Aquatic Species Biological Assessment for the

Long Creek, Blue Mountain and Camp Creek Allotments

BLUE MOUNTAIN RANGER DISTRICT

MALHEUR NATIONAL FOREST

GRANT COUNTY, OREGON

Prepared by:

Steve Namitz, Forest Fish Biologist

Signature: ____*/s/ Ian Reid*_______________

Date: ________October 14, 2011__________

for Steve Namitz
Forest Fish Biologist

AQUATIC BIOLOGICAL ASSESSMENT

for

Endangered Species Act Section 7 and
Magnuson-Stevens Act Consultation

TABLE 1. ESA ACTION AREA HYDROLOGIC UNIT CODE NAMES AND NUMBERS.

Long Creek Allotment			
4th Fields	HUC	6th Fields	HUC
Middle Fork John Day	17070203	Lick Creek	170702030206
5th Fields		Upper Camp Creek	170702030205
Camp Creek-Middle Fork John Day River	1707020302	Lower Camp Creek	170702030207
Long Creek	1707020304	Headwaters Long Creek	170702030401
Camp Creek Allotment			
4th Fields	HUC	6th Fields	HUC
Middle Fork John Day	17070203	Lower Camp Creek	170702030207
5th Fields		Bear Creek-Middle Fork John Day River	170702030301
Camp Creek-Middle Fork John Day River	1707020302	Balance Creek-Middle Fork John Day River	170702030208
Big Creek-Middle Fork John Day River	1707020303		
Blue Mountain Allotment			
4th Fields	HUC	6th Fields	HUC
Middle Fork John Day	17070203	Summit Creek	170702030102
5th Fields		Squaw Creek	170702030101
Bridge Creek-Middle Fork John Day River	1707020301	Mill Creek-Middle Fork John Day River	170702030106
		Dry Fork	170702030103
		Clear Creek	170702030104

Name and Location of Administrative Unit: Blue Mountain Ranger District, Malheur National Forest, P.O. Box 909, John Day, OR 97845

TABLE 2. ESA AND EFH EFFECT DETERMINATIONS.

Long Creek Allotment								
Common Name	**Scientific Name**	**Known to Occur?**	**Potential to Occur?**	**ESA[1] Status**	**Critical Habitat Status**	**Essential Fish Habitat Status**	**Effect Determination ESA Species/CH[2]**	**Effect Determination EFH[3]**
MCR Steelhead	*Oncorhynchus mykiss*	Yes	Yes	Threatened	Designated	Not applicable	LAA/LAA[4]	Not applicable
MCR Spring Chinook	*Oncorhynchus tshawytscha*	Yes	Yes	Not warranted	Not applicable	Established	Not applicable/ Not applicable	Adverse Effect
Bull Trout	*Salvelinus confluentus*	No	Yes	Threatened	Designated	Not applicable	No effect / No effect	Not applicable
Camp Creek Allotment.								
Common Name	**Scientific Name**	**Known to Occur?**	**Potential to Occur?**	**ESA[1] Status**	**Critical Habitat Status**	**Essential Fish Habitat Status**	**Effect Determination ESA Species/CH[2]**	**Effect Determination EFH[3]**
MCR Steelhead	*Oncorhynchus mykiss*	Yes	Yes	Threatened	Designated	Not applicable	LAA/LAA[4]	Not applicable
MCR Spring Chinook	*Oncorhynchus tshawytscha*	Yes	Yes	Not warranted	Not applicable	Established	Not applicable/ Not applicable	Adverse Effect
Bull Trout	*Salvelinus confluentus*	Yes	Yes	Threatened	Designated	Not applicable	NLAA/NLAA	Not applicable
Blue Mountain Allotment.								
Common Name	**Scientific Name**	**Known to Occur?**	**Potential to Occur?**	**ESA[1] Status**	**Critical Habitat Status**	**Essential Fish Habitat Status**	**Effect Determination ESA Species/CH[2]**	**Effect Determination EFH[3]**
MCR Steelhead	*Oncorhynchus mykiss*	Yes	Yes	Threatened	Designated	Not applicable	LAA/LAA[4]	Not applicable
MCR Spring Chinook	*Oncorhynchus tshawytscha*	Yes	Yes	Not warranted	Not applicable	Established	Not applicable/ Not applicable	Adverse Effect
Bull Trout	*Salvelinus confluentus*	Yes	Yes	Threatened	Designated	Not applicable	LAA/LAA[4]	Not applicable

1. Endangered Species Act
2. Critical habitat
3. Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act
4. May Affect, Likely to Adversely Affect

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1 INTRODUCTION

The Blue Mountain Ranger District of the Malheur National Forest (MNF) proposes to authorize livestock grazing for the next five seasons, 2012-16, on the Long Creek, Blue Mountain, and Camp Creek Allotments. Consistent with the Endangered Species Act (ESA) and its implementing regulations, this Biological Assessment (BA) documents the analysis and conclusions of the Forest Service regarding the effects of implementing the livestock grazing it intends to authorize during this period. The analysis in the BA evaluates the effects on: (1) the Middle Columbia River Steelhead Distinct Population Segment (DPS) listed by the National Marine Fisheries Service (NMFS) as Threatened, and the Columbia River bull trout DPS listed by the US Fish and Wildlife Service (FWS) as Threatened; (2) designated critical habitat (CH) for both of these DPSs; and (3) Essential Fish Habitat (EFH) established for Chinook salmon, a species regulated under a Federal fisheries management plan. It is prepared in compliance with the requirements of Forest Service Manual (FSM) 2630.3, FSM 2672.4 ESA regulations, and regulations promulgated pursuant to the Magnuson-Stevens Fishery Conservation Act (MSA) as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267) (MSA §305(b)(2)).

1.1 CONSULTATION HISTORY

Past and ongoing informal and formal consultations that overlap the ESA action area and the 6th field HUC subwatersheds of Long Creek, Blue Mountain, and Camp Creek Allotments are described in this section.

1.1.1 INFORMAL CONSULTATIONS (RECENT AND ONGOING)

1.1.1.1 BLUE MOUNTAIN EXPEDITED SECTION 7 CONSULTATION PROCESS

The MNF received a concurrence letter in June 2007 (NMFS 2007a) from NMFS (2007/02970) for a consultation on the effects of the Blue Mountain Expedited Section 7 Consultation Process (Process). The LOC is currently active, and applies through June 2012. The Process evaluates consistency of an action with a set of project design criteria (PDC). Among the categories of actions specifically considered for application of the Process are: (1) vegetation management (mechanized and non-mechanized); (2) livestock grazing (range improvements); (3) wildlife, fish or watershed improvement projects; (4) road maintenance; (5) low impact permits; and, (6) recreation and administrative sites. Other types of projects can be covered under the programmatic as long as all of the PDC are met. The Level I team will determine if the use of the expedited process is appropriate for that project.

The action agency prepares documentation evaluating whether or not the action is consistent with the PDC covered by the concurrence letter. If an action is determined to be consistent with all of the PDC after evaluation by the Level 1 team, then an ESA effect determination of “May Affect, NLAA” applies. The Level 1 team then sends a letter to the respective action agency official, documenting its finding regarding consistency with the Process and stating that the letter tiers to the concurrence letter.

Actions occurring within the Allotments that are covered by the Process:

MNF Road Maintenance

The MNF has consulted with the NMFS and USFWS on Forest wide road maintained. On January 29, 2010 a letter was sent to the Malheur National Forest Supervisor from the interagency members of the Malheur Level 1 Team (FS, BLM, NMFS and FWS). The letter tiered to the 2007 NMFS concurrence letter for the Process and stated that the team had reviewed the PDC documentation package for the MNF Road Maintained program for consistency with the Process. The team agreed with the MNF finding that the project "may affect, but is not likely to adversely affect (NLAA) the species and their designated CH for Mid-Columbia River Steelhead and Bull Trout based on the rationale that was presented for consistency with all PDC in the documentation package." The Malheur Level 1 Team also concluded that the documentation package demonstrated that the action would adequately avoid, minimize or otherwise offset potential effects to designated EFH and fulfilled requirements under the MSA. The letter provided ESA and MSA coverage for the Forests Road Maintenance program from 2010 to 2015.

1.1.2 FORMAL CONSULTATION (RECENT AND ONGOING)

1.1.2.1 AQUATIC AND RIPARIAN RESTORATION PROGRAMMATIC CONSULTATION

The Forest Service and BLM concluded formal consultation on June 27, 2008 with NMFS (2008/03505) (NMFS 2008) on Forest Service and BLM aquatic restoration activities for administrative units in Oregon and Washington including the MNF. The biological opinion (BO) applies through CY 2012, and provides coverage for 19 aquatic restoration program activity types:

1. Large Wood, Boulder, and Gravel Placement
2. Reconnection of Existing Side Channels and Alcoves
3. Head-cut Stabilization and Associated Fish Passage
4. Bank Restoration
5. Fish Passage Culvert and Bridge Projects
6. Irrigation Screen Installation and Replacement
7. In-channel Nutrient Enhancement
8. Floodplain Overburden Removal
9. Reduction of Recreation Impacts
10. Estuary Restoration
11. Riparian Vegetation Treatment (non-commercial, mechanical)
12. Riparian and Upland Juniper Treatment (non-commercial)
13. Riparian Vegetation Treatment (controlled burning)
14. Riparian Area Invasive Plant Treatment
15. Riparian Exclusion Fencing (with water gaps and stream crossings)
16. Riparian Vegetation Plantings
17. Road Treatments
18. Removal of Legacy Structures
19. Fisheries, Hydrology, Geomorphology Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration

Actions occurring in the ESA action area that are covered by the Aquatic and Riparian Restoration Programmatic Consultation:

Long Creek, Camp Creek, Blue Mountain Allotments:

1. Camp Creek Log Weir Removal Project (Phase 1). This project included removal/replacement of 35 log-weirs to decrease width/depth ratios, create pools, capture spawning gravels, increase sinuosity, improve stream temperature, and restore juvenile fish passage. The structures were initially constructed to improve fish habitat but were installed in a manner that was inappropriate for the given stream type. The project occurred in 2009 and included design criteria specified in aquatic restoration program activity type #18.
2. Lick Cr 1 and 3 Culvert Replacements. This project included replacement of two culverts on Lick Creek to allow passage of all life stages of fish, to pass 100 year flood events, and meet other criteria provided in R6 guidance. The project restored access to 2.5 miles (Lick Cr 1) and 2.8 miles (Lick Cr 3) of habitat for steelhead and Chinook salmon. The project occurred in 2009 and included design criteria specified in aquatic restoration program activity type #5.
3. Lower Cougar Culvert Replacement. This project included replacement of a culvert on Cougar Creek to allow passage of all life stages of fish, to pass 100 year flood events, and meet other criteria provided in R6 guidance. The project restored access to 0.7 miles of habitat for steelhead and Chinook salmon. The project occurred in 2009 and included design criteria specified in aquatic restoration program activity type #5.
4. West Fork Lick Culvert Replacement. This project included replacement of an existing 8 ft bottomless arch with a 12 ft bottomless arch, and removal of a log weir immediately downstream which had a 30" perch, to allow passage of all life stages of fish, to pass 100 year flood events, and meet other criteria provided in R6 guidance. The project occurred in 2010 and included design criteria specified in aquatic restoration program activity type #5 & 18.
5. Cougar Creek Culvert Replacement. This project included replacement of an existing 8 ft pipe arch and associated log weir, with a 12 ft span bottomless arch to allow passage of all life stages of fish, to pass 100 year flood events, and meet other criteria provided in R6 guidance. The project occurred in 2010 and included design criteria specified in aquatic restoration program activity type #5 & 18.
6. Camp 733 Culvert Replacement. This project included replacement of an existing 5 ft diameter pipe and associated log weir with a 12 ft span elliptical pipe arch to allow passage of all life stages of fish, to pass 100 year flood events, and meet other criteria provided in R6 guidance. The project occurred in 2010 and included design criteria specified in aquatic restoration program activity type #5 & 18.
7. Camp Creek Log Weir Removal Project (Phase 2). This project included removal or modification of approximately 123 log-weirs in Camp Creek Reaches 4 and 5, and Lick Creek Reach 1, to decrease width/depth ratios, create pools, capture spawning gravels, increase sinuosity, improve stream temperature, and restore juvenile fish passage. Work initiated in 2009 within Camp Creek Reaches 1 and 3 (Phase 1) was also completed. The structures were initially constructed to improve fish habitat but were installed in a manner that was inappropriate for the given stream type. The project occurred in 2011 and included design criteria specified in aquatic restoration program activity type #18.
8. Camp Creek 36 Road Culvert Replacement. This project included replacement of two culverts on Camp Creek to allow passage of all life stages of fish, to pass 100 year flood

events, and meet other criteria provided in R6 guidance. The project restored access to 2.4 (culvert #15) and 2.0 (culvert #17) miles of habitat for steelhead. The project occurred in 2011 and included design criteria specified in aquatic restoration program activity type #5 & 18.

9. Camp Creek Tributaries Culvert Replacement Project – 2011. This project included replacement of culverts on Shoburg Creek (Trib 12), Charlie Creek, and Eagle Creek to allow passage of all life stages of fish, to pass 100 year flood events, and meet other criteria provided in R6 guidance. The project restored access to 1.6 miles of habitat for steelhead. The project occurred in 2011 and included design criteria specified in aquatic restoration program activity type #5 & 18.
10. Blue Mountain District Range Fence Construction 2011. This project includes construction of fences to restrict livestock use and improve distribution to maintain/restore stream channel, riparian vegetation, and floodplain functions. Work within the Camp Creek Allotment included splitting the Upper Camp Creek pasture along the 36 road to exclude cattle from Camp Creek, and a second fence within the Middle Camp pasture to exclude cattle from Camp Creek and the Middle Fork John Day River. The project is expected to occur in 2011 and includes design criteria specified in aquatic restoration program activity type #15.

1.1.2.2 LIVESTOCK GRAZING

Long Creek and Camp Creek Allotments

The MNF has formally consulted with NMFS on the 2007-2011 livestock grazing in the Long Creek and Camp Creek Allotment. A BO was completed for the Long Creek and Camp Creek Allotments as documented by NMFS reference numbers 2007/01290, 2005/05693, 2004/00610, 2003/00610, and 2002/00510.

2 DESCRIPTION OF PROJECT AREA

2.1 LONG CREEK ALLOTMENT

Elevations within the Allotment range from 3,650 feet on lower Camp Creek to 6,300 feet at Ragged Rocks. Forest Road 36 and Camp Creek bisect the Allotment running north and south.

Overstory vegetation in the Allotment consists of Ponderosa Pine, Douglas Fir, Western Larch, Lodgepole Pine, Western White Pine, and Engelmann Spruce. Dominant grass species are bluebunch wheatgrass, Idaho fescue, elk sedge, and pine grass.

Riparian overstory vegetation generally consists of a mix of hardwood and conifer species along the stream. Riparian areas in the allotment vary from heavily shaded and entrenched channels with snowberry, current, and rose being the dominant shrub species to Rosgen C and E type channels with hydrophytic hardwoods or Sedges lining the banks. Access to riparian areas by livestock is highly variable even within a single system and can range from highly accessible to limited access within a few yards.

Historically this allotment was heavily logged with railroad grades which are still evident in most riparian areas. After the time of the railroad, the allotment was again logged using conventional methods. Roads were built up the bottom of most major drainages, many of which are still in use today. The combination of logging, valley bottom roads and railroad grades, insect epidemic, and historic livestock grazing has reduced riparian shading from hardwood and conifer species.

Livestock use of this allotment has drastically changed over the last hundred years with the permitted AUMs decreasing by 50% from the time when 14,000 sheep were run through the allotment. Even greater changes have occurred over the last 50 years, as significant changes to the major streams began after a 100 year flood event in 1964. For example, nearly all of Camp Creek, over ten miles of Steelhead habitat, has been fenced into riparian pastures with a variable season of use that include consecutive years of rest. The Forest Service installed log weirs and planted hardwoods along most of Camp Creek stream from its head waters to it confluence with the Middle Fork of the John Day River. Many of the Log weirs within the Camp Creek watershed are currently being removed.

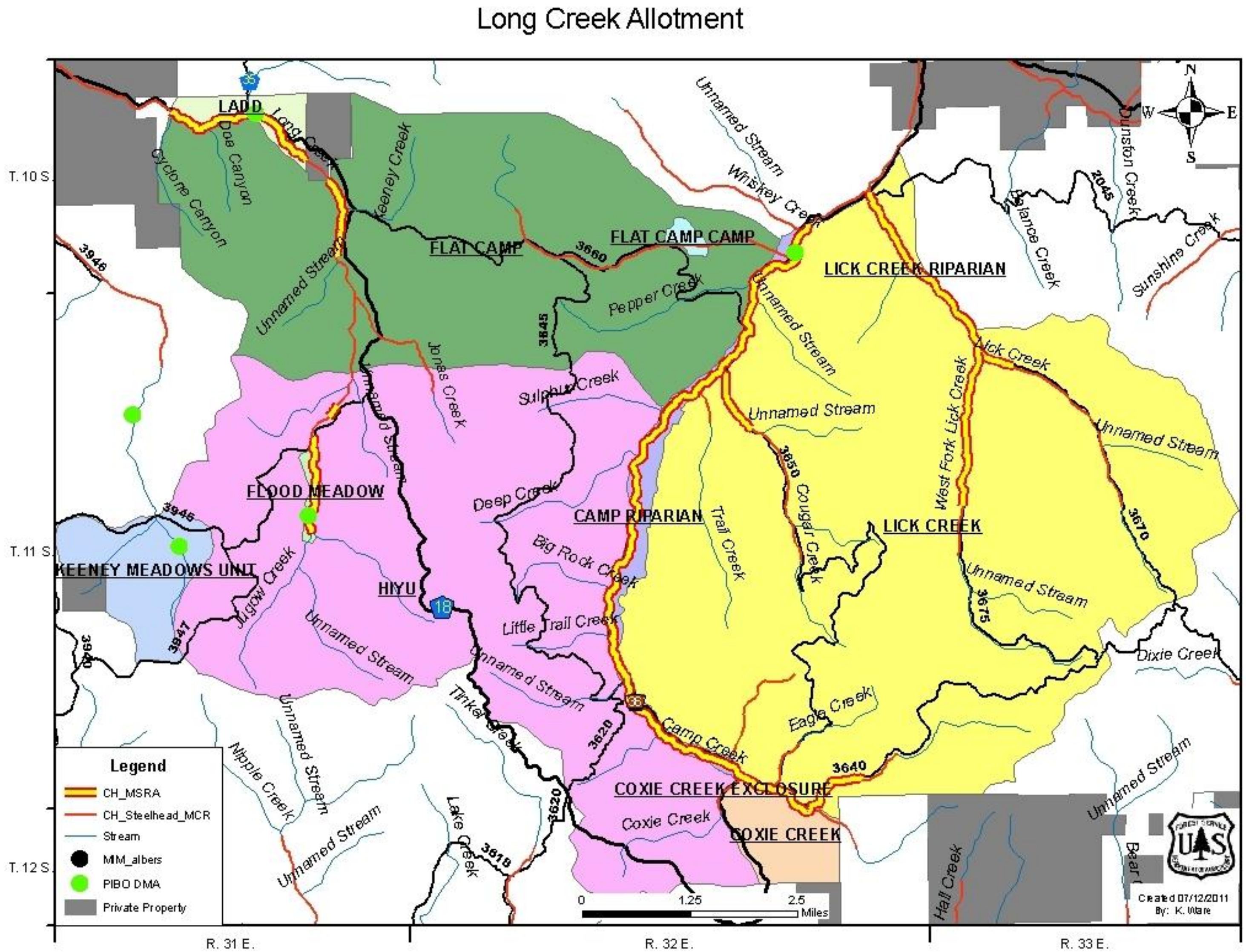

FIGURE 1. LONG CREEK ALLOTMENT AND PASTURES MAP W/MCR STEELHEAD CRITICAL HABITAT/MSRA

This allotment consists of 10 pastures and contains 37.3 miles of steelhead critical habitat and 26.0 miles of Most sensitive riparian areas (MSRA) (Table 3). There is no bull trout critical habitat within the Long Creek allotment. In general, the MSRAs are areas the MNF has identified that are the most accessible and sensitive to livestock impacts within streams containing steelhead CH; they are not land-use designations and do not have any legally independent force or effect, but instead are being referenced in this Proposed Action to facilitate the Forest Service's analysis of impacts and provide a useful basis for distinguishing among areas within the allotments under consultation so as to focus special attention on those areas the agency has already determined may be the most susceptible to causing adverse impacts to the listed fish from grazing. A detailed description of MSRA is presented in Appendix G. Locations of MSRA are found in Figure 1.

TABLE 3. STREAM MILES OF MIDDLE COLUMBIA RIVER STEELHEAD CRITICAL HABITAT AND MOST SENSITIVE RIPARIAN AREAS IN THE LONG CREEK ALLOTMENT.

Stream Name	Miles of Steelhead Critical Habitat	Miles of MSRA
Camp Creek	11.2	10.5
Charlie Creek	1.5	
Cottonwood Creek	3.8	
Cougar Creek	2.6	2.6
Coxie Creek	0.5	
Eagle Creek	0.7	
Jonas Creek	1.6	1.3
Lick Creek	4.9	2.4
Long Creek	6.9	6.8
Trail Creek	0.4	
West Fork Lick Creek	2.4	2.4
Unnamed trib. to Camp Creek	0.8	
TOTAL	**37.3**	**26.0**

Flat Camp Pasture

Elevations in the Flat Camp pasture vary from about 4,000 feet in the northeast corner to approximately 5,400 feet above Cyclone Canyon. This pasture is approximately 11,000 acres of timbered mountains, with scattered open rocky grassland southern slopes. This pasture is generally grazed first or second in the grazing rotation.

Streams in the Flat Camp pasture containing steelhead critical habitat are: Long Creek, Jonas Creek, and Cottonwood Creek.

Flat Camp Cow Camp

The Cow Camp is approximately a one acre pasture within the Flat Camp pasture. This small pasture contains the housing facility for the full time rider, several outbuildings, a corral, and a pasture for the riders' horses. During the grazing season at least one rider stays at this facility seven days a week. Cottonwood Creek (CH for MCRS) flows through this small pasture,

Ladd Pasture

Elevations in the Ladd pasture vary from about 4,000 feet to 4,500 feet. This is a fairly narrow pasture of approximately 300 acres. The Ladd pasture is used to load and un-load livestock onto the allotment at the beginning and end of the grazing season. Long Creek is the only stream containing steelhead critical habitat within the pasture.

Lick Creek Pasture

Elevations in the Lick Creek pasture vary from approximately 3,800 feet at the mouth of Lick Creek to 6,300 feet at Ragged Rocks. This pasture is approximately 21,000 acres of steep timbered terrain. This pasture is generally grazed first or second in the grazing rotation.

Streams in the Lick Creek pasture containing steelhead critical habitat are: Lick Creek, Cougar Creek, Camp Creek, Trail Creek, W. Fork Lick Creek, Eagle Creek, and Charlie Creek.

Lick Creek Riparian Pasture

The Lick Creek Riparian pasture is approximately 100 acres and includes 2.4 miles of the main stem of Lick Creek. This pasture is used for gathering and short-term holding. Cattle will overnight in this pasture and then be moved out the following day. Lick Creek is the only stream containing steelhead critical habitat in this pasture.

Hiyu Pasture

Elevations in the Hiyu pasture vary from about 4,500 feet at the southeastern corner of the pasture to about 6,040 feet at Jonas Mountain. The area east of Big Rock is among the steepest on the entire allotment. The Hiyu pasture is approximately 15,500 acres and is primarily timbered, with several large meadows mainly following Long Creek. Streams in the Hiyu pasture containing steelhead critical habitat are: Long Creek and Jonas Creek

Coxie Creek Pasture

Coxie Creek pasture is approximately760 acres in size and located in the Southeast corner of the Hiyu pasture.

Keeney Meadows Pasture

The pasture is approximately 1,200 acres and consists of two large meadows; Keeney and Clark meadows. There is no steelhead critical habitat within this pasture and therefore will not be discussed father.

Flood Meadows Pasture

In October of 2005 the Flood Meadows pasture was created. This pasture allowed the permittees to better control cattle access to the main stem of Long Creek adjacent to Flood Meadows. A small riparian exclosure with a water gap was also created at the lower end of the meadow parallel to the 3945Rd. In addition to the creation of this pasture, numerous riparian hardwoods were planted and caged with 6 foot cages. The hardwoods and cages are still present are observed yearly. Notably, the hardwoods that have grown above the cages are heavily browsed and stunted. Since 6 feet is beyond the reach of livestock, it is assumed that this is due to wildlife.

Also within the Flood Meadows pasture is an approximately 1.5 acre fen. This fen is a mineral rich source of ground water that maintains a constant flow, temperature, and pH regardless of the time of year. With the exception of a few 2ft oval openings in the peat on top of the ground, the fen is completely covered with peat and hydric vegetation. These openings are common elk wallows and are used year round for watering since they never freeze over. Livestock rarely enter the fen because their weight cannot be supported by the layer of peat.

Camp Creek Riparian Pasture

The Camp Creek Riparian pasture began in 1964 as a cattle enclosure constructed upstream from Coxie Creek. This enclosure was rested for three years. From 1964 to 1973 the enclosure was opened to season long grazing. In 1974 and 1975 another enclosure was completed that was approximately 8 miles in length paralleling Camp Creek. A total of 5,000 willow, cottonwood and red osier dogwood were planted along 3 miles of Camp Creek within the enclosure. Numerous other habitat improvements have been constructed to present date. There are currently three riparian pastures running the length of Camp Creek and enclosing over 8 miles of stream.

The riparian pastures total approximately 900 acres. The three pastures are managed using a rest rotation, ensuring that 2 of the pastures are rested every year. Due to the size of these pastures no more than 200 c/c and for less than 3 weeks are authorized to graze the riparian pastures. More commonly, these pastures will be used to gather livestock. Livestock will overnight in these pastures and be moved the following day.

