Forest Aquatic Restoration Project
NEPA Compliance and Implementation Checklist

Summit Project Area Aspen Restoration

Project Number: 0406-2019 **Date:** 03/05/2019 **Location:** See Implementation Plan

Category: Category 2- Large Wood, Boulder, Gravel-- Category 13-Riparian Vegetation Treatment Restoration-- Category 14-Riparian Vegetation Planting

Project Description: Aspen restoration (see implementation plan

Heritage (to be completed by heritage specialist)

Y	N	Initial	
☒	☐	KJD	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	
☐	☑	AT	4A Big Game Winter range	☐	☑	AT	9 Research Natural Areas
☐	☑	AT	6A & 6BWilderness	☐	☑	AT	10 Semi-Primitive Non-Motorized Recreation Areas
☐	☑	AT	7 Scenic Area	☐	☑	AT	22/22A Wild and Scenic River
☐	☑	AT	8 Special Interest Areas	☐	☑	AT	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	[signature]	4/18/2019	Follow ALL PDCs addressed in Sums Creek EA for Heritage
Botany	[signature]	3/21/19	known RG listed sensitives do occur in project area Follow PDCs & work w/ the botanists.
Invasive Plants	[signature]	3/21/19	Strictly follow PDCs to prevent new infestations!
Wildlife	[signature]	3/27/19	make sure to follow all PDC's pertaining to wlf, ensure Bio present during tree tipping
Fish*	[signature]	3/14/2019	Consistent with relevant PDCs for Fisheries
Hydrology*	[signature]	4/22/19	consistent with relevant PDCs
Range	[signature]	3/19/19	Work with Range for potential fencing and livestock movement
Soils	[signature]	4/3/19	NELSON SAYS "EXISTING IMPACTS ARE GENERALLY MINOR"
Recreation	[signature]	3/19/19	No recreation concerns
Special Uses	[signature]	3/20/19	See attached
Lands	[signature]	3/20/19	See attached
Mining	[signature]	4/29/19	No mine claims in the area - per GIS layer.
Engineering	[signature]	3/28/19	
Fuels / Fire	[signature]	4/15/19	No concern
Silviculture	[signature]	4/1/19	PDCs - ensure any piles are away from remaining trees

* 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: [signature] Date: 4/29/2019

Line Officer Signature: [signature] Date: 4/29/2019

Forest Aquatic Restoration Project
NEPA Compliance and Implementation Checklist

Summit Project Area Channel (large wood) Restoration

Project Number: 0407-2019 **Date:** 03/05/2019 **Location:** See Implementation Plan

Category: Category 2- Large Wood, Boulder, Gravel-- Category 4- Channel Restoration/ Relocation-- Category 13-Riparian Vegetation Treatment Restoration-- Category 14- Riparian Vegetation Planting—Category 16- Beaver Habitat Restoration

Project Description: Channel (large wood) restoration (see implementation plan

Heritage (to be completed by heritage specialist)

Y	N	Initial	
☒	☐	RSD	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	
☐	☑	AT	4A Big Game Winter range	☐	☑	AT	9 Research Natural Areas
☐	☑	AT	6A & 6BWilderness	☐	☑	AT	10 Semi-Primitive Non-Motorized Recreation Areas
☐	☑	AT	7 Scenic Area	☐	☑	AT	22/22A Wild and Scenic River
☐	☑	AT	8 Special Interest Areas	☐	☑	AT	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		4/18/2019	FOLLOW ALL HERITAGE PDC'S ADDRESSED, NOTIFY DISTRICT ARCH. PRIOR TO TREE TIPPING.
Botany		3-21-2019	Area to be surveyed in spring
Invasive Plants		3-21-2019	Follow PDC's to prevent new infestations!
Wildlife		3/21/2019	follow wildlife PDC + make sure Bio. is present during tree tipping
Fish*		3/14/2019	Consistent with all PDC's for Fisheries.
Hydrology*	Hazel Wood	3/14/19	consistent " " Hydrology
Range		3/19/19	Work with Range to ensure water is available for livestock
Soils	Robert C. Mitchell	4/3/19	NELSON SAYS "EXISTING IMPACTS ARE GENERALLY MINOR"
Recreation		3/19/19	No recreation concerns
Special Uses	Skiwell	3/20/19	No lands SUPs currently identified within or adjacent to project boundary
Lands	Skiwell	3/20/19	See attached.
Mining		4-7-19	No mining claims in project area.
Engineering		3/28/19	
Fuels / Fire		4/15/19	No concerns
Silviculture		4/1/19	No concerns at this Time - PDCs in place

* 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: 4/29/2019

Line Officer Signature: _____ Date: 4/29/2019

Forest Aquatic Restoration Project
NEPA Compliance and Implementation Checklist

Summit Project Area Meadow Restoration

Project Number: 0408-2019 **Date:** 03/05/2019 **Location:** See Implementation Plan

Category: Category 2- Large Wood, Boulder, Gravel-- Category 4- Channel Restoration/ Relocation-- Category 13-Riparian Vegetation Treatment Restoration-- Category 14- Riparian Vegetation Planting—Category 16- Beaver Habitat Restoration

Project Description: Meadow restoration (see implementation plan

Heritage (to be completed by heritage specialist)

Y	N	Initial	
☒	☐	RJD	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	
☐	☑	AT	4A Big Game Winter range	☐	☑	AT	9 Research Natural Areas
☐	☑	AT	6A & 6BWilderness	☐	☑	AT	10 Semi-Primitive Non-Motorized Recreation Areas
☐	☑	AT	7 Scenic Area	☐	☑	AT	22/22A Wild and Scenic River
☐	☑	AT	8 Special Interest Areas	☐	☑	AT	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		4/18/2019	FOLLOW ALL HERITAGE PDC's ADDRESSED. NOTIFY DISTRICT ARCH PRIOR TO TREE TIPPING.
Botany		3-21-2019	Little Logan has sensitive plants. Follow PDCs strictly & work w/ botanist. Wickiup to be surveyed in spring. follow up w/ botanist.
Invasive Plants		3-21-2019	Follow PDC's to prevent new infestations.
Wildlife		3-27-2019	follow all PDC's + make sure Bio is present during tree tipping
Fish*		3/14/2019	Consistent with all PDCs relevant to Aquatics.
Hydrology*		4/22/2019	consistent w/ all PDCs
Range		3/19/19	work with Range to ensure water is available for livestock
Soils		3/26/19	NELSON SAYS "EXISTING IMPACTS ARE GENERALLY MINOR"
Recreation		3/19/19	No recreation concerns
Special Uses		3/20/19	See attached
Lands		3/20/19	See attached
Mining		4/25/19	No mine claims in the project area - per GIS layer.
Engineering		3/28/19	
Fuels / Fire		4/15/19	No Concerns
Silviculture		4/1/19	Follow PDS.

* 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: Renee Helwell Date: 4/29/19

Line Officer Signature: [signature] Date: 4/29/19


Implementation Description:

Summit and Bosonberg subwatersheds aquatic restoration projects Aspen, In-Stream, and Meadow Restoration

Category 2 – Large Wood, Boulder, and Gravel Category 4- Channel Restoration/Relocation Category 13 – Riparian Vegetation Treatment Category 14 – Riparian Vegetation Planting Category 16 – Beaver Habitat Restoration	Lead Preparer: Jordan Bass/ Allen Taylor
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: 06/01/2019	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 associated with the following checklists for aquatic restoration developed under the Summit EA:

- ***0406-2019 (aspen)***
- ***0407-2019 (in-stream channel restoration)***
- ***0408-2019 (meadow restoration)***

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 Bosonberg 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.

