sediment delivery from these headwater drainages would be consistent with natural disturbance processes. Channels would have low width /depth ratios (below 10; USDA Forest Service, 1990).

Culverts and road crossings would provide:

- adequate passage of streamflow at all stages, including floodstage (sizing for a 50-100 year flood)
- adequate passage for sediment and debris
- a road-stream crossing that does not degrade water quality and water storage capacity or contribute to channel incision

Funding and Timing:

Anticipated years of implementation are provided in the tables below for each project. Anticipated implementation years may change based on funding. Some projects may also not be completed in one field season.

Checklists for each implementation year will be put together by the aquatics program and available to be signed by April of that year.

Culvert replacement projects

Culvert replacement restoration is designed to increase aquatic organism passage and sediment passage on streams. Listed culverts (Table 2 and Figure 2) have been evaluated for their capacity for passage and have been found to be inappropriately designed (see examples in Figure 3). Each are unable to pass all life stages of resident fish populations and are located on or proximal to (culverts 2 & 4) fish bearing streams. Culverts 5 and 7 are on streams designated as critical habitat for threatened bull trout. Culvert replacement includes the following activity categories:

- Category 1 – Fish Passage Restoration
- Category 11 – Road and Trail Erosion Control

Table 2: Site-specific project description for meadow restoration projects and year that implementation is scheduled to begin

Project description	Project Location	TR Location	USGS quad	Land Use Plan Conformance	Year
▪ Replace with stream simulation culvert that provides fish passage ▪ Realign stream channel as needed to meet channel and culvert angle and gradient	*Culvert 3 (see map)* West Summit Creek @ 6200135 road	T.16S, R.34E, *Section 3	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2020
	Culvert 2 (see map) North Summit Creek @ 6200000 road	T.15S, R.35E, *Section 33	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2021
	Culvert 1 (see map) Summit Creek @ 6200598 road	T.15S, R.35E, *Section 33	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2021
	Culvert 6 (see map) Bosenberg Creek @ 1649000 road	*Section 12, T.16S., R.33.2E., 33	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2019
	Culvert 7 (see map) Bosenberg Creek @ 1649000 road	*Section 12, T.16S., R.33.2E., 33	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A	**2019

Project description	Project Location	TR Location	USGS quad	Land Use Plan Conformance	Year
				Adjacent to: MA14	
	Culvert 8 (see map) Bosenberg trib @ 1648000 road	*Section 13, T.16S., R.33.2E., 33	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2020
	Culvert 9 (see map) Bosenberg trib @ 6200198 road	*Section 2, T.16S., R.33.2E., 33	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2020
	Culvert 10 (see map) Wickiup Creek @ 1651000 road	*Section 31, T.16S., R.34E., 33	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2022
	Culvert 11 (see map) Wickiup Creek @ 1410364 road	*Section 32, T.16S., R.34E., 33	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2022
▪ Replace culvert to eliminate perched pipe on category 4 stream and allow for the passage of streamflow and sediment	*Culvert 4 (see map)* Near West Summit Creek @ 6200135 road	T.16S, R.34E, *Section 3	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2020

*Includes part of section where creek/river runs through it

**Implementation year denotes the year that implementation is anticipated to begin. Start year may vary based on funding. Some projects may not be completed in one year.

Implementation plan

All culverts will be removed and replaced using heavy equipment (excavators, dozers, etc.) during the in-stream work period of July 15-August 15. New culverts will be put in at the appropriate gradient for that stream reach, based on survey data.

New culverts for culverts 1-3 will be open-bottomed arches or round-pipes of sufficient size to pass fish, sediment, debris, and a 50-100 year flood event. The new culvert for culvert 4 will be a round-pipe or ford crossing of appropriate size to pass sediment, debris, and large flood events.

In-stream work to help stabilize the channel may include add large wood, hardwood planting, or channel re-alignment and could occur for up to 300 feet upstream and downstream of the road crossing.

Road-fill material will be recycled or collected from nearby gravel pits approved by the weeds specialist. Excess road fill will be stored outside the sediment delivery zone of streams and water bodies. Stored road fill may be used in other aquatic restoration projects, including those aimed at improving road crossings or add fill to extremely incised channels.

Maps & Figures

Figure 2Figure 1 map indicating the location of culvert replacements.

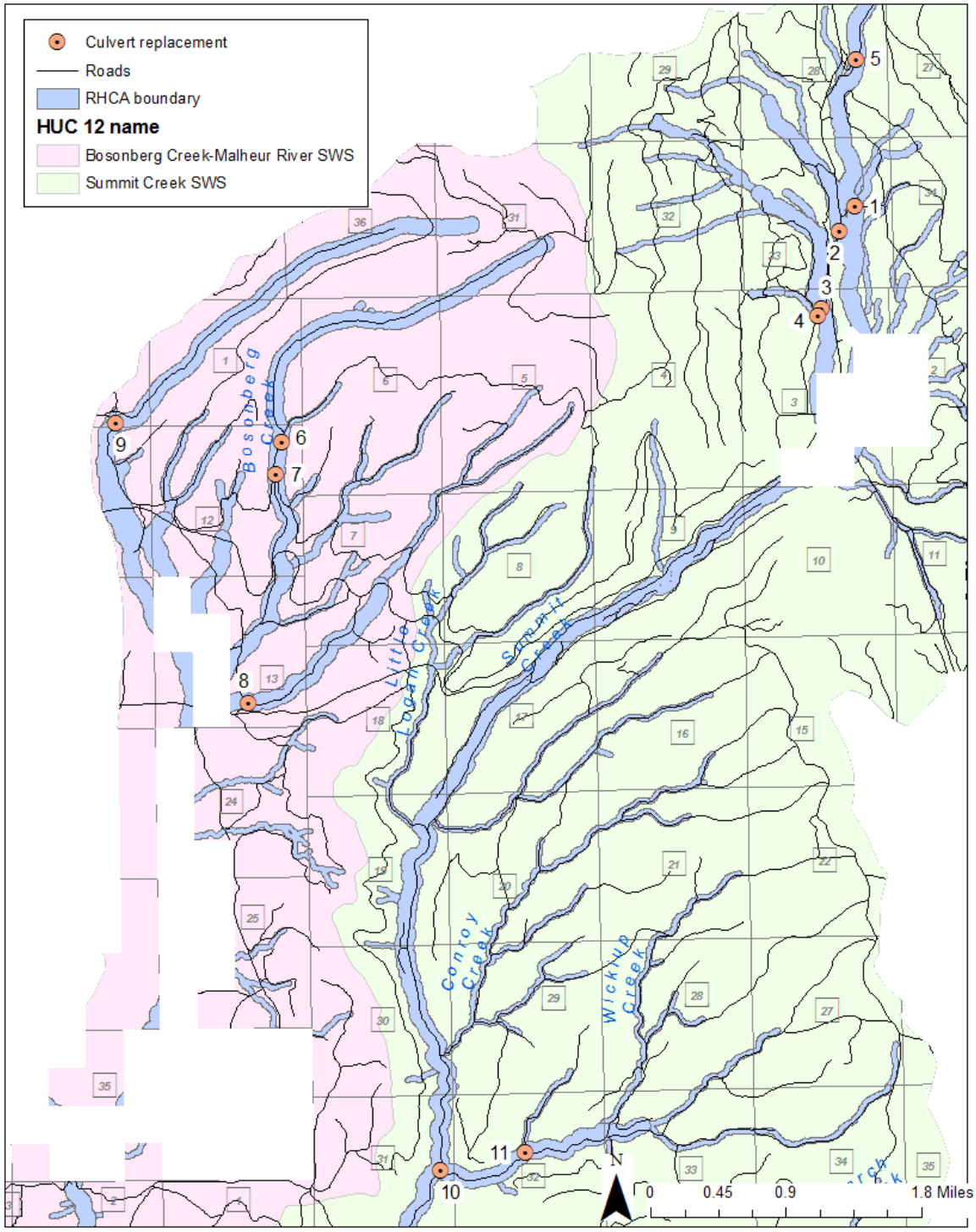


Figure 3 existing conditions of problem culverts; 1) Summit Creek @ 6200598 road, 2) North Summit Creek & 6200000 road, and 3) West Summit Creek @ 6200135 road.