When livestock move between Flat Camp and Lick Creek pasture or Lick Creek pasture and Hiyu pasture, it is often necessary for them to cross the Camp Creek Riparian pastures. When this occurs livestock are driven (i.e., not allowed to drift across – but driven in bunches) across one of two established, hardened crossings. The Clover Crossing of Camp Creek is used to move cattle between Flat Camp and Lick Creek pastures and is located on the 36 road at the junction of the 3650 road and Cougar Creek. The second crossing is located on the 36 road at the border of the Long Creek and Slide Creek grazing allotments. Both of these crossings are characterized by shallow bank angles, for ingress and egress, with stream beds that are comprised of predominantly cobble sized material.

2.1.1 CAMP CREEK ALLOTMENT

The Camp Creek allotment is located at the confluence of the Middle Fork of the John Day (MFJD) River and Camp Creek. Elevations within the allotment average 3,600 feet. The MFJD River runs the length (east/west) of the allotment, as does County Road 20. Camp Creek and the 36 road also run the length of the allotment (north/south). Private land adjacent to the allotment is excluded by fencing.

The Camp Creek allotment is comprised of primarily dry meadows consisting of Kentucky bluegrass, meadow foxtail, orchard grass, and various wheatgrass species. Riparian tree/shrub species within the allotment are Black Hawthorne, Black Cottonwood, and Willow species. Uplands are dominated by Ponderosa Pine and Idaho fescue with lesser components of bluebunch wheatgrass.

There are four water rights certificates issued within the boundaries, or associated areas of the Camp Creek Allotment. There are four existing irrigation diversions on Camp Creek; two are located on National Forest System (NFS) Lands and two are located on private lands. The two on NFS lands are no longer functional and there are no plans for repairing them. The push-up dam diversion points, which irrigate private lands, have been improved through the installation of infiltration galleries.

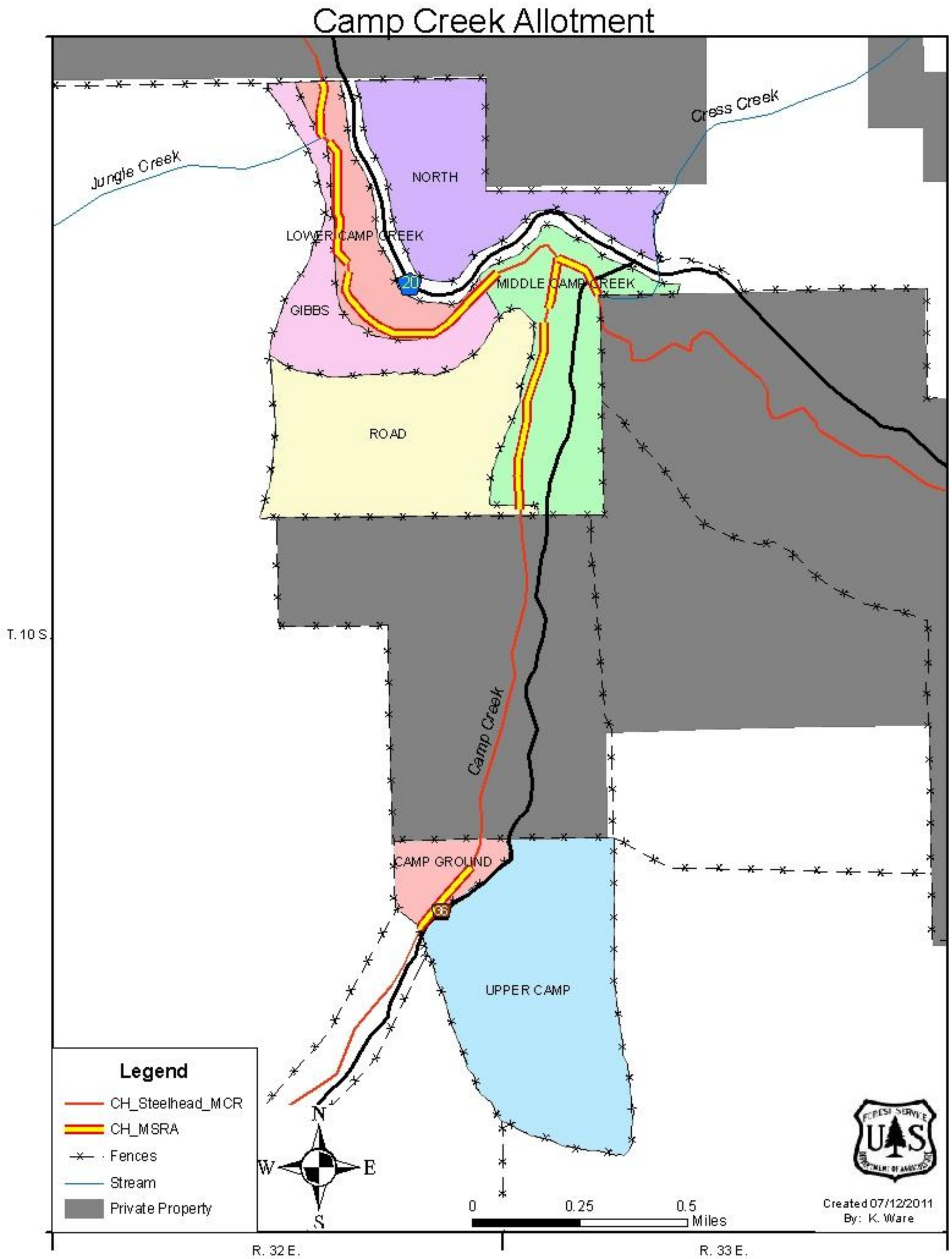

FIGURE 2. CAMP CREEK ALLOTMENT AND PASTURES MAP W/MCR STEELHEAD CRITICAL HABITAT/MSRA.

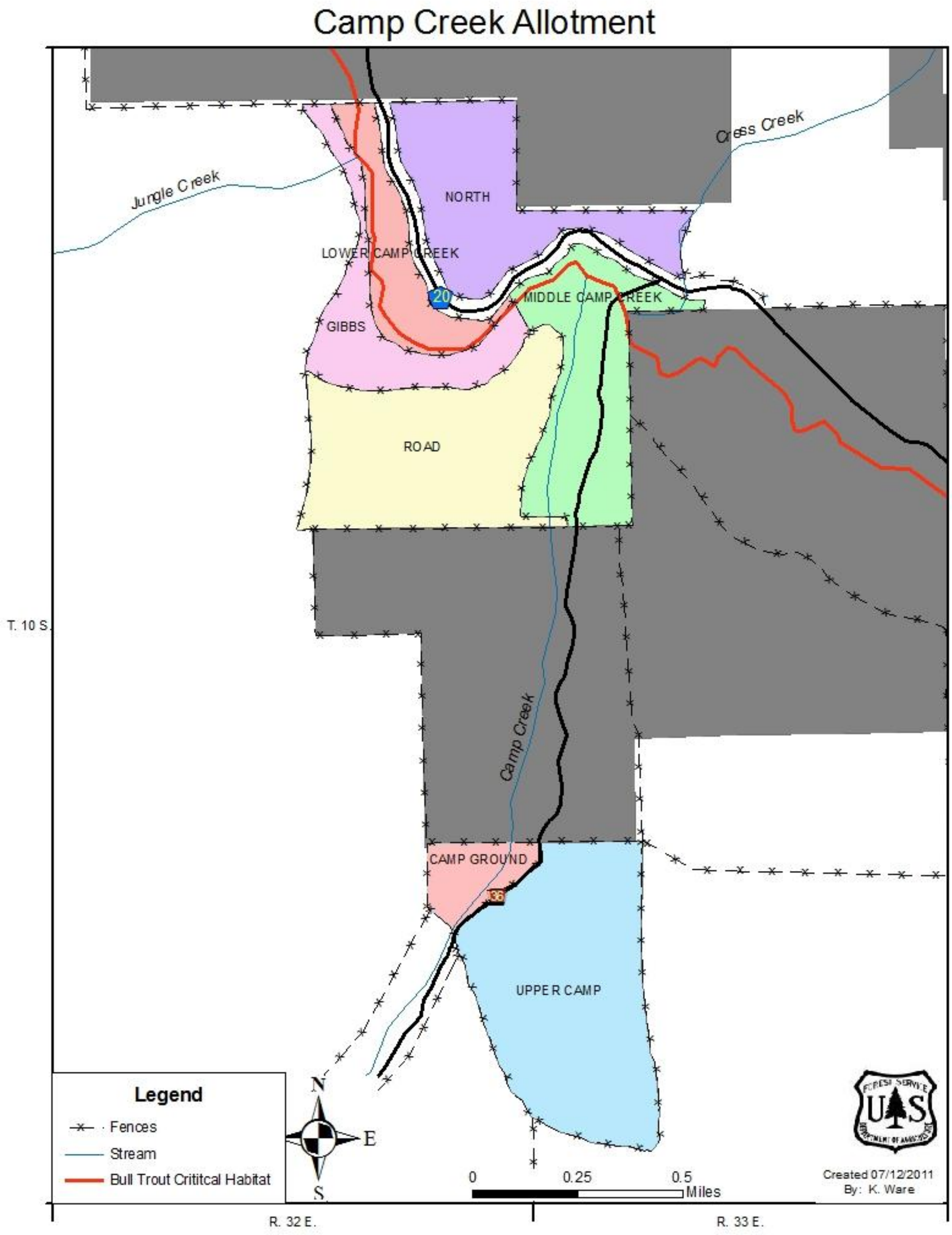

FIGURE 3. CAMP CREEK ALLOTMENT AND PASTURES MAP W/ BULL TROUT CRITICAL HABITAT.

This allotment consists of 7 pastures and contains 2.17 miles of steelhead critical habitat and 1.82 miles of MSRA (Table 4) and 1.29 miles of bull trout critical habitat (Table 5). The MSRA are areas that the MNF has identified that are the most accessible and sensitive to livestock impacts within streams containing steelhead CH. A detailed description of MSRA is presented in Appendix G. Locations of MSRA are found in Figure 2.

TABLE 4. MILES OF STEELHEAD CRITICAL HABITAT – CAMP CREEK ALLOTMENT

Stream Name	Miles of Steelhead Critical Habitat	Miles of MSRA
Camp Creek	0.88	0.75
Middle Fork John Day River	1.29	1.07
TOTAL	**1.89**	**1.82**

TABLE 5. MILES OF BULL TROUT CRITICAL HABITAT – CAMP CREEK ALLOTMENT

Stream Name	Miles of Bull Trout Critical Habitat
Middle Fork John Day River*	1.29
TOTAL	**1.29**

* The MFJD River is considered migratory bull trout habitat.

Lower Camp Creek Pasture

The Lower Pasture is a riparian pasture containing the MFJD River. The majority of the River within this pasture is unconstrained with multiple channels. The MFJD River is winter rearing habitat for steelhead and redband trout, rearing and spawning habitat for Chinook salmon, and migratory habitat for bull trout. The MFJD River is a Sensitive Stream Reach within these pastures and is on the State of Oregon 303(d) list for elevated summer temperatures.

Field surveys conducted in January 2005 showed a lack of mature shrubs, however recruitment of new shrubs was evident in some areas – the Lower Unit is a notable exception, as it displayed almost no woody recruitment. Riparian herbaceous vegetation appeared to be in late seral condition and included wooly sedge, Nebraska sedge, Baltic rush, with redtop and Kentucky bluegrass in some locations. Since 2005, shrub recruitment is occurring in the Lower pasture with many seedling and young willows beginning to establish.

Middle Camp Creek Pasture

The Middle Pasture contains the MFJD River and Camp Creek. In 2011 an exclosure will be constructed along both the MFJD River and Camp Creek. As a result there will be no cattle access to either the River or Camp Creek with the exception of a water gap on Camp Creek near the bridge on the 3690 road.

Streams in this pasture containing steelhead critical habitat are: MFJD River and Camp Creek. The MFJD River also supports migratory habitat for bull trout.

Campground Pasture

The Campground Pasture is a very small unit, which contains a short segment (less than ¼ mile) of Camp Creek, a developed campground, a ditch diversion and County Road 36. This pasture will be removed from the allotment rotation beginning in 2012. Use of this pasture will only occur as cattle are driven (not allowed to trail or linger) through to enter and exit the Upper pasture.

Road Pasture

The Road pasture is an upland pasture with no fish bearing streams. There is a water gap on Camp Creek that is about 25 feet long and is located upstream from the bridge on the 3690 road and below private land. It serves as a water source for the Road Unit and is the only portion of Camp Creek in the Road Unit

North Pasture

The North pasture is an isolated south facing unit on the north side of County Road 20. It is entirely and upland pasture and does not contain any fish bearing streams therefore it will not be discussed further.

Gibbs Meadow Pasture

The Gibbs Meadow pasture is an old hay field located south of the MFJD River. A small section of Jungle Creek flows through this pasture, however it does not contain steelhead critical habitat and will not be discussed further.

Upper Camp Pasture

The Upper Camp pasture is an isolated pasture east of the 36 road. It is entirely and upland pasture and does not contain any fish bearing streams therefore it will not be discussed further.

2.1.2 BLUE MOUNTAIN ALLOTMENT

Elevations within the Allotment range from 4,200 feet where the Middle Fork John Day leaves the allotment to 5,800 feet in the northeast corner of the allotment. The allotment is bordered by Highway 7 on the west, US Highway 26 on the south, and the Wallow/Whitman National Forest on the north and east. Private land within this allotment is excluded by fencing and is not managed as part of the allotment grazing system.

Overstory vegetation in the Allotment varies from dominant Ponderosa Pine stands with associated species of Douglas fir, Western Larch, Lodgepole Pine, to Grand Fir/Western Larch. Engelmann Spruce can also be found in a number of drainages within the allotment. The understory consists of bluebunch wheatgrass, pine grass/elk sedge communities and Idaho fescue.

Riparian overstory vegetation generally consists of a mix of hardwood and conifer species along the stream. Dominant hardwood species generally consist of Alder and Dogwood, conifer species are generally Engelmann Spruce and Douglas fir. Historically, riparian areas were logged by conventional tractor yarding. The combination of logging and valley bottom roads and railroad grades, insect epidemic, and historical livestock grazing has reduced riparian shading from hardwood and conifer species.

Squaw Creek, Summit Creek and the MFJD River in this allotment have down cut due to the loss of beaver dam complexes and a large localized rain on snow event in January 1997. Floodplains were disconnected and water tables were lowered from this event. Currently, established of riparian shrubs is limited and there are no riparian shrubs mature enough to providing shade for maintaining stream temperatures, creating cover for fish or stabilizing raw banks for several hundred yards in each of these streams. Grasses, sedges and rushes are limited along some reaches on and above the greenline. Most of the impacted area was fenced (Squaw pasture) to exclude cattle and the remaining portions have been in non-use since 2003. In addition, the entire allotment has also been in non-use since 2003.

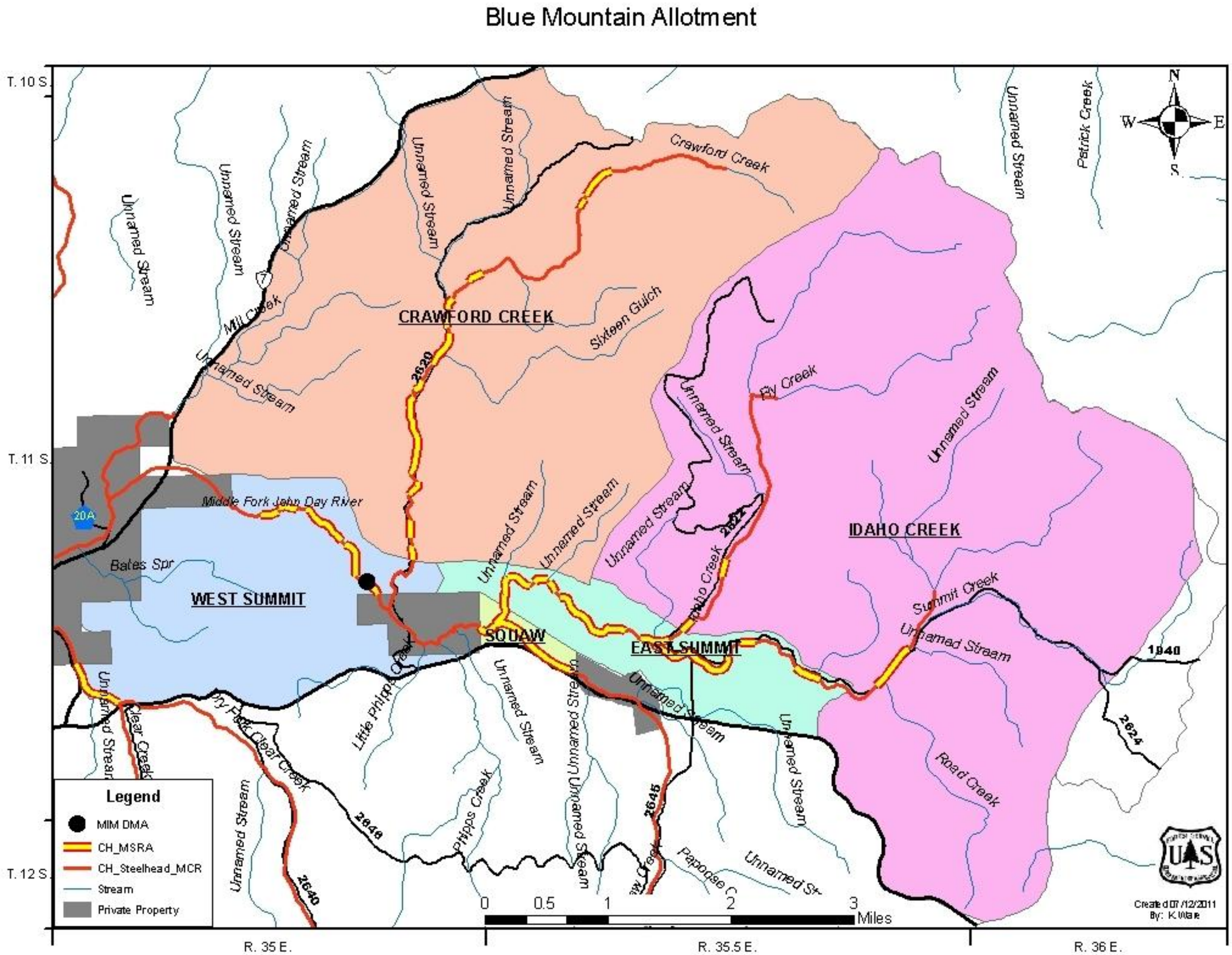

FIGURE 4. BLUE MOUNTAIN ALLOTMENT AND PASTURE MAP WITH MCR STEELHEAD AND CRITICAL HABITAT/ MSRA.

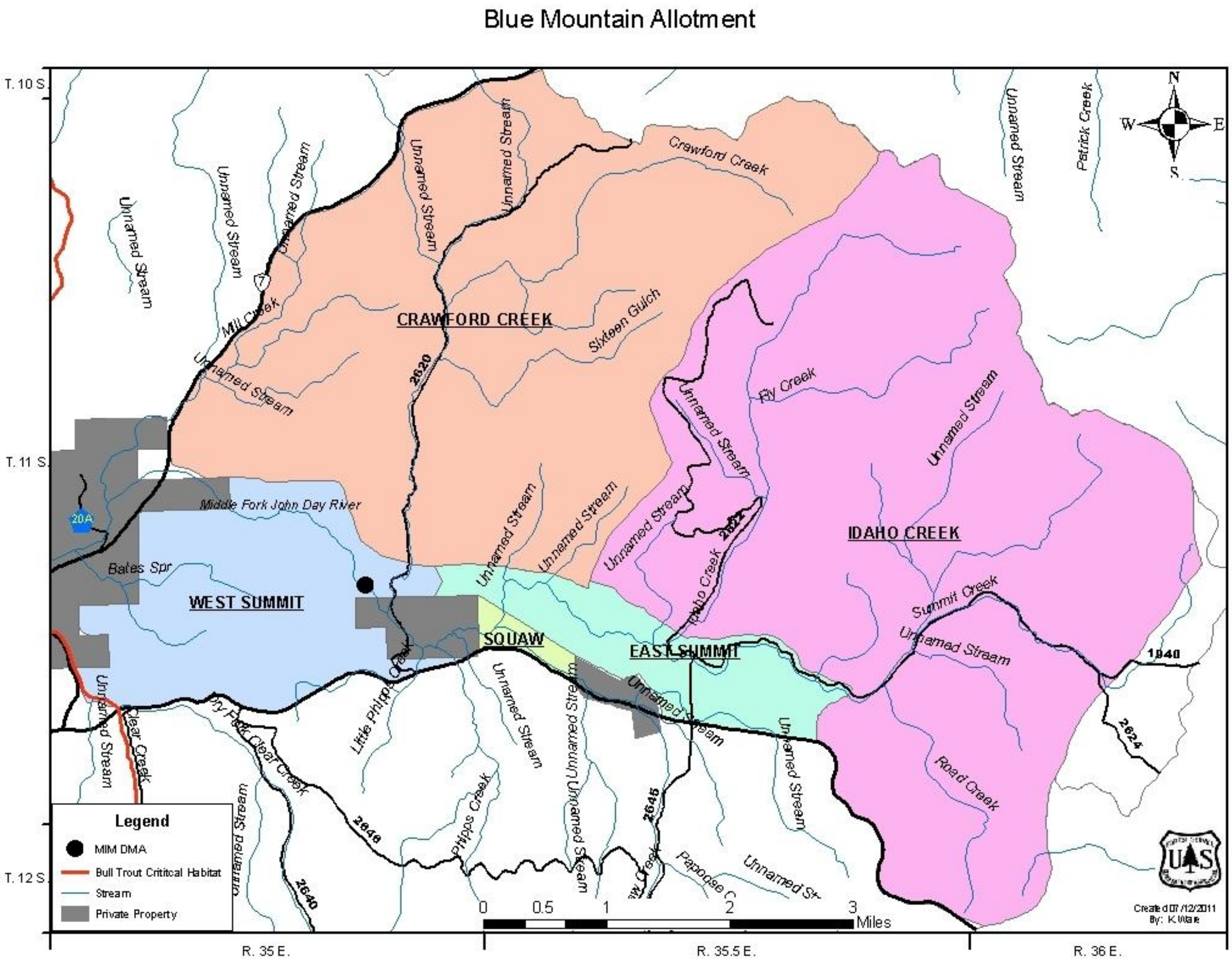

FIGURE 5. BLUE MOUNTAIN ALLOTMENT AND PASTURE MAP WITH BULL TROUT CRITICAL HABITAT.

This allotment consists of 5 pastures and contains 16.97 miles of steelhead critical habitat, including 8.41 miles of MSRA and 0.5 miles of Bull trout Critical Habitat (Table 6). The process for determining MSRA can be found in Appendix G.

TABLE 6. STREAM MILES OF MIDDLE COLUMBIA RIVER STEELHEAD AND BULL TROUT CRITICAL HABITAT AND MOST SENSITIVE RIPARIAN AREAS IN THE BLUE MOUNTAIN ALLOTMENT.

Stream Name	Miles of Steelhead Critical Habitat	Miles of Bull Trout Critical Habitat	Miles of MSRA
Crawford Creek	5.92	0	2.25
Fly Creek	0.23	0	
Idaho Creek	2.49	0	0.38
Middle Fork John Day River	2.30	0	1.34
North Fork Summit Creek	0.38	0	
Squaw Creek	0.77	0	0.77
Summit Creek	4.88	0	3.17
Clear Creek	.5	.5	.5
TOTAL	**16.97**	**.5**	**8.41**

Squaw Pasture

The Squaw pasture is a small riparian pasture (136 acres). This pasture is used only to facilitate moves between the larger pastures. This pasture was created following the 1997 spring flood event to allow for greater management flexibility and provided the rest needed to a facilitate recovery.

Streams in the Squaw pasture containing steelhead critical habitat are: MFJD River, Summit Creek, and Squaw Creek.

A Level II stream survey was conducted in 1991, but the data is no longer useable as this portion of Summit Creek downcut during a large rain on snow event in January 1997. The stream is now a recovering Rosgen "F6" channel type with some point bars developing. The stream is almost entirely riffle or glide habitat. The water table dropped several feet when the channel downcut; however it did not downcut as deeply as Squaw Creek. Summit Creek maintained base flows in 2002 and 2003 when Squaw Creek stop flowing.

A PFC analysis was conducted in 2004 which determined this segment of Summit Creek to be rated as Functioning at Risk with a strong upward trend (because it is not downcut as deeply as

Squaw Creek). Riparian herbaceous vegetation, mainly Nebraska sedge and Baltic rush, are re-colonizing the stream banks but the shrub component is lacking; elk use is a concern in this unit.

A Level II stream survey was conducted in 1991 on Squaw Creek, but the data is no longer usable this portion of Squaw Creek downcut during a large rain on snow event in January 1997. The stream is now a recovering Rosgen “F6” channel type with some point bars developing. The stream is almost entirely riffle or glide habitat. The water table dropped several feet when the channel downcut. Squaw Creek stopped flowing in 2002 and 2003. Juvenile and adult steelhead were observed in this stream in 2002. This stream currently contains very little steelhead and redband trout spawning and rearing habitat in the pasture.

A PFC analysis was conducted in 2004 which determined this segment of Squaw Creek to be rated as Functioning at Risk with an upward trend. Riparian herbaceous vegetation, mainly Nebraska sedge and Baltic rush, are beginning to re-colonize the stream banks but the shrub component is lacking; elk use is a concern in this unit.

Crawford Creek Pasture

Elevations in the Crawford Creek pasture vary from 4,200 feet in the southwest corner to 5,500 feet in the northeast corner.

Crawford Creek is the only stream within the pasture containing steelhead critical habitat.

Crawford Creek originates from large wetlands at 5000 feet elevation. Meadows and wetlands are common along most of the stream within the pasture. Measured flow at the mouth of Crawford Creek was 0.57 cfs on July 10, 1993. The upper portion of the stream is perennial while the lower portion becomes intermittent in the summer months. Average stream gradient is about 3 percent. Salmonids have been observed in the upper reaches of Crawford Creek in the Crawford Meadow area.