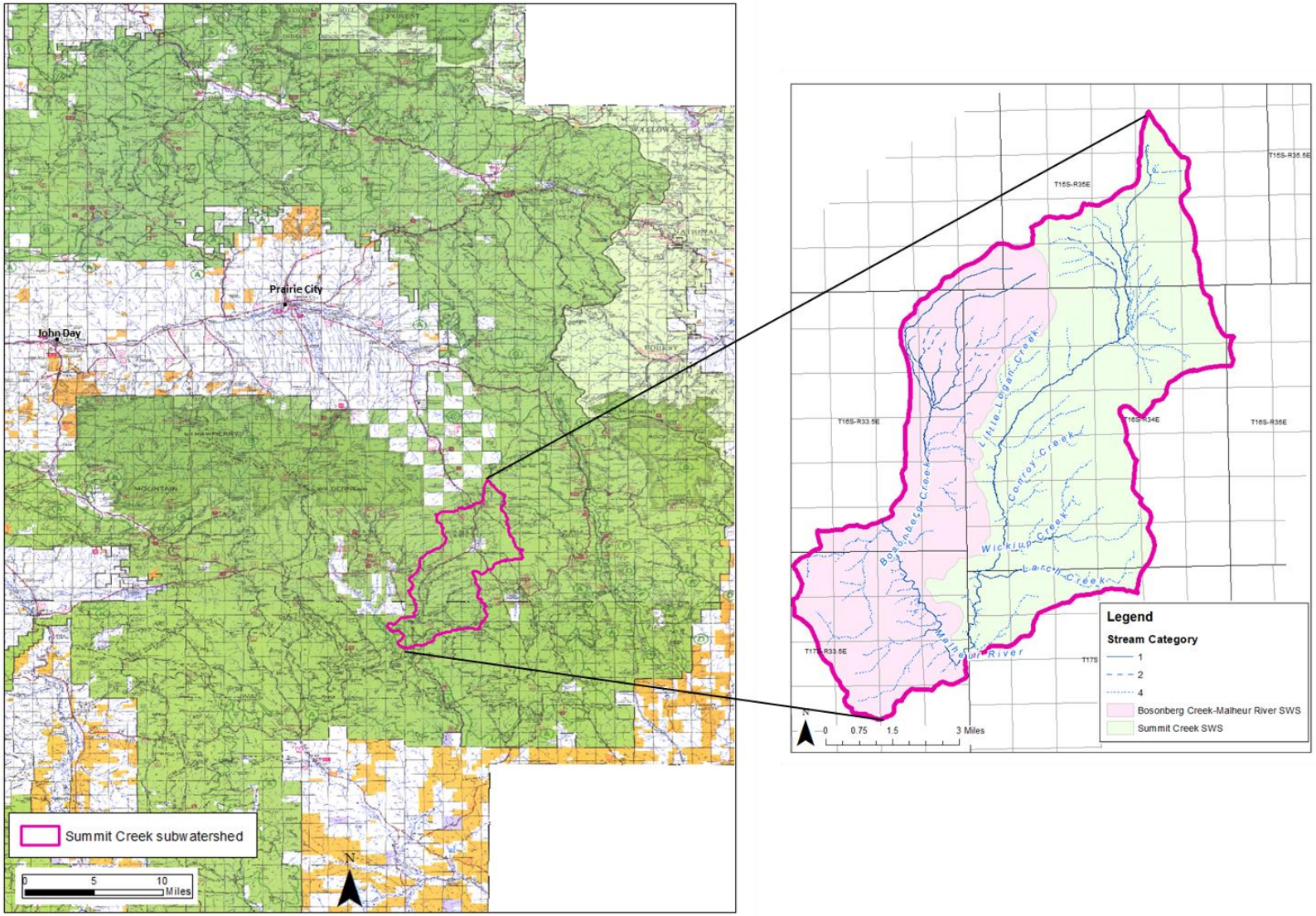
T:Pathway

Geospatial information for this project is located here:
T:\FS\NFS\Malheur\Project\AquaticRestoration2014\GIS\Implementation\PCRD\FY17\SummitProjectArea\AqRestprojects.gdb

Relevant layers: *AllAspenForChecklist, LargeWood, Meadow*

[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
Channel (large wood) restoration	▪ Bosonberg Creek	▪ Category 2 – Large Wood, Boulder, and Gravel ▪ Category 4- Channel Restoration/Relocation ▪ Category 13 – Riparian Vegetation Treatment restoration ▪ Category 14 – Riparian Vegetation Planting ▪ Category 16 – Beaver Habitat Restoration
Meadow restoration	▪ Bosonberg Tributaries/Logan Valley ▪ West Summit Creek ▪ West Summit Creek Tributary ▪ Unnamed tributary to Summit Creek ▪ North Summit Creek ▪ Little Logan Creek ▪ Wickiup Creek	▪ Category 2 – Large Wood, Boulder, and Gravel ▪ Category 4- Channel Restoration/Relocation ▪ Category 13 – Riparian Vegetation Treatment ▪ Category 14 – Riparian Vegetation Planting ▪ Category 16 – Beaver Habitat Restoration
Aspen restoration	▪ 34 acres of riparian aspen in Bosonberg-Malheur River subwatershed ▪ 82 acres of riparian aspen in Summit subwatershed (see map)	▪ Category 2 – Large Wood, Boulder, and Gravel ▪ Category 13 – Riparian Vegetation Treatment ▪ Category 14- Riparian Vegetation Planting

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. Bosonberg 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.

MA2- Rangeland

Emphasize forage production on nonforested areas on a sustained yield basis while providing for other resources and values.

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 and MA2), 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 (9 ºC), 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 Bosonberg 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.

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).

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.

Aspen Restoration

Aspen restoration describes a number of projects with the primary objectives of aspen restoration. All of these projects include a riparian aspen stand with varying levels of decline. The root cause of the decadent aspen stands vary slightly at each site-specific location. In all the aspen stands, a major cause of decline is lack of frequent wildfire disturbance and increased conifer encroachment. Incised stream channels and grazing issues are also common contributors. Therefore the first of two treatment types addresses those primary threats. In addition, many aspen stands are overstocked with large conifers that can be tipped and used in 'channel (large wood) restoration' projects described below. Tipping large trees from aspen stands for large wood projects is a great opportunity to reduce competition to aspen and utilize those materials to benefit streams deprived in large wood. The second category of aspen treatments includes this additional treatment. Table 2 and the project implementation descriptions below provide those site-specific details.

Aspen restoration includes the following activity categories:

- Category 2 – Large Wood, Boulder, and Gravel
- Category 13 – Riparian Vegetation Treatment restoration
- Category 14- Riparian Vegetation Planting

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

Project description	Project Location	TR Location	USGS quad	Land Use Plan Conformance	Year
Hand-falling Stands: ▪ Thin conifers from the aspen stand using chainsaws. Target trees are all encroaching conifers that are competing with aspen (less than ~24" dbh), except those providing primary shade or bank stability. ▪ Add large and coarse wood to the channel by placing by hand or directionally felling to meet forest plan standards for large wood. ▪ Protecting aspen with caging, fencing and/or shrouding	Up to 34 acres in the Bosonberg-Malheur subwatershed and up to 69 acres in the Summit subwatershed	See map	Logan Valley East (B544118), Dollar Basin (A544118) Magpie Table (A644118)	*Within*: Category 1, 2, 4 RHCA, MA3A *Adjacent to:* MA1, MA14	2019-2021

Project description	Project Location	TR Location	USGS quad	Land Use Plan Conformance	Year
▪ Possible prescribed burning depending on Rx burning timelines for the area					
Hand-falling and/or Tipping stands: ▪ Thin conifers from the aspen stand using chainsaws and/or heavy equipment. Target trees are all encroaching conifers that are competing with aspen (less than ~24" dbh), except those providing primary shade or bank stability ▪ Add large and coarse wood to the channel by placing with an excavator, hand-felling, or directional felling to meet forest plan standards for large wood ▪ Trees may be used on-site or staged using heavy equipment for use in large wood restoration at other locations ▪ Protect aspen with caging, fencing and/or shrouding ▪ Possible prescribed burning depending on Rx burning timelines for the area	Up to 13 acres in the Summit subwatershed	See map	Logan Valley East (B544118), Dollar Basin (A544118), Magpie Table (A644118)	*Within*: Category 1, 2, 4 RHCA, MA3A *Adjacent to:* MA14	2019-2021

*Includes part of section where creek/river(s) runs through

**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.

Summary of treatment:
In acres:

Subwatershed	**Hand-falling stands (acres)**	**Hand-falling and/or Tipping**
Bosonberg Creek-Malheur River subwatershed	34	0
Summit Creek subwatershed	69	13
Total	**103**	**13**

In stream miles:

Subwatershed	**Stream miles affected (miles)**
Bosonberg Creek-Malheur River	1.13
Summit Creek	2.57
Total	**3.70**

Implementation plan

To attain the desired conditions, the USFS is proposing the following actions:

1) 'Hand-falling' stands –

Channel, floodplain, aspen, and riparian restoration would include the following activities:

- Felling– The goal of this action is to remove/reduce trees that have encroached onto the floodplain in the absence of wildfire, enhance aspen stands, and utilize a local source for in-stream wood. The encroachment of conifers has contributed to a de-watered floodplain, declining aspen stand, and incised channel. Trees less than 24" DBH located on the floodplain or from the nearby hillslope on either side of the stream (outside the primary shade zone) would be utilized. This activity would occur through hand-falling with a chainsaw. Leave tree species preference will be Engelmann Spruce, Western Larch, Ponderosa Pine, and Douglas-fir, selecting for the healthiest individuals. Lodgepole pine and western juniper will be targeted for removal. The prescription targets trees within 150 feet from any live aspen tree, and includes specifications for skips and gaps. Handpiling may occur where excess fuels would create undesirable fire effects, and the prescription includes specifications that limit the proximity of handpiles near streams to protect water quality. Aspen found outside the mapped units would be treated on a situational basis due to minor GIS clipping errors. Snags would be left for wildlife habitat unless they pose a threat to operations that cannot be mitigated.

- Large wood augmentation- the felled small and large wood (from *felling a*bove) would be placed or directionally felled into the channel and onto the floodplain. Wood would be placed into the channel as small wood structures and individual pieces to dissipate energy and capture sediment (Figure 5). The majority of wood structures would be smaller (not requiring the use of heavy machinery). Wood structures and individual pieces would also be created near side channels to encourage connectivity between the mainstem and side channels during high flow events. Structures (of variable sizes) would occur ***up to*** 50 feet apart along the stream channel.

- Prescribed burning – In order to stimulate natural aspen and other hardwood regeneration, as well as reducing conifer shading and sapling competition, a low to moderate severity burn of the stand will be initiated at some point in the future. Burning would likely occur as part of larger burns for vegetation projects, but may occur at a site-specific level. Coordination with the fuels department would occur to identify anticipated burning timelines.

- Aspen protection- Exclosure fencing (including cages or temporary fence) may be utilized to protect aspen stands from ungulate browse. Felled conifers and slash material may also be used as a natural barrier, where appropriate based on fuels and other factors.