Railroad Grade stream crossing improvements

Railroad grades are legacy structures built to facilitate railroad logging in the past. At the time, consideration of fish passage was not a factor. Crossings at railroad grade structures limit passage of fish, sediment, and other aquatic organisms. Restoration activities are similar to road decommission or culvert replacement type of work, but has been separated out separately for easy identification. Rail beds differ in that backfill depths and narrow work surfaces will require additional machine operator skills (see Figure 6). Railroad grade stream crossing improvements include the following activity categories:

- Category 11 – Road and Trail Erosion Control
- Category 2 – Large Wood, Boulder, and Gravel
- Category 14 – Riparian Vegetation Planting

Table 3: Site-specific project description for meadow restoration projects and year that implementation is scheduled to begin

Project description	Project Location	TR Location	USGS quad	Land Use Plan Conformance	Year
▪ Remove culvert and road fill using heavy equipment ▪ Regrade slopes for recreation trail use ▪ Construct and harden bike trail on regraded slope ▪ Harden bike trail crossing at stream ▪ Add large and coarse wood upstream and downstream of road fill removal ▪ Plant/seed riparian hardwoods (aspen, willow, cottonwood, dogwood, alder) ▪ Protect hardwoods with caging, fencing, and/or shrouding.	*RR5 (see* – Bosenberg Creek @ FS road 1649070	T.16S, R.33 1/2E, *Section 12	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2019
	RR8 – (see – Tributary to Bosenberg Cr. @ FS road 1649070	T.16S, R.34E, *Section 7	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2019
	RR3 – (see – Tributary to Bosenberg Cr. @ FS road 1648308	T.16S, R.33 1/2E, *Section 12	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2020
	RR4 – (see – Tributary to Bosenberg Cr. @ FS road 1648062	T.16S, R.33 1/2E, *Section 12	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2020

Project description	Project Location	TR Location	USGS quad	Land Use Plan Conformance	Year
▪ Remove culvert using heavy equipment ▪ Add large and coarse wood upstream and downstream of road fill removal	*RR12 – (see –* Frazier Creek	T.17S, R.33 1/2E, *Section 10	Magpie Table (A644118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA14	**2021
	RR13 – (see – Diamond Dot Gulch @ FS road 1643440	T.17S, R.33 1/2E, *Section 14	Dollar Basin (A544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA1	**2021

*Includes part of section where creek/river runs through it

**Implementation year denotes the year that implementation is anticipated to begin. Start year may vary based on funding. Some projects may not be completed in one year.

Implementation plan

All railroad grade crossings (Figure 4 and Figure 5) will be removed using heavy equipment (e.g. excavators, dozers, dump trucks, etc.) during the in-stream work period of July 15-August 15 (unless exception to the in-stream work window is applied for). Stream channels will be constructed at the site of the old crossing using heavy equipment.

In-stream work to help stabilize the channel may include add large wood, hardwood planting, or channel re-alignment. This would occur at the site of the stream crossing and for up to 600 feet upstream and downstream of the road crossing.

Excess road fill will be stored outside the sediment delivery zone of streams and water bodies. This may include closed road beds or gravel storage areas. Stored road fill may be used in other aquatic restoration projects, including those aimed at improving road crossings, add fill to extremely incised channels, or filling in relic channels.