Upland vegetation includes Lodgepole and Ponderosa Pine with lesser components of Western Larch. There is an abandoned logging mill within the pasture. Abandoned railroad grades are still evident today and are primarily found with valley bottoms along streams. Many of these railroad grades were later converted to roads that are still in use today.

Idaho Creek Pasture

Elevations in the Idaho Creek pasture vary from 4,400 feet where Idaho Creek leaves the pasture to 5,800 feet in the northeast corner.

Lodgepole Pine and Western Larch dominate the overstory with lesser components of Ponderosa Pine and Douglas fir and Grand fir comprising the riparian overstory. Understory vegetation consists of Idaho fescue and pine grass/elk sedge communities with bluebunch wheatgrass found at the lower elevations.

Streams in the Idaho Creek pasture containing steelhead critical habitat are: Idaho Creek, Fly Creek, Summit Creek, and North Fork Summit Creek.

East Summit Pasture

Elevations in the East Summit pasture vary from 4,300 feet to 4,500 feet.

Vegetation within this pasture is generally characterized by Lodgepole pine and Ponderosa pine surrounding open meadows of Kentucky bluegrass, meadow foxtail, and lesser components of native meadow species. Greenline species consist of sedges and rushes and intermittent sections of alder in the overstory.

Streams in the East Summit pasture containing steelhead critical habitat are: Summit Creek and Idaho Creek.

West Summit Pasture

Elevations in the West Summit pasture vary from 4,200 feet to 4,500 feet.

Vegetation within this pasture is generally characterized by Lodgepole pine and Ponderosa pine surrounding open meadows of Kentucky bluegrass, meadow foxtail, and lesser components of native meadow species. Greenline species consist of sedges and rushes and intermittent sections of alder in the overstory.

Streams in the West Summit pasture containing steelhead critical habitat are: MFJD River and Crawford Creek and Clear Creek. Within this pasture Clear Creek is designated as critical habitat for bull trout.

3 FOREST DIRECTION AND POLICIES GUIDING DEVELOPMENT OF PROPOSED ACTION

Forest direction and policies provide a management framework that direct or guide development of grazing actions on the MNF. Components of the management framework include the MNF Land and Resource Management Plan (LRMP), pertinent LRMP amendments and Forest policies. The most pertinent amendments to the MNF LRMP are PACFISH/INFISH and Amendment 29. The MNF Riparian Monitoring Strategy is a forest policy, MNF (2006).

3.1 MALHEUR NATIONAL FOREST LRMP

The MNF LRMP (MNF 1990) contains goals and objectives for the Range Program that provide direction with respect to range management and other resources. Goals 20 - 22 of the MNF LRMP for the Range program state:

"Provide a sustained production of palatable forage for grazing by livestock and dependent wildlife species."

"Manage rangelands to meet the needs of other resources and uses at a level which is responsive to site-specific objectives."

"Permit livestock use on suitable range when the permittee manage livestock using prescribed practices."

A Range program MNF LRMP Objective also provides context:

"Analyze allotments to determine proper stocking levels. Use specific management area goals and standards to resolve conflicts between wild horses, cattle, and big game."

Rangeland will be managed to meet the needs of ESA-listed MCR Steelhead and big game as "other resources." The MNF Range program LRMP Objective directs that when there are conflicts between wild horse, cattle and big game uses in determining stocking levels, management area goals and standards will be used to resolve the conflicts.

The LRMP direction described above provides conservation benefits to ESA-listed MCR Steelhead and its designated CH by directing that the needs of other resources will be met.

Other components of the Forest management framework (MNF LRMP) that guide the development of the proposed action are discussed under the Forest amendments sections of the BA. The most pertinent amendments to the MNF LRMP are PACFISH and Amendment 29.

3.1.1 LRMP AMENDMENT 29 DESIRED FUTURE CONDITIONS

The MNF Land and Resource Management Plan (MNF 1990) was amended in 1994 (Amendment 29) in response to the Columbia River Basin Anadromous Fish Habitat Management Policy and Implementation Guide (USDA FS 1991). The Forest modified Standard 5 of the Fish and Wildlife resource elements. The amended Standard 5 included specific numerical desired future conditions (DFCs) for Management Area 3A (non-anadromous riparian areas) and Management Area 3B (anadromous riparian areas). The DFCs addressed: 1) sediment/substrate, 2) water quality, 3) stream channel morphology, and 4) riparian vegetation. See Amendment 29 for the specific numeric values (Appendix A). The numerical DFCs were selected to protect water quality, features of riparian vegetation, and components of fish habitat.

Amendment 29 did not set specific quantifiable standards for livestock grazing activities. However, grazing activities can directly affect the attainment of Amendment 29 DFCs for: 1) sediment/substrate (cobble embeddedness), 2) channel morphology (bank stability, lower bank angle, width to depth ratios, 3) riparian vegetation (ground cover, percentage of stream bank vegetated), and 4) shade/canopy closure (hardwood/meadow complex). Desired Future Conditions were developed to provide the criteria against which attainment or progress toward attainment of the riparian goals are measured. The MNF manages according to the more stringent standards applicable to habitat components of anadromous riparian areas as between Amendment 29 DFCs and the Riparian Management Objectives (RMOs) of the PACFISH/INFISH amendment, although it should be added that the two are not always directly correlative or equally applicable; for example, with respect to bank stability, the Amendment 29 DFC applies to forested areas only. Nevertheless, this overarching directive provides conservation benefits to ESA-listed MCR Steelhead and its designated CH. Table 7 presents Amendment 29 DFCs and PACFISH/INFISH RMOs by habitat indicator/criterion and displays which of the two is more stringent to the extent that both may be applicable in a given management situation.

TABLE 7. IDENTIFICATION OF MORE STRINGENT HABITAT INDICATOR NUMERIC VALUES OR CRITERIA BETWEEN AMENDMENT 29 DESIRED FUTURE CONDITIONS OR PACFISH/INFISH RIPARIAN MANAGEMENT OBJECTIVES.

Habitat Indicator	Desired Future Condition or Riparian Management Objective		More Stringent Condition or Objective
	Amendment 29	PACFISH/INFISH RMO	

Habitat Indicator	Desired Future Condition or Riparian Management Objective		More Stringent Condition or Objective
Cobble embeddedness	<20%	NA	Amendment 29
Water temp.	No increase if <68°F, reduce to 68°F if >68°F (See Appendix A for DFC details)	No measurable increase. Max below 64°F for migration/rearing, max below 60°F for spawning	PACFISH/INFISH RMO
Large Woody Debris	Varies by ponderosa (20-70/mi), Mixed conifer (80-120/mi), lodgepole (100-350/mi). Sizes vary.	>20/mi >12" dia >35' length	Amendment 29 is more specific
Pool frequency	Range expected for Rosgen B&C streams, upper limits adjusted for streams >75 ft. to be consistent w/PACFISH/INFISH. Provides table w/ranges by bankfull width	Table provided shows pools/mile by wetted width. All values fall within ranges by BFW of Amendment 29	Same
Bank stability (forested)	90% and no decrease if above 90%	>80%	Amendment 29
Lower bank angle (non-forested)	50-75% of banks w/90 degree angle or greater	>75% w/90 degree angle	PACFISH/INFISH RMO
W/D ratio	<10	<10	Same
Potential LWD forest	To provide a rate of input to maintain LWD standard	NA	Amendment 29
Ground cover	90% of site potential	NA	Amendment 29
% streambank vegetated	90% of site potential	NA	Amendment 29
Shade/canopy closure	Varies by conifer species forest. Hardwood/meadow	NA	Amendment 29

Habitat Indicator	Desired Future Condition or Riparian Management Objective		More Stringent Condition or Objective
	complex 80% shaded		

3.1.2 PACFISH/INFISH LRMP AMENDMENT

PACFISH/INFISH applies specifically to the MNF lands within the range of anadromy including the Long Creek, Camp Creek, and Blue Mountain Allotments. PACFISH/INFISH amended Forest Service Land and Resource Management Plans (LRMPs). PACFISH/INFISH contains the following components that provide the necessary direction and objectives, and regulatory certainty that FS management actions will be designed to maintain and restore ecological processes that support high quality habitat for salmon and steelhead over the long term:

- Riparian Goals;
- Riparian Management Objectives (RMOs);
- Delineation of streamside areas (Riparian Habitat Conservation Areas) that are important to maintenance of high quality aquatic habitat and where special management considerations are applied;
- Standards and/or guidelines to ensure projects do not prevent or retard attainment of riparian goals and management objectives;
- Designation of Key watersheds where additional management emphasis and/or watershed analysis is required to ensure that salmon and steelhead habitat is maintained or provided priority for restoration;
- Watershed analyses to provide sufficient context for designing actions that support maintenance or restoration of aquatic habitats needed for recovery of ESA-listed salmon and steelhead;
- Targeted watershed restoration identified through watershed analysis;
- Monitoring program to evaluate the implementation (compliance) and effectiveness of PACFISH/INFISH in improving aquatic habitat on federal lands.

Riparian Goals provide management context for proposed activities. The goals of PACFISH/INFISH establish an expectation of the characteristics of healthy, functioning watershed, riparian areas, and associated fish habitats. They are stated in relatively broad, generic terms such that they can be said to apply to most riparian areas regardless of stream type and other more site-specific conditions, but need to be evaluated in the context of the particular stream at issue. Since the quality of water and fish habitat in aquatic systems is inseparably related to the integrity of upland and riparian areas within watersheds, PACFISH/INFISH articulates the following goals to maintain or restore:

- Water quality, to a degree that provides for a stable and productive riparian and aquatic ecosystem;
- Stream channel integrity, channel processes and sediment regime (including the elements of timing, volume, and character of sediment input and transport) under which riparian and aquatic ecosystems developed;
- Instream flows to support healthy riparian and aquatic habitats, stable and functioning channels, and the ability to route flood flows;

- Natural timing and variability of water tables in meadows and wetlands;
- Diversity and productivity of native and desirable non-native plant communities in riparian zones;
- Riparian vegetation to provide for 1) an amount and distribution of large woody debris characteristic of natural aquatic and riparian ecosystems, 2) adequate summer and winter thermal regulation within the riparian and aquatic zone, and 3) rates of surface erosion, bank erosion, and channel migration characteristics of those under which the communities developed;
- Riparian and aquatic habitats necessary to foster unique genetic fish stock that evolved within the specific geo-climatic region; and,
- Habitat to support populations of well-distributed native and non-native plant, vertebrate and invertebrate populations that contribute to the viability of riparian-dependent communities.

3.1.2.1 PACFISH/INFISH RIPARIAN MANAGEMENT OBJECTIVES

Interim quantitative Riparian Management Objectives (RMOs) for stream channel, riparian and watershed conditions were also developed as part of PACFISH to provide criteria against which attainment or progress of the strategy's riparian goals may be measured. The objectives need to be evaluated and assessed temporally to reflect the ecological capabilities of specific ecosystems and the fact that attainment of or progress toward many of the objectives is only able to occur over extended periods of time. In general, and to the extent applicable and feasible, the MNF manages livestock grazing so as not to prevent or retard attainment of these RMOs unless Forest Plan amendment # 29 is more stringent, which will benefit habitat for MCR Steelhead.

Bank Stability: at least 80%

Water Temperature: No measureable increase in maximum temperature; Meet state water quality standards. The standard is defined as: All streams identified as having anadromous fish passage and salmonid rearing use for Designated Beneficial Use purposes. 7 Day Mean Max 64°F (17.8°C) (migration and rearing habitat); 7 Day Mean Max 60°F (15.6°C) (spawning habitat).

Width-to-Depth Ratio (W:D): W:D <10, mean wetted width divided by mean depth (NMFS PACFISH/INFISH BO 1998); or **Bankfull Width-to-Depth Ratio** within 75th percentile of the range for minimally managed or reference watershed conditions (i.e. healthy streams) by stream type (analysis pending from PACFISH/INFISH biological opinions (PIBO) Effectiveness Monitoring Team).

3.1.2.2 PACFISH/INFISH RIPARIAN HABITAT CONSERVATION AREAS AND STANDARDS

Project and site-specific standards apply to all Riparian Habitat Conservation Areas (RHCAs) and to projects and activities in areas outside RHCAs that would degrade them. Standards and/or guidelines were developed to ensure to the extent practicable given site conditions that projects do not prevent or retard attainment of or reasonable progress toward riparian goals and management objectives. PACFISH/INFISH (USDA FS and USDI BLM 1995) standards for livestock management are presented below.

- GM-1 - Modify grazing practices (e.g., accessibility of riparian area to livestock, length of grazing season, stocking levels, timing of grazing, etc.) that retard or prevent attainment of Riparian Management Objectives or are likely to adversely affect listed anadromous fish. Suspend grazing if adjusting practices is not effective in meeting Riparian Management Objectives and avoiding adverse effects on listed anadromous fish (PACFISH/INFISH).
- GM-2 – Locate new livestock handling and/or management facilities outside of Riparian Habitat Conservation Areas. For existing livestock handling facilities inside the Riparian Habitat Conservation Areas, assure that facilities do not prevent attainment of Riparian Management Objectives or adversely affect listed anadromous fish. Relocate or close facilities where these objectives cannot be met.
- GM-3 – Limit livestock trailing, bedding, watering, salting, loading, and other handling efforts to those areas and times that will not retard or prevent attainment of Riparian Management Objectives or adversely affect listed anadromous fish.

Implementing these standards clearly provide a conservation benefit to MCR Steelhead and designated CH.

3.1.2.3 PACFISH/INFISH MONITORING

The PACFISH/INFISH Monitoring Strategy was designed to feed information back to management for decision making. The implementation strategy uses “endpoints” and “triggers” to assess whether the authorized grazing is having the anticipated effects to resources and as an additional precautionary measure that helps the Forest Service to ensure that PACFISH direction is met as the season progresses. The endpoints measure annual conditions after grazing has been completed and the triggers measure conditions during grazing to determine if adjustments are necessary or appropriate to be made to the rotation and schedule the Forest Service has developed based on its best professional judgment and projections for a particular grazing season. The results of implementation monitoring are to be fed into effectiveness monitoring, which uses “trend” of long-term indicators of habitat condition to assess the need for revising management. This monitoring has a direct application to habitat features essential to long-term conservation of salmon and steelhead.

The PIBO Effectiveness Monitoring (EM) Program (under the Interagency Deputy Team) was initiated to evaluate the effects of land management activities on aquatic and riparian communities at multiple scales and to determine whether PACFISH/INFISH management practices are effective in maintaining or improving the structure and function of riparian and aquatic conditions. A pilot study was begun in 1998 on Forest Service lands within the Salmon River basin of central Idaho. In 2000, the pilot study was expanded to include additional Federal Lands in the interior Columbia River basin. The study area includes 20 National Forests and nine BLM field units within the interior Columbia River basin. Results from sample size analysis suggested that the monitoring program will be able to detect changes in resource condition at the scale of individual Forests and BLM field offices (35 to 90 sites) for many of the attributes measured. The PACFISH/INFISH Effectiveness Monitoring Program sampling design anticipates collecting information at least through 2015.

The PIBO EM and Implementation Monitoring (IM) programs are coordinated such that data collected to assess trend is linked to management actions taken under the PACFISH/INFISH strategy. Thus, monitoring sites selected for evaluating the effectiveness of PACFISH/INFISH are also monitored for compliance with the standards and guidelines. Preliminary results from broad-scale aquatic habitat status and trend monitoring of FS and BLM lands within the interior Columbia River basin since 2001 indicates conditions have improved over the past 5 years, continuing the habitat recovery the agencies intended to commence upon their adoption in 1995 of the protections PACFISH/INFISH (NMFS 2009).

3.1.2.4 PACFISH/INFISH ENCLOSURE B: LIVESTOCK GRAZING GUIDELINES

A revision of PACFISH/INFISH Enclosure B, the "Recommended Livestock Grazing Guidelines," was sent to the PACFISH/INFISH Forest Supervisors on August 14, 1995 (Appendix B). The guidelines were recommended for use in modifying applicable allotment management plans, annual operating plans, project decision documents and instructions to permittees to provide a high degree of assurance that objectives for conservation and restoration of anadromous fish habitat would be met.

The revision identified a set of key assumptions. One of the assumptions is that the goals or desired outcomes of management efforts provide the foundation for the recommended programmatic livestock grazing guidelines. The PACFISH/INFISH EA was described as providing suitable riparian goals. All management activities should be structured so as not to prevent or meaningfully hinder accomplishment of the goals.

A summary of key priorities identified in the Enclosure B revision are:

- Maintain or allow for improvement of conditions where criteria for late seral ecological status are met or exceeded.
- Adjust management practices where the criteria for mid-seral ecological status are met but the trend is static or downward. This is especially important where vegetative factors are primarily responsible for the mid-seral rating.
- Adjust management practices where the criteria for early seral ecological status are met, with the understanding that deteriorated stream bank and channel conditions may not be recovered in the near term.

The Enclosure B revision stated that Al Winward, in Clary and Webster (1989) defined ecological status as a measure of the degree of similarity between current vegetation and potential vegetation for a given riparian area. Refined definitions for the three ecological classes were presented:

- Early seral. Percent similarity of riparian vegetation to the potential natural community/composition less than or equal to 25%; or, stream bank/channel condition rating "poor".
- Mid-seral. Percent similarity of riparian vegetation to the potential natural community/composition 26-50% or better; and, stream bank/channel condition of at least "fair".
- Late seral. Percent similarity of riparian vegetation to the potential natural community/composition greater than or equal to 50% or better; and, stream bank/channel condition rating "good" or better.

The MNF is utilizing Winward (2000) to evaluate ecological status of riparian vegetation, in place of the process described in Enclosure B. If similarity of riparian information is lacking, the Enclosure B revision suggested using PFC condition classes as a substitute.

3.2 MALHEUR NATIONAL FOREST RIPARIAN MONITORING STRATEGY

Many accepted methodologies and analytical tools are available to monitor short-term and long-term rangeland and forest health. The methods and tools chosen are dependent on the specific monitoring objectives as well as constraints such as timing, available funding and personnel, other priorities, and the geographical area to be monitored. Described below are the overall monitoring strategy, methods and analytical tools that the Malheur National Forest is currently using for determining condition and trend of riparian ecosystems as they relate to grazing activities. **The assessments and monitoring methods used are intended to be an important part of the adaptive management process and are subject to changes or modifications based on new scientific findings and improvements in methodologies as well as changes in definitions and policy. In particular, see Appendix L for a discussion of the monitoring protocol the Forest Service intends to use to evaluate compliance with bank alteration thresholds.** Moreover, risk analyses and prioritization generally should be completed in all areas prior to initiating monitoring in order to determine the level and intensity of quantitative data collection. PFC assessments can serve as the risk analyses/prioritization step.

Below are the key components of the MNF Riparian Monitoring Strategy:

1. Information Gathering and Interpretation
    - Proper Functioning Condition (PFC) Assessment –qualitative condition assessment over a stream reach (geomorphic or unit specific)
    - Multiple Indicator Monitoring (MIM) – quantitative monitoring protocol at designated DMAs
    - Analysis – interpretation and evaluation of assessment and monitoring information to determine current riparian condition and, to the extent feasible,trend)
    - Channel cross-section, streambed particle size distribution, and reach description measurements (i.e. Rosgen Channel Type)
    - Forest Service Region 6 Level II Stream Inventory Surveys – extensive quantitative assessment of stream channel, riparian vegetation, aquatic habitat condition, and biota to determine condition of selected stream systems
    - Spawning Surveys – quantitative assessment of redd vulnerability to disturbance
2. Support determinations of plan compliance -Provide information on which MNF can assess compliance with Forest Plan, including PACFISH/INFISH & INFISH amendments. See Appendix C. for further discussion of Forest Plan standards and objectives related to riparian areas, water quality and fish habitat.
    - Standards are GM 1-4 in PACFISH/INFISH & INFISH; standards 15-21 in Forest Plan (see Chapter IV).
    - Management Objectives for stream and riparian areas are described in PACFISH/INFISH & INFISH amendments (RMO's) and in Amendment 29 of Forest Plan for MA3A/B (DFC's).
3. Recommendations

- Shows linkage between condition, trend, and past/current management activities
    - A process that provides support for grazing management decisions or any necessary or appropriate adaptive management adjustments
        - Allows annual adjustment of management strategies, as needed, to achieve compliance with plan direction

Proper Functioning Condition Assessments

Proper functioning condition (PFC) assessments are a qualitative method for determining the condition of riparian areas. The term PFC is used to describe both the assessment process, and a defined, on the-ground condition of a riparian area. PFC assessments can be an appropriate starting point for determining and prioritizing the type and location of quantitative inventory or monitoring necessities, and has been proven to be an excellent communication tool for bringing a wide diversity of publics to agreement. All PFC assessments are to be conducted with a journey level interdisciplinary team. One purpose of these assessments is to help correlate the findings with the trend towards attainment of the Malheur Forest Plan Riparian Management Objectives (RMOs), more specifically, to determine whether grazing practices are retarding attainment of Near Natural Rates of Recovery of RMOs.

Multiple Indicator Monitoring

The July 1, 2003 PACFISH/INFISH Implementation Monitoring Program Manual provides the background and direction for monitoring. The Multiple Indicator Monitoring (MIM) supplement, dated May 2005 with addendums (Cowley and Burton 2005), provides the procedures in use by the MNF to monitor stream banks and riparian vegetation. The Interagency Implementation Team created the above documents; see Appendix E for these documents. The authors of MIM recently issued a 2011 technical guide as well (Burton et. al. 2011). MIM for grazing activities is designed to determine whether or not livestock grazing management is resulting in "Near Natural Rates of Recovery" as defined by PACFISH/INFISH. Below are the three components, which comprise MIM. Monitoring is to be conducted by an interdisciplinary professional team trained in riparian plant identification and channel classification. Multiple indicator monitoring consists of implementation (endpoint indicator) monitoring and effectiveness (riparian objective) monitoring at designated locations (i.e. designated monitoring areas).

Designated Monitoring Areas

Designated Monitoring Areas (DMA's) are the locations in riparian areas and along streambanks where quantitative monitoring takes place. They are monitored to provide information concerning the management of critical areas. Essentially DMA selection relies on the theory that if proper management occurs in that location, proper management will be occurring throughout the rest of the management unit. See Appendix E for the procedures used to collaboratively establish DMA's. The goal is to establish more DMA's each grazing season in order to establish a 5-year re-monitoring schedule and have coverage across the Forest's allotments.

Implementation Monitoring - Endpoint Indicators

Implementation (endpoint indicator) monitoring measures indicators to determine if the authorized livestock grazing strategy for a particular season has had the projected effects to resources that the MNF has anticipated in developing the strategy and to determine if adaptive management adjustments need to be made for the following season(s). It provides information to assist with making decisions under adaptive management. Presently, implementation monitoring includes: modified extensive browse utilization (BLM 1996), modified stubble height (BLM, 1996 and Challis Resource Area, 1999), and streambank alteration (Cowley, 2004). These procedures provide information to refine and make annual adjustments to livestock grazing management practices necessary to meet long-term management objectives (adaptive management). They can be used as early warning indicators that current grazing impacts may prevent the achievement of management objectives and can also be used to help explain changes in riparian vegetation and channel conditions over time. See web-site (*http://www.rmsmim.com/*) for sampling procedures used.

Effectiveness Monitoring - Riparian Objectives

Effectiveness (riparian objective) monitoring is designed to address the question of whether or not management practices currently applied to the area are achieving the desired results. These procedures are designed to assess the current condition and measure changes in streambanks, channels, and streamside vegetation over time, i.e., trend. They help determine if local livestock grazing management strategies and other land management actions are making progress toward achieving the long-term goals and objectives for streamside riparian vegetation and aquatic resources. The goal is to conduct effectiveness monitoring every three to five years on riparian areas and streambanks. This period of time is considered to be the minimum necessary to detect changes, although unusually wet years and/or flood events may result in short-term changes that validate the need to monitor more frequently, or at least at the time of the event. Budget and personnel constraints may limit the extent in which monitoring of this type will be conducted. Presently, effectiveness monitoring includes: modified greenline composition (adapted from Winward 2000 and BLM 1996), woody species height class (Kershner et al. 2004), streambank stability and cover (adapted from Kershner et al. 2004), woody species age class (adapted from Winward 2000), greenline-to-greenline width (Burton et al. 2008), substrate (Bunte and Abt 2001), and residual pool depth and pool frequency (Lisle 1987). These provide data and information concerning the present conditions and trend of riparian vegetation, channels, and streambanks, and to help determine if aquatic systems are being degraded, maintained, or restored across the Malheur National Forest. See web-site (http://www.fs.fed.us/biology/fishecology/emp/) for PIBO data and sampling procedures used.

Forest Service Region 6 Level II Stream Inventory Surveys

Forest Service Region 6 Level II Stream Inventory Surveys generate comparable baseline information on conditions of fish-bearing streams to support a variety of management activities. As inventories are completed and repeated over time, the information generated by them can be useful in measuring changes in stream channel conditions and determining attainment of habitat management objectives. The Level II inventory generates quantitative measurements and estimates of channel conditions and habitat attributes, including core attributes of streamflow, temperature, substrate composition, width/depth ratio, channel length and sinuosity, gradient, pool frequency, large wood, bank stability, and special habitats. Numerous non-core optional attributes may also be evaluated based on Forest needs, such as stream shading and overstory/understory vegetation. The Forest goal is to inventory 10 percent of fish-bearing streams per year, inferring a 10-year re-inventory recurrence interval. The 2010 Region 6 Stream Inventory Handbook can be found at:
(http://www.fs.fed.us/r6/water/fhr/sida/handbook/Stream-Inv-2010.pdf)

Spawning Surveys

Spawning surveys are a quantitative method to assess steelhead redd presence and vulnerability to livestock disturbance and may also be used to assess compliance with the level of "take" authorized within a Biological Opinion. The Forest has developed a strategy to avoid redd trampling "take" of steelhead and bull trout (see Appendix F).

Uplands Monitoring

Beginning in the 1930s, permanent camera points were established on the Malheur National Forest. Their purpose was to monitor the effects of management on the resources of the Forest (Fifty Years of Change on the Range, R6-Mal-035-89). Many camera points have been re-photographed a number of times. This monitoring will continue.