2) 'Hand-falling and/or tipping stands'–

Channel, floodplain, aspen, and riparian restoration would include the following activities:

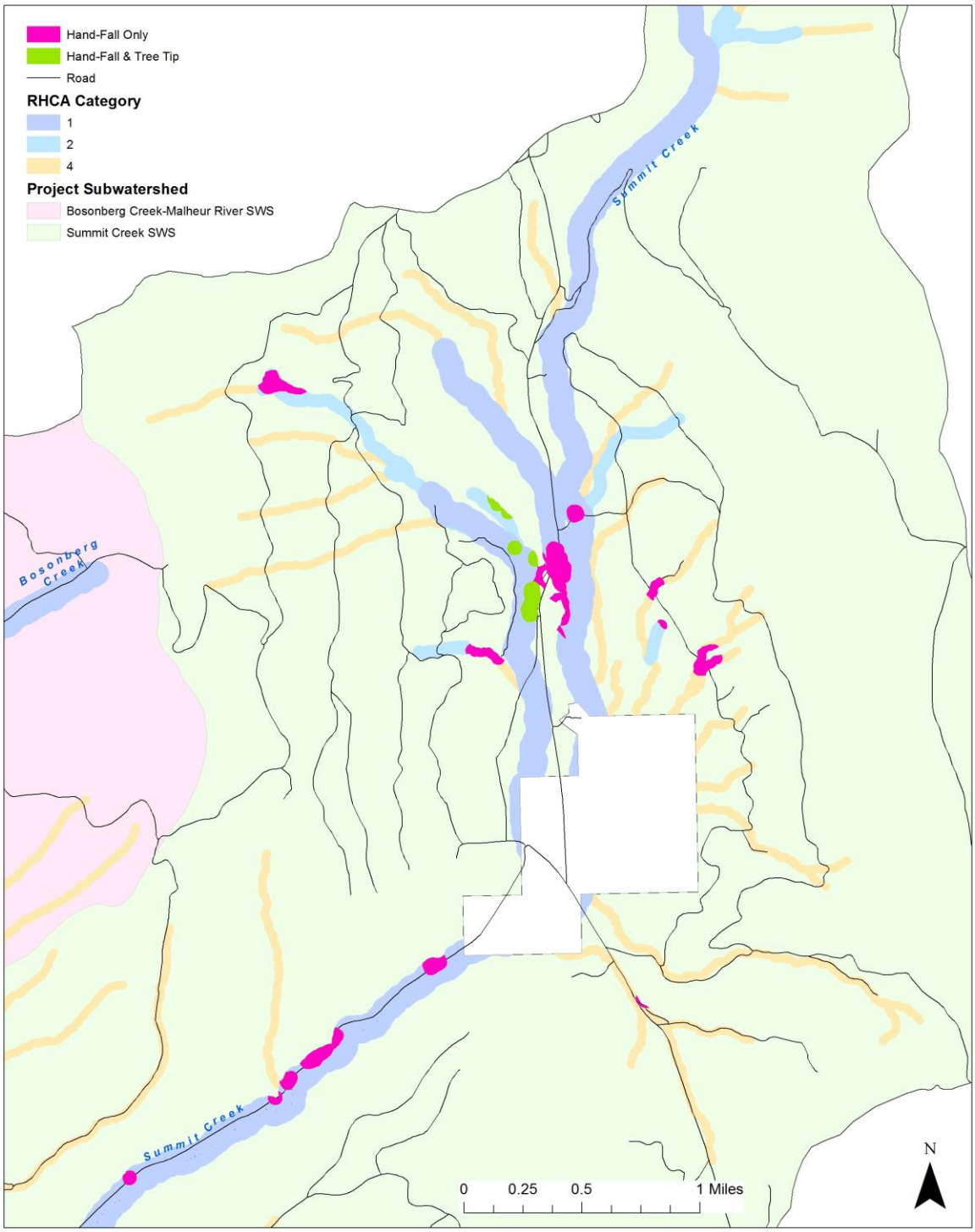
- Felling and tipping– as described for hand-falling stands only, but this activity would occur through a combination of heavy equipment and hand-falling with a chainsaw. Smaller trees would be felled using chainsaws and carried or dragged to the channel or floodplain by hand. Larger trees may be tipped or directionally felled towards the channel. An excavator may also carry large trees and place them in the channel.

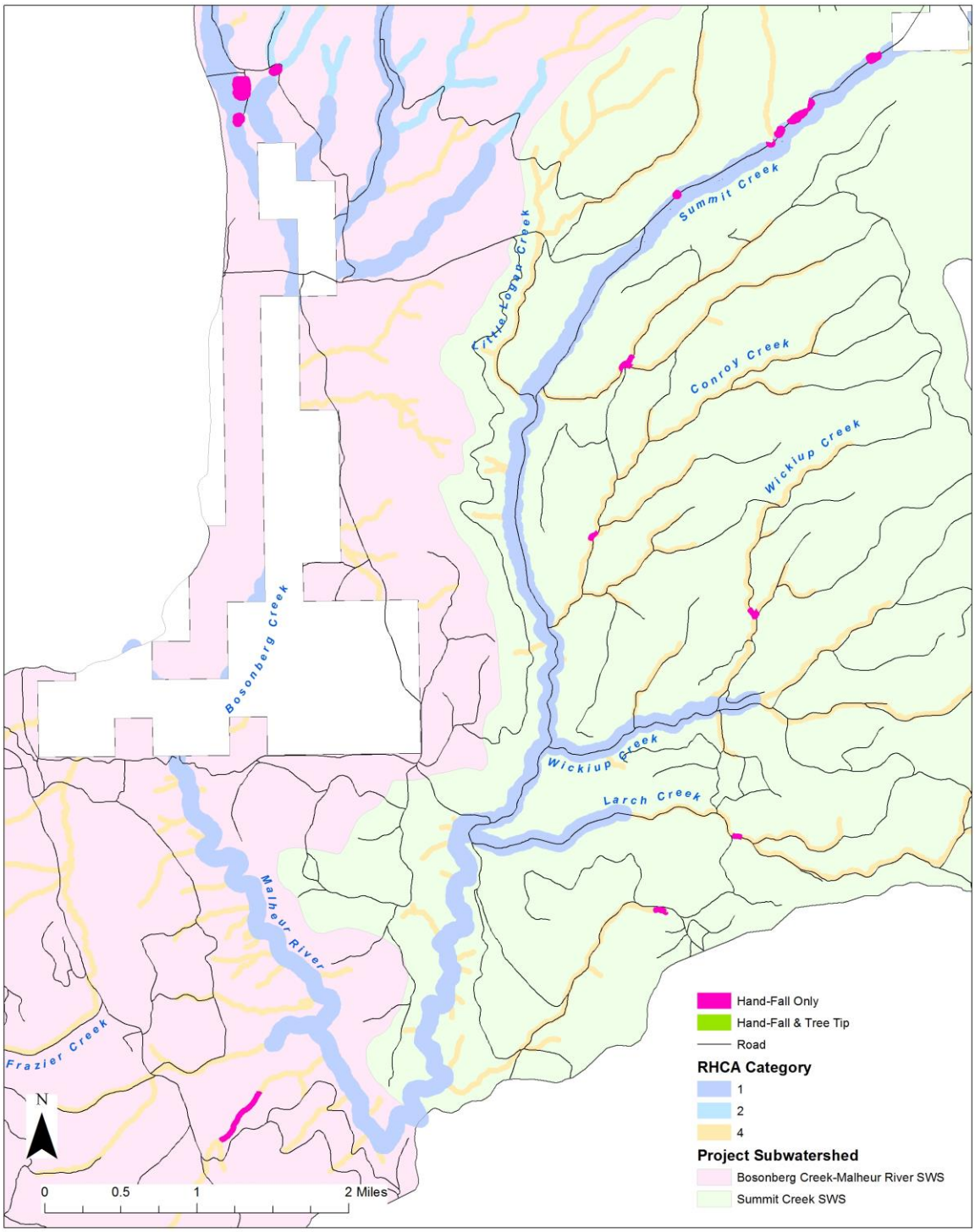
- Large wood augmentation- as described for hand-falling stands only, but this activity would occur through a combination of heavy equipment and handfalling with a chainsaw.

- Prescribed burning – as described for hand-falling stands only

- aspen protection- as described for hand-falling stands only

Maps & Figures




Summit Creek
Little Log Creek
Conroy Creek
Wickiup Creek
Bosonberg Creek
Wickiup Creek
Larch Creek
Malheur River
Frazier Creek
N
0
0.5
1
2 Miles
Hand-Fall Only
Hand-Fall & Tree Tip
Road
RHCA Category
1
2
4
Project Subwatershed
Bosonberg Creek-Malheur River SWS
Summit Creek SWS

Channel (large wood) restoration

Channel (large wood) restoration describes projects with the primary objectives of large wood restoration to improve fish habitat. Bosonberg Creek is below forest plan standards for pools and large wood, among other habitat features. This stream also has degraded hardwood communities, channel incision and/or overwidening, and poor stream shade. The restoration approach for this stream is multi-faceted to address multiple issues, but is characterized by the need for heavy equipment and large wood. Table 3 and the project implementation descriptions below provide those site-specific details.

Channel (large wood) restoration includes the following activity categories:

- Category 2 – Large Wood, Boulder, and Gravel
- Category 4- Channel Restoration/Relocation
- Category 13 – Riparian Vegetation Treatment restoration
- Category 14 – Riparian Vegetation Planting
- Category 16 – Beaver Habitat Restoration

Table 3: Site-specific project description for channel (large wood) restoration projects and year that implementation is scheduled to begin

Project description	Project Location	TR Location	USGS quad	Land Use Plan Conformance	Year
Heavy equipment: ▪ Tip trees from within the RHCA using heavy equipment (e.g. excavator, feller-buncher, etc.). Thinning would target: 1) Larger (~12-24") conifers from outside the primary shade zone. Up to 120 trees per stream mile would be tipped to meet forest plan standards for large wood; tipping would selectively thin around the largest, healthiest trees and may create small openings (less than ¼ acre, spaced at least 1/2 mile apart) outside the primary shade zone	Bosonberg Creek (up to 2 miles)	T.16S, R.33 1/2E, *Sections 1, 33, 13	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA1 & MA14	**2020

Project description	Project Location	TR Location	USGS quad	Land Use Plan Conformance	Year
2) smaller encroaching conifers (e.g. 5-10" dbh lodgepole) outside the primary shade zone that are competing with hardwoods ▪ Add trees to the channel using an excavator ▪ Plant/seed riparian hardwoods (aspen, willow, cottonwood, dogwood, alder) ▪ Protect hardwoods with caging and/or shrouding. ▪ Construct Beaver Dam analogs (BDA's) using heavy equipment or hydraulic post pounder					

*Includes part of section where creek/river(s) runs through

**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

To attain the desired conditions, the USFS is proposing the following actions:

3) Bosonberg Creek -

Channel, floodplain, and riparian restoration would include the following activities:

- Felling and tipping– The goal of this action is to remove/reduce trees that have encroached onto the floodplain in the absence of wildfire and utilize a local source for in-stream wood. The encroachment of conifers have contributed to a de-watered floodplain, shaded out hardwoods and incised channel. Conifers within the RHCA but outside the primary shade zone would be felled and left on the floodplain or added to the channel. Trees located on the floodplain or from the nearby hillslope on either side of the stream would be utilized. This activity would occur through a combination of heavy equipment and hand-falling with a chainsaw. Larger trees would be tipped and smaller trees may be tipped or felled. Both sizes would be carried or dragged to the channel or floodplain using a skidder, excavator, and/or feller-buncher.