Maps & Figures

Figure 4 map including locations of RR3, RR4, RR5, and RR8

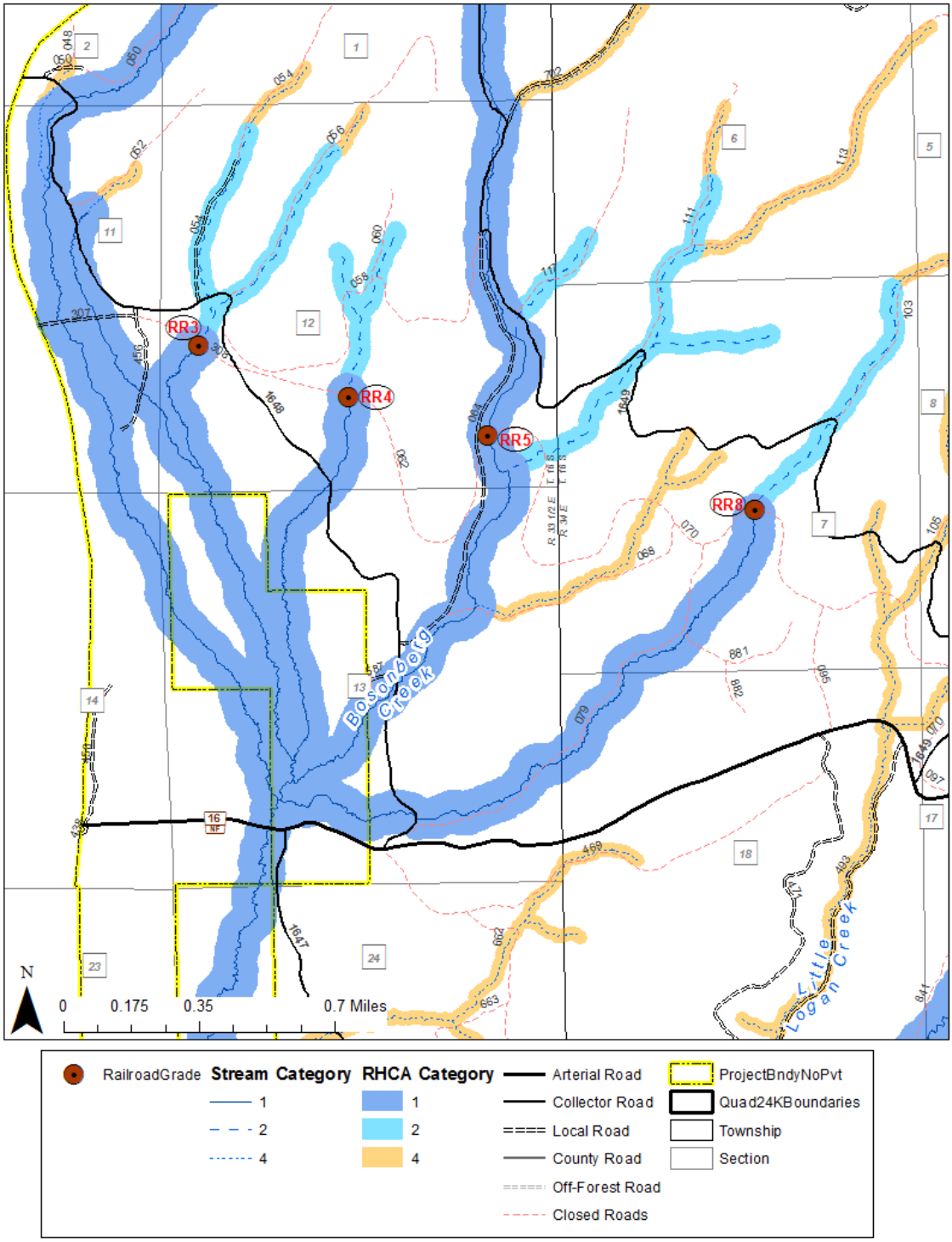


Figure 5 map including locations of RR12 and RR13

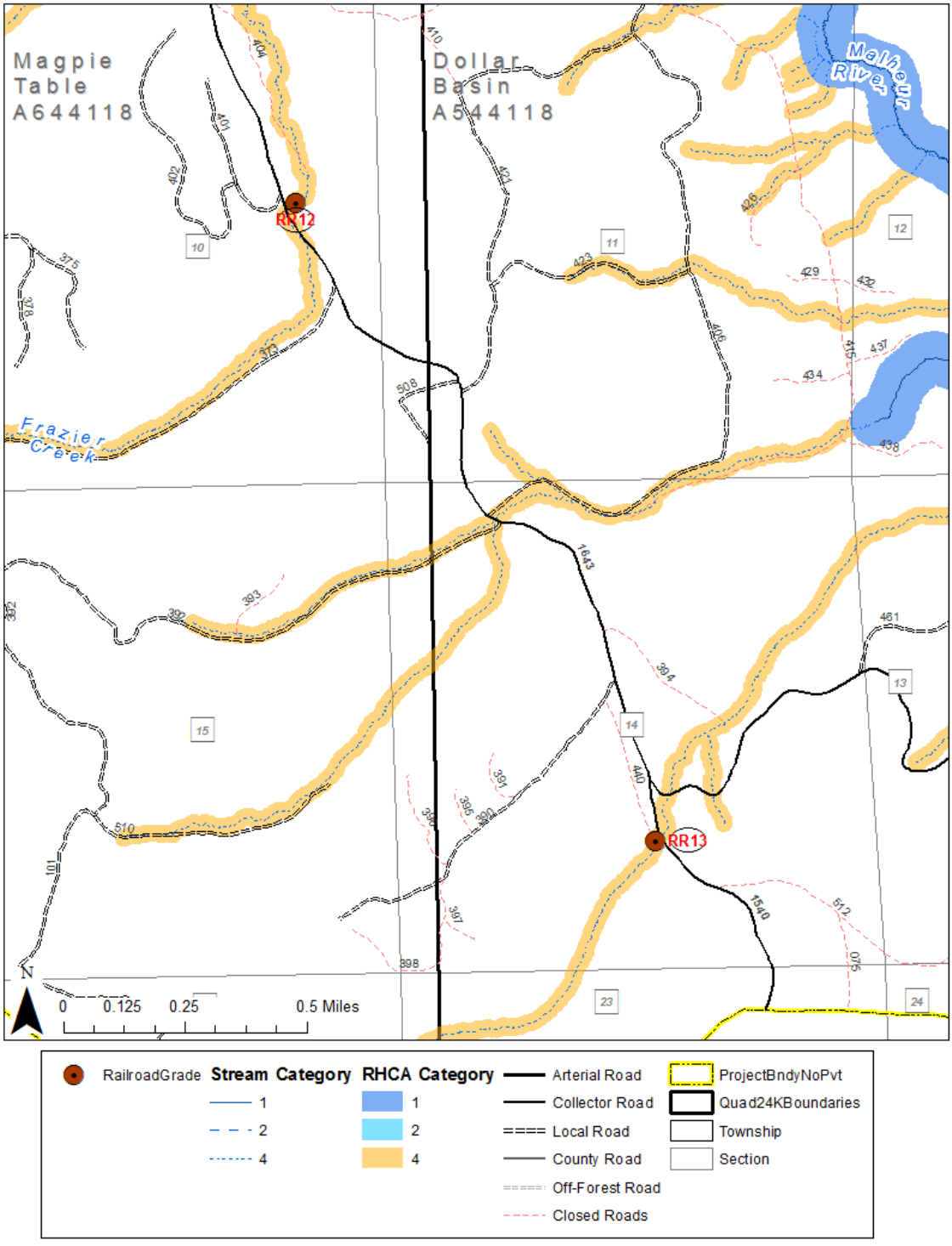



Figure 6 existing conditions of railroad crossings RR3 and RR5

Road decommission projects

The following roads are located within the RHCA and within the sediment delivery zone of a nearby stream. Some roads are overgrown and un-drivable and the purpose of decommission is to prevent sediment delivery in the future that would occur during road blading, brushing, and reconstruction. Other roads have been identified as having a hydrologic issue or poor drainage features. Restoration requirements at each road varies depending on the issue. Many of these roads are closed under the Summit decision in 2017. Road decommission includes the following activity categories:

- Category 11 – Road and Trail Erosion Control
- Category 14 – Riparian Vegetation Planting
- Category 2 – Large Wood, Boulder, and Gravel

Table 4: Site-specific project description for meadow restoration projects and year that implementation is scheduled to begin

Project description	Project Location (FS Road)	TR Location	USGS quad	Land Use Plan Conformance	Year
Administrative decommission (2.9 miles) ▪ Decommission road segment by removing from FS road system ▪ Remove carsonite road sign	1410218 (0.3 miles)	T.16S R.34E S.33	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	2019
	1410367 (0.2 miles)	T.16S R.34E S.34	Dollar Basin (A544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA14	2019
	1450725 (0.2 miles)	T.17S R.34E S.4	Logan Valley East (B544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA14	2019
	1600493 (1.3 miles)	T.16S R.34E S.18	Logan Valley East (B544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA14	2019

Project description	Project Location (FS Road)	TR Location	USGS quad	Land Use Plan Conformance	Year
	1600701 (0.2 miles)	T.16S R.34E S.10	Logan Valley East (B544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA14	2019
	6200206 (0.7 miles)	T.16S R.34E S.3	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	2019
Restore and revegetate road prism (5.6 miles): ▪ Decommission road segment by removing from FS road system ▪ Remove carsonite road sign ▪ Pull ditch-relief culverts ▪ Revegetate road prism using native grass, forbs, and/or shrubs ▪ Scarify soil as needed to decompact surface ▪ Add coarse wood or water bar road prism for erosion control, as needed ▪ Camouflage entrance as needed by scattering debris or coarse wood ▪ Add coarse wood to stream channel using hand-falling or heavy equipment as needed to stabilize	1649103 (0.3 miles)	T.16S, R. 34E, *Section 5,6,7,8	Logan Valley East (B544118)	*Within*: Category 2 & 4 RHCA, MA3A *Adjacent to:* MA14	**2019
	1648056 (1.0 miles)	T.16S, R. 33 1/2E, *Section 1 & 12	Logan Valley East (B544118)	*Within*: Category 2 & 4 RHCA, MA3A *Adjacent to:* MA14	**2019
	1649109 (0.9 miles)	T.16S, R. 34E, *Section 5	Logan Valley East (B544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA14	**2019
	1410348 (0.2 miles)	T.16S R.34E S.29	Logan Valley East (B544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA14	**2020
	1410372 (0.5 miles)	T.16S R.34E S.27	Logan Valley East (B544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA14	**2020

Project description	Project Location (FS Road)	TR Location	USGS quad	Land Use Plan Conformance	Year
	1643392 (1.4 miles)	T.17S R.33.5E S.14	Magpie Table (A644118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA14	**2020
	1643410 (0.5 miles)	T.17S, R. 33 1/2E, *Section 2	Dollar Basin (A544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA14	**2020
	1643413 (0.1 miles)	T.17S, R. 33 1/2E, *Section 2	Dollar Basin (A544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA14	*2020
	6200198 (0.2 miles 2 segments)	T.16S R.34E S.3	Logan Valley East (B544118)	*Within*: Category 2 RHCA, MA3A *Adjacent to:* MA14	**2019
	1643415 (0.5 miles)	T.17S, R. 33 1/2E, *Section 11 & 14	Dollar Basin (A544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA1	**2021
Decommission stream crossings & restore and revegetate road prism 3.1 miles): ▪ All activities described under 'restore and revegetate road prism' above ▪ Remove culverts and road fill to allow floodplain connectivity	1649113 (1.0 miles)	T.16S, R. 34E, *Section 6	Logan Valley East (B544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA1, MA14	**2019
	1648308 (1.4 miles)	T.16S, R. 33 1/2E, *Section 12	Logan Valley East (B544118)	*Within*: Category 2 & 4 RHCA, MA3A *Adjacent to:* MA14	**2019