In the 1950s and early 1960s Parker Three-Step C&T (Condition & Trend) Transects were installed throughout the Forest. The majority of these were established in the uplands. Over the last five years some of these transects have been re-examined. The procedure has been to read the transect using the original Three-Step method and then reread the transect using a modified Daubenmire cover/frequency method (see Technical Reference 1734-4). This allows comparisons between old and new information to determine ecological condition and trend and establishes a baseline using the more accurate cover/frequency method for gathering future data. The re-examining of these established transects will continue. If new trend transects are established the modified Daubenmire cover/frequency will be used.

There are a variety of additional or other monitoring methods available for use**.** The method or methods to be used will depend on the questions needing to be answered and considering other priorities. In some cases ocular observation (qualitative) will be sufficient to measure utilization, but when specific concerns are identified the forest may need quantitative methods such as Paired Clipped plots or development and use of height/weight curves may be necessary. Some of the more commonly used methods can be found in *"Utilization Studies and Residual Measurements"* (BLM 1996). (Please refer to ***Malheur National Forest Range Monitoring Guidelines***, October 16, 2006 for additional accepted methodology)

All of the monitoring methods used by the Forest are also intended to facilitate communications between forest range and resource personnel, grazing permittees and consulting agency personnel. This will largely be accomplished through participation and one-on-one interaction during the interdisciplinary, on the ground implementation.

4 PROPOSED ACTION AND ESA ACTION AREA

The MNF used the LRMP direction and policies presented in Section 3 to design the 2012-2016 proposed grazing action for the three allotments. Public laws such as Clean Water Act were considered. The development of the project design criteria, grazing end-points and grazing strategies for the three allotments considered the PACFISH / INFISH RMOs and Grazing Management Standards, desired conditions and standards from amendment 29 to the MNF LRMP, PACFISH / INFISH livestock grazing guidelines (Enclosure B) (Appendix C) and MSRAs (Appendix A). The LRMP direction and Clean Water Act also informed Forest policies on Riparian Monitoring and MSRAs. Examples of resource objectives and their sources include:

- Greenline successional status value of at least 61, indicating late seral or the current value, whichever is greatest (Winward 2000, Burton et al. 2008) was developed in response to the PACFISH/INFISH Enclosure B revision;
- Woody species regeneration sufficient to develop and maintain healthy woody plant communities (diversity of age and structure classes) was developed in response to MNF LRMP Amendment 29;
- Bank stability criteria (80% or current value, whichever is greatest for non-priority watersheds; at least 90% or current value, whichever is greatest, for priority watersheds) were from PACFISH/INFISH;
- Water temperature criteria are from the MNF LRMP; and
- Width-depth ratio criteria are from PACFISH/INFISH

The above resource objectives from the Forest direction and policies (See Section 3) are long term objectives that are achieved by developing a proposed action with project design criteria and annual monitoring indicators.

4.1 PROPOSED ACTION

Long Creek Allotment

The Long Creek Allotment is located north of the town of John Day on National Forest System Lands, mostly within T. 11, and 12 S, R. 31, 32, and 33 E. The Allotment encompasses approximately 49,000 acres and is divided into 10 pastures: Flat Camp, Flat Camp Cow Camp, Ladd, Lick Creek, Lick Creek Riparian, Hiyu, Flood Meadows, Keeney Meadow, Coxie Creek, and Camp Creek Riparian (Figure 1).

Camp Creek Allotment

The Camp Creek Allotment is located northeast of the town of John Day on National Forest System Lands, mostly within T 10 S, R 32 and 33 E. The Allotment encompasses approximately 600 acres and is divided into 7 pastures: Lower Camp Creek, Middle Camp Creek, North, Road, Gibbs, Campground, Upper Camp (Figure 2 and 3).

Blue Mountain Allotment

The Blue Mountain Allotment is located northeast of the town of John Day on National Forest System Lands, mostly within T 10, 11 and 12 S, R 35, 35.5 and 36 E. The Allotment encompasses approximately 22,708 acres and is divided into 5 pastures: Crawford Creek, Idaho Creek, East Summit, West Summit, and Squaw (Figure 4 and 5).

4.1.1 PERMIT INFORMATION AND GRAZING SYSTEMS

Long Creek Allotment

The Long Creek Allotment is currently permitted for 967 cow/calf pairs (5,749 AUM's) from 6/1 to 10/15. Permittees, permitted livestock numbers, and permit issuance and expiration dates are identified in Table 8.

Grazing System:

- The Long Creek Allotment consists of three main pastures.

- The Long Creek Allotment's grazing rotation system will continue to emphasize a deferred rotation with a staggered season of use entry system.
- Flat Camp and Lick Creek pastures will continue to be grazed first and second, alternating years.
- Ladd pasture will be used as an overnight stop or for unloading when bringing livestock onto the Forest.
- Camp Creek and Lick Creek Riparian pastures will be used for gathering
- Flat Camp Cow Camp will continue to house the full-time riders and provide pasture for stock horses.
- Range Readiness and utilization levels may vary on/off dates and pasture rotations within the parameters of authorize use.

TABLE 8. PERMIT INFORMATION FOR THE LONG CREEK ALLOTMENT

Permit Number	Permitted Livestock (Cow/Calf Pairs) / AUMs	Permit Issuance Date	Permit Expiration Date
01718A	219 / 1302	05/13/2009	12/31/2018
01790	361 / 2146	05/19/2004	12/31/2013
01857	306 / 1819	06/01/2007	12/31/2016
01831	81 / 482	03/15/2006	12/31/2015

Camp Creek Allotment

The Camp Allotment is currently permitted for 50 cow/calf pairs (330 AUMs) from 6/1 to 10/30. Permittees, permitted livestock numbers, and permit issuance and expiration dates are identified in Table 9.

Grazing system:

- The Lower pasture will be used early in the grazing season to allow for continued riparian shrub recovery.
- Beginning in 2012 the Campground pasture will not be grazed as part of the annual authorization. Cattle will only be driven through to access and leave the Upper Camp pasture.
- Range Readiness and utilization levels may vary on/off dates and pasture rotations within the parameters of authorize use.

TABLE 9. PERMIT INFORMATION FOR THE CAMP CREEK ALLOTMENT

Permit Number	Permitted Livestock (Cow/Calf Pairs) / AUMs	Permit Issuance Date	Permit Expiration Date
01783	50 / 330	03/22/2004	12/31/2013

Blue Mountain Allotment

The Blue Mountain Allotment is currently permitted for 163 cow/calf pairs (821 AUMs) from 6/16 to 10/9. Permittees, permitted livestock numbers, and permit issuance and expiration dates are identified in Table 10. The permit for this allotment is in the process of being waived back to the Forest Service. This allotment will be maintained for emergency use. The District IDT will determine whether grazing is appropriate based on conditions within the Allotment and or at what duration and levels of use.

Grazing system:

- The Blue Mountain Allotment consists of 4 main pastures.
- When this allotment is authorized for use (emergency situations) the following will be the grazing strategy.
- The Squaw pasture will only be used to facilitate moves between the larger pastures.
- A rest-rotation grazing system will be implemented on the remaining pastures.
- Authorized use will be evaluated on an annual basis by the District ID Team.
- Range Readiness and utilization levels may vary on/off dates and pasture rotations within the parameters of authorize use.

TABLE 10. PERMIT INFORMATION FOR THE BLUE MOUNTAIN ALLOTMENT

Permit Number	Permitted Livestock (Cow/Calf Pairs) / AUMs	Permit Issuance Date	Permit Expiration Date
01783	163 / 821	02/28/2005	12/31/2014

4.1.2 PROJECT DESIGN CRITERIA

The following project design criteria (PDC) will be used to minimize or eliminate adverse effects of the PEs on MCR Steelhead, bull trout, and designated CH. The MNF regards these PDC as integral components of the proposed action and expects that all proposed project activities will be completed consistent with those measures.

1. Management will be framed in a manner that will allow managers to manipulate grazing strategies (dates, stocking levels, rotational patterns) depending on annual environmental factors and permittee success at meeting standards during the previous year.
2. Permittees must maintain perimeter and interior fences prior to turn-out.
3. Standards that are required of the permittee (e.g., turn on dates, move triggers, end point standards) will be outlined in an addendum to Part III of the grazing permit.
4. MSRA will be located and used to identify stream sections that are most vulnerable to livestock impacts. Identifying MSRA locations will guide application of bank alteration values.
5. Spawning surveys will occur within all pastures containing MSRA's where turn out is expected to occur prior to June 30. Of the remaining CH reaches 20% will be randomly surveyed for redds where turn out is prior to June 30 (See Appendix F. Strategy to minimize Redd Trampling "Take" of Steelhead and Bull trout).

6. Where there is significant risk for redd trampling, the Forest and permittees will utilize a number of tools to protect redds, which include but are not limited to: alternative rotation, rest, exclusion with water gaps, temporary electric fences, additional riding.
7. Complete all required monitoring at PIBO Effectiveness Monitoring DMAs. DMA's to be monitored are provided to the Forest yearly by the EM Team via the Regional Office. This will effectively satisfy Interagency Implementation Team (IIT) monitoring requirements.
8. The Forest Service will visually inspect riparian livestock use in each pasture containing steelhead CH near the mid-point of the grazing rotation for that pasture, and will conduct applicable Multiple Indicator Monitoring ("MIM") on any such pasture where it appears that riparian conditions are approaching one or more move triggers or end-point indicators. This will help meet our long term riparian resource objectives.
9. Annual use indicators will dictate when livestock are moved between units or off the allotment, within the terms of the term grazing permit, including moves in response to fish spawning. This will help us meet our long term riparian resource objectives.
10. The Forest Service will provide the Services with an End of Year Grazing Report by March 1 of each year.
11. Use of roads and off-road travel by permittees and staff will follow these PDC:
    a. Vehicles are not authorized to travel through seeps, springs or streams except for use of existing fords on road crossings;
    b. All refueling activities and fuel storage will occur at least 150 feet away from live streams;
    c. OHV routes within 100 feet of streams will be camouflaged so that access routes do not become new trails and minimize disturbance to riparian vegetation;
    d. OHV travel off established roads within 100 feet of streams would occur only during periods when soil is dry.

4.1.3 GRAZING USE INDICATORS AND SUPPORTING RATIONALE

The Forest Service's Regions 1, 4, 6 and Bureau of Land Management's Idaho, Montana, Nevada, Oregon and Washington have made commitments through the PACFISH/INFISH and INFISH Management Strategies to protect and improve aquatic resources found in the interior Columbia River basin. Since the Forest Service Pacific Northwest Region (Oregon and Washington) which includes the Malheur National Forest began implementing these strategies, there has been marked improvement in management of aquatic resources. To strengthen the implementation of the aquatic strategies, an interagency group consisting of deputies from the various action and regulatory agencies (Deputy Team) was formed to provide oversight of the strategies and subsequent biological opinions commonly known as PIBO. Under the Deputy Team oversight, an implementation monitoring module was developed for livestock grazing, and its application is required where listed fish species occur in the interior Columbia River basin. Compliance with these requirements is monitored and presented to the Deputy Team during their annual reviews.

The PNW region requires application of the PIBO implementation and effectiveness monitoring program for National Forest LRMPs amended by PACFISH/INFISH and INFISH, and the regional office annually coordinates the PIBO monitoring programs with the National Forests with listed fish species. FS line officers continue to work with their staffs and grazing permittees to ensure that implementation monitoring requirements are met. As described in the PIBO monitoring strategy and the annual regional coordination letter, the Forest established Designated Monitoring Areas (DMAs) and annually monitors the grazing use indicators at these PIBO DMAs as well as DMAs established by the MNF (Figure 1 and 4).

Data collected at the PIBO effectiveness monitoring DMAs reflect the grazing use indicators applicable to stream banks and stream channels. Accordingly, the regional monitoring coordination letter identifies the following requirements will apply to these DMAs:

A. Measurements will be on the greenline (first perennial vegetation above the channel). Measurements must include, at minimum: 1) bank alteration and 2) stubble height if any herbaceous vegetation is present.
B. Where woody riparian vegetation dominates the DMA with little or no herbaceous vegetation along the greenline, woody use (browse) should be measured and may be sampled in lieu of stubble height.
C. These measures will be made using the current MIM protocol.

Therefore, the grazing use indicators required by the PIBO and used by the Forest riparian monitoring programs at all DMAs are: browse of woody vegetation, stubble height of greenline vegetation and streambank alteration. Woody vegetation browse is used to regulate impacts on woody recruitment to streams, greenline stubble height is used to regulate grazing impacts on greenline ecological status and streambank alteration is used to regulate grazing impacts on streambank stability and channel width. For consistency with the PIBO monitoring program and regional direction regarding coordination with it, the Forest elected to use the current MIM for their monitoring protocol.

The MNF utilizes move trigger and endpoint (annual) indicators to manage livestock. The underlying concept behind the use of end-point indicators for livestock grazing management is that the selected end-points, if not exceeded, will allow for the attainment ofor reasonable progress to be made toward desired conditions for riparian areas and fish habitat as described in Section 3 – Malheur NF LRMP and Section 4 – Proposed Action.

The MNF developed values for livestock move trigger and annual endpoint indicators (Table 11-13). The ranges of values are starting points based on research and the MNF’s best collective professional judgment for establishing desired riparian conditions. The end-point indicator values (allowable use in riparian areas) are, to the extent feasible and appropriate data are available, be site-specifically designed to prevent any meaningful carry-over effects. They also provide for the evaluation of management practices to determine if they are effective in maintaining the desired and/or proper functioning condition, or improving the structure and function of riparian and aquatic conditions. These values could be adjusted as more site-specific information is gathered. End-point indictors (allowable use in riparian areas) should be adjusted for timing, intensity, frequency, and duration. The rationale for the development of the move trigger and end-point grazing use indicators is discussed below.

Livestock grazing along the greenline of stream channels will be limited to attain the numeric move trigger and end-point indicator values in Table 11-13.

TABLE 11. LONG CREEK ALLOTMENT ANNUAL USE INDICATORS

Pasture Name/ DMA or Key area Name / Creek Name	Monitoring Attribute	Key Species	Move Trigger[2]	Endpoint Indicator
Flat Camp MSRA-Present	Browse use		40% 30%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	5 in. 7 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
Lick Creek West Fork Lick Creek DMA MSRA-Present	Browse use		40% 30%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	5 in. 7 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
Hiyu MSRA-Present	Browse use		40% 30%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	5 in. 7 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
Camp Creek Riparian Camp Creek DMA MSRA-Present	Browse use		40% 30%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	5 in. 7 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
Lick Creek Riparian Lick Creek DMA	Browse use		40% 30%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted	5 in.	4 in. (early season use)

Pasture Name/ DMA or Key area Name / Creek Name	Monitoring Attribute	Key Species	Move Trigger[2]	Endpoint Indicator
MSRA-Present		hydric spp.	7 in.	6 in. (late season use)
	Streambank Alteration		10%	15%
Flood Meadows Flood Meadows DMA MSRA-Present	Browse use		40% 30%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	5 in. 7 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
Upland Sites (All Pastures)	% Utilization	Upland grass species	35%	45%
Riparian Areas (All Pastures)	% Utilization	Riparian grass species	35%	45%

[1]Browse use and greenline stubble will be used until next trend reading is completed to determine which attribute will be best suited to attain long term objectives.

[2]The move triggers identified in this document are not intended to be used as a "standard." They are designed to function as a tool to help permitees successfully meet allowable use standards. The move trigger values are set at lower levels than the endpoint indicators to serve as a trigger point for permitees to begin gathering and moving livestock to the next scheduled pasture. Meeting move triggers is not a requirement of the term grazing permit as are the endpoint indicators.

Table 12. Camp Creek Allotment Annual Use Indicators

Pasture Name/ DMA or Key area Name / Creek Name	Monitoring Attribute	Key Species	Move Trigger[2]	Endpoint Indicator
Lower Camp/ Middle Fork John Day River MSRA-Present	Browse use		40% 30%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	5 in. 7 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%

Upland Sites (All Pastures)	% Utilization	Upland grass species	35%	45%
Riparian Areas (All Pastures)	% Utilization	Riparian grass species	35%	45%

[1]Browse use and greenline stubble will be used until next trend reading is completed to determine which attribute will be best suited to attain long term objectives.

[2]The move triggers identified in this document are not intended to be used as a "standard." They are designed to function as a tool to help permitees successfully meet allowable use standards. The move trigger values are set at lower levels than the endpoint indicators to serve as a trigger point for permitees to begin gathering and moving livestock to the next scheduled pasture. Meeting move triggers is not a requirement of the term grazing permit as are the endpoint indicators.

TABLE 13. BLUE MOUNTAIN ALLOTMENT ANNUAL USE INDICATORS.

Pasture Name/ DMA or Key area Name / Creek Name	Monitoring Attribute	Key Species	Move Trigger[2]	Endpoint Indicator
Crawford Creek/ Site yet to be determined/ Crawford Creek MSRA-Present	Browse use		40% 30%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	5 in. 7 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
West Summit/ West Summit DMA/ Middle Fork John Day River MSRA-Present	Browse use		40% 30%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	5 in. 7 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
Idaho Creek/ Site yet to be determined MSRA-Present	Browse use		40% 30%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	5 in. 7 in.	4 in. (early season use) 6 in. (late season use)
	Streambank		10%	15%

	Alteration			
East Summit/Site yet to be determined MSRA-Present	Browse use		40% 30%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	5 in. 7 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
Squaw/Site yet to be determined/Squaw Creek MSRA-Present	Browse use		40% 30%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	5 in. 7 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
Upland Sites (All Pastures)	% Utilization	Upland grass species	35%	45%
Riparian Areas (All Pastures)	% Utilization	Riparian grass species	35%	45%

[1]Browse use and greenline stubble will be used until next trend reading is completed to determine which attribute will be best suited to attain long term objectives.

[2]The move triggers identified in this document are not intended to be used as a "standard." They are designed to function as a tool to help permitees successfully meet allowable use standards. The move trigger values are set at lower levels than the endpoint indicators to serve as a trigger point for permitees to begin gathering and moving livestock to the next scheduled pasture. Meeting move triggers is not a requirement of the term grazing permit as are the endpoint indicators.

4.1.4 RATIONALE TO SUPPORT THE RANGE OF INITIAL VALUES FOR SELECTED END-POINT INDICATORS/CONDITION THRESHOLDS/ALLOWABLE USE CRITERIA

Stubble Height: 4-6 inches. Stubble height has been identified as being related to the physiological health and vigor of individual plants/communities as well as the ability of vegetation to protect streambanks and filter during overbank flows, although by itself it is generally not sufficient to establish a relationship between grazing and riparian vegetative conditions. Research is limited, but the literature generally suggests 4-6 inches of residual stubble height allows for improved riparian grazing management and provides for adequate riparian protection. Clary and Leininger (2000) conducted studies on stubble height and its ability to improve riparian habitats and to capture and stabilize sediment. They concluded that stubble heights of 4-6 inches appear to stabilize the greatest amount of sediment. Clary (1999) states that by maintaining stubble heights of 4-5.5 inches allowed for streambank recovery. End-point indicator values are intended to vary by site depending on similarity to desired conditions and the resiliency of the site being monitored (University of Idaho Stubble Height Study Team 2004, Clary and Leininger 2000, Clary et al. 1996, Hall and Bryant 1995, Appendix B - PACFISH/INFISH Enclosure B, Clary and Webster 1989). Stubble height is an annual use indicator that should be used in combination with long-term monitoring of vegetation and stream channel attributes.

Bank Alteration: 10-30%. In general, the most widespread impact livestock have on riparian areas is trampling stream banks (Bengeyfield, 2006). Like stubble height, streambank alteration is another annual or short-term indicator used to evaluate the potential effects of livestock grazing in riparian areas, primarily evaluating potential effects to long-term streambank stability and channel shape. It is used as a tool to assess the intensity of grazing along streambanks and to determine when such intensity may be appropriate or deemed excessive. It can also prove useful in determining the cause-and-effect relationships between livestock grazing and stream channel conditions and whether management changes are needed for the following year. Streams are naturally dynamic and have the ability to repair a certain amount of annual disturbance each year (the amount is variable based upon stream gradient, substrate composition, streambank materials, vegetation type and abundance, channel geometry, flow regime, etc.). Again, although the literature is not extensive, it generally suggests that 10-30% of annual streambank alteration is consistent with providing adequate riparian protection, and is intended to vary by site depending on similarity to desired conditions and the resiliency of the site being monitored (Burton et al. 2011, Heitke et al. 2008, Bengeyfield 2006, Cowley 2002, Bengeyfield and Svoboda 1998). Bengeyfield (2006) found that when streambank alteration measured 15-20%, width to depth ratios showed an improving trend. He also noted that the vegetation improvements kept pace with the physical changes.

The streambank alteration procedure described here is an intercept procedure recording presence/absence of current year’s disturbance along the greenline. It is not a measure of the percent of the area of streambank altered, but rather an estimate of the percent of the length of bank altered along the greenline based on the presence or absence of a hoofprint(s) intercepting one (or more) of the five lines within a plot. This procedure samples only that part of the streambank associated with the greenline, often at the top of the streambank, and only within a 42-by-50cm plot. The streambank may be wider or narrower than the width of the plot.

Streambank alteration is an annual use indicator that should be used in combination with long-term monitoring of streambank stability and channel geometry. In addition, it is worth noting that research is continuing to be conducted on the various ways that can be used to monitor for and measure actual streambank alteration (including MIM, which the District is presently using) to account for accuracy of results, reduction of variability among observers, and the resources necessary to carry out such measures.

Mean incidence of use on woody species: 30-50%. Woody vegetation is an important component of many stream/riparian ecosystems as it can provide a strong root system, filter sediment, and provide stream shade and habitat diversity. Woody species browse is a short-term indicator of grazing utilization of woody species. Overall, there is generally a reduction in seed production of woody plants that receive more than 55 percent utilization, and when heavy and severe utilization levels are sustained over time overall plant health, including size and root strength, is reduced. Although the literature is not extensive, it generally suggests light to moderate allowable use on woody species (~30-50%) can be sustained and not meaningfully impede the potential for improved conditions of affected woody plant communities; and is intended to vary by site depending on similarity to desired conditions and the resiliency of the site being monitored (Winward 2000, USDI BLM 1996, Appendix B-PACFISH/INFISH Enclosure B). Woody species browse is an annual use indicator that should be used in combination with the long-term monitoring indicators of woody species age class and greenline composition to help determine the health of woody plant communities.

Livestock grazing along the greenline of stream channels will be limited to attain the numeric move trigger and end-point indicator values in Tables 11-13. The numeric values in Tables 11-13 are considered starting points for allowable use since values could be adjusted as more site-specific information is gathered.

Initial Values for Grazing Use Indicators

Based on the best available science, applied science publications, and professional judgment, the Forest interdisciplinary team selected initial values for each indicator. The season of use determined the initial values of endpoint indicators for woody shrub use and stubble height of greenline vegetation. The early season initial values for shrub use and stubble height are 50% and 4 inches, and the late season initial values for shrub use and stubble height are 40% and 6 inches, respectively. Grazing use in the early season allows time for vegetation growth after livestock use. The exact dates and times of early and late season can vary across the Forest and between given years, and therefore are not specified. However, to provide some typical guidelines, early season is usually defined as the beginning of the growing season to mid-July and late season from mid-August to the end of the growing season.

To determine an initial value for the streambank alteration grazing use indicator, the Forest also looked a Regional Technical Team (RTT) report prepared under the Streamlining Consultation Procedures resolution process. The NMFS had stated that “The best available science indicates that the 10% and 20% bank alteration levels are appropriate in preventing bank destabilization and protecting habitats critical to listed fish.” Their position paper cited numerous references to support these values. The RTT reviewed documents cited by NMFS, and they concluded that NMFS had reasonably established a causal link between streambank alteration-related habitat effects caused by livestock grazing activity and the taking of the species (i.e., grazing will affect stream channel conditions that will affect fish habitat conditions such as water quality, food, cover, etc.). The literature generally supports the concept that increased streambank alteration will, at some point, adversely affect stream channel conditions, and therefore fish habitat conditions. However, there was uncertainty relative to the percentage of streambank alteration at which habitat conditions were significantly altered and take of the species is likely to occur.

There is little field research supporting any specific percent streambank alteration standard using a defined and repeatable measurement protocol. The above RTT report and citations provide recommendations and professional judgments that range from 10% to 30% streambank alteration, but do not present empirical evidence from grazing monitoring data to support the percentages. The Forest interdisciplinary team recognizes a connection between the streambank alteration grazing use indicator and long term fish habitat conservation objectives in the LRMP, but couldn’t determine a consensus value. Therefore, the Forest interdisciplinary team selected an initial value of 20% streambank alteration for endpoint grazing use indicator which is the statistical median of the range.

Adjustments to Values of Grazing Use Indicators and/or Grazing Strategy

The interdisciplinary team considers available information on riparian condition (eg. succession status of greenline vegetation and woody species regeneration) and presence of MSRAs to adjust values of grazing use indicators and/or the grazing strategy. Information wasn't available for the successional status of the greenline and woody species regeneration for the pastures in this allotment. Therefore, it didn't affect the values of the grazing use indicators in Tables 11-13. However, the presence of MSRAs resulted in reductions of the streambank alteration values for several pastures.

Criteria used to evaluate the riparian condition (eg. succession status of greenline vegetation and woody species regeneration):

When these conditions apply:

- Greenline plant communities show moderate to high similarity to desired condition class/seral stage -- greenline successional status value is 41% or greater (mid-late seral) as defined by Winward (2000); *and/or*
- Stream/riparian systems have been assessed as being in Properly Functioning Condition or Functioning-at-Risk (high to moderate) category (Prichard et al. 1998); and/or
- Riparian/channel attributes are near desired conditions) in a Unit,

Then allowable use within riparian areas will be:

1. <40-50% browse on both clumped, multi-stemmed species (i.e. most willows (*Salix spp.*) and single-stemmed species (i.e. coyote willow (*Salix exigua*), birch (*Betula spp.*), alder (*Alnus spp.*), cottonwood or quaking aspen (*Populus spp.*)) i.e. <50% browse if early season use, and <40% browse for mid and late season use[1]; and
2. >4-6 inch residual stubble height (will vary based on greenline successional status/seral stage, and season of use) i.e. >4 inches if early season use, and >6 inches for mid and late season use; and
3. Allowable bank alteration will be limited to 20% streambank alteration[2] by large herbivores (% of linear length of greenline altered) (Multiple Indicator Monitoring (MIM) of Stream Channels and Streamside Vegetation (Interagency Technical Reference 1737-23 2010)[3]. The estimated combined variability, observer error and

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[1] The exact dates and times of "early", "mid" and "late" can vary across the Forest and between given years, and therefore are not specified. However, to provide some typical guidelines, "early" is usually defined as the beginning of the growing season to mid-July, "mid" season from mid-July to mid-August, and "late" season from mid-August to the end of the growing season.