  The primary objective for riparian thinning is to reduce young conifers that are encroaching on hardwoods in the inner riparian zone. Large trees providing overstory canopy would be avoided. Target trees for in-stream wood on Bosonberg Creek is 12"-24" dbh.

- Large wood augmentation- the tipped/felled small and large wood (from *felling and tipping* above) would be placed into the channel and onto the floodplain. The majority of materials will be sourced locally, from the RHCA, but we may have to acquire materials from other locations. Wood would be placed into the channel as complex wood structures (assemblage of small and/or large wood) or individual pieces to dissipate energy and capture sediment (Figure 5). Large structures would be created just downstream of tributary junctions to simulate the natural recruitment of wood jams at tributary junctions and to tie into the geomorphic pinch points at those locations. Smaller wood structures and individual pieces would also be created near side channels to encourage connectivity between the mainstem and side channels during high flow events. Structures (of variable sizes) would occur ***up to*** 50 feet apart along the stream channel. Large wood would be placed into the channel and floodplain using heavy equipment (e.g. excavator).

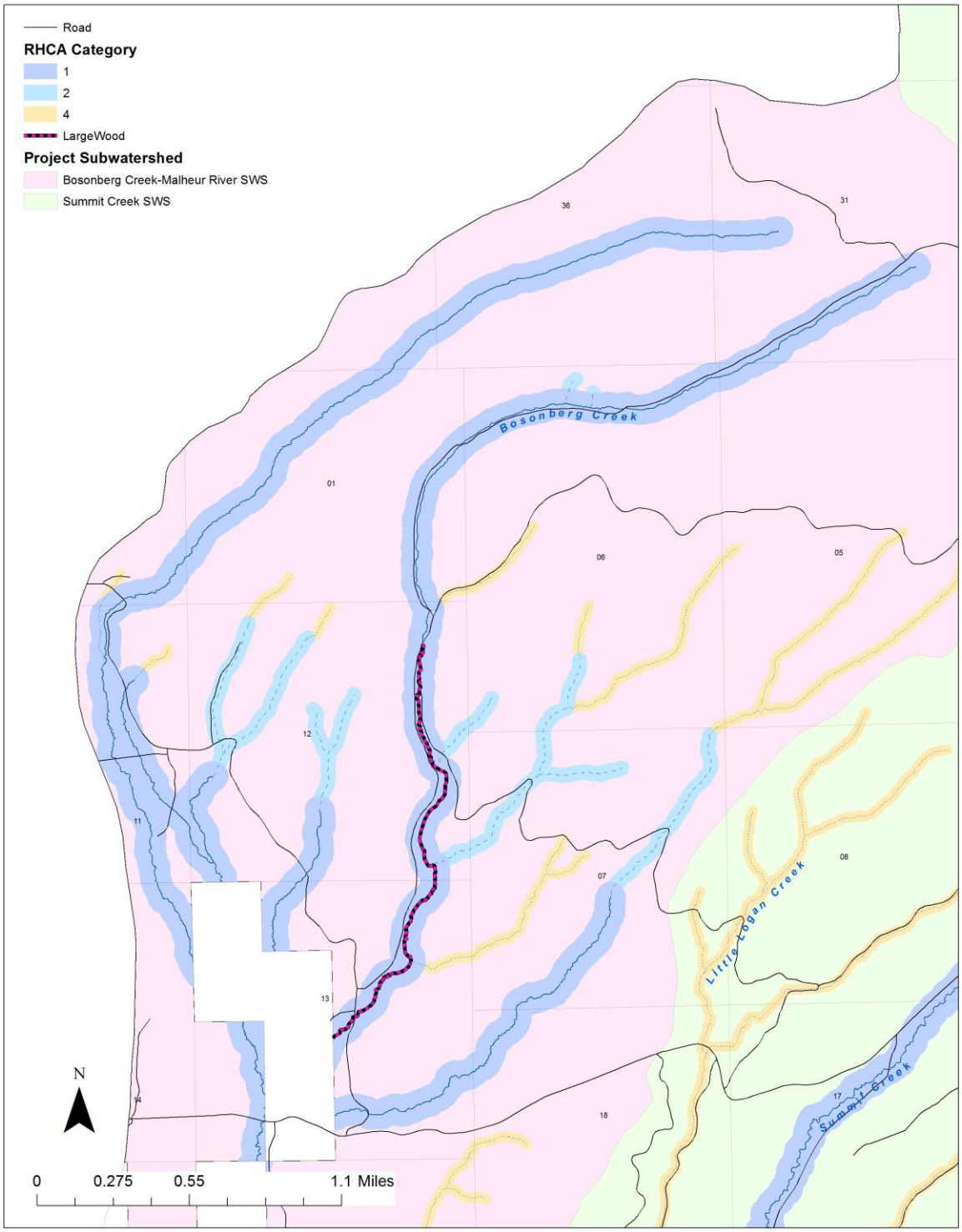
- Gravel augmentation – as the railroad grade crossing is decommissioned gravel and fill may be redistributed to incised portions of the creek to help fill in channel incision and improve floodplain connectivity. This decommissioning would be routed for approval under a separate Implementation Plan and checklist.

- Beaver dam analogs (BDAs)- The purpose of the BDA is to simulate beaver dams by damming water and capturing sediment (Figure 3 & Figure 4). BDAs would be constructed by sinking wooden posts approximately 1.5-2.5 feet apart across the length of the channel and floodplain and weaving in willow cuttings. Posts may be installed by hand (manual post-pounder) or via heavy equipment (e.g. excavator). Posts would be 30% buried into the subsurface to a depth of approximately 2-3 ft. Willow cuttings would be locally sourced or imported, as described below in *riparian hardwood planting*, and would be cut and installed by hand. The BDAs would be constructed using as much natural, untreated, biodegradable woody material as possible with the expectation that structures may start to deteriorate after 1-5 years as sediment aggrades. Maintenance of the BDA's may be necessary over time (replacing posts and/or willow cuttings), until habitat conditions support a viable beaver population within these reaches.

- Riparian hardwood planting – The majority of planting would occur in the northernmost section of the river before the canyon restricts floodplain width. Aspen, willow, dogwood, cottonwood, and/or alder would be planted or seeded to move riparian areas toward site potential vegetation (ODEQ, 2010). Hardwoods would be planted by hand or with machinery within the floodplain. Cuttings will be locally sourced or imported from facilities equipped to produce species and drainage- specific clones (e.g. Burns FFA, USFS nursery at Clarno, etc.)

- Riparian hardwood protection- Felled conifers and slash material may be used as a natural barrier, where appropriate, to reduce access by wildlife. Exclosure fencing (including cages or temporary fence paneling) may also be used if felled trees provided insufficient protection.

Maps & Figures



Meadow restoration

Meadow restoration projects describe a number of projects with the primary objectives of restoring perennial meadows and depositional reaches of perennial streams. These projects are lumped under this category because they share many characteristics: all are perennial streams with channel incision and/or overwidening, poor stream shade, and declining hardwoods such as willow, alder, dogwood, etc. A variety of restoration tools maybe used to address these issues. Table 4 and the project implementation descriptions below provide those site-specific details.

Meadow restoration includes the following activity categories:

- Category 2 – Large Wood, Boulder, and Gravel
- Category 4- Channel Restoration/Relocation
- Category 13 – Riparian Vegetation Treatment restoration
- Category 14 – Riparian Vegetation Planting
- Category 16 – Beaver Habitat Restoration

Table 4: 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
Heavy equipment and manual labor ▪ Fell and/or tip trees from within the RHCA using heavy equipment (e.g. excavator, feller buncher, etc.). Thinning would target: 1) larger (~12-24" dbh) conifers from outside the primary shade zone. Up to 120 trees per stream mile would be tipped to meet forest plan standards for large wood; tipping would selectively thin around the largest, healthiest trees and may create small openings (less than ¼ acre, spaced at least 1/2 mile apart) outside the primary shade zone	West Summit Creek (up to 0.75 miles)	T.16S, R.34E, *Section 3 & T.15S, R.35E, *Section 33	Logan Valley East (B544118)	*Within*: Category 1 and 2 RHCA, MA3A *Adjacent to:* MA14	2019
	Tributary to West Summit Creek (up to 0.2 miles)	T.15S, R.35E, *Section 33	Logan Valley East (B544118)	*Within*: Category 2 RHCA, MA3A *Adjacent to:* MA14	**2019
	North Summit Creek (up to 1.5 miles)	T.15S, R.35E, *Sections 33	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2020
	Bosonberg tributaries /Logan	T.16S, R.33 1/2E,	Logan Valley East	*Within*: Category 1 & 2 RHCA, MA3A	**2020

Project description	Project Location	TR Location	USGS quad	Land Use Plan Conformance	Year
2) smaller encroaching conifers (e.g. 5-10" dbh lodgepole) outside the primary shade zone that are competing with hardwoods ▪ Add trees to the channel using a heavy equipment (e.g. excavator) ▪ plant/seed riparian hardwoods (aspen, willow, cottonwood, dogwood, alder) ▪ Protect hardwoods with caging, fencing, and/or shrouding. ▪ Construct Beaver Dam analogs (BDA's) using heavy equipment or hydraulic post pounder	Valley (up to 3 miles)	*Sections 11, 12, 13, 14	(B544118)	*Adjacent to:* MA14	
Heavy equipment, manual labor, **channel fill** ▪ all activities described under 'Heavy equipment and manual labor' above ▪ Channel fill to restore streams incised due to headcutting using heavy equipment such as excavators, dump trucks, and dozers.	West Summit Creek (up to 0.5 miles)	T.16S, R.34E, *Section 3 & T.15S, R.35E, *Section 33	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	2019
	Wickiup Creek (up to 0.1 miles)	T.16S, R.34E, *Section 28	Logan Valley East (B544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA1	2020
	Little Logan Creek (up to 0.15 miles)	T.16S, R.34E, *Section 18	Logan Valley East (B544118)	*Within*: Category 4 RHCA, MA3A *Adjacent to:* MA1 & MA14	2020