Project description	Project Location (FS Road)	TR Location	USGS quad	Land Use Plan Conformance	Year
	1643406 (0.5 miles)	T.17S R.33.5E S.3	Dollar Basin (A544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA1	**2020
	1660636 (0.2 miles)	T.16S R.34E S.2	Logan Valley East (B544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA1	**2020
Restore streamflow in channel & restore and revegetate road prism (1.0 miles): ▪ All activities described under 'restore and revegetate road prism' above ▪ Restore stream channel to natural location in the valley bottom Add large and coarse wood to 0.3 miles of channel by hand-felling using chainsaws (where road has captured or disrupted the stream)	1643147 (0.2 miles)	T.17S R.33.5E S.2	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA1	**2021
	1630385 (0.3 miles)	T.17S, R. 33 1/2E, *Sections 9 & 16	Magpie Table (A644118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA1	**2021
	1630510 (0.5 miles)	T.17S R.33.5E S.15	Magpie Table (A644118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA1	**2020
Heavy in-stream and road work (1.3 miles): ▪ All activities described under 'restore and revegetate road prism' above ▪ Remove 3 culverts at stream crossings	1649000 (1.3 miles)	T.16S R.33.5E S.12	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A (critical habitat for bull trout) *Adjacent to:* MA1	**2019

Project description	Project Location (FS Road)	TR Location	USGS quad	Land Use Plan Conformance	Year
▪ Remove road surface and recontour where inhibiting floodplain connectivity ▪ Add coarse wood to road prism for erosion control ▪ Add coarse and large wood to stream channel using hand-falling or heavy equipment to stabilize					

*Includes part of section where road runs through it

**Implementation year denotes the year that implementation is anticipated to begin. Start year may vary based on funding. Some projects may not be completed in one year.

Implementation plan

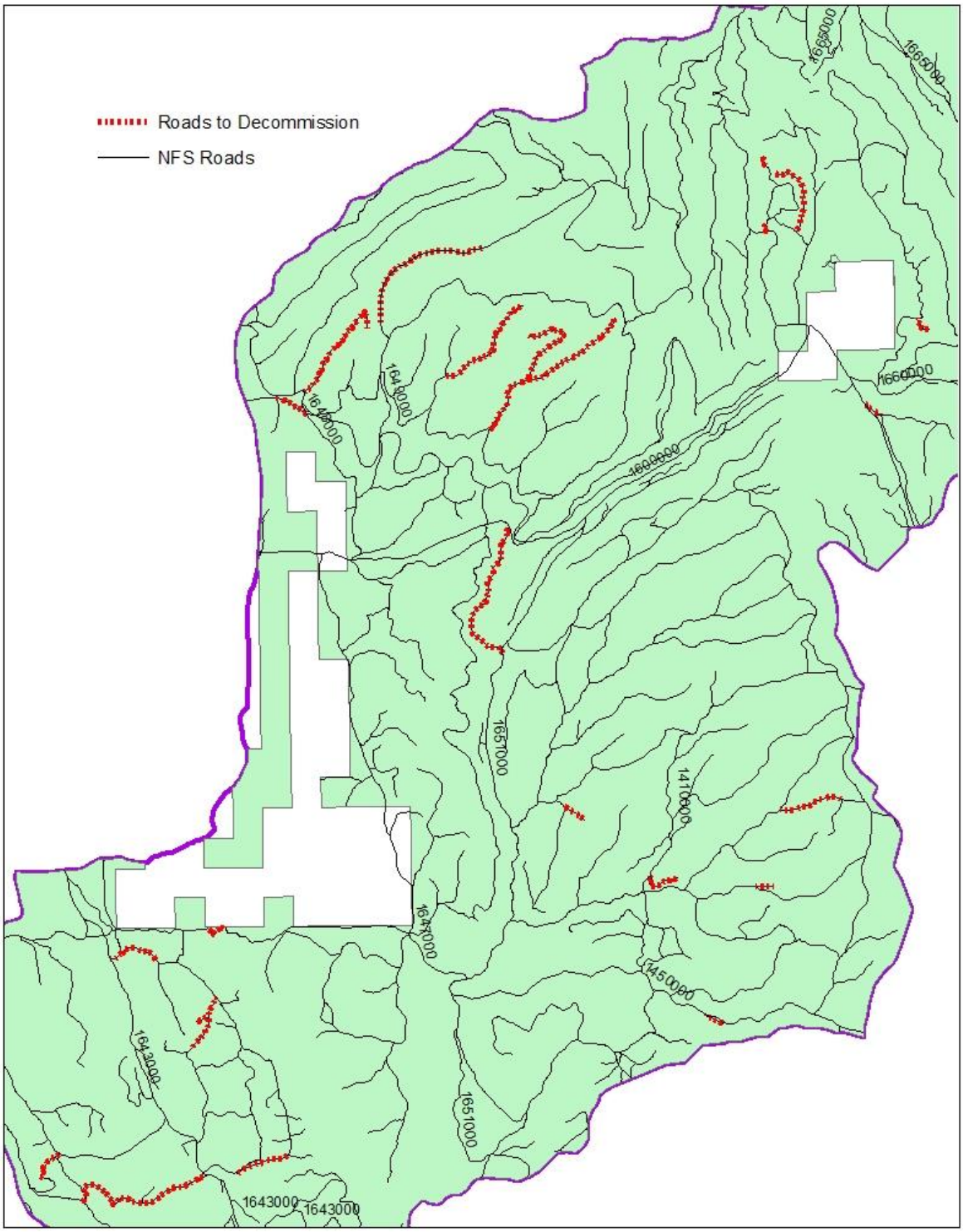
In phase 1 (anticipated 2019), all roads that are effectively self-decommissioned (closed by natural vegetation overgrowth) and require minimal activities on the ground will be removed from the FS system. Carsonite signs will be removed.

In phase 2 (anticipated 2019), the 1649000 and other priority roads will also be decommissioned, which will include removing passage barriers, recontouring the road, and revegetating the inner riparian area. Streams may be re-aligned using heavy equipment where needed for up to 50 feet upstream and downstream of the channel. Locally available large and coarse wood will be directionally felled or hand-carried to the channel to help stabilize the channel and capture sediment.

In phase 3, (anticipated 2020-2022), remaining roads in the Bosenberg, Malheur, and Summit subwatersheds will be decommissioned. These roads require some amount of road work and/or stream work to effectively decommission and return road prisms to the natural state. Culverts will be removed using the lowest impact heavy equipment possible (small excavator, etc.). Disturbed areas will be seeded and/or planted with native hardwoods. Streams will be re-aligned using heavy equipment where needed for up to 50 feet upstream and downstream of the channel. Locally available large and coarse wood will be directionally felled or hand-carried to the channel to help stabilize the channel and capture sediment.