[2] The allowable level of bank alteration for a specific site should allow for no more than 5% of the lineal bank distance (includes both sides of the stream) displaying evidence of new bank instability that has become perceptible after livestock grazing is initiated in a pasture. Note: hoof prints by themselves are not a sign of instability unless they move the bank by > 10 cm (direct shearing or sloughing of the bank).

[3] Research is presently ongoing, which may result in a new and or modified method of measuring Bank Alteration. If in fact this occurs the PIBO EM Team and or other researchers would present findings and provide a cross walk and rational to the existing monitoring method and endpoint indicators.

sampling error or sample size, results in a 95% confidence interval of 6% for this bank alteration monitoring method. Thus, by setting a trigger for moving livestock at ~14%, we can be reasonably confident that livestock would be off the pasture before an additional 12% alteration was reached. The upper level for reasonable confidence would be 26% -- which represent an upper limit for the associated conservation measure.

However, when these conditions apply:

- When greenline plant communities show low similarity to desired condition class/seral stage -- greenline successional status value is less than 41 (early seral) as defined by Winward (2000); and/or
- Stream/riparian systems have been assessed as being in a *Functional-at-Risk (low) to Non-Functional category* (Prichard et al. 1998) {a Non-Functional system is one that clearly does not provide adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, etc.; there is an absence of certain physical attributes such as a floodplain where one should be} in a Unit,

Then,

1. Consider resting the area/s for one or more years until condition reaches moderate similarity for those riparian areas with moderate and low gradient channels, such as Rosgen "B" and "C" channel types, with substrates composed of medium to fine easily eroded materials; or
2. If grazing is allowed, use should be for only short duration (i.e. to facilitate moves, etc.) and during a period of least environmental impacts

Most Sensitive Riparian Areas:

The MNF has identified stream reaches of high quality steelhead spawning and rearing critical habitat called Most Sensitive Riparian Areas (MSRAs). The process and criteria for identifying MSRAs is described in detail in Appendix G- Methods for determining Most Sensitive Riparian Areas in relation to Mid Columbia River Steelhead. The miles of MSRA by stream and location in the allotment are displayed in Tables 3, 4, and 6 and Figures 1, 2, 4 respectively.

MSRAs are typically steelhead critical habitat that is most accessible and sensitive to livestock use. MSRA and the grazing strategies described below are part of the proposed action. Certain grazing strategies can be used to minimize livestock and stream interactions and promote maintenance of, or recovery towards, desired conditions. Pastures containing MSRA that include one or more of the following grazing strategies would result in allowable use levels of 20% bank alteration versus the more restrictive standard of 15%:

- Rest Rotation – 1 year of complete rest during a grazing cycle (grazing cycle is typically 3-4 pastures)

- Double Rest Rotation – pasture is rested for two consecutive years, then grazed either early or late to following year depending on recovery needs (i.e. herbaceous or shrubs)
- Corridor Fencing – complete rest from grazing for a specified period of time or until specified objectives are met.

If at any point during this consultation a permittee adopts one or more of the strategies listed above the endpoint indicator would be adjusted to reflect such management changes in the annual instructions.

Other useful tools to minimize riparian use include – using a full-time rider (7 days/week), using electric fence, using low-stress stockmanship, placing low-moisture nutrient supplement blocks (as well as using other supplementations) in uplands, less than 21 days grazing duration in any pasture during the hot season (typically mid and late seasons, or mid-July to end of growing season). The use of these tools will be evaluated by the IDT on an annual basis to determine if the level of allowable use would be raised to 20% bank alteration. If none of these tools are in place, allowable use will remain at the 15% bank alteration.

4.1.5 MONITORING

The Malheur National Forest monitoring strategy for determining condition and trend of riparian ecosystems as they relate to grazing activities was described in detail in Section 3.2. The goal is to determine site-specific desired riparian/stream channel conditions and the levels of allowable use (annual indicators also known as end-points) that will improve conditions that are not at the desired and/or proper functioning condition. The assessments and monitoring protocols used, as well as the values for desired conditions and allowable use, are intended to be an important part of the adaptive management process and are subject to changes or modifications based on new scientific findings and improvements in methodologies as well as changes in definitions and policy.

The annual indicators are used in implementation monitoring to ensure that grazing does not prevent the attainment of the desired conditions. Riparian annual use indicators used on the Malheur National Forest include greenline stubble height, bank alteration, and woody browse. Greenline stubble height is used to regulate grazing impacts on greenline ecological status, bank alteration is used to regulate grazing impacts on bank stability, and woody browse is used to regulate impacts on woody recruitment. The specific indicators selected for a specific unit should be those that correspond with the riparian resources that are most sensitive to the impacts of livestock grazing. For example, if bank stability was the riparian feature most likely to be impacted by livestock grazing in a unit, then bank alteration would be selected as the annual use indicator for that unit.

Annual use indicators will be measured at key areas by key species (on uplands) and at DMA greenlines annually. Key areas are monitoring sites chosen to reflect the effects of grazing over a larger area (Burton et al 2008). Key species are preferred by livestock and an important component of a plant community, serving as an indicator of change (Coulloudon et al. 1999). The Interagency Technical Reference or other best available science would be used to monitor grazing use. The MIM Interagency Technical Bulletin (Burton et al. 2008) or other best available science would be used to monitor grazing use at DMAs. The Forest Service will monitor annual use indicators. Triggers will be used by permittees as a tool to help ensure annual use indicators are met. Endpoint indicators will be monitored by MNF personnel at designated monitoring areas (DMAs), following the MIM protocol (Burton et al. 2011). Move trigger evaluations will be conducted by the permittee.

Effectiveness (riparian objective) monitoring is designed to address the question of whether or not management practices currently applied to the area are achieving the desired results. These procedures are designed to assess the current condition and measure changes in streambanks, channels, and streamside vegetation over time, i.e., trend. They help determine if local livestock grazing management strategies and other land management actions are making progress toward achieving the long-term goals and objectives for streamside riparian vegetation and aquatic resources. The goal is to conduct effectiveness monitoring every three to five years on riparian areas and streambanks. This period of time is considered to be the minimum necessary to detect changes, although unusually wet years and/or flood events may result in short-term changes that validate the need to monitor more frequently, or at least at the time of the event. Budget and personnel constraints may limit the extent in which monitoring of this type will be conducted.

Presently, effectiveness monitoring includes: modified greenline composition (adapted from Winward 2000 and BLM 1996), woody species height class (Kershner et al. 2004), streambank stability and cover (adapted from Kershner et al. 2004), woody species age class (adapted from Winward 2000), greenline-to-greenline width (Burton et al. 2008), substrate (Bunte and Abt 2001), and residual pool depth and pool frequency (Lisle 1987). These provide data and information concerning the present conditions and trend of riparian vegetation, channels, and streambanks, and to help determine if aquatic systems are being degraded, maintained, or restored across the Malheur National Forest.

4.1.6 ADAPTIVE MANAGEMENT

The adaptive management strategy described below and depicted in Appendix H diagrams 1.0 (Long-term) and 2.0 (Annual) is intended for allotments requiring consultation. It is designed to provide the MNF the ability to make management decisions based on new information, changing conditions, or the results of implementation/effectiveness monitoring. Adaptive management will be used to ensure: 1) sites at desired condition remain in desired condition; 2) sites not in desired condition have an upward trend; and 3) direction from consultation with the Services is met.

The overall strategy consists of a long-term adaptive management strategy and an annual adaptive management strategy. The long-term strategy describes how adaptive management will be used to ensure the three objectives previously stated are achieved and to maintain consistency with Forest Plan level direction. The annual adaptive management strategy describes how adjustments will be made within the grazing season to ensure annual use indicators and other direction from consultation is met, it also describes when and how regulatory agencies will be contacted in the event direction from consultation is not going to be met.

Ideally, the value associated with the annual use indicator is customized to the specific circumstances in each unit. However, customizing this value generally requires a significant amount of data and/or experience with a particular unit. As data is gathered and analyzed the annual use indicators may be adjusted to reflect the new information.

The annual use indicators within the Multiple Indicator Monitoring (MIM) method will be used to detect the annual use of wild horses, wildlife, and livestock at the end of a grazing period or growing season, whichever occurs first. Although the Proposed Action includes a suite of measures designed to avoid such an outcome, the MNF acknowledges that it is nevertheless possible that annual use indicators could be exceeded in a particular year. If this occurs, the MNF proposes the adaptive management process to be initiated immediately and will make any necessary adjustments to the current or future grazing strategy to ensure that the exceedances do not recur.

When the annual utilization data is collected at the end of the growing season, the MNF will consider adjustments of livestock numbers, timing of grazing, and duration of grazing. If the big game populations exceed ODFW Management Objectives, appropriate coordination will occur among the agencies.

If there are recurring exceedances of annual indicators, or if there is a failure to comply with the terms and conditions of the grazing permit, the issuance of a Notice of Non-Compliance may be warranted. This notice, issued to the permittee(s), is likely to be in addition to the outcomes that result from following the adaptive management process described above. The issuance of a Notice of Non-Compliance and resulting action taken by the MNF will be consistent with FSH 2209.13 Section 16 and 36 CFR 222.4. All exceedances of annual indicators and subsequent grazing strategy adjustment recommendations will be documented by the MNF in the annual EOY Report and presented to the Level I consultation team. A specific strategy for when the endpoint indicator for streambank alteration is exceeded is discussed in Section 4.1.6.1 below.

4.1.6.1 COMPLIANCE STRATEGY FOR THE STREAMBANK ALTERATION ENDPOINT INDICATOR

The MNF acknowledges that there is a ±6% margin of error associated with the MIM protocol (see section 4.1.3). Action would only be taken for permit violations and not as a result of wild ungulate or unauthorized use. The MNF will follow the strategy outlined below for exceedance of the bank alteration endpoint indicator. For each level of exceedance, the BMRD will incorporate adaptive management strategies into the following season's grazing strategy which may include: adjustments of livestock numbers, timing of grazing, or duration of grazing.

- **Measured bank alteration ≤ 6% over the endpoint indicator:** will be evaluated by the District IDT. The IDT will examine the level of measured use on stubble height and woody browse to determine if an exceedance of the endpoint indicator occurred. If the IDT concludes that the endpoint indicator has been exceeded the permittee will be contacted via phone or in person to notify them of the IDT findings. The permittee would be given 1 year to remedy. A follow-up letter will be sent to the permittee to document the verbal discussion and include what action is expected of the permittee to remedy the situation, to what standard, and by when (FSH 2209.13, 10, 16.2e).
- **Measured bank alteration 7-13% over the endpoint indicator:** the BMRD will, at a minimum, issue a notice of Non-Compliance for violation of terms and conditions of the term grazing permit and be given 1 year to remedy the non-compliance. Adjustments to the grazing strategy may be made following the adaptive management process. Failure to remedy the non-compliance during the following grazing season may result in a reduction of 25% of permitted AUMs for the following grazing season, **or** rest the pasture the following grazing season (FSH 2209.13, 10, 16.2e).
- **Measured bank alteration 14-20% over the endpoint indicator:** the BMRD will, at a minimum, issue a notice of Non-Compliance for violation of terms and conditions of the

term grazing permit and will give the permittee 1 year to remedy the non-compliance. Adjustments to the grazing strategy may be made following the adaptive management process. When documented inspection indicates that the initial non-compliance has not been remedied as specified, or if a second situation of non-compliance has occurred, the permittee will be contacted by phone or in person describing the specific non-compliance. The BMRD will either reduce the authorized use by 25% of permitted AUMs for the following grazing season, **or** rest the pasture the following grazing season. A follow-up letter of a notice of permit action for non-compliance will be sent to the permittee indicating that a specified part of the permitted numbers or seasons is being suspended for a period of at least two years (FSH 2209.13, 10, 16.2e).

- **Measured bank alteration >21% over the endpoint indicator:** the BMRD will, at a minimum, issue a notice of Non-Compliance for violation of terms and conditions of the term grazing permit and will give the permittee 1 year to remedy the non-compliance. Adjustments to the grazing strategy may be made following the adaptive management process. When documented inspection indicates that the initial non-compliance has not been remedied as specified, or if a second situation of non-compliance has occurred, the permittee will be contacted by phone or in person describing the specific non-compliance. The BMRD will reduce the authorized use by 25% of permitted AUMs for the following grazing season, **and** rest the pasture the following grazing season using the adaptive management process. A follow-up letter of a notice of permit action for non-compliance will be sent to the permittee indicating that a specified part of the permitted numbers or seasons is being suspended for a period of at least two years (FSH 2209.13, 10, 16.2e).

Recurring non-compliance may lead to suspension of AUMs and/or the cancellation in part or whole of the Term Grazing Permit. Permit action involving the suspension or cancelation of grazing permits as per direction outlined in FSH 2209.13, 10, 16.2 and 36 CFR 222.4,

4.1.7 COORDINATION AND REPORTING

Reporting

Annual end-of-year (EOY) grazing reports are prepared by BMRD staff for all livestock grazing allotments. The reports include monitoring results, descriptions of any exceedance of grazing end-points and recommendations for management changes for the next grazing season. See monitoring section for a description of the grazing use and stream channel condition indicators for which information is collected, evaluated and reported. The report is sent to the NMFS and/or FWS by March 1 of each year.

Coordination

EOY report. Both internal and external coordination takes place regarding information and recommendations for changes in management found within the EOY report. The recommendations for changes in management in the EOY report are developed in an interdisciplinary manner. Typically, range conservationists, fish biologists, hydrologists, and the line officer will be involved. On occasion, wildlife biologists and botanists will participate.

Level 1 Team Meeting: A Level 1 team meeting is scheduled after a draft EOY report is sent to NMFS and/or FWS. The Level 1 Team discusses the draft EOY monitoring results, proposed remedies, and application of the compliance strategy (Section 4.1.6.1).

4.2 INTERRELATED ACTIONS

The regulations require the MNF to impose penalties for violation of prohibited acts on public lands. Unauthorized use is a prohibited act, and therefore is not a federal action. If unauthorized use occurs, the MNF's response could constitute a separate, interrelated federal action.

Unauthorized livestock grazing can occur in the allotment, and is reasonably certain to occur in the future. It is not a large problem in the allotments analyzed in this BA. Typically, it involves a few cow/calf pairs every few years.

Forest Service grazing regulations define unauthorized use, also known as "trespass," as occurring when livestock not under permit enter National Forest System (NFS) lands. It is a violation of 36 CFR 261.7. When unauthorized use occurs, the MNF attempts to identify and contact the owner of the livestock with instructions to remove the unauthorized livestock from NFS. The MNF can then bill the owner for the unauthorized use at the appropriate rate as identified in 36 CFR 222.50(h). If the ownership of the livestock is unknown, or the owner fails to comply with instructions to remove the livestock, the impoundment of said livestock by the MNF can occur as per 36 CFR 262.10.

4.3 PROJECT ELEMENTS

Project elements are the component parts of the action. Project elements will be assessed in the effects analysis section of the BA. Several of the project elements involve the use of vehicles on and off roads to access sites, such as four wheel drive trucks and OHVs.

1. Livestock use of allotment/pastures. Livestock will utilize the allotment/pastures consistent with the permitted numbers, season of use and grazing system described above and in the term grazing permit.
2. Permittee management of livestock and infrastructure maintenance. This includes move-in and move-out of cattle, herding, placement of nutrient (salt blocks) in the uplands, and maintenance of troughs, springs, ponds, fences and gates. Use of highway and off-road vehicles is included in this PE.
3. Range improvements. This includes the construction of fences for riparian pastures, and the construction/development of off-stream water sources.
4. Exclusionary fencing. Fences are constructed or placed to exclude areas from grazing. This is done to prevent livestock damage of riparian areas and in the case of electric fencing, to eliminate the potential for cattle stepping on redds.
5. Monitoring. A variety of implementation and effectiveness monitoring techniques are employed to determine if desired conditions are being met. The MNF Riparian Monitoring Strategy is discussed in detail in 4.1.4 below. Workers use manual and electronic equipment to measure vegetation, water quality and stream channel/streambed characteristics.
6. Adaptive management. An adaptive management strategy is designed to provide the MNF the ability to make management decisions based on new information, changing conditions, or the results of implementation/effectiveness monitoring. It will be used to

ensure: (1) Sites at desired condition remain in desired condition; (2) sites not in desired condition have an upward trend; and (3) direction from ESA consultation with NMFS is met. The adaptive management strategy describes how adjustments will be made to ensure annual endpoint indicators as well as other direction from this consultation are met, and describes when and how regulatory agencies will be contacted in the event direction from this ESA consultation is not going to be met. The MNF Adaptive Management Strategy is described in Section 4.1.6.

4.4 ESA ACTION AREA

The ESA action area for this consultation is displayed in Figures 6-9. The ESA action area is displayed by cross-hatched area within the allotment boundary of the 6th field HUCs listed in Table 1.

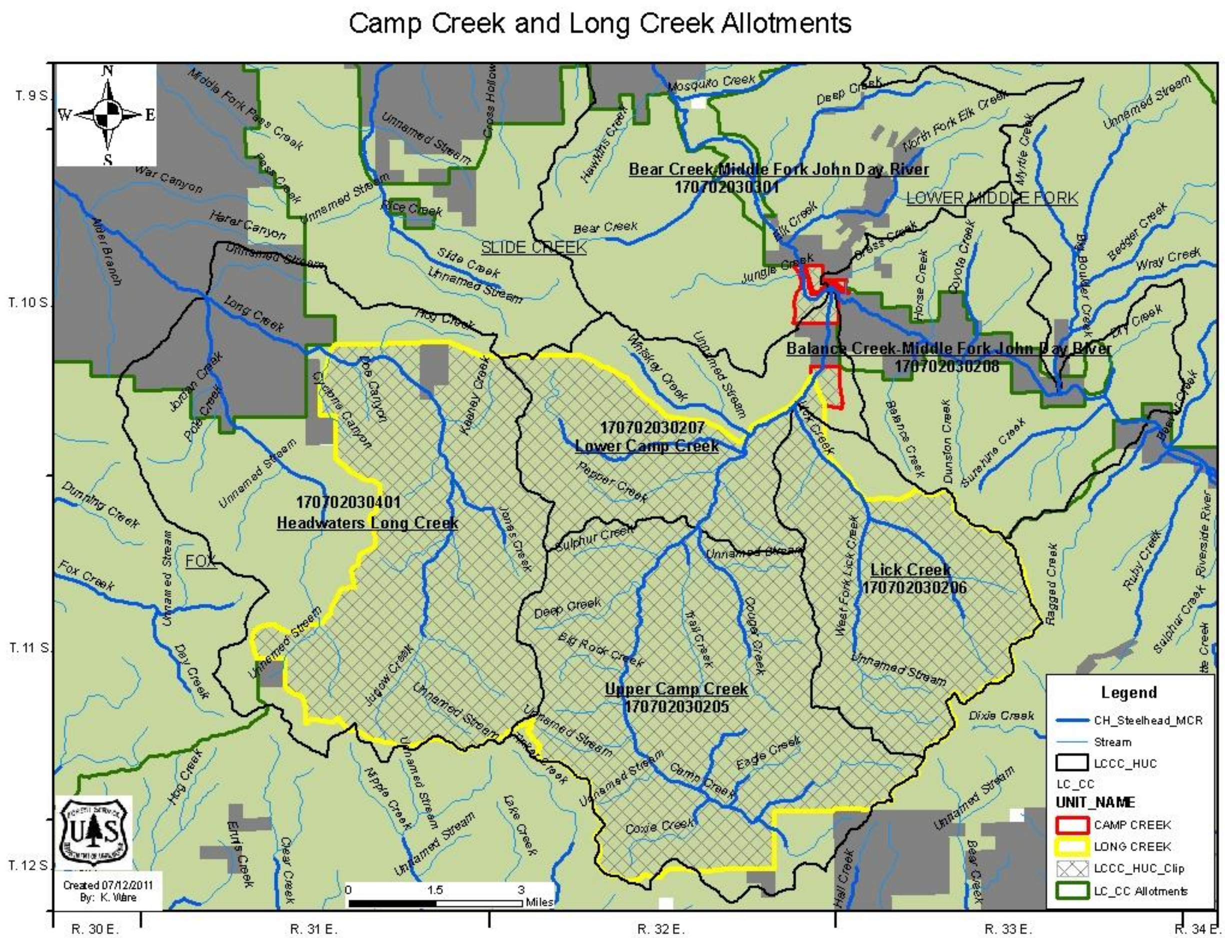


FIGURE 6. LONG CREEK & CAMP CREEK ALLOTMENT ESA CONSULTATION ACTION AREA MAP FOR MCRS.

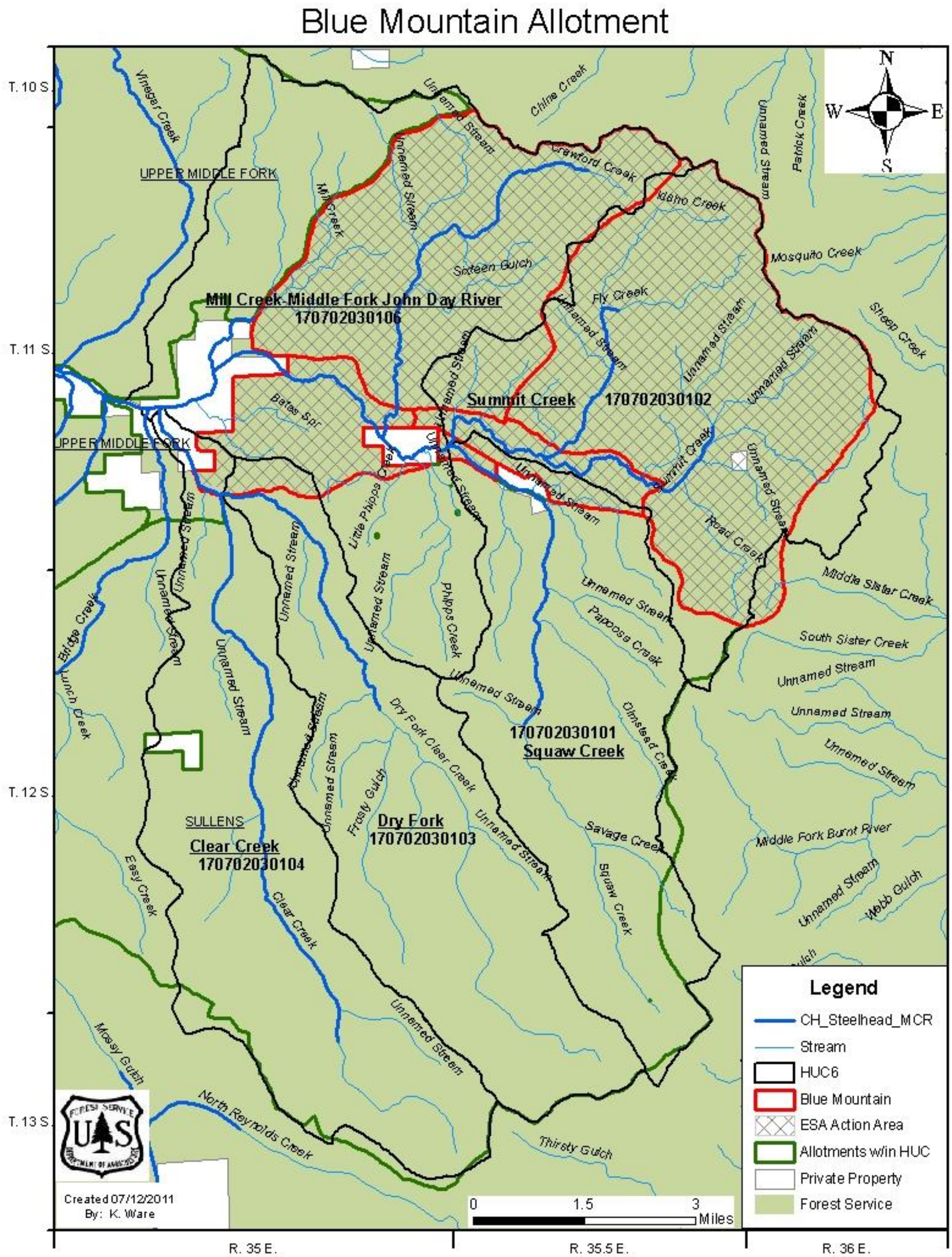


FIGURE 7. BLUE MOUNTAIN ALLOTMENT; ESA CONSULTATION ACTION AREA MAP FOR MCRS.