Project description	Project Location	TR Location	USGS quad	Land Use Plan Conformance	Year
Manual labor only ▪ Thin understory conifers from the riparian area using chainsaws. Target trees are smaller encroaching conifers that are competing with hardwoods (e.g. 5-10" dbh lodgepole) outside the primary shade zone, however some larger (12-24" dbh) conifers would be felled in this area to provide key pieces and meet forest plan standards for large wood. Work would selectively thin around the largest, healthiest trees and may create small openings (less than ¼ acre, spaced at least 1/2 mile apart) outside the primary shade zone ▪ add felled trees to the channel by directionally falling, dragging, or carrying ▪ plant/seed riparian hardwoods (e.g. aspen, willow) by hand protect hardwoods with caging, fencing and/or shrouding	West Summit Creek (up to 0.4 miles)	T.15S, R.35E, *Section 33	Logan Valley East (B544118)	*Within*: Category 1 RHCA, MA3A *Adjacent to:* MA14	**2019
	Tributary to West Summit Creek (up to 0.2 miles)	T.15S, R.35E, *Section 33	Logan Valley East (B544118)	*Within*: Category 2 RHCA, MA3A *Adjacent to:* MA14	**2019
	Unnamed tributary to Summit Creek (up to 0.2 miles)	T.15S, R.35E, *Sections 34	Logan Valley East (B544118)	*Within*: Category 2 RHCA, MA3A *Adjacent to:* MA14	**2020

*Includes part of section where creek/river(s) runs through

**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

To attain the desired conditions, the USFS is proposing the following actions:

4) Bosonberg tributaries, Logan Valley, West Summit Creek, West Summit Creek Tributary, North Summit Creek, Wickiup Meadow, Little Logan Meadow:

Channel, floodplain, and riparian restoration would include the following activities:

- Felling and tipping– The goal of this action is to remove/reduce trees that have encroached onto the floodplain in the absence of wildfire and utilize a local source for in-stream wood. The encroachment of conifers have contributed to a de-watered floodplain, shaded out hardwoods and incised channel. Conifers up to 24 inches DBH located on the floodplain would be felled and left on the floodplain or added to the channel. Trees located on the floodplain or from the nearby hillslope on either side of the stream would be utilized. This activity would occur through a combination of heavy equipment and hand-falling with a chainsaw. Larger trees would be tipped and smaller trees may be tipped or felled. Both sizes would be carried or dragged to the channel or floodplain using a skidder or excavator, or by hand.

  The primary objective for riparian thinning is to reduce young conifers that are encroaching on hardwoods in the inner riparian zone. Large trees providing overstory canopy would be avoided. Trees for in-stream wood in West Summit Creek would target 2-24" DBH and for the remaining smaller tributaries would target 7-15" DBH.

- Large wood augmentation- the tipped/felled small and large wood (from *felling and tipping* above) would be placed into the channel and onto the floodplain. The majority of materials will be sourced locally, from the RHCA. Wood would be placed into the channel as complex wood structures (assemblage of small and/or large wood) or individual pieces to dissipate energy and capture sediment (Figure 5). Smaller wood structures and individual pieces would also be added throughout the channel at high frequency, to encourage sediment deposition. Large wood would be placed into the channel and floodplain using heavy equipment (e.g. excavator), directionally felling, or hand-placing.

- Riparian hardwood planting – aspen, willow, dogwood, cottonwood, and/or alder would be planted to move riparian areas toward site potential vegetation (ODEQ, 2010). Hardwoods would be planted by hand or by heavy equipment within the floodplain. Cuttings will be locally sourced or imported from facilities equipped to produce species and drainage- specific clones (e.g. Burns FFA, USFS nursery at Clarno, etc.

- Riparian hardwood protection- Felled conifers and slash material may be used as a natural barrier, where appropriate, to reduce access by wildlife. Exclosure fencing (including cages or temporary fence paneling) may also be used if felled trees provided insufficient protection.

- Beaver dam analogs (BDAs)- The purpose of the BDA is to simulate beaver dams by damming water and capturing sediment (Figure 3 & Figure 4). BDAs would be constructed by sinking wooden posts approximately 1.5-2.5 feet apart across the length of the channel and floodplain and weaving in willow cuttings. Posts may be installed by hand (manual post-pounder) or via heavy equipment (e.g. excavator). Posts would be 30% buried into the subsurface to a depth of approximately 2-3 ft. Willow cuttings would be locally sourced or imported, as described above in *riparian hardwood planting*, and would be cut and installed by hand. The BDAs would be constructed using as much natural, untreated, biodegradable woody material as possible with the expectation that structures may start to deteriorate after 1-5 years as sediment aggrades. Maintenance of the BDA's may be necessary over time (replacing posts and/or willow cuttings), until habitat conditions support a viable beaver population within these reaches.

5) West Summit Creek, Wickiup Meadow, Little Logan Meadow

In addition to activities listed above, West Summit Creek, Wickiup Meadow, and Little Logan Meadow have large head-cuts that would be fixed using the following techniques:

- Channel Reconstruction/Relocation- channel restoration or relocation would be required on lower West Summit Creek to resolve multiple headcuts including one exceeding 3 feet in depth. The goal of this work would be to increase the sinuosity of the channel and decrease the gradient at the location of the hydraulic jump. Through this process we will return water storage to the floodplain and reduce impacts from historic channelization. Work would be implemented using equipment such as excavators, dump trucks, and dozers.

6) Unnamed tributaries to West Summit Creek (upper reach only) and Summit Creek:

These small tributaries would not benefit from heavy equipment and would be treated with hand-falling only:

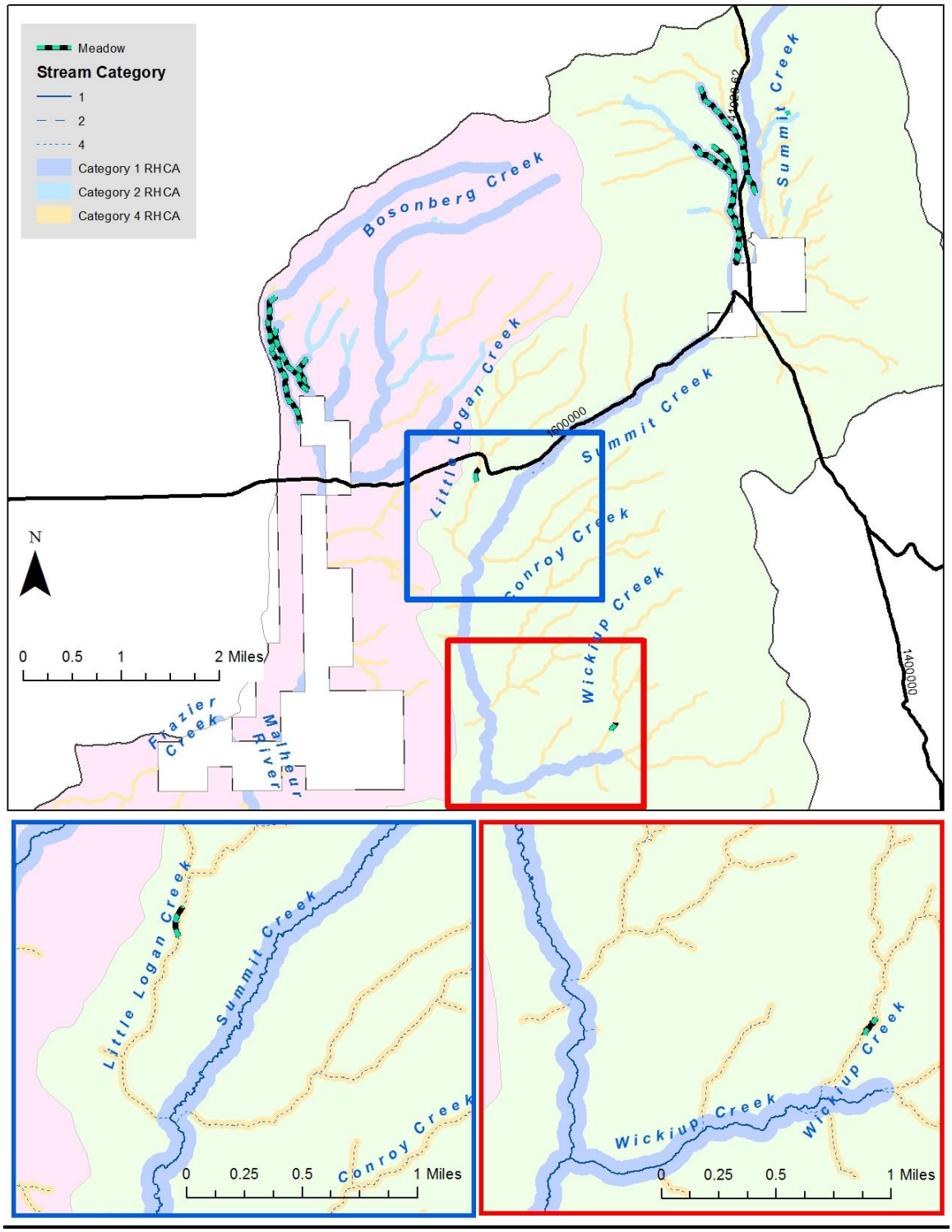
- Hand-felling– The goal of this action is to remove/reduce trees that have encroached onto the floodplain in the absence of wildfire and utilize a local source for in-stream wood. The encroachment of conifers have contributed to a de-watered floodplain, shaded out hardwoods and incised channel. Conifers 5-10" dbh outside the primary shade zone would be targeted for felling and left on the floodplain or added to the channel, however some larger (12-24" dbh) conifers

would be felled in this area to provide key pieces and meet forest plan standards for large wood. Trees located on the floodplain or from the nearby hillslope on either side of the stream would be utilized. This activity would occur through hand-falling with a chainsaw. Trees would be added to the stream channel by directionally falling or would be carried or dragged to the channel or floodplain.