Maps & Figures

Figure 7 larger map of all decommission roads



Appendices to the Aquatic Restoration EA Implementation Description

Project Title: Summit and Bosenberg subwatersheds aquatic restoration
Project Number: 04042019, 04052019, 04062019

Category 1 – Fish Passage Restoration
Category 2 – Large Wood, Boulder, and Gravel
Category 11 – Road and Trail Erosion Control
Category 14 – Riparian Vegetation Planting

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

Program Administration

1. Integration of project design criteria and conservation measures and terms and conditions into project design and contract language
    a. This document is to outline the conservation measures and PDCs that will be used during project implementation to remain compliant with the aquatic restoration BA as well as ARBO II.
2. Project notification: The following information will be provided to the NMFS Level 1 Aquatics members 30 days prior to implementation as a Project Notification Form 7.
    a. Action identifier- 04012019, 04022019, 04032019
    b. Project name- Summit and Bosenberg subwatersheds aquatic restoration
    c. Location-

Project	Summit Creek Restoration
Stream Name	Summit Creek
6th field HUC	170501160104 & 170501160103
Latitude (Decimal Degrees)	Varies widely, see maps and information above
Longitude (Decimal Degrees)	Varies widely, see maps and information above

    d. Agency contact- PCRD Aquatics
    e. Timing- Work will occur from 2019-2022, with in-stream work happening on perennial streams between July 15 to August 15.
    f. Activity category-
        Category 1 – Fish Passage Restoration
        Category 2 – Large Wood, Boulder, and Gravel
        Category 11 – Road and Trail Erosion Control
        Category 14 – Riparian Vegetation Planting
    g. Project description- Project description is available in the Implementation Description under the section “Implementation Plan” above.

h. Extent- Work will occur throughout many creeks and riparian areas in the Upper Headwaters Malheur River watershed in the Middle Snake-Boise basin.
i. Species affected-
    i. Listed species: bull trout
    ii. Critical Habitat: within critical habitat for bull trout
    iii. MIS Species: redband trout
j. Date of submittal- To be completed in 2019-2022, at least 30 day prior to implementation
k. Site assessments- Assessment for contaminants will be considered on a case-by-case basis if more than 20 yards of road fill is moved
l. Review- NMFS fish passage review and Restoration Review Team review are not required.
m. Verification- _____
n. SOD project notification- _____

3. Minor Variance: No variances from the criteria specified in the aquatic restoration document are being considered.
4. NMFS Fish Passage Review and Approval: This will occur on a project by project basis as required.
5. Restoration Review Team: This work does not require review by the restoration review team.
6. Project Completion Report: To be completed after implementation. This project will be completed within three years of implementation initiation.
7. Annual Program Report: annual reporting will occur in the winter of the fiscal year after work was done before February 15th and occur annually until project completion.

Project Design Criteria

General Aquatic Conservation Measures

8. Technical Skill and Planning Requirements:
    a. An appropriately qualified fisheries biologist or hydrologist will be involved in the design of this project.
    b. The scope of this project is limited in both space and context. Field evaluations and site-specific surveys will require little work. Appropriate time will be allotted for these actions, prior to implementation. Planning and design will involve appropriate expertise.
    c. The assigned fisheries biologist or hydrologist will make sure that any applicable conservation measures and project design criteria are met through the contracting process.
9. Climate Change: Although individual activities only affect small areas of the watershed, the impacts of this work as a whole will improve resistance and resilience of the system and biota to climate change through cold-water storage, enhanced biodiversity and improved habitat.
10. In-Water Work Period: In-stream activities will occur between July 15th and August 15th, and work occurring outside the high flow elevation can occur outside of this window.
11. Fish passage: Fish passage will be addressed on a case-by-case basis depending on the actions within a specific checklist.
12. Site Assessment For Contaminants: In developed or previously developed sites, such as areas with past dredge mines, or sites with known or suspected contamination, a site assessment for contaminants will be conducted on projects that involve excavation of >20 cubic yards of material. The action agencies will complete a site assessment to identify the type, quantity, and extent of any potential contamination. The level of detail and resources committed to such an assessment will be commensurate with the level and type of past or current development at the site. The assessment may include the following:
    a. Review of readily available records, such as former site use, building plans, records of any prior contamination events.
    b. Site visit to observe the areas used for various industrial processes and the condition of the property.
    c. Interviews with knowledgeable people, such as site owners, operators, occupants, neighbors, local government officials, etc.
    d. Report that includes an assessment of the likelihood that contaminants are present at the site.
13. Pollution and Erosion Control Measures: Implement the following pollution and erosion control measures:
    a. Project Contact: Identify a project contact (name, phone number, an address) that will be responsible for implementing pollution and erosion control measures.
    b. List and describe any hazardous material that would be used at the project site, including procedures for inventory, storage, handling, and monitoring; notification procedures; specific clean-up and disposal

instructions for different products available on the site; proposed methods for disposal of spilled material; and employee training for spill containment.

c. Temporarily store any waste liquids generated at the staging areas under cover on an impervious surface, such as tarpaulins, until such time they can be properly transported to and treated at an approved facility for treatment of hazardous materials.
d. Procedures based on best management practices to confine, remove, and dispose of construction waste, including every type of debris, discharge water, concrete, cement, grout, washout facility, welding slag, petroleum product, or other hazardous materials generated, used, or stored on-site.
e. Procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities. Ensure that materials for emergency erosion and hazardous materials control are onsite (e.g., silt fence, straw bales, oil-absorbing floating boom whenever surface water is present).
f. Best management practices to confine vegetation and soil disturbance to the minimum area, and minimum length of time, as necessary to complete the action, and otherwise prevent or minimize erosion associated with the action area.
g. No uncured concrete or form materials will be allowed to enter the active stream channel.
h. Steps to cease work under high flows, except for efforts to avoid or minimize resource damage.

14. Site Preparation
    a. Flagging sensitive areas –Prior to construction, clearly mark critical riparian vegetation areas, wetlands, and other sensitive sites to minimize ground disturbance.
    b. Staging area –Establish staging areas for storage of vehicles, equipment, and fuels to minimize erosion into or contamination of streams and floodplains.
        i. No Topographical Restrictions –place staging area 150 feet or more from any natural water body or wetland in areas where topography does not restrict such a distance.
        ii. Topographical Restrictions –place staging area away from any natural water body or wetland to the greatest extent possible in areas with high topographical restriction, such as constricted valley types.
    c. Temporary erosion controls –Place sediment barriers prior to construction around sites where significant levels of erosion may enter the stream directly or through road ditches. Temporary erosion controls will be in place before any significant alteration of the action site and will be removed once the site has been stabilized following construction activities.
    d. Stockpile materials –Minimize clearing and grubbing activities when preparing staging, project, and or stockpile areas. Any large wood, topsoil, and native channel material displaced by construction will be stockpiled

for use during site restoration. Materials used for implementation of aquatic restoration categories (e.g., large wood, boulders, fencing material) may be staged within the 100-year floodplain.

e. Hazard trees –Where appropriate, include hazard tree removal (amount and type) in project design. Fell hazard trees when they pose a safety risk. If possible, fell hazard trees within riparian areas towards a stream. Keep felled trees on site when needed to meet coarse large wood objectives.

15. Heavy Equipment Use
    a. Choice of equipment – Heavy equipment will be commensurate with the project and operated in a manner that minimizes adverse effects to the environment (e.g., minimally-sized, low pressure tires, minimal hard turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils).
    b. Fueling and cleaning and inspection for petroleum products and invasive weeds
        i. All equipment used for instream work will be cleaned for petroleum accumulations, dirt, plant material (to prevent the spread of noxious weeds), and leaks repaired prior to entering the project area. Such equipment includes large machinery, stationary power equipment (e.g., generators, canes), and gas-powered equipment with tanks larger than five gallons.
        ii. Store and fuel equipment in staging areas after daily use.
        iii. Inspect daily for fluid leaks before leaving the vehicle staging area for operation.
        iv. Thoroughly clean equipment before operation below ordinary high water or within 50 feet of any natural water body or areas that drain directly to streams or wetlands and as often as necessary during operation to remain grease free.
    c. Temporary access roads – Existing roadways will be used whenever possible. Minimize the number of temporary access roads and travel paths to lessen soil disturbance and compaction and impacts to vegetation. Temporary access roads will not be built on slopes where grade, soil, or other features suggest a likelihood of excessive erosion or failure. When necessary, temporary access roads will be obliterated or revegetated. Temporary roads in wet or flooded areas will be restored by the end of the applicable in-water work period. Construction of new permanent roads is not permitted.
    d. Stream crossings – Minimize number and length of stream crossings. Such crossings will be at right angles and avoid potential spawning areas to the greatest extent possible. Stream crossings shall not increase the risk of channel re-routing at low and high water conditions. After project completion, temporary stream crossings will be abandoned and the stream channel and banks restored.
    e. Work from top of bank – To the extent feasible, heavy equipment will work from the top of the bank, unless work instream would result in less damage to the aquatic ecosystem.