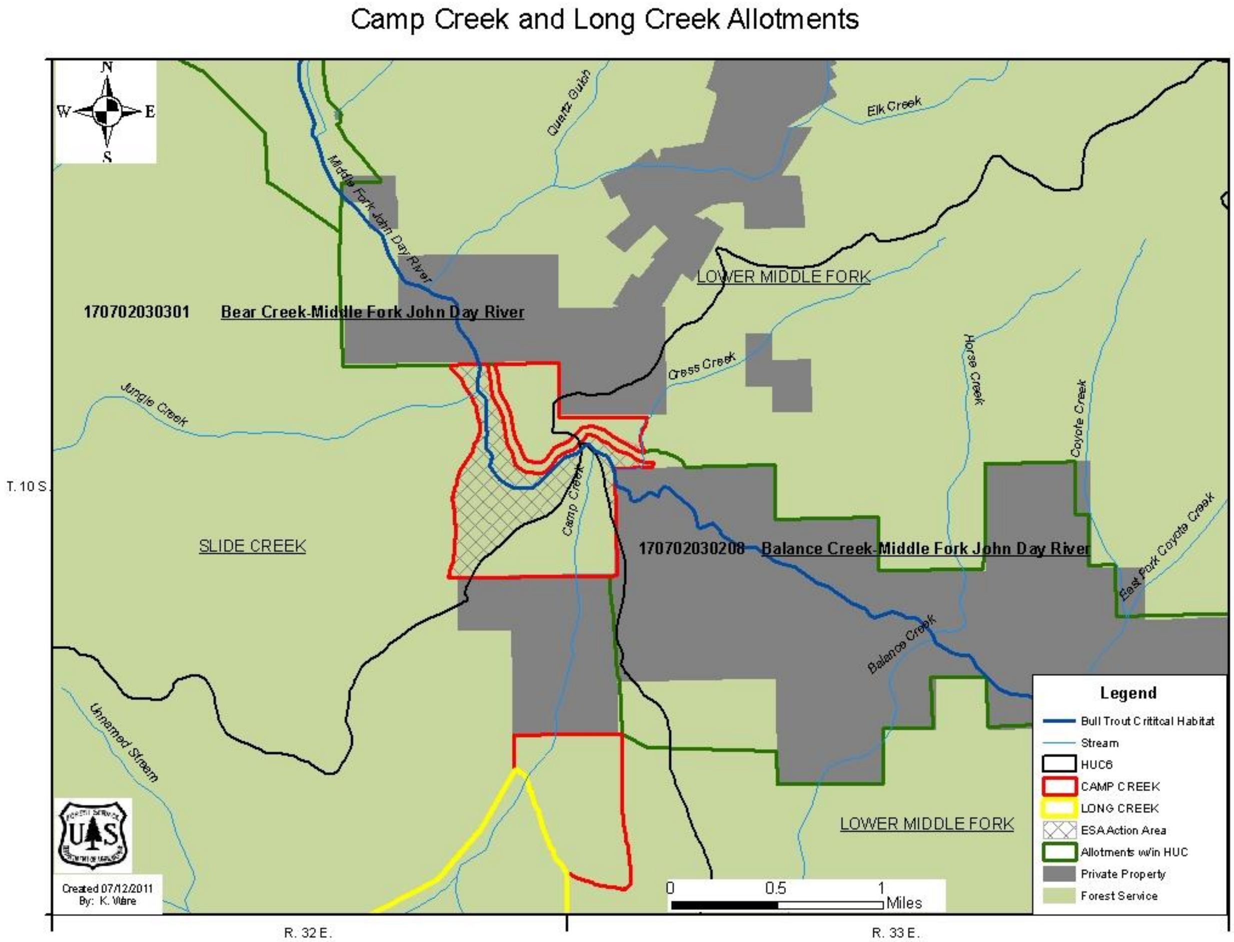


FIGURE 8. CAMP CREEK ALLOTMENT, ESA CONSULTATION ACTION AREA MAP FOR BULL TROUT.

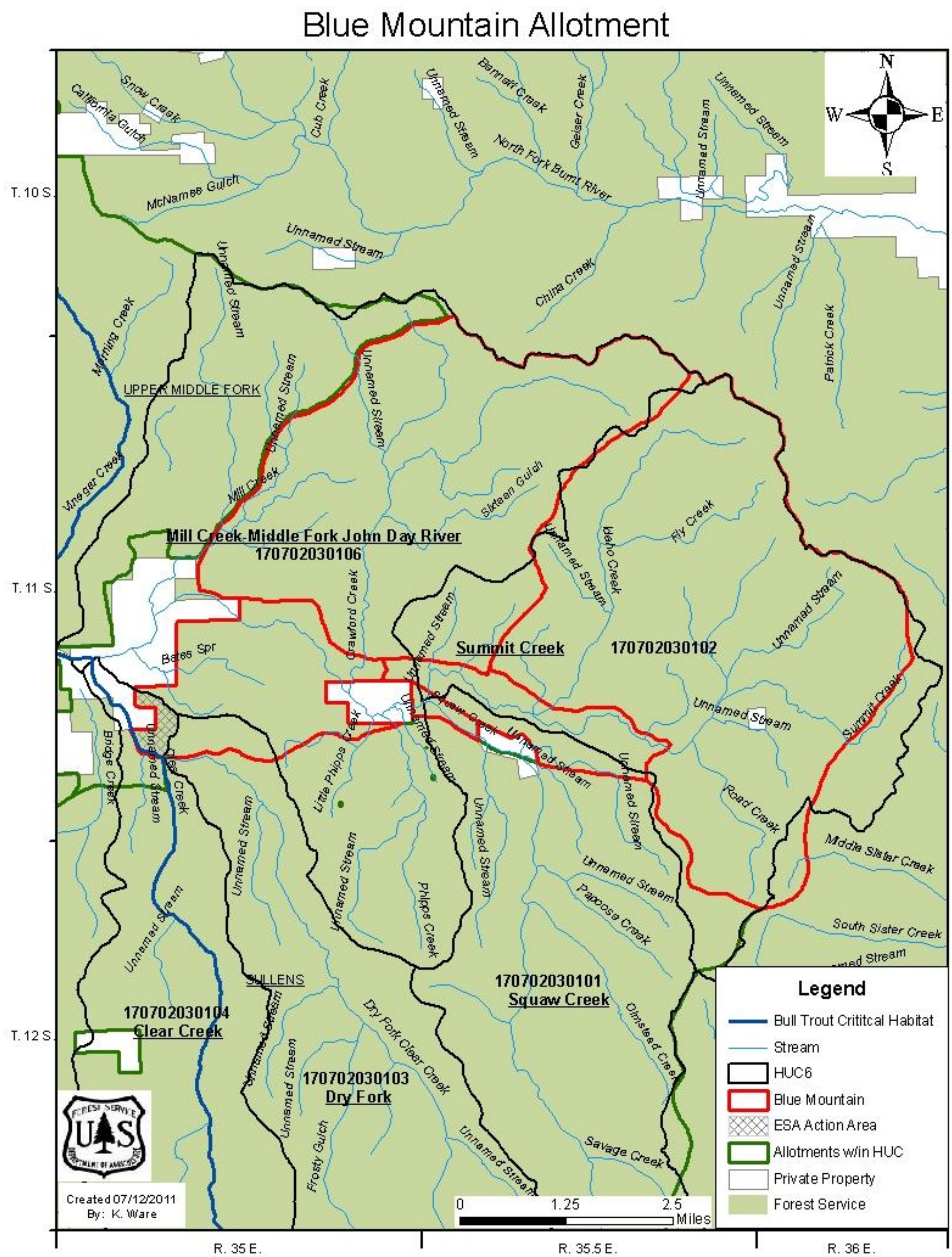


FIGURE 9. BLUE MOUNTAIN ALLOTMENT; ESA CONSULTATION ACTION AREA MAP FOR BULL TROUT.

5 STATUS OF THE SPECIES AND DESIGNATED CRITICAL HABITAT

The status of the Middle Columbia River Steelhead distinct population segment (DPS) and bull trout distinct population segment and their designated critical habitat (CH) is presented in this section.

5.1 MIDDLE COLUMBIA RIVER STEELHEAD DISTINCT POPULATION SEGMENT

5.1.1 LISTING HISTORY AND LOCATION

The Middle Columbia River Steelhead DPS was listed by NMFS as Threatened under the Federal ESA on March 25, 1999 (64 FR 15417). NMFS reaffirmed its threatened status on January 5, 2006 (71 FR 834). Protective regulations for MCR Steelhead were issued under section 4(d) of the ESA on July 10, 2000 (65 FR 42423). The NMFS revised the 4(d) protective regulations on June 28, 2005 (70 FR 37160).

The MCR Steelhead DPS includes all naturally-spawned populations of steelhead in streams within the Columbia River basin from above the Wind River in Washington and the Hood River in Oregon (exclusive), upstream to, and including, the Yakima River in Washington, excluding steelhead from the Snake River basin (64 FR 14517; March 25, 1999). The major tributaries occupied by this DPS are the Deschutes, John Day, Klickitat, Umatilla, Walla Walla, and Yakima River systems. The John Day River (JDR) probably represents the largest naturally spawning, native stock of steelhead in the region. The MCR Steelhead DPS does not include co-occurring resident forms of *O. mykiss* (rainbow trout).

5.1.2 LIFE HISTORY AND HABITAT REQUIREMENTS

Steelhead trout are the anadromous form of *O. mykiss*. Adult summer steelhead typically return to freshwater from June through September. Adults overwinter in large rivers while sexually maturing. Adults resume migration to spawning streams in early spring.

The JDR adult summer steelhead enter the lower river as early as September and as late as March, depending on water temperatures. Adult migration in the JDR generally peaks in October. The JDR below the North Fork JDR is used only for migration due to high summer water temperatures. Spawning takes place from March through May. Eggs incubate during the spring and emergence occurs from April through July depending on water temperatures. Juveniles typically rear for 2 to 3 years in freshwater before smolting and migrating to the ocean.

Juvenile steelhead generally utilize habitats with higher water velocities than juvenile Chinook salmon. In winter, juveniles utilize deep pools with abundant cover. Juveniles may reside in their natal stream for their entire freshwater rearing phase or may migrate to other streams within a watershed. Smoltification occurs during late winter and emigration to the ocean occurs during spring. Smolts outmigrate rapidly, taking 45 days or less to reach the ocean from upstream rearing areas. In the JDR below the North Fork, smolts generally stay within the thalweg, taking advantage of cover provided by depth and turbidity. Approximately 80% of the steelhead rear in the ocean for 2 years before returning to the JDR system as adults to spawn (PD BLM 2006).

5.1.3 MCR STEELHEAD POPULATIONS

The Interior Columbia Basin Technical Recovery Team (ICTRT) (2003) identified 15 populations in four major population groups (MPG) (Cascades Eastern Slopes Tributaries, John Day River (JDR), the Walla Walla and Umatilla Rivers, and the Yakima River) and one unaffiliated independent population (Rock Creek) in this steelhead DPS. There are two extinct populations in the Cascades Eastern Slopes Tributaries MPG, the White Salmon River and Deschutes River above Pelton Dam.

The JDR Subbasin contains the MCR Steelhead JDR MPG that consists of the Lower Mainstem John Day (LMJD), North Fork John Day (NFJD), Middle Fork John Day (MFJD), South Fork John Day (SFJD), and Upper Mainstem John Day (UMJD) populations (ICTRT 2003). The action area is associated with the NFJD, MFJD and UMJD populations.

5.1.4 MCR STEELHEAD DPS VIABILITY STATUS

The status of a salmon or steelhead species is expressed in terms of likelihood of persistence over 100 years, or in terms of risk of extinction within 100 years. The ICTRT defined viability at two levels: less than 5 percent risk of extinction within 100 years (viable) and less than 1 percent risk of extinction within 100 years (highly viable). A third category, "maintained," represents a less than 25 percent risk. The risk level of the steelhead DPS as a whole is built up from the aggregate risk levels of the populations and MPGs. The viable salmonid population (VSP) parameters (abundance, productivity, spatial structure, and diversity of the component populations) must be taken into account to determine the risk level.

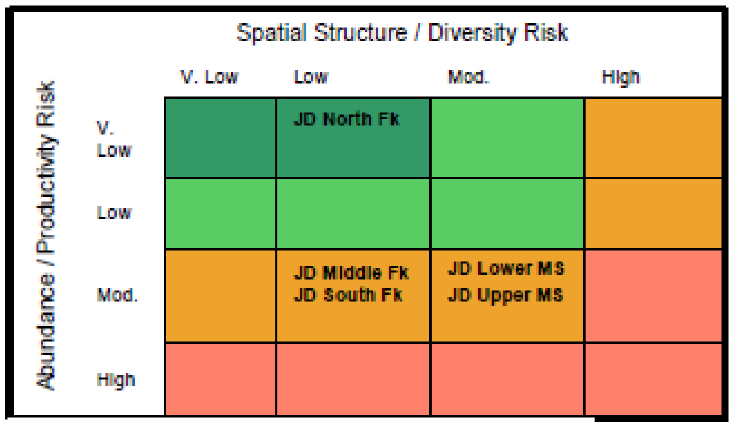
The MCR Steelhead DPS does not currently meet viability criteria because its four component MPGs are not at low risk. However, for this DPS the outlook is relatively optimistic. One population, North Fork John Day, is currently at very low risk or "highly viable." Two populations are currently viable (Deschutes Eastside, Fifteenmile); eleven are at moderate risk, with good prospects for improving. However, three large populations at high risk (Deschutes Westside, Naches, and Upper Yakima) are important to DPS viability; these present significant challenges.

Significant programs are underway for natural recolonization (White Salmon) or reintroduction (Deschutes Crooked River above Pelton Dam) of two of the extirpated populations to historically accessible habitat. Success of these programs should help improve overall DPS viability.

The MCR Steelhead Recovery Plan (NMFS 2009) presented viability ratings for the MCR Steelhead MPG. The risk of extinction is displayed as a combination of ratings for Spatial Structure/Diversity Risk and Abundance/Productivity Risk (Figure 10). The North Fork John Day MPG rates low/very low by the two criteria. The Middle Fork and South Fork MPGs rate low/moderate and the Lower Mainstem and Upper Mainstem MPGs have the highest extinction risk at moderate/moderate.

5.1.5 JOHN DAY RIVER MPG POPULATION STATUS

The current status of the MCR Steelhead John Day River MPG populations, showing 10-year geometric mean abundance by population, estimated productivity, and the minimum abundance threshold needed for long-term viability is summarized in Table 14. The table also includes the 10-year geometric mean proportion of hatchery spawners for the populations where data are available, and the risk ratings of high, moderate, low, and very low, for abundance and productivity combined, and spatial structure and diversity combined.



John Day Basin Major Population Group.

FIGURE10. VIABILITY RATINGS FOR THE MCR STEELHEAD MPG (NMFS 2009). SHADES OF GREEN INDICATE LOWER RISK OF EXTINCTION AND SHADES OF RED INDICATE HIGHER RISK.

TABLE 14. MCR STEELHEAD JOHN DAY RIVER MPG - SUMMARY OF ABUNDANCE, PRODUCTIVITY, RISK RATINGS, AND MINIMUM ABUNDANCE THRESHOLDS (SOURCE: MIDDLE COLUMBIA RIVER STEELHEAD DPS RECOVERY PLAN SUMMARY 2009).

Population	Abundance Threshold[1]	Size Category	Run Timing	10-year Geomean abundance	Abundance Range	10-yr Hatchery Fraction[2]	Produc-tivity[3]	Productivity Standard Error	A&P Risk Rating[4]	SSD Risk Rating
Lower Mainstem John Day	2250	Very Large	Summer	1800	563-6257	0.1	2.99	0.24	M	M
North Fork John Day	1500	Large	Summer	1740	369-10,235	0.08	2.41	0.22	VL	L
Upper Mainstem John Day	1000	Intermed.	Summer	524	185-5169	0.08	2.14	0.33	M	M
Middle Fork John Day	1000	Intermed.	Summer	756	195-3538	0.08	2.45	0.16	M	M

South Fork John Day	500	Basic	Summer	259	76-2729	0.08	2.06	0.27	M	M

1 Abundance threshold for viability based on habitat intrinsic potential

2 Average proportion of hatchery spawners over most recent 10 years in the data series.

3 Geomean return per spawner calculated over most recent 20 years in data series.

4 Abundance & Productivity Risk Ratings: H = high risk, M= moderate risk, L = low risk, VL = very low risk

5.1.6 POPULATION LIMITING FACTORS

The MCR Steelhead ESA Recovery Plan (NMFS 2009) identified population limiting factors. For the NFJD population the primary tributary habitat limiting factors identified by the recovery planning team are degraded floodplain connectivity and function, degraded channel structure and complexity (habitat quantity, habitat diversity, channel stability), altered sediment routing, water quality (temperature), and altered hydrology. The primary tributary limiting factors for the SFJD population include altered sediment routing, degraded floodplain and channel structure (habitat quantity and habitat diversity), altered hydrology, water quality (temperature) and blocked or impaired fish passage. Tributary limiting factors for the UMJD population include degraded channel structure and complexity (habitat quantity and diversity), degraded riparian areas and large woody debris recruitment, altered sediment routing, water temperatures and altered hydrology.

For the MFJD population the primary tributary limiting factors are degraded floodplain and channel structure (habitat quantity/diversity), altered sediment routing, altered hydrology and water temperature. Habitat limiting factors identified in NMFS (2009) for the Major and Minor Spawning Areas (MaSA and MiSA) of the MFJD River are displayed in Table 15. MaSAs have enough habitat to support 500 spawners.

TABLE 15. HABITAT LIMITING FACTORS FOR MIDDLE FORK JDR MAJOR AND MINOR SPAWNING AREAS IDENTIFIED IN NMFS (2009).

Population MaSA and MiSA	**Major Limiting Factors**						
Middle Fork John Day Population	Degraded floodplain connectivity	Degraded floodplain and channel structure	Altered hydrology	Altered sediment routing	Water quality (temperature)	Fish passage	Degraded Riparian Areas
Long Ck. MaSA		X	X	X	X	X	

Slide Ck. MaSA	X	X		X			X
Rush Ck. MaSA	X	X				X	
Upper M. Fk. MaSA		X	X	X	X		
Camp Ck. MiSA		X	X	X	X		
Big Ck. MiSA		X	X	X	X		

5.2 CRITICAL HABITAT FOR MIDDLE COLUMBIA RIVER STEELHEAD DPS

5.2.1 DESIGNATION HISTORY

Critical habitat (CH) was designated for MCR Steelhead on February 16, 2000 (65 FR 7764) that encompassed the major Columbia River tributaries known to support the DPS, including the Deschutes, John Day, Klickitat, Umatilla, Walla Walla, and Yakima Rivers, as well as the Columbia River and estuary.

In late 2000, a lawsuit was filed challenging the NMFS February 2000 final designation of CH for ESUs/DPSs of Pacific salmon and steelhead listed under the ESA. A federal court ruled that the agency did not adequately consider the economic impacts of the CH designations. In April 2002, NMFS withdrew its 2000 CH designations.

Critical habitat for MCR Steelhead was designated again on September 2, 2005 (70 FR 52630). Designated CH includes the stream channels within the designated stream reaches, and includes a lateral extent as defined by the ordinary high-water line (33 CFR 319.11). In areas where ordinary high-water line has not been defined, the lateral extent is defined by the bankfull elevation. Bankfull elevation is the level at which water begins to leave the channel and move into the floodplain and is reached at a discharge which generally has a flood recurrence interval of 1 to 2 years on the annual flood series.

5.2.2 PRIMARY CONSTITUENT ELEMENTS

The physical or biological features of CH essential to the conservation of the species are known as primary constituent elements (PCEs). The PCEs of MCR Steelhead CH are those sites and habitat components that support one or more life stages, including:

(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;

(2) Freshwater rearing sites with:

(i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;

(ii) Water quality and forage supporting juvenile development; and

(iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

(3) Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

5.2.3 STATUS OF MIDDLE COLUMBIA RIVER STEELHEAD CRITICAL HABITAT

Migratory habitat quality for MCR steelhead has been severely degraded by the development of the Federal Columbia River Power System. Depending on their natal watershed, adults and out-migrating juvenile steelhead encounter between one and three mainstem Columbia River dams migrating to and from the ocean. Hydroelectric development has modified natural flow regimes resulting in higher water temperatures, changes in fish community structure, and increased travel time for migrating adults and juvenile salmonids. Physical features of dams such as turbines also kill migrating fish. The only substantial habitat blockages at present for this species are Pelton Dam on the Deschutes River and Condit Dam on the White Salmon River. However, minor blockages from smaller dams, impassable culverts, and irrigation dams occur throughout the region. Several dams in the JDR basin previously blocked habitat, but they have since been modified with ladders; however, there is a possibility that local native stocks were extirpated before these ladders were built (NMFS 2004).

Water quality impairment that affects spawning, migration, and rearing is a problem in many areas of designated CH for the MCR Steelhead. Summer stream temperature is the primary water quality problem for this species, and many of the stream reaches proposed as CH are listed on the Clean Water Act 303(d) list for water temperature. Many areas that were historically suitable rearing and spawning habitat are now unsuitable due to high summer stream temperatures. Elevated stream temperatures may form thermal barriers to juvenile migration within tributaries. Removal of riparian vegetation, alteration of natural stream morphology, and withdrawal of water for agricultural or municipal use all contribute to elevated stream temperatures. Contaminants such as insecticides and herbicides from agricultural run-off and heavy metals from mine waste are common in some areas of designated CH for this species.

Low summer stream flow is also a common characteristic affecting spawning, rearing, and migration PCEs for this DPS. There is little or no late summer flow in sections of the lower Umatilla and Walla Walla Rivers. Withdrawal and storage of natural stream flow in spawning and rearing areas have altered hydrological cycles, causing a variety of adverse impacts to MCR Steelhead habitat. Increased summer stream temperatures, migration blockages, stranding of fish, and alteration of sediment transport processes can result from water withdrawal for irrigation or municipal use (NMFS 1996; Spence *et al.* 1996). In many river basins, the amount and quality of available rearing habitat has been reduced by water withdrawals. Many stream reaches are over-appropriated under state water law, with more allocated water rights than existing stream flow conditions can support.

Spawning and rearing salmonids, such as steelhead, require physically complex lotic habitats with pools, large woody debris, undercut banks, and substrates with low levels of fine sediments (Spence *et al.* 1996; Bjornn and Reiser 1991). Although these habitat conditions are still present in many wilderness, roadless, and undeveloped areas, recent subbasin assessments and plans (NWPCC 2004) indicate that habitat complexity has been greatly reduced in many areas of designated CH. Channel and riparian alterations for agricultural purposes, transportation, mining, forestry and other development activities have affected spawning, rearing and migration PCEs by reducing overall habitat complexity, cover, food availability, and spawning and rearing quality and quantity.

Under section 303(d) of the Clean Water Act, the Oregon Department of Environmental Quality (ODEQ) identified many streams within the LMJD, UMJD, MFJD, and NFJD watersheds that are water quality limited for high temperatures, dissolved oxygen, or biological criteria. Additionally, the ODEQ identified total phosphates and fecal coliform as water quality limitations for many streams within the Lower Mainstem JDR, and sediment for many NFJD streams (NMFS 2004).

Critical Habitat Analytical Review Teams (CHARTs) were convened by NMFS for each recovery domain (NMFS 2005). CHARTs were charged with analyzing the best available data for each listed species, to make findings regarding the presence of essential habitat features in each watershed, identify potential management actions that may affect those features, and determine the conservation value of each watershed within each species' range. The MFJD River has five 5th-field Hydrologic Unit Codes (HUCs) commonly referred to as watersheds: Upper MFJD River; Camp Creek; Big Creek; Long Creek and Lower MFJD River. The Lower MFJD River was assigned a low conservation value for MCR Steelhead while the other four were give a rating of high conservation value. Mid-Columbia CHART members noted that PCEs in these watersheds support unique genetic resources since there is minimal hatchery influence on these populations.

The revised draft John Day Subbasin Plan (NPCC 2005) included an Ecosystem and Diagnostic Treatment (EDT) analysis of habitat conditions for the watersheds located in the action area. The approach was to display the top quartile protection and/or restoration watersheds and their important restoration attributes.

Fourteen watersheds denoted by EDT as important to the MFJD steelhead population were evaluated. Three of the top five watersheds (Big Creek, Camp Creek, and Long Creek) are listed as high priority for both protection and restoration, signifying that all three should be protected from further degradation and that restoration on any of the limiting factors listed would have the potential to increase productivity and abundance for the population. The Lower Middle Fork JDR made the top five for restoration benefit, while the Upper Middle Fork JDR made the list for protection benefit. Common attributes to all five top priority watersheds for restoration is key habitat quantity and sediment load. Upon review, the John Day technical team thought that habitat diversity and temperature were important attributes for restoration for Camp Creek.

The Subbasin Plan also evaluated watersheds by restoration priority. Five watersheds were evaluated for the MFJD River. Camp Creek was the highest priority, Upper MFJD River and Long Creek were tied for second priority, Big Creek ranked fourth and the Lower MFJD River was fifth.

5.3 COLUMBIA RIVER BULL TROUT DISTINCT POPULATION SEGMENT

5.3.1 LISTING HISTORY, LOCATION AND STATUS REVIEW

The U.S. Fish and Wildlife Service (FWS) listed the Columbia River and Klamath River populations of bull trout (*Salvelinus confluentus*) in a final rule as "threatened" on June 10, 1998 (63 FR 31647) (FWS 1998) under the authority of the Endangered Species Act of 1973. The Columbia River DPS occurs throughout the entire Columbia River basin within the United States and its tributaries, excluding bull trout found in the Jarbidge River, Nevada. Five different DPS were identified in the 1998 final rule. In a subsequent 1999 final rule for listing other DPS (64 FR 58909), the five DPSs were combined into one DPS for the coterminous United States (FWS 1999). In the 1999 final rule, the FWS stated: " In recognition of the scientific basis for the identification of these bull trout population segments as DPS's, and for the purposes of consultation and recovery planning, we will continue to refer to these populations as DPS's. These DPS's will serve as interim recovery units (RUs) in the absence of an approved recovery plan."

The FWS conducted a 5-year review on the status of bull trout in 2008 (FWS 2008). The review concluded that a change in classification from "Threatened" was not warranted. The review also evaluated the DPS policy. The FWS concluded that since the conterminous listing in 1999, new information suggests potential changes in the number of distinct population segments and their boundaries (e.g., Spruell et al., 2003). In addition to strong scientific evidence continuing to support identification of multiple population segments of bull trout, the Service and some State and Tribal partners have identified policy reasons for revisiting the Service's application of its DPS policy to bull trout.

Consequently, the FWS recommended evaluating designation of multiple bull

trout DPS's and stated that it would initiate a new, separate status assessment effort to identify DPSs and evaluate their status. Recommendation 3 in the recommendations for Future Action section of the five-year review is to develop a number of RUs for bull trout (perhaps 5 to 10 for management purposes) that contain assemblages of core areas that retain genetic and ecological integrity, and allow potential future options to pursue regulatory relief/delisting on a RU basis. The FWS appears to use the term recovery units synonymously with DPSs.