- Large wood augmentation- the felled small and large wood (from *felling a*bove) would be placed or directionally felled into the channel and onto the floodplain. The majority of materials will be sourced locally, from the RHCA, but we may acquire materials from other locations. Wood would be placed into the channel as small wood structures and individual pieces to dissipate energy and capture sediment (Figure 5). The majority of wood structures would be smaller (not requiring the use of heavy machinery).

- Riparian hardwood planting – aspen, willow, dogwood, cottonwood, and/or alder may be planted by hand.

Maps & Figures



West Summit Creek Meadow Restoration

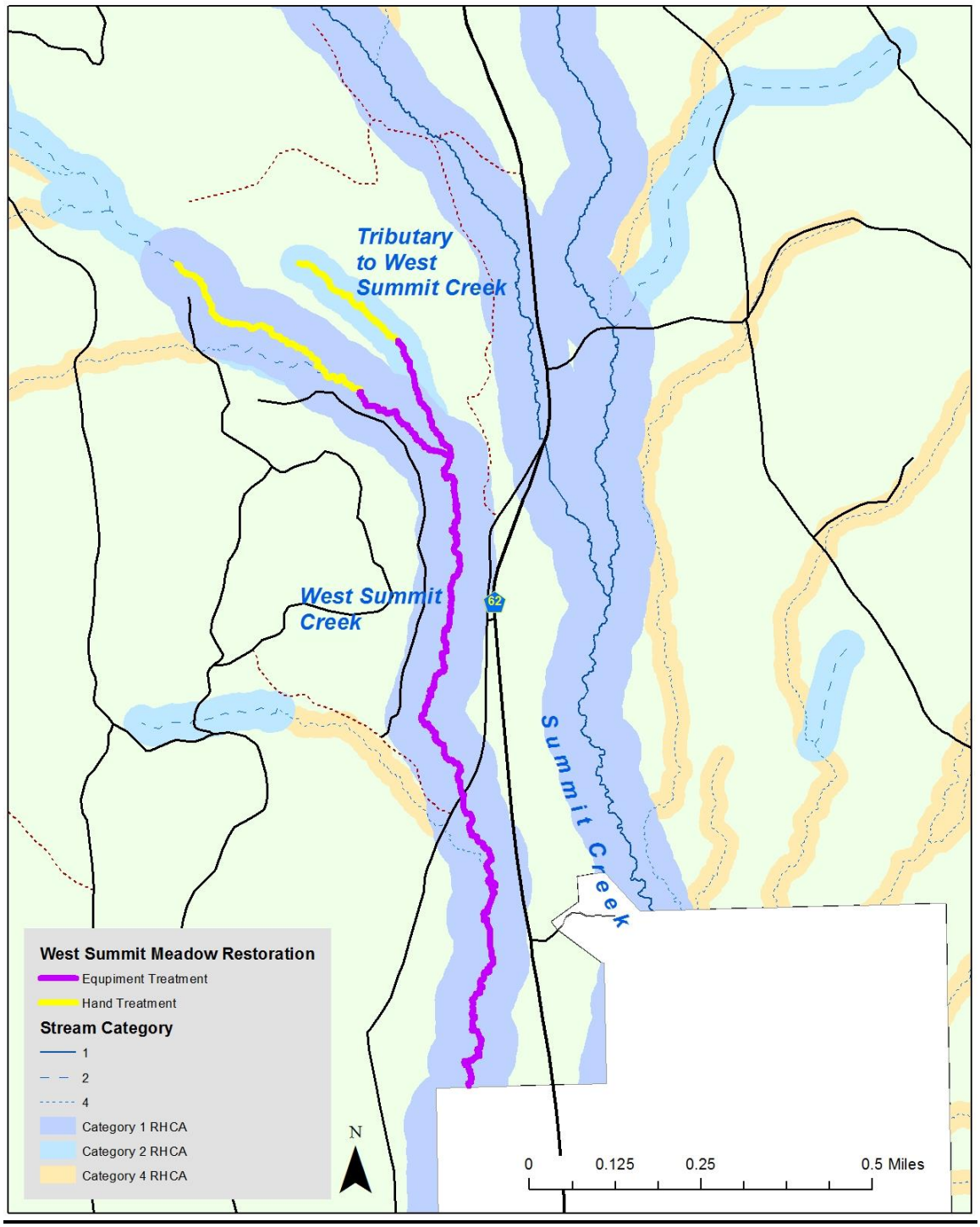


Figure 2 existing conditions for stream and riparian conditions on perennial meadow.

Figure 3. Examples of Beaver Dam Analogues in Pine Creek, a tributary to the John Day River near Fossil, OR, using fence posts which were installed with a manually operated hydraulic post-pounder.

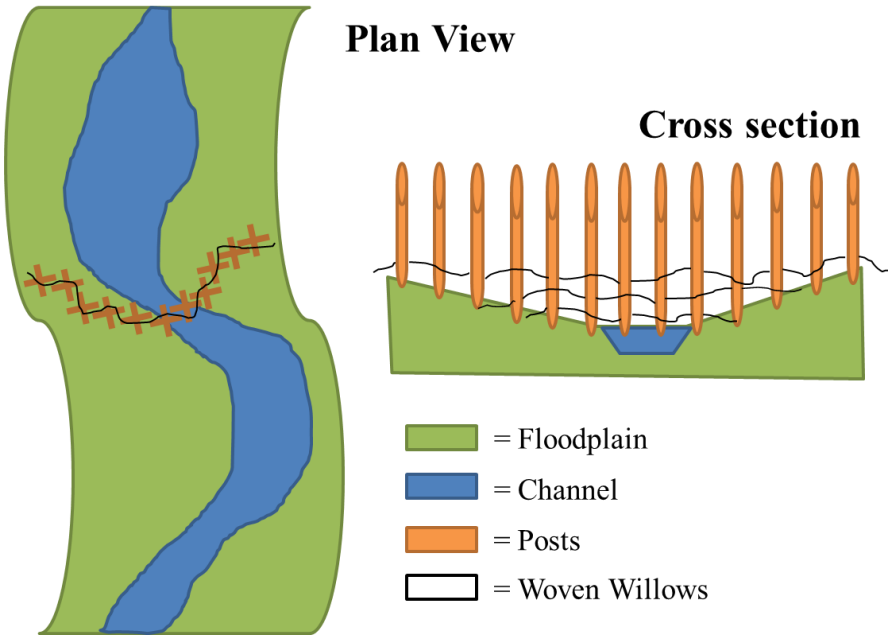


Figure 4. Mock-up of BDA implementations.

Figure 5. Example of large wood augmentation from a restoration project Wiwaanaytt Creek, tributary to the Middle Fork John Day River.

Appendices to the Aquatic Restoration EA Implementation Description

Project Title: Summit and Bosonberg subwatersheds aquatic restoration
Aspen, In-Stream, and Meadow Restoration
Project Number: 0406-2019, 0407-2019, 0408-2019

Category 2 – Large Wood, Boulder, and Gravel
Category 4- Channel Reconstruction/Relocation
Category 13 – Riparian Vegetation Treatment restoration
Category 14 – Riparian Vegetation Planting
Category 16 – Beaver Habitat Restoration

The following information will guide actions for this project that is taking place within the bounds of the Decision Notice for the 2014 Malheur National Forest Aquatic Restoration Environmental Analysis to maintain that all conservation measures, guidelines and project design criteria (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- 0406-2019, 0407-2019, 0408-2019
    b. Project name- Summit and Bosonberg subwatersheds aquatic restoration- Aspen, In-Stream, and Meadow 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 is anticipated to occur from 2019-2021, with in-stream work happening on perennial streams between July 1 and August 30.
    f. Activity category-
        Category 2 – Large Wood, Boulder, and Gravel
        Category 4- Channel Reconstruction/Relocation
        Category 13 – Riparian Vegetation Treatment restoration

Category 14 – Riparian Vegetation Planting
Category 16 – Beaver Habitat Restoration

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, at least 30 day prior to implementation
k. Site assessments- Assessment for contaminants is not required.
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 restistance 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
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
    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 18ºC 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.iv) of this section. Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. If diversion allows for downstream fish passage, place diversion outlet in a location to promote safe reentry of fish into the stream channel, preferably into pool habitat with cover. Pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel.

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

Project Design Criteria for Aquatic Restoration Activity Categories

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 4. Channel Reconstruction/Relocation projects include

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

a. **General Project Design Criteria**

i. ***Design Review***

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

ii. ***Design Guidance***

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

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

1. Background and Problem Statement
    a. Site history.
    b. Environmental baseline.
    c. Problem Description.
    d. Cause of problem.
2. Project Description
    a. Goals/objectives.
    b. Project elements.
    c. Sequencing, implementation.
    d. Recovery trajectory –how does it develop and evolve?
3. Design Analysis
    a. Technical analyses.
    b. Computations relating design to analysis.
    c. References.