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

16. Site Restoration
    a. Initiate rehabilitation – Upon project completion, rehabilitate all disturbed areas in a manner that results in similar or better than pre-work conditions through removal of project related waste, spreading of stockpiled materials (soil, large wood, trees, etc.) seeding, or planting with local native seed mixes or plants.
    b. Short-term stabilization – Measures may include the use of non-native sterile seed mix (when native seeds are not available), weed-free certified straw, jute matting, and other similar techniques. Short-term stabilization measures will be maintained until permanent erosion control measures are effective. Stabilization measures will be instigated within three days of construction completion.
    c. Revegetation – Replant each area requiring revegetation prior to or at the beginning of the first growing season following construction. Achieve reestablishment of vegetation in disturbed areas to at least 70% of pre-project levels within three years. Use an appropriate mix of species that will achieve establishment and erosion control objectives, preferably forb, grass, shrub, or tree species native to the project area or region and appropriate to the site. Barriers will be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.
    d. Planting manuals – All riparian plantings shall follow Forest Service direction described in the Regional letter to Units, Use of Native and Nonnative Plants on National Forests and Grasslands May 2006 (Final Draft), and or BLM Instruction Memorandum No. OR-2001-014, Policy on the Use of Native Species Plant Material.
    e. Decompact soils – Decompact soil by scarifying the soil surface of roads and paths, stream crossings, staging, and stockpile areas so that seeds and plantings can root.

17. Monitoring

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

    a. Implementation
        i. Visually monitor during project implementation to ensure effects are not greater (amount, extent) than anticipated and to contact Level 1 representatives if problems arise.
        ii. Fix any problems that arise during project implementation.
        iii. Regular biologist/hydrologist coordination if biologist/hydrologist is not always on site to ensure contractor is following all stipulations.

b. 401 Certification – To minimize short-term degradation to water quality during project implementation, follow current 401 Certification provisions of the Federal Clean Water Act for maintenance or water quality standards described by the following: Oregon Department of Environmental Quality (Oregon BLM, Forest Service, and BIA); Washington Department of Ecology (Washington BLM); and the Memorandum of Understanding between the Washington Department of Fish and Wildlife and Forest Service regarding Hydraulic Projects Conducted by Forest Service, Pacific Northwest Region (WDFW and USDA-Forest Service 2012); California, Idaho, or Nevada 401 Certification protocols (BLM and Forest Service).
c. Post project – A post-project review shall be conducted after winter and spring high flows.
    i. For each project, conduct a walk through/visual observation to determine if there are post-project affects that were not considered during consultation. For fish passage and revegetation projects, monitor in the following manner:
    ii. Fish Passage Projects – Note any problems with channel scour or bedload deposition, substrate, discontinuous flow, vegetation establishment, or invasive plant infestation.
    iii. Revegetation – For all plant treatment projects, including site restoration, monitor for and remove invasive plants until native plants become established.
    iv. In cases where remedial action is required, such actions are permitted without additional consultation if they use relevant PDC and aquatic conservation measures and the effects of the action categories are not exceeded.

18. Work Area Isolation, Surface Water Withdrawals, and Fish Capture and Release – Isolate the construction area and remove fish from a project site for projects that include concentrated and major excavation at a single location within the stream channel. This condition will typically apply to the following aquatic restoration categories: Fish Passage Restoration; Dam, Tidegate, and Legacy Structure Removal; Channel Reconstruction/Relocation.
    a. Isolate capture area – Install block nets at up and downstream locations outside of the construction zone to exclude fish from entering the project area. Leave nets secured to the stream channel bed and banks until construction activities within the stream channel are complete. If block nets or traps remain in place more than one day, monitor the nets and or traps at least on a daily basis to ensure they are secured to the banks and free of organic accumulation and to minimize fish predation in the trap.
    b. Capture and release – Fish trapped within the isolated work area will be captured and released as prudent to minimize the risk of injury, then released at a safe release site, preferably upstream of the isolated reach in a pool or other area that provides cover and flow refuge. Collect fish in the best manner to minimize potential stranding and stress by seine or dip nets as the area is slowly dewatered, baited minnow traps placed overnight, or electrofishing (if other options are ineffective). Fish must be handled with

extreme care and kept in water the maximum extent possible during transfer procedures. A healthy environment for the stressed fish shall be provided—large buckets (five-gallon minimum to prevent overcrowding) and minimal handling of fish. Place large fish in buckets separate from smaller prey-sized fish. Monitor water temperature in buckets and well-being of captured fish. If buckets are not being immediately transported, use aerators to maintain water quality. As rapidly as possible, but after fish have recovered, release fish. In cases where the stream is intermittent upstream, release fish in downstream areas and away from the influence of the construction. Capture and release will be supervised by a fishery biologist experienced with work area isolation and safe handling of all fish.

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

with a by-pass culvert or a water-proof lined diversion ditch. Diversion sandbags can be filled with material mined from the RHCA as long as such material is replaced at end of project. Small amounts of instream material can be moved to help seal and secure diversion structures. If ESA listed-fish may be present and pumps are required to dewater, the intake must have a fish screen(s) and be operated in accordance with NMFS fish screen criteria described below (in part e.ii) of this section. Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. If diversion allows for downstream fish passage, place diversion outlet in a location to promote safe reentry of fish into the stream channel, preferably into pool habitat with cover. Pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel.

e. Surface water withdrawals
    i. Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate. Where ESA-listed fish may be present, diversions may not exceed 10% of the available flow and fish screen(s) will be installed, operated, and maintained according to NMFS's fish screen criteria (NMFS 2011e).
    ii. For the dewatering of a work site to remove or install culverts, bridge abutments etc., if ESA-listed fish may be present, a fish screen that meets criteria specified by NMFS (2011e) must be used on the intake to avoid juvenile fish entrainment. If ESA-listed salmon, steelhead, eulachon, or green sturgeon may be present, the Action Agencies will ensure that the fish screen design is reviewed and approved by NMFS for consistency with NMFS (2011e) criteria if the diversion (gravity or pump) is at a rate greater than 3 cfs. NMFS approved fish screens have the following specifications: a) An automated cleaning device with a minimum effective surface area of 2.5 square feet per cfs, and a nominal maximum approach velocity of 0.4 feet per second (fps), or no automated cleaning device, a minimum effective surface area of 1 square foot per cfs, and a nominal maximum approach rate of 0.2 fps; and b) a round or square screen mesh that is no larger than 2.38 mm (0.094 inches) in the narrow dimension, or any other shape that is no larger than 1.75 mm (0.069 inches) in the narrow dimension.
f. Stream re-watering – Upon project completion, slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden release of suspended sediment. Monitor downstream during re-watering to prevent stranding of aquatic organisms below the construction site.

Project Design Criteria for Aquatic Restoration Activity Categories

Category 1. Fish Passage Restoration includes the following: total removal of culverts or bridges, or replacing culverts or bridges with properly sized culverts and bridges, replacing a damaged culvert or bridge, and resetting an existing culvert that was improperly installed or damaged; stabilizing and providing passage over headcuts; removing, constructing (including relocations), repairing, or maintaining fish ladders; and constructing or replacing fish screens for irrigation diversions. Such projects will take place where fish passage has been partially or completely eliminated through road construction, stream degradation, creation of small dams and weirs, and irrigation diversions. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

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

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

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

ii. **Bridge Design**

1. Bridges with vertical abutments, including concrete box culverts, which are constructed as bridges, shall have channel widths that are designed using the culvert criteria (PDC 21a-i above). This opinion does not cover bridges that require pile driving within a wetted stream channels.
2. Primary structural elements must be concrete, metal, fiberglass, or untreated timber. Concrete must be sufficiently cured or dried before coming into contact with stream flow.