The final rule designating bull trout CH (75 CFR 63898) (FWS 2010) discussed the 5-year review recommendation and stated that six draft RUs were subsequently identified. Each of the six RUs was evaluated. It was confirmed that each RU was needed to ensure a resilient, redundant, and representative distribution of bull trout populations throughout the range of the listed entity. To accomplish these goals, protection of large areas of high-quality habitat, multiple populations, and diverse genetic and life-history aspects will be required. The six draft RUs identified for bull trout in the coterminous United States include: Mid-Columbia (containing the JDR basin); Saint Mary; Columbia Headwaters; Coastal; Klamath; and Upper Snake. These six new biologically based RUs will be proposed to replace the 27 RUs previously identified in the bull trout Draft Recovery Plan (DRP).

5.3.2 LIFE HISTORY AND BIOLOGICAL REQUIREMENTS

The taxonomy, physical description, distribution, life history, habitat characteristics and diet of bull trout are described in detail in the final rule for listing the Columbia River DPS (63 FR 31647) (FWS 1998), which is herein incorporated by reference.

5.3.3 BULL TROUT POPULATIONS

A bull trout DRP was prepared in 2002 (FWS 2002). The DRP identifies the JDR Basin as one of 22 bull trout RUs for the Columbia River population. RUs place the scope of bull trout recovery on smaller spatial scales than distinct population segments.

Chapter 9 of the DRP focuses on the JDR basin. As of 2002, bull trout distribution was limited primarily to the headwaters of the North Fork JDR, Middle Fork JDR, and upper mainstem JDR and tributaries, with seasonal use of the mainstem river downstream to the vicinity of the town of John Day (Ratliff and Howell 1992, Buchanan *et al.* 1997)**.**

The John Day River Recovery Unit Team (JDRRUT) identified one core area (the John Day River Core Area). For the purposes of recovery, a core area represents the closest approximation of a biologically functioning unit. Core areas consist of both habitat that could supply all the necessary elements for every life stage of bull trout (*e.g.,* spawning, rearing, migratory, and adult) and have one or more groups of bull trout. Core areas are the basic units on which to gauge recovery within a RU. The JDRRUT also identified 12 extant local populations. Three are located in the Middle Fork JDR subbasin: Clear Creek; Granite Boulder Creek; and, Big Creek, with interconnective migratory habitat between populations (Buchanan *et al.* 1997). While most bull trout in these streams appear to be resident forms, larger, potentially migratory bull trout have recently been observed in the Middle Fork JDR (T. Unterwegner, ODFW, pers. comm. 2000).

Streams with documented bull trout spawning in the Middle Fork JDR include Clear Creek, Big Creek, Deadwood Creek and Granite Boulder Creek. Current distribution in the Middle Fork JDR is based on isolated sightings with the primary distribution restricted to tributaries and limited to 22 percent of stream miles previously known to support bull trout (Claire and Gray 1993, Buchanan *et al.* 1997). Ratliff and Howell (1992) considered bull trout to be extirpated from the Middle Fork JDR and at high risk of extinction in the tributaries. The status evaluation by Buchanan *et al.* (1997), maintains this assessment with the addition of Clear Creek as a high risk tributary.

Biological assessments for the Middle Fork JDR subbasin (MNF 1998a and 1999) provide detailed descriptions of baseline habitat conditions. Resident (summer distribution) bull trout currently occupy only approximately 23 miles of streams in the MFJD metapopulation area (9.5 miles in Big Creek; 4.5 miles in Granite-Boulder Creek; and nine miles in Clear Creek) (USDA 1998a). The 1990 and 1992 Oregon Department of Fish and Wildlife Aquatic Inventory Project also identified 2.5 miles of summer habitat in Deadwood Creek, a tributary to Big Creek. Bull trout migration from these tributary streams during the summer is highly unlikely due to high water temperatures and habitat modifications in the mainstem.

Aquatic inventory surveys conducted by the Oregon Department of Fish and Wildlife in 1990 and 1991 detected 60 bull trout in the Middle Fork JDR basin; two fish were measured at 260 millimeters (10 inches) and 360 millimeters (14 inches), all others were less than 210 millimeters (8 inches) in length (Buchanan *et al.* 1997). In the 1999 and 2000 surveys of Clear Creek, eight redds were observed each year (MNF 2001).

5.3.4 BULL TROUT VIABILITY STATUS

The FWS conducted a conservation status assessment for 121 core areas (FWS 2005).

The threat rank characterization combines an analysis of severity, scope and immediacy of threats to bull trout. Severity captures the degree to which a threat impacts the population and the degree to which the threat is reversible. Scope refers to the proportion of the core area affected by a threat. The ranking for immediacy of threat was a straightforward analysis of the operational timeframe of the threat. A rank of high immediacy meant the threat was operational immediately or within a year. For a rank of moderate immediacy, the threats would be operational in 2 to 5 years, and for a rank of low immediacy, the threats were estimated to be operational in 5 to 20 years. The Natural Heritage Program criteria attach greatest significance to the severity of the threat, followed by scope and then immediacy in synthesizing the three threat categories into eight rank classifications. The result for all 121 core areas is shown in Table 16.

TABLE 16. THREAT CATEGORY RANKING FOR 121 BULL TROUT CORE AREAS (AFTER FWS 2005)

Threat category	Number of core areas
Substantial, imminent threat	44
Moderate, imminent threat	31
Substantial, non-imminent threat	3
Moderate, non-imminent threat	7
Localized, substantial threat	2
Widespread, low-severity threat	19
Slightly threatened	18
Unthreatened	5
Unknown	2

Three of the core areas are in the JDR basin: MFJD; NFJD; and UMJD. A summary of the status assessment results is presented in Table 17. A final rank of “at-risk” indicates that a core area has very limited and/or declining numbers, range, and/or habitat, making the bull trout in this core area vulnerable to extirpation.

TABLE 17. RESULTS OF 2005 CONSERVATION STATUS ASSESSMENT FOR JDR BASIN CORE AREAS FOR BULL TROUT (ADAPTED FROM FWS 2008).

Core Area	Population Abundance Category (individuals)	Distribution Range Rank (stream length miles)	Short-term Trend Rank	Threat Rank	Final Rank

Middle Fork John Day River	Unknown	125-620	Increasing	Substantial, imminent	At-risk
North Fork John Day River	Unknown	125-620	Increasing	Substantial, imminent	At-risk
Upper Mainstem John Day River	1-50	125-620	Increasing	Moderate, non-imminent	At-risk

5.3.5 JOHN DAY RIVER BULL TROUT POPULATION STATUS

A key concern for the JDR core area is isolation and habitat fragmentation**.** The major isolating mechanism affecting bull trout local populations in the JDR basin is seasonally inadequate water quality and quantity in the mainstem river and tributaries, due to degraded riparian and stream habitat conditions. Other barriers include low head dams, diversions, and natural waterfalls (Claire and Gray 1993, ODFW *in litt*. 2000).

Populations within the Middle Fork subbasin are at greatest risk from isolation due to habitat fragmentation, seasonally high water temperatures, and reduced flows in the connecting mainstems (ODFW *in litt*. 2000). Bull trout are found in only three Middle Fork tributaries that are geographically distant. Population estimates for two of the tributaries are below 800 total fish of all ages, and existing data show no evidence of interchange between the local populations (ODFW *in litt*. 2000).

Bull trout in the MFJD River persist at low abundance levels. In 1999, population surveys were conducted in Clear Creek, Big Creek, Deadwood Creek, and Granite Boulder Creek to estimate abundance. Total numbers of bull trout consisting of primarily juvenile and sub-adult fish, were estimated to be 1,950 individuals in Big Creek, 640 individuals in Clear Creek, and 368 individuals in Granite Boulder Creek (Hemmingsen 1999).

Recovery goals and objectives are described in Chapter 9 of the DRP. The goal of the bull trout recovery plan is to ensure the long-term persistence of self-sustaining, complex interacting groups of bull trout distributed throughout the species' native range, so that the species can be delisted. Four objectives were identified to achieve the goal for bull trout in the JDR RU:

- Maintain current distribution of bull trout and restore distribution in previously occupied areas within the JDR RU.
- Maintain stable or increasing trends in abundance of bull trout.
- Restore and maintain suitable habitat conditions for all bull trout life history stages and strategies.
- Conserve genetic diversity and provide opportunity for genetic exchange.

Rieman and McIntyre (1993) and Rieman and Allendorf (2001) evaluated the bull trout population numbers and habitat thresholds necessary for long-term viability of the species. They identified four elements, and the characteristics of those elements, to consider when evaluating the viability of bull trout populations. These four elements are: 1) number of local populations; 2) adult abundance (defined as the number of spawning fish present in a core area in a given year); 3) productivity, or the reproductive rate of the population (as measured by population trend and variability); and 4) connectivity (as represented by the migratory life history form and functional habitat). For each element, the JDRRUT classified bull trout into relative risk categories.

For the population element, the team assigned the risk category of "diminished risk," which is the lowest risk category. For the adult abundance element, the team assumed that abundance levels for migratory bull trout in individual local populations was below 100 spawners per year, and therefore are at risk of inbreeding depression. Similarly, the team concluded that the core area currently supported less than 1,000 migratory adults per year and consequently was at risk from genetic drift. For the productivity element, bull trout were classified at an increased risk, due to either the short duration of population census information, or the incomplete record of the redd count surveys within each core area. Finally, for the connectivity element, the team concluded that while the migratory form persists within the JDR core area, local populations are fragmented by habitat degradation, and the core area is considered at increased risk.

5.3.6 LIMITING FACTORS

The 2002 DRP states that the main threats to bull trout persistence are habitat fragmentation and degradation, passage barriers that isolate populations, competition and predation from nonnative fishes, angling mortality, and effects resulting from isolation and small population sizes. The recovery strategy is to restore habitats and connectivity, reduce effects of nonnative fishes, and reduce angling mortality.

Livestock grazing is identified as a specific threat for listing factor A (the present or threatened destruction, modification or curtailment of bull trout habitat or range) in Chapter 1, Table 2 of the DRP. Categories of recovery actions identified to address livestock grazing in Table 2 that are germane to the proposed action include:

- Maintain or improve water quality in bull trout core areas or potential core habitat.
- Identify impaired stream channel and riparian areas and implement tasks to restore their functions.
- Design and implement a standardized monitoring program to assess the effectiveness of recovery efforts affecting bull trout and their habitats.
- Conduct evaluations of the adequacy and effectiveness of current and past best management practices in maintaining or achieving habitat conditions conducive to bull trout recovery.
- Use partnerships and collaborative processes to protect, maintain, and restore functioning core areas for bull trout.

Reasons for the decline of bull trout in the John Day Basin are presented in a draft summary of the John Day Subbasin Plan (NPPC 2001). Two overriding factors influencing fisheries and fish habitat are land use practices that have altered "the storage, movement and character of water resources over entire areas of the JDR subbasin and its tributary system," and these prevalent land uses in combination with altered hydrologic responses are translated into stream channel instability in many area streams. The Oregon Department of Environmental Quality (1998) identified all streams inhabited by bull trout in the MFJD system (MFJDR, Big Creek, Granite Boulder Creek, and Clear Creek) as water quality limited, primarily for high summer temperatures, but also flow modification of the river.

Degraded fish habitat conditions are identified as occurring in approximately 966 kilometers (600 miles) of stream, due to erosion and sedimentation which reduce pool habitat, alter hydrographs, and result in loss of instream habitat elements Although a variety of factors are at play in each of the major stream segments (south, north, middle, and upper mainstem), the results have been similar across the basin.

Buchanan *et al.* (1997) indicates other limiting factors including: (1) chemical mine waste, (2) reduction in anadromous fish populations, (3) past opportunities for over-harvest and poaching, and (4) hybridization and competition with brook trout.

Key habitat and population elements identified in Middle Fork JDR subbasin biological assessments, of concern to bull trout, include isolated populations, high summer water temperatures, substrate embeddedness, and high road densities (MNF 1998a, 1998b and 1999).

Chapter 9 of the DRP discusses reasons for decline (limiting factors). They include mainstem Columbia River dams, forest management practices, livestock grazing, agricultural practices, the transportation network, mining, residential development, recreation and isolation and habitat fragmentation due to seasonally inadequate water quality and quantity in the mainstem river and tributaries, due to degraded riparian and stream habitat conditions. Other barriers include low head dams, diversions, and natural waterfalls (Claire and Gray 1993, Oregon Department of Fish and Wildlife *in litt*. 2000).

Livestock grazing is discussed in some detail and is summarized here. Historic, and to a lesser degree, current grazing practices have removed extensive amounts of riparian vegetation that help stabilize stream channels and provide essential shade and cover to streams throughout the entire basin (ODFW, *in litt*. 2000). In many areas native bunch grasses have been replaced with invasive nonnative vegetation such as cheat grass and medusa head wild rye (ODFW, *in litt*. 2000). These nonnative grasses are more susceptible to frequent fires and retard the growth of native species by reducing the amount of water available during critical growing periods (ODFW, *in litt*. 2000).

High intensity livestock grazing and agricultural development has contributed to aquatic habitat degradation. Local areas may experience concentrations of livestock sufficient to damage streambanks and degrade habitat quality (ODFW, *in litt*. 2000). Grazing on private land varies widely, but often times shows ongoing stream bank damage from livestock (ODFW, *in litt*. 2000).

Livestock grazing occurs over much of the area along the Middle ForkJDR and its tributaries, and during the hot season, livestock tend to congregate near water sources, often leading to damaged riparian zones. This is particularly true on private lands adjacent to the river and tributaries where livestock are allowed to graze during summer and fall months. Several areas of the Middle Fork JDR lack adequate riparian vegetation and shrubs necessary to prevent bank erosion and heating of water (ODFW, *in litt*. 2000). The absence of shrubs and deciduous trees in meadows along the upper reaches of the Middle Fork has been attributed to summer long grazing (ODFW, *in litt*. 2000).

A Qualitative Habitat Assessment (QHA) modeling tool was used to assess bull trout habitat in the John Day Subbasin for the revised draft Subbasin Plan (NPCC 2005). For QHA modeling, a reach system consisting of 61 reaches was developed by the John Day fisheries technical team. The reach system encompassed all streams that bull trout presently inhabit, or are believed to formerly inhabit. The QHA model determined which attributes are most important in each geographic area in terms of limiting bull trout production. For the Middle Fork, of 11 attributes evaluated, the top five habitat limiting factors in order of importance are: riparian condition; high water temperature; fine sediment; habitat diversity and channel stability.

5.4 CRITICAL HABITAT FOR BULL TROUT DPS

5.4.1 DESIGNATION HISTORY

A final rule to designate CH for Columbia River bull trout was published in the Federal Register on October 18, 2010 (75 CFR 63898) (FWS 2010). The effective date of the final rule was November 17, 2010. Figures 3 and 5 display streams designated as CH within the Middle Fork JDR subbasin.

When the FWS identifies CH in occupied areas, it also assesses whether the PCEs may require any special management considerations or protection. In the final rule the FWS identified livestock grazing as one of the primary land and water management activities impacting the physical or biological features essential to the conservation of bull trout that may require special management considerations. The FWS stated that improper livestock grazing can promote streambank erosion and sedimentation and limit the growth of riparian vegetation important for temperature control, streambank stability, fish cover, and detrital input (Platts 1991, pp. 397–399). In addition, grazing often results in increased organic nutrient input in streams (Platts 1991, p. 423). These activities can directly and immediately threaten the integrity of the essential physical or biological features described in PCEs 1 through 8. Special management could include best management practices specifically designed to reduce these types of impacts in streams with bull trout, such as fencing livestock from stream sides, moving animal feeding operations away from surface waters, using riparian buffer strips near crop fields, minimizing water withdrawal from streams, avoiding stream channel and spring head alteration, and avoiding stream dewatering.

5.4.2 PRIMARY CONSTITUENT ELEMENTS

The FWS identified nine PCEs of bull trout CH in the 2010 final rule. Table 18 lists the nine PCEs.

TABLE 18. THE NINE PRIMARY CONSTITUENT ELEMENTS OF BULL TROUT CH THAT POTENTIALLY ARE AFFECTED BY LIVESTOCK GRAZING.

PCE	Description
1	Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.
2	Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.
3	An abundant food base, including terrestrial organisms of riparian origin, aquatic

PCE	Description
	macroinvertebrates, and forage fish.
4	Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.
5	Water temperatures ranging from 2 to 15° C (36 to 59 ° F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; and local groundwater influence.
6	In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.
7	A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.
8	Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
9	Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

5.4.3 STATUS OF BULL TROUT CRITICAL HABITAT

The limiting factors discussion presented earlier in Section 5.3.6 describes the condition of CH throughout the JDR Basin. A brief summary is that stream flows have been reduced by withdrawals and their timing has changed, water quality has been reduced (sedimentation and water temperature increases), stream substrates have become embedded, stream channels have been altered and riparian vegetation has been impacted with a resultant loss of shade canopy and large woody debris potential.

The QHA for bull trout provided a ranking of 61 JDR Basin stream reaches for both habitat protection and habitat restoration (NPPC 2005). Of those with extant populations in the Middle Fork, Granite Boulder, Big Creek reach 2 and Clear Creek were in the top quartile for protection benefit, while Big Creek reach 1 was in the second quartile. Big Creek reach 1 and Clear Creek were in the second quartile for restoration benefit, while Big Creek reach 2 was in the third quartile and Granite Boulder was in the fourth quartile.

6 ENVIRONMENTAL BASELINE

As mentioned in earlier sections, the predominant land use activity in the action area is livestock grazing for which there have been MNF and BLM formal and informal ESA consultations. The past, present and anticipated impacts of future Federal livestock grazing which have undergone formal consultation have been taken into account in the following description of the environmental baseline.

6.1 NMFS AND FWS MATRIX OF PATHWAYS AND INDICATORS

A NMFS process paper titled "Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale" (NMFS 1996) and A Framework to Assist In Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale (USFWS 1998) is used to describe the environmental baseline. It is commonly known as the NMFS and or FWS Matrix of Pathways and Indicators, hereafter referenced as the "NMFS& FWS MPI."

The NMFS MPI identifies indicators to analyze for the following pathways: 1) Water quality; 2) Habitat access; 3) Habitat elements; 4) Channel condition and dynamics; 5) Flow/hydrology; and, 6) Watershed condition. The condition of each indicator is described as either "Properly Functioning" (PF), "At Risk (AR)," or "Not Properly Functioning (NPF)" based upon specific numeric or qualitative criteria.

The FWS MPI identifies indicators to analyze for the following pathways: 1) Subpopulation Characteristics within subpopulation watersheds; 2) Water quality; 3) Habitat access; 4) Habitat elements; 5) Channel condition and dynamics; 6) Flow/hydrology; 7) Watershed condition; and 8) Integration of Species and Habitat Conditions.

Table 19 presents the current status of the environmental baseline for the Middle Fork John Day River sub-basin, which includes the action area, utilizing the NMFS and FWS MPI. Table cells in bold print indicate the current status of each indicator. The habitat indicators in the NMFS and FWS matrix also correspond to the PCEs of designated CH. The relationship between NMFS and FWS MPI habitat indicators and PCEs of CH is discussed in Section 7.2 (Analysis of Effects to Designated Critical Habitat).

TABLE 19. MCR STEELHEAD AND COLUMBIA RIVER BULL TROUT STATUS OF ENVIRONMENTAL BASELINE FOR THE MIDDLE FORK JOHN DAY SUB-BASIN.1

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
Species: Specific for Bull Trout				
Subpopulation Characteristics within subpopulation watersheds	Subpopulation Size	Mean total subpopulation size or local habitat capacity more than several thousand individuals. All life stages evenly epresented in the subpopulation.	Adults in subpopulation are less than 500 but >50.	**Adults in subpopulation has less than 50.**
	Growth and Survival	Subpopulation has the resilience to recover from short term disturbances (e.g. atastrophic events, etc) or subpopulation declines within one to two generations (5 to 10 years). The subpopulation is characterized as increasing or stable. At least 10+ years of data support this estimate.	When disturbed, the subpopulation will not recover to predisturbance conditions within one generation (5 years). Survival or growth rates have been reduced from those in the best habitats. The subpopulation is reduced in size, but the reduction does not represent a long-term trend. least 10+ years of data support this characterization.2 If less data is available and a trend cannot be confirmed, a subpopulation will be considered at risk until enough data is available to accurately determine its trend.	**The subpopulation is characterized as in rapid decline or is maintaining at alarmingly low numbers. Under current management, the subpopulation condition will not improve within two generations (5 to 10 years). This is supported by a minimum of 5+ years of data.**

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
	Life History Diversity and Isolation	The migratory form is present and the subpopulation exists in close proximity to other spawning and rearing groups. Migratory corridors and rearing habitat (lake or larger river) are in good to excellent condition for the species. Neighboring subpopulations are large with high likelihood of producing surplus individuals or straying adults that will mix with other subpopulation groups.	The migratory form is present but the subpopulation is not close to other subpopulations or habitat disruption has produced a strong correlation among subpopulations that do exist in proximity to each other.	**The migratory form is absent and the subpopulation is isolated to the local stream or a small watershed not likely to support more than 2,000 fish.1**
	Persistence and Genetic Integrity	Connectivity is high among multiple (5 or more) subpopulations with at least several thousand fish each. Each of the relevant subpopulations has a low risk of extinction. The probability of hybridization or displacement by competitive species is low to nonexistent.	**Connectivity among multiple subpopulations does occur, but habitats are more fragmented. Only one or two of the subpopulations represent most of the fish production. The probability of hybridization or displacement by competitive species is imminent, although few documented cases have occurred.**	Little or no connectivity remains for refounding subpopulations in low numbers, in decline, or nearing extinction. Only a single subpopulation or several local populations that are very small or that otherwise are at high risk remain. Competitive species readily displace bull trout. The probability of hybridization is high and documented cases have occurred.
Habitat: MCR Steelhead and Bull Trout				
Water Quality	Temperature	MCR Steelhead 50 – 57° F (max 7-day average)	MCR Steelhead 57 – 61° F (spawning, max 7-day average)	**MCR Steelhead** **> 61° F (spawning, max 7-day average)**

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
		Bull Trout 7 day average maximum temperature in a reach during the following life history stages: incubation 2 - 5 *C rearing 4 - 12 *C spawning 4 – 9 *C also temperatures do not exceed 15*C in areas used by adults during migration (no thermal barriers)	57 – 64° F (migration and rearing, max 7-day average) Bull Trout 7 day average maximum temperature in a reach during the following life history stages: incubation <2*C or 6 *C rearing <4 *C or 13 - 15 *C spawning <4 or 10 *C also temperatures in areas used by adults during migration sometimes exceeds 15*C	**> 64° F (migration and rearing, max 7-day average)** **Bull Trout** **7 day average maximum temperature in a reach during the following life history stages:** **incubation <1*C or >6 *C** **rearing >15 *C** **spawning <4 or >10 *C** **also temperatures in areas used by adults during migration regularly exceed 15EC (thermal barriers present)**
	Sediment	< 12% fines (<0.85mm) in gravel	**12 – 20% fines**	> 20% fines
	Chemical Contaminants or Nutrients	Low levels of chemical contamination from agricultural, industrial, and other sources; no excess nutrients; no CWA 303d designated reaches	**Moderate levels of chemical contamination from agricultural, industrial, and other sources; some excess nutrients; one CWA 303d designated reach**	High levels of chemical contamination from agricultural, industrial, and other sources; high levels of excess nutrients; more than one CWA 303d designated reach

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
Habitat Access	Physical Barriers	Any man-made barriers present in watershed allow upstream and downstream fish passage at all flows	Any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at base/low flows	**Any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows**
Habitat Elements	Substrate	Dominant substrate is gravel or cobble (interstitial spaces clear), or embeddedness <20%	Gravel and cobble is subdominant, or if dominant, embeddedness 20 – 30%	**Bedrock, sand, silt, or small gravel dominant, or if gravel and cobble dominant, embeddedness >30%**
	Large Woody Debris	MCR Steelhead > 20 pieces/mile (> 12 inch diameter and > 35 ft length), and adequate sources of woody debris recruitment in riparian areas Bull Trout current values are being maintained at greater than 80 pieces/mile that are >24"diameter and >50 ft length on the Coast 9, or >20 pieces/ mile >12"diameter >35 ft length on the Eastside also adequate sources of woody debris are available for both long and short-term recruitment	**Currently meets standards for Properly Functioning, but lacks potential sources from riparian areas of woody debris recruitment to maintain that standard**	Does not meet standards for Properly Functioning and lacks potential large woody debris recruitment

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
	Pool Frequency	MCR Steelhead Meets pool frequency standards and meets large woody debris recruitment standards for Properly Functioning habitat Bull Trout Pool frequency in a reach closely approximates: Wetted width (ft) #pools/mile 0-5 39 5-10 60 10-15 48 15-20 39 20-30 23 30-35 18 35-40 10 40-65 9 65-100 4	MCR Steelhead Meets pool frequency standards but large woody debris recruitment inadequate to maintain pools over time Bull Trout Pool frequency is similar to values in " functioning appropriately", but pools have inadequate cover/temperature, and/or there has been a moderate reduction of pool volume by fine sediment.	**MCR Steelhead** **Does not meet pool frequency standards** **Bull Trout** **Pool frequency is considerably lower than values desired for "functioning appropriately"; also over/temperature is inadequate and there has been a major reduction of pool volume by fine sediment.**
	Pool Quality	Pools > 1 meter deep (holding pools) with good cover and cool water; minor reduction of pool volume by fine sediment	Few deeper pools (> 1 meter) present or inadequate cover/ temperature; moderate reduction of pool volume by fine sediment	**No deep pools (> 1 meter) and inadequate cover/temperature; major reduction of pool volume by fine sediment**