4. River Restoration Analysis Tool –The River Restoration Analysis Tool (restorationreview.com) was created to assist with design and monitoring of aquatic restoration projects. The following questions taken from the tool must be addressed in the project documentation:

a. Problem Identification
    i. Is the problem identified?
    ii. Are causes identified at appropriate scales?

b. Project Context
    i. Is the project identified as part of a plan, such as a watershed action plan or recovery plan?
    ii. Does the project consider ecological, geomorphic, and socioeconomic context?

c. Goals & Objectives
    i. Do goals and objectives address problem, causes, and context?
    ii. Are objectives measurable?

d. Alternatives/Options Evaluation
    i. Were alternatives/options considered?
    ii. Are uncertainties and risk associated with selected alternative acceptable?

e. Project Design
    i. Do project elements collectively support project objectives?
    ii. Are design criteria defined for all project elements?
    iii. Do project elements work with stream processes to create and maintain habitat?
    iv. Is the technical basis of design sound for each project element?

f. Implementation
    i. Are plans and potential implementation impacts and risks?

g. Monitoring & Management
    i. Does monitoring plan address project compliance?
    ii. Does monitoring plan directly measure project effectiveness?

h. Monitoring –Develop a monitoring and adaptive plan that has been reviewed and approved by the Restoration Review Team and the Services. The plan will include the following:
    i. Introduction
    ii. Existing Monitoring Protocols
    iii. Project Effectiveness Monitoring Plan
    iv. Project Review Team Triggers
    v. Monitoring Frequency, Timing, and Duration
    vi. Monitoring Technique Protocols
    vii. Data Storage and Analysis
    viii. Monitoring Quality Assurance Plan
    ix. Literature cited

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

a. Low and Moderate Severity Burns

i. Experienced fuels specialists, silviculturists, fisheries biologist, and hydrologists shall be involved in designing prescribed burn treatments.

ii. Prescriptions will focus on restoring the plant species composition and structure that would occur under natural fire regimes.

iii. Burn plans are required for each action and shall include, but not be limited to the following: a description of existing and desired future fire classifications, existing and target stand structure and species composition (including basis for target conditions); other ecological objectives, type, severity, area, and timing of proposed burn; and measures to prevent destruction of vegetation providing shade and other ecological functions important to fish habitat.

iv. Low-severity burns will be used except where the objective is to restore deciduous trees, as describe below under part "v.", with a goal of creating a mosaic pattern of burned and unburned landscape. Low severity burns are characterized by the following: Low soil heating or light ground char occurs where litter is scorched, charred, or consumed, but the duff is left largely intact. large wood accumulation is partially consumed or charred. Mineral soil is not changed. Minimal numbers of trees, typically pole/saplings, will be killed.

v. Moderate-severity burns are permitted only where needed to invigorate decadent aspen stands, willows, and other native deciduous species and may be targeted in no more than 20% of the area within RHCAs or Riparian Reserves/6th field HUC/year. Such burns shall be contained within the observable historical boundaries of the aspen stand, willow site, other deciduous species, and associated meadows; additional area outside of the "historical boundaries" may be added to create controllable burn boundaries. Moderate severity are characterized by the following: Moderate soil heating or moderate ground char occurs where the litter on forest sites is consumed and the duff is deeply charred or consumed, but the underlying mineral soil surface is not visibly altered. Light colored ash is present. large wood is mostly consumed, except for logs, which are deeply charred.

vi. Fire lines will be limited to five feet in width, constructed with erosion control structures, such as water bars, and restored to pre-project conditions before the winter following the controlled fire. To the extent possible, do not remove vegetation providing stream shade or other ecological functions that are important to streams.

vii. Ignition can occur anywhere within the Riparian Reserve and RHCAs area as long as project design criteria are met.

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

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

i. Non-commercial tree thinning and slash removal is allowed only as required to adjust fuel loads to implement a moderate-severity burn to promote growth of deciduous trees and shrubs, such as aspen, cottonwood, willow, other deciduous species, and associated meadows.

ii. Thinning is allowed only in dry forest types, i.e., east of the Cascade mountains and southwestern Oregon, and in localized lowland areas in western Oregon, i.e., oak woodlands.

iii. To protect legacy trees, thinning from below is allowed. If conifers are even-aged pole, sapling, or mid-seral with no legacy trees, thin existing trees to the degree necessary to promote a moderate-severity burn.

iv. No slash burning is allowed within 30-feet of any stream. To the extent possible, avoid creating hydrophobic soils when burning slash. Slash piles should be far enough away from the stream channel so any sediment resulting from this action will be unlikely to reach any stream.

v. Apply PDC in National Fire Plan salmonid criteria (USDI-Bureau of Land Management 2005) for limits on mortality to residual overstory vegetation.

vi. Only hand equipment—chain saws, axes, Pulaski's, etc.—may be used for felling.

vii. Where livestock or wildlife grazing could be a threat to restoration of aspen, cottonwood, willow, alder, and other deciduous vegetation and an immediate moderate-severity burn would consume large amounts of felled trees, consider delaying the burn and leaving felled trees in place to create grazing barriers to help assure plant growth.

viii. If in an existing grazing allotment, projects in this category shall be accompanied by livestock grazing practices that promote the attainment of moderate-severity burn objectives

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.

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

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

b. **Habitat Restoration**
   i. Beaver Restoration activities may include planting riparian hardwoods (species such as willow, red osier dogwood, and alder) and building exclosures (such as temporary fences) to protect and enhance existing or planted riparian hardwoods until they are established (Malheur National Forest and the Keystone Project 2007).
   ii. Maintain or develop grazing plans that will ensure the success of beaver habitat restoration objectives.

iii. As a means to restore desired vegetation (e.g., aspen, willow, alder, and cottonwood) associated with quality beaver habitat, follow project design criteria in the *Riparian Vegetation Treatment (controlled burning) b. Noncommercial thinning associated with Moderate-severity burns* category.

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.

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

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.

Additional Soils PDCs added April 2018

Soil Protection Guidance for Aquatic Restoration Projects Using Heavy Equipment Off Roads

Hersh McNeil, Tom Friedrichsen, & Steve Namitz 3-20-18

The following are soil protection practices typically used to minimize adverse effects to the environment, in order to meet desired soil conditions (including Forest Plan standards) as well as Project Design Criteria described in the Aquatic Restoration EA.

Avoid heavy machinery travel ("HMT") on slopes steeper than 35 percent, where feasible.
No heavy equipment shall be allowed on highly erodible soil. “Highly erodible soil” generally means areas larger than 50 feet diameter, and either: (1) steeper than 30 percent, with less than 75 percent ground cover, (2) 20-30 percent slope with less than 50 percent ground cover, (3) 10-19 percent slope with less than 25 percent ground cover, or (4) with signs of current erosion, such as pedestaling or rilling.

For tree-tipping or removal for LWD projects ---- On areas where existing skid trails spaced 100 to 140 feet apart can be reused, reuse the old skid trails. Otherwise, space HMT travel ways about 120 feet apart where practical, using existing skid trails where possible and appropriate. Travel ways ("trails") should average less than 14 feet wide.
Low ground pressure equipment (less than 8.5 pounds per square inch [psi]) can be allowed off trails on dry, snow-covered, or frozen soil. For soil protection practices “dry” means July through September, or obviously dry in 6 of the top 10 inches in other months; “snow-covered” means sufficient snow strength and depth to prevent compaction; “frozen” means the soil is frozen at least through the top 4 inches.
Tree tipping trails shall be covered with slash to reduce runoff and erosion.

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.

Summit Project Area Channel (large wood), Meadow, and Aspen Restoration

Lands & Special Uses project review & comments

3/20/2019

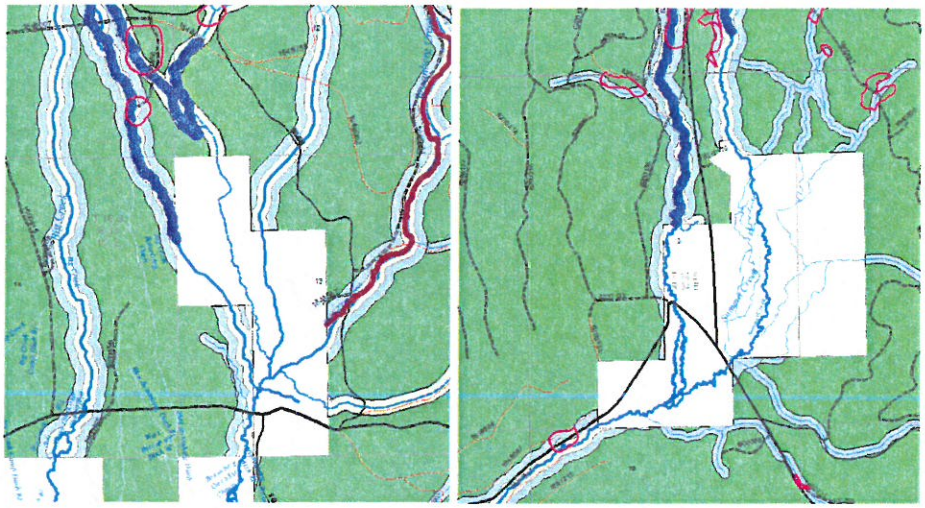
- No Lands Special Use Permits currently identified within or adjacent to project boundary.
- Ensure National Forest Boundary Line Policy is reviewed prior to project implementation and adjacent landowners are adequately notified.
- One point of diversion (POD App. #71450) identified within project boundary.

2019 - PCRD Aquatics EA Checklist Lands Special Uses Review as of 03/18/2019

(Internal Information)

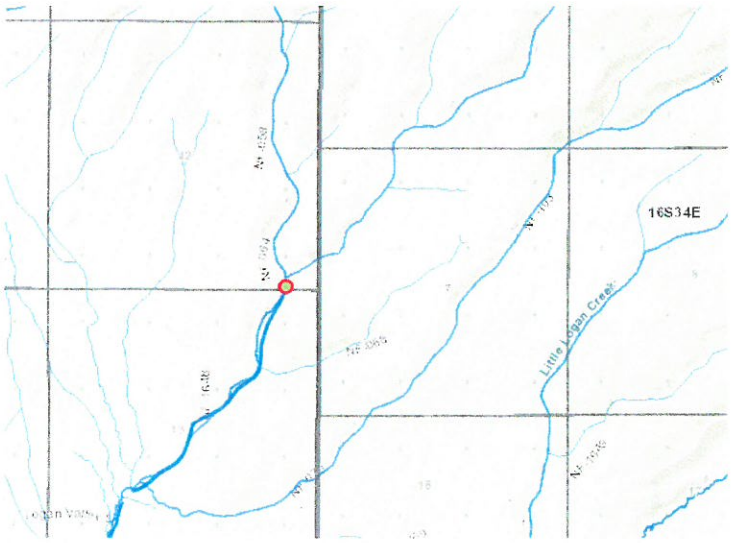
Summit Bosonberg - Aspen/Large Wood/Meadows:

- No Lands Special Uses currently identified within project boundary.
- No *known* Ditches identified to be within project vicinity.
- No Access issues identified.
- Boundary within ¼ mile.
    - *Boundary maintained in 2014 per Robert Moyers email 3/13/2019.*



OWRD - https://apps.wrd.state.or.us/apps/gis/wr/Default.aspx

- POD for Sec. 12, T. 16 S., R. 33.5 E.



- ODF&W App IS 71450 – Use Anadromous & Resident Fish habitat (Instream); Priority Date 3/28/1991.