3. Riprap must not be placed within the bankfull width of the stream. Riprap may only be placed below bankfull height when necessary for protection of abutments and pilings. However, the amount and placement of riprap should not constrict the bankfull flow.

iii. **Crossing Design**

1. Crossings shall be designed using an interdisciplinary design team consisting of an experienced Engineer, Fisheries Biologist, and Hydrologist/Geomorphologist. 2. Forest Service crossing structures wider than 20 feet or with costs that exceed $100,000 shall be reviewed by the USDA-Forest Service, Region 6, Aquatic Organism Passage Design Assistance Team.

3. At least one member of the design team shall be trained in a weeklong Aquatic Organism Passage course based *Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings* (USDA-Forest Service 2008).

4. Bankfull width shall be based on the upper end of the distribution of bankfull width measurements as measured in the reference reach to account for channel variability and dynamics.

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

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

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

1. **Stabilize Headcuts**

a. In streams with current or historic fish presence, provide fish passage over stabilized headcut through constructed riffles for pool/riffle streams or a series of log or rock structures for step/pool channels as described in Category 2 below.

b. Armor headcut with sufficiently sized and amounts of material to prevent continued up-stream migration of the headcut. Materials can include both rock and organic materials which are native to the area. Material shall not contain gabion baskets, sheet pile, concrete, articulated concrete block, and cable anchors.

c. Focus stabilization efforts in the plunge pool, the headcut, as well as a short distance of stream above the headcut.
d. Minimize lateral migration of channel around headcut ("flanking") by placing rocks and organic material at a lower elevation in the center of the channel cross section to direct flows to the middle of channel.
e. Short-term headcut stabilization (including emergency stabilization projects) may occur without associated fish passage measures. However, fish passage must be incorporated into the final headcut stabilization action and be completed during the first subsequent in-water work period.
f. In streams without current or historic fish presence, it is recommended to construct a series of downstream log or rock structures as described in part ii below to expedite channel aggradation.

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

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

b. **Fish Ladders**

i. **NMFS fish passage review and approve –** The Action Agencies will ensure that the action is individually reviewed and approved by NMFS for consistency with criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2011e).

ii. Design preference is based on project type, level of maintenance, and required monitoring essential for reliable fish passage. Typical fishway designs include:

1. Roughened channels/boulder step structures
2. Channel spanning concrete sills
3. Pool and chute, and
4. Pool and weir fishways.

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

iii. If a project involves the removal of multiple barriers on one stream or in one watershed over the course of a work season, remove the most upstream barrier first if possible.

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

i. **NMFS fish passage review and approve** – The Action Agencies will ensure that the action is individually reviewed and approved by National Marine Fisheries Service (NMFS) for consistency with criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2011e).

ii. Diversion structures—associated with points of diversion and future fish screens—must pass all life stages of threatened and endangered aquatic species that historically used the affected aquatic habitat.

iii. Water diversion intake and return points must be designed (to the greatest degree possible) to prevent all native fish life stages from swimming or being entrained into the diversion.

iv. NMFS fish screen criteria (NMFS 2011e) applies to federally listed salmonid species under their jurisdiction. This includes screens in temporary and permanent pump intakes.

v. All fish screens will be sized to match the irrigator's state water right or estimated historic water use, whichever is less.

vi. Size of bypass structure should be big enough to pass steelhead kelt into the stream.

vii. Abandoned ditches and other similar structures will be plugged or backfilled, as appropriate, to prevent fish from swimming or being entrained into them.

viii. When making improvements to pressurized diversions, install a totalizing flow meter capable of measuring rate and duty of water use. For non-pressurized systems, install a staff gage or other measuring device capable of measuring instantaneous rate of water flow.

ix. Conversion of instream diversions to groundwater wells will only be used in circumstances where there is an agreement to ensure that any surface water made available for instream flows is protected from surface withdrawal by another water-user.
x. For the removal of diversion structures constructed of local rock and dirt, the project sponsor will dispose of the removed material in the following manner:

1. Material more than 60% silt or clay will be disposed in uplands, outside of the active floodplain.
2. Material with more than 40% gravel will be deposited within the active floodplain, but not in wetlands.
3. Material with more than 50% gravel and less than 30% fines (silt or clay) may be deposited below the ordinary high water mark (HWM).

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

a. **Large Wood and Boulder Projects**

i. Place large wood and boulders in areas where they would naturally occur and in a manner that closely mimic natural accumulations for that particular stream type. For example, boulder placement may not be appropriate in low gradient meadow streams.
ii. Structure types shall simulate disturbance events to the greatest degree possible and include, but are not limited to, log jams, debris flows, windthrow, and tree breakage.
iii. No limits are to be placed on the size or shape of structures as long as such structures are within the range of natural variability of a given location and do not block fish passage.
iv. Projects can include grade control and bank stabilization structures, while size and configuration of such structures will be commensurate with scale of project site and hydraulic forces.
v. The partial burial of large wood and boulders is permitted and may constitute the dominant means of placement. This applies to all stream systems but more so for larger stream systems where use of adjacent riparian trees or channel features is not feasible or does not provide the full stability desired.
vi. large wood includes whole conifer and hardwood trees, logs, and rootwads. large wood size (diameter and length) should account for bankfull width and stream discharge rates. When available, trees with rootwads should be a minimum of 1.5x bankfull channel width, while logs without rootwads should be a minimum of 2.0x bankfull width.

vii. Structures may partially or completely span stream channels or be positioned along stream banks.
viii. Stabilizing or key pieces of large wood must be intact, hard, with little decay, and if possible have root wads (untrimmed) to provide functional refugia habitat for fish. Consider orienting key pieces such that the hydraulic forces upon the large wood increases stability
ix. Anchoring large wood – Anchoring alternatives may be used in preferential order:

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

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

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

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

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

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

c. Porous Boulder Structures and Vanes

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

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

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

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

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

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

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

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

d. Gravel Augmentation

i. Gravel can be placed directly into the stream channel, at tributary junctions, or other areas in a manner that mimics natural debris flows and erosion.
ii. Augmentation will only occur in areas where the natural supply has been eliminated, significantly reduced through anthropogenic disruptions, or used to initiate gravel accumulations in conjunction with other projects, such as simulated log jams and debris flows.
iii. Gravel to be placed in streams shall be a properly sized gradation for that stream, clean, and non-angular. When possible use gravel of the same lithology as found in the watershed. Reference the Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings (USDA-Forest Service 2008) to determine gravel sizes appropriate for the stream.
iv. Gravel can be mined from the RHCA at elevations above bankfull, but not in a manner that would cause stranding during future flood events. Crushed rock is not permitted.
v. After gravel placement in areas accessible to higher stream flow, allow the stream to naturally sort and distribute the material.
vi. Do not place gravel directly on bars and riffles that are known spawning areas, which may cause fish to spawn on the unsorted and unstable gravel, thus potentially resulting in redd destruction.
vii. Imported gravel must be free of invasive species and non-native seeds. If necessary, wash gravel prior to placement.