Forest Service | Washington Office | 1400 Independence Avenue, SW
Washington, DC 20250

File Code: 7150 **Date:** March 18, 2016
Route To: 5500; 7150

Subject: National Forest Boundary Line Policy

To: Regional Foresters

The Forest Service Line Officer has a public trust responsibility to efficiently manage, protect and preserve the public estate managed by the Forest Service as National Forest System (NFS) land. This includes the responsibility to ensure any land, resource or restoration project occurring near or adjacent to any Forest Service boundary line does not proceed until the legal NFS boundary lines are properly located and physically marked in the field prior to any management action.

Current Forest Service policy is that all NFS boundary lines shall be located, monumented, marked and posted to prescribed Forest Service boundary marking standards prior to undertaking land management activities planned near or adjacent to any Forest Service boundary line, and that no management activity take place that may create or cause a false or misleading boundary location. This Forest Service policy has been in effect for decades and is currently documented in FSM 7152.03 Policy, Item 3. Land Stewardship. Lands and Realty Management is currently in the process of updating FSM 7150 – Surveying, and issuing direction under a new Boundary Management Chapter and Handbook to be released in the fall of 2016.

The updated direction will require all NFS property line and Special Designated Area boundary lines be surveyed, marked and maintained in their correct legal location in the field prior to undertaking any land, resource and restoration projects occurring within ¼ mile of any NFS boundary line. While the Forest Service national standard is "within ¼ mile of any NFS boundary line," the regional land surveyor and/or forest land surveyors may increase or decrease this distance based upon their professional knowledge of the accuracy and reliability of Forest Service maps, the land net and land surveys of record.

An accurate delineation and location of NFS boundary lines will help prevent boundary disputes and/or loss of valued NFS land and its resources. It is Forest Service policy to fully manage the NFS land and resources to the legal boundary location on the ground. Creating false or miss-leading boundary lines by deliberately offsetting back onto NFS lands from an unknown or an approximated boundary, or adjusting land, resource and restoration project boundaries to avoid the responsibility to mark NFS boundary lines violates Forest Service boundary line policies and is not acceptable.

Geographic Information System (GIS) based coordinates for the land net shall not be used as authorative indicators of legal boundary lines and property corners, unless the GIS coordinate values are derived from direct physical occupation and observation, validated by a state licensed professional land surveyor or an authorized Bureau of Land Management (BLM) cadastral surveyor. In addition fence lines, fence corners and other alleged physical evidence of the lines and corners are not to be used as indicators of boundary lines unless their locations are also validated by a state licensed professional land surveyor or a BLM cadastral surveyor.

Substandard boundary location practices used to locate land, resource and restoration boundaries cause the following problems:

1. Mislead adjoining landowners and promote encroachments by them or by the Forest Service.
2. Neglect our public land stewardship responsibilities.
3. Create unmanaged strips of NFS land and resources.
4. Dramatically increase Federal and possibly personal liability, when Forest Service management actions trespass onto adjoining private lands.
5. Violate the laws and regulations applicable to protection and preservation of Special Management Areas established by Pubic Law, or other special areas established by Executive Order, Proclamations and other establishment procedures and processes.
6. Create litigation, along with the associated expenses to resolve encroachments.

It is against Forest Service policy for any employee other than an individual authorized by the Forest Service or the BLM and acting in their official capacity as a land surveyor to determine and/or mark NFS boundaries. Surveying, locating, marking and maintaining NFS boundaries of any type shall be performed under the direct supervision and responsible charge of a land surveyor working under state or federal land survey authority, whether the survey work is completed by force account or contract.

A Forest Service state licensed professional land surveyor, or a BLM cadastral surveyor, shall be consulted prior to any ground disturbing activity such as a prescribed burn, fire rehabilitation, mechanical thinning, road realignment and construction, facilities improvement or construction, etc. All original corner locations and boundary locations shall be searched, restored and maintained as necessary by a state licensed professional land surveyor or a BLM cadastral surveyor so the expense of perpetuating original corners and original lines to standard is not lost during the management activity. NFS boundaries that have not previously been located and marked shall be surveyed and marked to Forest Service boundary line marking standards. All land surveys and identification of NFS boundary lines shall be completed to Forest Service land surveying standards, as well as appropriate federal and state laws, regulations and guidelines governing the profession of land surveying.

In order to meet our boundary management goals, it is critical we pursue and act upon opportunities to share the financing of project generated boundary work with other programs when appropriate. Unit Line Officers should work collaboratively with their professional land surveyor and other staff areas to identify, approve and prioritize the annual program of work and ensure the project-specific survey and boundary line programs are funded.

/s/ Gregory C. Smith

GREGORY C. SMITH
Director of Lands and Realty Management

Kimbell, Stacia -FS

From: Moyers, Robert - FS
Sent: Wednesday, March 13, 2019 8:57 AM
To: Kimbell, Stacia -FS; Lind, Kenneth A -FS
Cc: Taylor, Allen -FS; Nelson, Jeffrey - FS; Bass, Jordan - FS; Guzman, Edward R -FS
Subject: RE: Boundary Check for 2019 PCRD Aquatics EA proposals

The Forest boundary for Marchbanks was maintained in 2017 and Summit Bosonberg was maintained 2014. I also looked at Little Crane Creek and Clear Creek. Both of these projects are surrounded by green so no boundary work is needed, however, I noticed two errors:

1. The location of Little Crane Creek is in T15S R35½E (plan shows R35E).
2. The location of Clear Creek is T11S R35E, S.34 & T12S R35E, S.3 (plan shows T10S).

Robert Moyers, PLS
Land Surveyor
Forest Service
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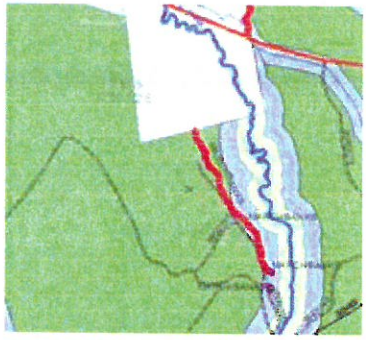
Caring for the land and serving people

From: Kimbell, Stacia -FS
Sent: Tuesday, March 12, 2019 3:26 PM
To: Moyers, Robert - FS <rmoyers@fs.fed.us>; Lind, Kenneth A -FS <klind@fs.fed.us>
Cc: Taylor, Allen -FS <allentaylor@fs.fed.us>; Nelson, Jeffrey - FS <jeffreynelson@fs.fed.us>; Bass, Jordan - FS <jordankoffutt@fs.fed.us>; Guzman, Edward R -FS <eguzman@fs.fed.us>
Subject: Boundary Check for 2019 PCRD Aquatics EA proposals

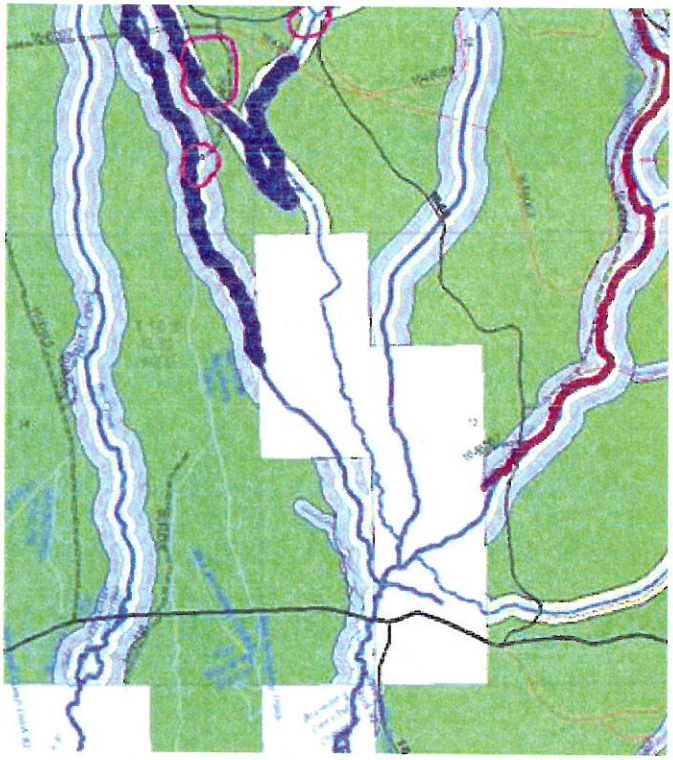
Robert and Ken –

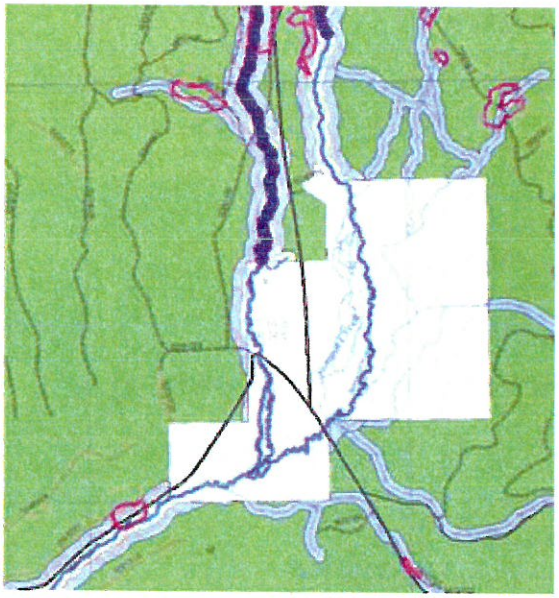
Prairie City Ranger District is proposing to implement the attached Aquatics EA checklist projects this field season. Per my review, I planned to include the "*Ensure National Forest Boundary Line Policy is reviewed prior to project implementation and adjacent landowners are adequately notified*" comment for the following project 2 areas:

- Marchbanks



- Summit Bosonberg





Each project description contains the GIS location data if needed.

Please provide recommendations on boundary verification and I will have the District schedule with you accordingly.

As always, thanks so much!

Stacia Kimbell
Realty Specialist
Forest Service
Malheur National Forest
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