e. Tree Removal for Large Wood Projects

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

Category 11. Road and Trail Erosion Control decommissioning roads and trails, including culvert removal in perennial and intermittent streams; removing, installing or upgrading cross-drainage culverts; upgrading culverts on non-fish-bearing steams; constructing water bars and dips; reshaping road prisms; vegetating fill and cut slopes; removing and stabilizing of sidecast materials; grading or resurfacing roads that have been improved for aquatic restoration with gravel, bark chips, or other permeable materials; contour shaping of the road or trail base; removing road fill to native soils; soil stabilization and tilling compacted surfaces to reestablish native vegetation. Roads closed under Forest Service and BLM/BIA-equivalent Travel and Access Management Plans will be subject to these PDC and may be addressed under this opinion. However, such "plans" for road management will require separate consultations. Such actions will target priority roads that contribute sediment to streams, block fish passage, or disrupt floodplain and riparian functions. Equipment such as excavators, bull dozers, dump trucks, front-end loaders, and similar equipment may be used to implement projects.

a. Road Decommissioning and Stormproofing

i. For road decommissioning and hydrologic closure projects within riparian areas, recontour the affected area to mimic natural floodplain contours and gradient to the extent possible.

ii. When obliterating or removing road segments adjacent to a stream, use sediment control barriers between the road and stream if space is available.

iii. Dispose of slide and waste material in stable sites out of the flood-prone area. Native material may be used to restore natural or near-natural contours.

iv. Drainage features used for stormproofing and treatment projects should be spaced as to hydrologically disconnect road surface runoff from stream channels. If grading and resurfacing is required, use gravel, bark, or other permeable materials for resurfacing.

v. Minimize disturbance of existing vegetation in ditches and at stream crossings.

vi. Conduct activities during dry-field conditions (generally May 15 to October 15) when the soil is more resistant to compaction and soil moisture is low.

vii. When removing a culvert from a first or second order, non-fishing bearing stream, project specialists shall determine if culvert removal should include stream isolation and rerouting in project design. Culvert removal on fish bearing streams shall adhere to the measures described in Fish

Passage Restoration (PDC 1).

viii. For culvert removal projects, restore natural drainage patterns and channel morphology. Evaluate channel incision risk and construct in-channel grade control structures when necessary.

b. Road Relocation

i. When a road is decommissioned in a floodplain and future vehicle access through the area is still required, relocate the road as far as practical away from the stream.

ii. The relocation will not increase the drainage network and will be constructed to hydrologically disconnect it from the stream network to the extent practical. New cross drains shall discharge to stable areas where the outflow will quickly infiltrate the soil and not develop a channel to a stream.

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

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

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

Project Design Criteria by Resource

Fisheries and Hydrology

Fisheries and Hydrology resources will follow all mitigation measures and project design criteria for aquatic restoration activities as shown in the 'Aquatic Restoration Project Categories, Program Administration, General Aquatic Conservation Measures, and Project Design Criteria for Aquatic Restoration Activity Categories on the Malheur National Forest.'
Additional Aquatic project design criteria were developed for the following elements: Tree Tipping and Felling, Juniper Treatments, Tree Hauling, and Prescribed Burning.

General For Inside Riparian Habitat Conservation Areas

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

Tree Tipping and Tree Felling for Large Wood Projects

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

Table 5 Primary shade zone width, based on adjacent hill slope.

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

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

The trees are located on a south facing slope (175-185 degree azimuth) and therefore do not provide stream shade;

An appropriate level of analysis is completed and documented, such as shade modeling, using site-specific characteristics to determine the primary shade tree width; and or

Field monitoring or measurements are completed to determine the width where optimum Angular Canopy Density (65% or greater) is achieved (see TMDL Implementation Strategies).

If trees are being felled for safety reasons they can be felled towards the stream.

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

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

Diameter

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

Table 6 Bankfull widths and minimum diameter of logs to be considered key pieces.

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

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

Length

The length of the wood is also important to stability. To be considered a key piece a log with a rootwad still attached should be at least one and one-half times (1.5X) the bankfull or a log without a rootwad should be twice (2X) the length of the stream’s

bankfull width. As the best fish habitat is formed around jams composed of 3 to7 logs, at least 2 key pieces should be used at each structure.

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

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

Juniper Treatments

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

What kind of site (potential natural vegetation, soils)?

Successional state of site?

Components that need to be restored?

How units may fit into the overall landscape mosaic?

Long-term goals and objectives?

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

Tree and Boulder Hauling

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

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

Haul Restrictions to Prevent Fine Sediment Delivery to Streams

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

- During haul, weather conditions are monitored daily for the chance of precipitation by the Hydrologist or Fish Biologist.
- No rutting of the road surface is occurring, indicating the subsurface is wet.
- Frozen ground conditions.
- Haul will cease at any time when the travelway of the road is wet and turbid water or fines are observed moving off the road surface to ditchlines that deliver to stream channels regardless of time of year.

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

Paved roads

Surfaced Ridge top roads

Surfaced outsloped roads with no ditch or stream crossings

Prescribed Burning and Related Activities

Mechanical piling and burning of large piles will be restricted to existing roads and landings.

Include all relevant PDC in Silviculture prescriptions and burn plan objectives for all fuel treatment activities within RHCA's.

Use all available fuel treatments and preparation activities as necessary (e.g. multiple entries, slash pull-back; modified ignition methods, locations, timing, and sequence; thinning of small green trees; pruning of green trees and snags, prescribed fire, fire suppression, jack pot burning, etc.) to achieve the specific PDC. Suppression should be used only as a last resort to achieve other PDC.

For perennial and fish-bearing stream channels:

Avoid removing trees along stream banks (e.g. don't cause bank instability or increase erosion).

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

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

For intermittent, non-fish-bearing stream channels:

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

For the maintenance and use of water sources and draft sites:

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

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

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

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

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

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

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

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

Wildlife

Threatened, Endangered or Sensitive Species

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

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

Raptors

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

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

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

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

Big Game

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

Botany

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

Rare and Sensitive Plants and Habitats

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

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

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

Sensitive and Unique Habitats

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

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

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

Groundwater-Dependent Ecosystems

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

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

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

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

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

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

Invasive Plant Species

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

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

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

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

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

Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before

any use of pit material. Use only gravel, fill, sand, and/or rock that are judged to be weed free by District or Forest weed specialists.

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

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

Native Plant Materials and Revegetation

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

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

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

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

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

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

Newly planted and/or seeded areas should be protected from animals and activities that may prevent, retard, or slow the establishment and recovery of native vegetation. Site-specific measures may include building fences, piling slash, jackstrawing, closing areas to vehicles, and/or temporarily changing grazing regimes until the desired condition is sufficiently achieved.

Soils

For projects involving heavy machinery off roads, the project proponents shall inspect the site for existing impacts to the soil. If existing impacts appear to be heavy on the Malheur or moderate on the Ochoco, they shall contact a soil scientist, who shall

determine what site specific project design criteria are necessary to meet Forest Plan and Forest Service Manual standards and guidelines. (If a soil scientist is not available, a silviculturist or hydrologist can do the work.) If standards and guidelines cannot be met, heavy machinery shall not be used.

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

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

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

For Road Erosion Control, erosion would be minimized.

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

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

Fire and Fuels

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

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

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

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

Heritage Resources

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

The District or Zone archaeologist will document their findings on a Programmatic Agreement form with a project description, rationale and location map which will be attached to the Forest Service Heritage Event database. The Forest archaeologist will

review and sign off on the Programmatic Review form if concurred with. For appendices A, B and C projects as defined in the 2004 Programmatic Agreement, the Forest will retain the documentation and provide the Oregon State Historic Preservation Office with the annual summary of projects as described in the Preservation Act.

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

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

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

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

Recreation

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

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

Grazing

General

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

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

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

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

Protection of Government and Permittee Investments

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

Maintain structural integrity of range improvements.

If structural improvements are damaged during project operations they would be repaired to Forest Service standards prior to livestock scheduled use by the party responsible for causing the damage. Repairs would be required of the purchaser if damage were done during thinning or fuel treatment contractors or by force account where appropriate.

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

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

Aspen Restoration

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

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

Notification

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

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