Pathway	**Indicators**	**Properly Functioning**	**At Risk**	**Not Properly Functioning**
	Large Pools	Bull Trout each reach has many large pools >1 meter deep	Bull Trout reaches have few large pools (>1 meter) present	**Bull Trout** **reaches have no deep pools (>1** **meter)**
	Off Channel Habitat	Backwaters with cover, and low energy off-channel areas (ponds, oxbows, etc.)	**Some backwaters and high energy side channels**	Few or no backwaters; no off-channel ponds
	Refugia	Habitat refugia exist and are adequately buffered (e.g., by intact riparian reserves); existing refugia are sufficient in size, number, and connectivity to maintain viable populations or subpopulations (all life stages and forms)	**Habitat refugia exist but are not adequately buffered (e.g., by intact riparian reserves); existing refugia are insufficient in size, number, and connectivity to maintain viable populations or subpopulations (all life stages and forms)**	Adequate habitat refugia do not exist
	Average Wetted Width/ Maximum Depth Ratio in scour pools in a reach	Bull Trout <10	Bull Trout 11 - 20	**Bull Trout** **>20**
Channel Condition & Dynamics	Width/Depth Ratio	MCR Steelhead < 10	MCR Steelhead 10 – 12	**MCR Steelhead** **> 12**
	Stream Bank Condition	> 80% of any stream reach has > 90% stability	**50 – 80% of any stream reach has > 90% stability**	< 50% of any stream reach has > 90% stability

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
	Floodplain Conectivity	Off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation, and succession	**Reduced linkage of wetland, floodplains, and river areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function and riparian vegetation/succession**	Severe reduction in hydrologic connectivity between off-channel, wetland, floodplain, and riparian areas; wetland extent drastically reduced, and riparian vegetation/success altered significantly
Flow/Hydrology	Change in Peak/Base Flows	Watershed hydrograph indicates peak flow, base flow, and flow timing characteristics comparable to an undisturbed watershed of similar size, geology, and geography	**Some evidence of altered peak flow, baseflow, and/or flow timing relative to an undisturbed watershed of similar size, geology, and geography**	Pronounced changes in peak flow, baseflow, and/or timing relative to an undisturbed watershed of similar size, geology, and geography
	Increase in Drainage Network	MCR Steelhead Zero or minimum increases in drainage network density due to roads Bull Trout zero or minimum increases in active channel length correlated with human caused disturbance	MCR Steelhead Moderate increases in drainage network density due to roads (e.g., 5%) Bull Trout low to moderate increase in active channel length correlated with human caused disturbance	**MCR Steelhead** **Significant increases in drainage network density due to roads (e.g., 20 – 25%)** **Bull Trout** **greater than moderate increase in active channel length correlated with human caused disturbance**

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
Watershed Condition	Road Density & Location	MCR Steelhead < 2 mi/mi^2; no Valley bottom roads Bull Trout <1mi/mi^2 ; no valley bottom roads	MCR Steelhead 2 – 3 mi/mi^2; some valley bottom roads Bull Trout 1 - 2.4 mi/mi^2; some valley bottom roads	**MCR Steelhead** **> 3 mi/mi^2; many valley bottom roads** **Bull Trout** **>2.4 mi/mi^2 ; many valley bottom roads**
	Disturbance History	< 15% ECA (entire watershed) with no concentration of disturbance in unstable or potentially unstable areas, and/or refugia, and/or riparian areas	**< 15% ECA (entire watershed) but disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian areas**	> 15% ECA (entire watershed) and disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian areas
	Riparian Management Areas	The riparian reserve system provides adequate shade, large woody debris recruitment, and habitat protection and connectivity in all subwatershed, and buffers or includes known refugia for sensitive aquatic species (>80% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/ composition > 50%	**Moderate loss of connectivity or function (shade, LWD recruitment, etc.) of riparian reserve system, or incomplete protection of habitats and refugia for sensitive aquatic species (~ 70 – 80% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/ composition 25 – 50% or better**	Riparian reserve system is fragmented, poorly connected, or provides inadequate protection of habitats and refugia for sensitive aquatic species (< 70% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/ composition < 25%

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
	Disturbance Regime	Environmental disturbance is short lived; predictable hydrograph, high quality habitat and watershed complexity providing refuge and rearing space for all life stages or multiple life-history forms. Natural processes are stable.	**Scour events, debris torrents, or catastrophic fire are localized events that occur in several minor parts of the watershed. Resiliency of habitat to recover from environmental disturbances is moderate.**	Frequent flood or drought producing highly variable and unpredictable flows, scour events, debris torrents, or high probability of catastrophic fire exists throughout a major part of the watershed. The channel is simplified, providing little hydraulic complexity in the form of pools or side channels. Natural processes are unstable.
Species and Habitat: Bull Trout				

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
Integration of Species and Habitat Conditions		Habitat quality and connectivity among subpopulations is high. The migratory form is present. Disturbance has not altered channel equilibrium. Fine sediments and other habitat characteristics influencing survival or growth are consistent with pristine habitat. The subpopulation has the resilience to recover from short-term disturbance within one to two generations (5 to 10 years). The subpopulation is fluctuating around an equilibrium or is growing.[1]	Fine sediments, stream temperatures, or the availability of suitable habitats have been altered and will not recover to predisturbance conditions within one generation (5 years). Survival or growth rates have been reduced from those in the best habitats. The subpopulation is reduced in size, but the reduction does not represent a long-term trend. The subpopulation is stable or fluctuating in a downward trend. Connectivity among subpopulations occurs but habitats are more fragmented.[1]	**Cumulative disruption of habitat has resulted in a clear declining trend in the subpopulation size. Under current management, habitat conditions will not improve within two generations (5 to 10 years). Little or no connectivity remains among subpopulations. The subpopulation survival and recruitment responds sharply to normal environmental events. 1**

The environmental baseline using the NMFS MPI ratings (Table 9) is based on scientific literature review, management documents and the professional judgment of MNF Forest and District fishery biologists, hydrologists, soil scientists and range conservationists. The MCR Steelhead Recovery Plan, the Malheur National Forest Roads Analysis Report, and the Forest water temperature monitoring program support the environmental baseline ratings. The rationale from the supporting documents and programs for these ratings are summarized in the following three sections: 6.1.1; 6.1.2; and 6.1.3.

Historic and current cattle grazing in the ESA action area likely play varying roles in the current environmental baseline ratings for these affected subbasins. In some situations the actual small streams and corresponding 6th field subwatersheds draining the ESA action area may be properly functioning or functioning at risk while the larger subbasins are not properly functioning. Grazing is one of multiple natural and human-caused watershed disturbances influencing environmental baseline ratings. In some circumstances in these subbasins the proposed action has causal mechanisms that affect fish habitat indicators analyzed in the environmental baseline ratings.

6.1.1 MIDDLE COLUMBIA RIVER STEELHEAD RECOVERY PLAN

The Recovery Plan describes limiting habitat conditions in the Middle Fork John Day Basin in section 8.2.7. The primary tributary habitat limiting factors identified by the recovery planning team for Middle Fork John Day steelhead are degraded floodplain and channel structure (key habitat quantity and habitat diversity), altered sediment routing, altered hydrology, and water quality (temperature).

Degraded floodplain connectivity and function

Channels have become disconnected from their floodplains in several areas of the Middle Fork John Day watershed (Malheur National Forest (MNF) 1999). A number of areas with very wide grassy valley bottoms historically were likely Rosgen E-channels but have been altered to type G and C channels by past overgrazing and road construction within floodplains (MNF 1999). Known areas with this condition include the mainstem Middle Fork John Day River, Squaw Meadow, Summit Creek and Squaw Creek near their mouths, and Olmstead Creek at Olmstead meadows. Floodplains along the Middle Fork and tributaries were also altered by mining operations.

Degraded channel structure and complexity

Tributaries to the Middle Fork that flow out of the Dixie Divide between the Middle Fork John Day and the Upper John Day are generally steep and incised in the lower reaches. Long, Squaw and Camp creeks flow through low-gradient meadow systems in the upper reaches. Tributaries that flow out of the Elkhorn Mountains to the north do not generally have meadow systems in their upper reaches, and the base rock is granite. Portions of Bridge, Dry Fork Clear, Crawford, Summit, and Squaw creeks have significant lengths of their channels impacted by streamside roads. EDT results identified habitat diversity and key habitat quantity as limiting factors in all major and minor spawning areas.

Mining operations have altered many of the stream channels and floodplains along the Middle Fork and its tributaries (MNF 1999). Alterations have occurred along Elk, Davis, Deep, Vinegar, Placer Gulch, Vincent, Caribou, Beaver, Granite Boulder, Big Boulder, Ragged, Butte, Ruby, and the Middle Fork mainstem. Some of the meadow areas have incised channels, including Phipps Meadow. Road construction has altered and constricted channels in many tributaries and along the Middle Fork mainstem. Log weirs, placed in lower Camp Creek, keep the channel from re-establishing its natural morphology.

Altered sediment routing

The BLM has identified sediment/turbidity and substrate embeddedness as "functioning at risk" in the Middle Fork John Day and a number of its tributaries (NMFS 2004/00383). EDT results identified sediment loading to be a significant limiting factor in the watershed. Excessive fine sediment problems are generally located in the Middle Fork mainstem (Unterwegner 2005). Poor riparian conditions, riparian roads, grazing activities, and past forestry, mining, and channel alterations all contribute sediment to streams in the watershed.

Altered hydrologic processes

The Middle Fork drainage is susceptible to rain-on-snow events capable of producing high volume, short duration run-off surges during the late winter and early spring months. Late season base flows are sustained by slow release of water from the soil matrix, effluent groundwater, numerous wet meadows, and perennial springs (MNF 1999). Where channels have become entrenched, water tables are lowered and water storage capacity is reduced, resulting in lower base flows.

While low flows are a problem throughout the subbasin, irrigation withdrawals are not as significant as for some other populations in the John Day subbasin, or as significant as they were a few years ago. Most water rights in the upper Middle Fork subbasin are no longer being used for irrigating pastures. Four of the five largest water users above Highway 395 have converted their consumptive rights to instream rights for either the entire year or for the most critical low flow period. Three properties in the Middle Fork subbasin above Highway 395 continue to irrigate pastures with flood irrigation. One of the properties is located on Camp Creek, one is on the Middle Fork immediately above Camp Creek, and the other is near Galena.

Degraded water quality

Water quality in the Middle Fork subbasin generally exhibits satisfactory chemical, physical, and biological quality as compared to ODEQ water quality standards (USDI 2000 cited in NPCC 2005). The Middle Fork usually has worse water quality problems than its tributaries, with the most serious water quality problem being elevated summer temperatures. Season-long cattle grazing contributes to elevated fecal coliform counts during summer. However, agricultural runoff presents a low level of potential impact to water quality (NPCC 2001 cited in NPCC 2005). Flow from Bates Pond, an old mill pond on Bridge Creek less than 200 yards from its confluence with the Middle Fork, likely increases temperatures in the Middle Fork.

ODEQ has identified several streams in the Middle Fork subbasin as water quality limited for high temperatures, dissolved oxygen, or biological criteria, with the most serious water quality problem being elevated summer temperatures caused by vegetation disturbance, stream straightening/relocation, livestock grazing, forest practices, road building, irrigation water withdrawals, and historical mining and dredging (NPCC 2005). Table 20 provides data on listed stream segments in the Middle Fork subbasin.

TABLE 20. MIDDLE FORK JOHN DAY RIVER SUBBASIN 303(D) LISTED STREAM SEGMENTS AND PARAMETERS OF CONCERN IN 1998 AND 2002 (ODEQ 2002).

Waterbody Name	River Mile	Parameter	Season	List Date
Big Creek	0 to 11.6	Temperature	Summer	1998
Camp Creek	0 to 15.6	Temperature	Summer	1998
Caribou Creek	0 to 3.6	Temperature	Summer	1998
Clear Creek	0 to 12.7	Temperature	Summer	1998
Coyote Creek	0 to 2.5	Temperature	Summer	1998
Crawford Creek	0 to 3.5	Temperature	Summer	1998
Davis Creek	0 to 6.8	Temperature	Summer	1998
Dry Fork Clear Creek	0 to 11	Temperature	Summer	1998
Granite Boulder Creek	0 to 8.1	Temperature	Summer	1998
Little Boulder Creek	0 to 2.1	Temperature	Summer	1998
Little Butte Creek	0 to 2.6	Temperature	Summer	1998
Long Creek	0 to 36.7	Temperature	Summer	1998
Lunch Creek	0 to 4.1	Temperature	Summer	1998
Middle Fork John Day River	0 to 69.8	Temperature	Summer	1998
Middle Fork John Day River	0 to 69.8	Temperature	August 15 - July 15	2002
Mill Creek	0 to 3.1	Temperature	Summer	1998
Placer Gulch	0 to 4.2	Temperature	Summer	1998
Ragged Creek	0 to 4.1	Temperature	Summer	1998
Squaw Creek	0 to 9.4	Temperature	Summer	1998
Summit Creek	0 to 8.6	Temperature	Summer	1998
Summit Creek	0 to 8.6	Temperature	August 15 - July 15	2002
Unnamed Waterbody	0 to 2.4	Temperature	Summer	1998
Vinegar Creek	0 to 7.1	Temperature	Summer	1998

Poage et al. (1996) studied stream temperatures along the length of the Middle Fork John Day River and found they differed from other subbasins of the John Day River. The average stream temperature profile for the Middle Fork John Day River indicated that the pattern of water temperature was highly variable, with the highest average water temperatures observed at the upstream end of the study section. The authors hypothesized that the decrease in downstream temperature can be explained by cold-water inputs from cooler tributaries, including Clear Creek, and as the result of relatively cool groundwater seeping into the main stream channel (Poage et al. 1996).

Blocked or impaired fish passage

Currently a number of culverts on forest land form partial passage barriers for steelhead (Unterwegner 2005). In the past, numerous pushup dams and irrigation diversions in the upper Middle Fork and several of its tributaries created intermittent passage barriers; they also increased sedimentation, seasonally reduced flows, altered channels, and caused other water quality impacts. Many of these irrigation diversions have been converted to permanent, more fish passage friendly structures within the last ten years. Water diversions that are not properly screened to prevent intake of juvenile Mid-C steelhead may still exist in the system, particularly on Long Creek and other tributaries of the lower Middle Fork (NPCC 2001 cited in NMFS 2004a).

Degraded riparian communities and large wood recruitment

Riparian corridors and levels of instream LWD have changed significantly from historical conditions. The reduction in large wood has resulted in fewer pools, increased stream velocities, reduced sediment trapping, and an overall reduction in channel diversity and key habitat (MNF 1999). Exceptions include the Clear Creek and Lunch Creek watersheds that contain high levels of woody material and good riparian conditions. Weir “hard structures” have been constructed in Camp, Lick, Squaw, Summit, Phipps, Dry Fork Clear creeks, and the lower portion of Clear Creek in an attempt to increase pool habitat and instream diversity (MNF 1999).

There are additional sources of information to inform the condition of the environmental baseline at finer scales than the Middle Fork John Day sub-basin. They include water temperature monitoring information, PACFISH-INFISH Biological Opinion (PIBO) effectiveness monitoring results, annual end-of-year grazing reports for the years 2008-2010 (MNF 2009c, MNF 2009a and MNF (2011), Proper Functioning Condition (PFC) assessments (Prichard et al. 1994) and Multiple Indicator Monitoring (MIM) (Burton et al. 2011) monitoring results at Designated Monitoring Areas (DMA) for specific pastures in the Long Creek, Camp Creek, and Blue Mountain Allotments for years ranging from 2005 to 2010. The information provided by each of these sources is presented and interpreted below.

6.1.2 MALHEUR NATIONAL FOREST ROADS ANALYSIS REPORT

The MNF prepared an analysis of its road system in a document titled “Malheur National Forest Roads Analysis Report” (MNF 2004b). Among the issues analyzed was the risk of the existing road network to general watershed health at the scale of 6^{th} level hydrologic unit codes (HUC), commonly known as sub-watersheds. A description and details of the analysis process are included in Appendix D of the report. Many scientific studies have documented the impacts of roads on to fish, fish habitat, and watershed function. Effects include habitat fragmentation from stream crossing structures that block migration, increases in peak flows from high road density, increased sedimentation and isolating streams from their floodplains (USDA FS 2001). The MNF used a Geographic Information System assessment to determine watershed risk. The following watershed risk rating elements were used:

- Total road density (roads in management levels 1-5)
- Road density (roads in management levels 1 and 2)
- Total road density within 200 feet of perennial and intermittent streams
- Density within 200 feet of perennial and intermittent streams (roads in management levels 1 and 2)
- Total road-stream crossing density (crossings/square mile)
- Geologic Sensitivity
- Soil Sensitivity

Ranges of values for each element were assigned a risk rating of low, moderate, high or extreme (Table 21). For example, for total road density, an “extreme” risk rating was for densities greater than five miles per square mile and a "low" rating was for densities less than one mile per square mile. To determine the overall subwatershed risk rating, the risk rating for each element was assigned a numeric value. They ranged from 1 for a rating of "low" to 4 for a rating of "extreme." The individual element numeric scores were then added for a total score. Total scores exceeding 23 were given an overall watershed risk rating of "extreme," scores in the 17-23 range were given a "high" rating, scores from 11-17 were given a "moderate" rating and scores less than 11 were given a rating of "low."

TABLE 21. RANGES OF VALUES BY RISK CATEGORY FOR ELEMENTS USED IN THE WATERSHED RISK ANALYSIS.

Risk Element	Risk Category			
	Low	Moderate	High	Extreme
Total Road Density (miles/mile^2)	0 - 1	1 - 3	3 - 5	>5
Level 1-2 Road Density (miles/mile^2)	0 - 1	1 – 2.5	2.5 – 4	>4
Road Density w/in 200 feet of streams (miles/mile^2)	0 – 0.2	0.2 – 0.6	0.6 – 0.9	>0.9
Level 1-2 Road Density w/in 200 feet of streams (miles/mile^2)	0 – 0.2	0.2 – 0.5	0.5 – 0.8	>0.8
Road Stream Crossing Density (#crossings/mile)	0 – 1.5	1.5 - 3	3 – 4.5	>4.5
Percent of Subwatershed with Sensitive Geology	1 - 20	20 – 50	50 – 100	Not applicable
Percent of Subwatershed with				

Risk Element	Risk Category			
	Low	Moderate	High	Extreme
Sensitive Soils	1 - 20	20 – 50	50 – 100	Not applicable

The results for the five 6th field HUCs represented in the Long Creek, Blue Mountain and Camp Creek Allotments are shown in Table 22.

Long Creek Allotment

Within the Long Creek Allotment; Middle Camp Creek, Lick Creek, and Lower Camp Creek all were given a "Extreme" watershed risk rating, while the Cotote Creek/Balance Creek 6th field had a "High" watershed risk rating. The majority of individual risk ratings for the road density, road proximity within 200 feet, and road crossings elements were "high" or "extreme." This suggests that the legacy road system has negatively impacted riparian and aquatic environmental baseline conditions in these 6th field HUCs.

The NMFS MPI values for the Road Density and Location (RDL) indicator are <2, 2-3 miles/mile^2 and >3 miles/mile^2 for the PF, AR and NPF categories, respectively. The "high" and "extreme" risk ratings for both road density risk elements are equivalent to the NMFS MPI NPF category. Therefore, the Middle Camp Creek, Lick Creek, Lower Camp Creek, and Cotote Creek/Balance Creek 6th field HUCs are NPF for RDL.

While there are no other roads risk analysis elements that are directly comparable to NMFS MPI indicators, it is logical that the Road Stream Crossing Density (RSCD) watershed risk element would inform an analysis of the NMFS MPI Increase in Drainage Network (IDN) indicator. The "extreme" risk scores for the RSCD risk element for the Middle Camp Creek, Lick Creek, Lower Camp Creek, and Cotote Creek/Balance Creek 6th field HUCs support a NMFS MPI classification of NPF for the IDN indicator.

Road crossings at streams are the primary mechanism for rainfall runoff intercepted by roads to enter stream channels. Roads tend to concentrate runoff, resulting in higher peak flows than would occur without roads. Fine sediments from road surfaces also enter stream channels at road crossings, increasing turbidity, substrate embeddedness and substrate composition. The "extreme" or "high" risk ratings for the RSCD risk element for the Middle Camp Creek, Lick Creek, Lower Camp Creek, and Cotote Creek/Balance Creek 6th field HUCs would logically support classification of NPF for the Change in Peak/Base Flows, Sediment and Substrate NMFS MPI indicators.

Blue Mountain Allotment

Within the Blue Mountain Allotment; Squaw Creek, Idaho Creek/Summit Creek, Dry Fork, and Mill Creek all were given a "High" watershed risk rating, while the Clear Creek 6th field had a "Moderate" watershed risk rating. The majority of individual risk ratings for the road density, road proximity within 200 feet, and road crossings elements were "high" or "extreme." This suggests that the legacy road system has negatively impacted riparian and aquatic environmental baseline conditions in these 6th field HUCs.

The NMFS MPI values for the Road Density and Location (RDL) indicator are <2, 2-3 miles/mile^2 and >3 miles/mile^2 for the PF, AR and NPF categories, respectively. The “high” and “extreme” risk ratings for both road density risk elements are equivalent to the NMFS MPI NPF category. Therefore, the Squaw Creek, Idaho Creek/Summit Creek, Dry Fork, and Mill Creek 6th field HUCs are NPF for RDL. The Clear Creek 6th field HUCs road density risk ratings of “moderate” would be considered either PF or AR, since the road density elements’ ranges for “moderate” (1-3, 1-2.5) encompass the NMFS MPI numeric ranges for the PF and AR categories.

While there are no other roads risk analysis elements that are directly comparable to NMFS MPI indicators, it is logical that the Road Stream Crossing Density (RSCD) watershed risk element would inform an analysis of the NMFS MPI Increase in Drainage Network (IDN) indicator. The “extreme” or “high” risk scores for the RSCD risk element for the Squaw Creek, Idaho Creek/Summit Creek, Dry Fork, and Mill Creek 6th field HUCs support a NMFS MPI classification of NPF for the IDN indicator. The Clear Creek 6th field HUCs road stream crossing density risk ratings of “moderate” would be considered either PF or AR.

Road crossings at streams are the primary mechanism for rainfall runoff intercepted by roads to enter stream channels. Roads tend to concentrate runoff, resulting in higher peak flows than would occur without roads. Fine sediments from road surfaces also enter stream channels at road crossings, increasing turbidity, substrate embeddedness and substrate composition. The “extreme” or “high” risk ratings for the RSCD risk element for the Squaw Creek, Idaho Creek/Summit Creek, Dry Fork, and Mill Creek 6th field HUCs would logically support classification of NPF for the Change in Peak/Base Flows, Sediment and Substrate NMFS MPI indicators. The Clear Creek 6th field HUCs road stream crossing density risk ratings of “moderate” would be considered either PF or AR.

Camp Creek Allotment

Within the Camp Creek Allotment; Lower Camp Creek was given an “Extreme” watershed risk rating, while Mosquito Creek/Bear Creek, and Cotote Creek/Balance Creek 6th field had a “High” watershed risk rating. The majority of individual risk ratings for the road density, road proximity within 200 feet, and road crossings elements were “high” or “extreme.” This suggests that the legacy road system has negatively impacted riparian and aquatic environmental baseline conditions in these 6th field HUCs.

The NMFS MPI values for the Road Density and Location (RDL) indicator are <2, 2-3 miles/mile^2 and >3 miles/mile^2 for the PF, AR and NPF categories, respectively. The “high” and “extreme” risk ratings for both road density risk elements are equivalent to the NMFS MPI NPF category. Therefore, the Lower Camp Creek, Mosquito Creek/Bear Creek, and Cotote Creek/Balance Creek 6th field HUCs are NPF for RDL.

While there are no other roads risk analysis elements that are directly comparable to NMFS MPI indicators, it is logical that the Road Stream Crossing Density (RSCD) watershed risk element would inform an analysis of the NMFS MPI Increase in Drainage Network (IDN) indicator. The "extreme" or "high" risk scores for the RSCD risk element for the Lower Camp Creek, Mosquito Creek/Bear Creek, and Cotote Creek/Balance Creek 6th field HUCs support a NMFS MPI classification of NPF for the IDN indicator.

Road crossings at streams are the primary mechanism for rainfall runoff intercepted by roads to enter stream channels. Roads tend to concentrate runoff, resulting in higher peak flows than would occur without roads. Fine sediments from road surfaces also enter stream channels at road crossings, increasing turbidity, substrate embeddedness and substrate composition. The "extreme" or "high" risk ratings for the RSCD risk element for the Lower Camp Creek, Mosquito Creek/Bear Creek, and Cotote Creek/Balance Creek 6th field HUCs would logically support classification of NPF for the Change in Peak/Base Flows, Sediment and Substrate NMFS MPI indicators.

General for all Allotments

The vast majority of road crossings at streams are culverts. Poorly designed culverts can be barriers to juvenile or adult fish passage. The RSCD risk scores do not incorporate fish passage barrier information, but high or extreme risk ratings imply a large number of culverts with potential fish passage problems. The MCR Steelhead Recovery Plan did identify fish passage barriers as a limiting factor for Middle Fork of the John Day and their tributaries.

The two risk elements for road density within 200 feet of streams do not have a comparable NMFS MPI indicator. However, roads within floodplains have the potential to negatively affect the Off-channel Habitat and Floodplain Connectivity NMFS MPI indicators. Many FS roads are in the valley bottoms, in or adjacent to riparian areas, and affect the ability of a stream to meander laterally through its floodplain. There is no information to determine to what degree a distance of 200 feet includes the floodplains for the various streams associated with the road system in the five 6th field HUCs represented in the above mentioned Allotments. However, the "extreme" or "high" risk ratings for the two risk elements for all of the five 6th field HUCs would tend to support a NMFS MPI classification of NPF for the two indicators.

TABLE 22. SUB-WATERSHED RISK RATINGS FOR SIXTH FIELD HYDROLOGIC UNITS (FROM MNF 2004B).

ALLOTMENT NAME & 6TH LEVEL HUC NAME	HUC NUMBER	ROAD DENSITY RISK OML 1-5	ROAD DENSITY RISK 0ML 1-2	ROAD 200' PROXIMITY RISK ML 1-5	ROAD 200' PROXIMITY RISK ML 1-2	ROAD CROSSINGS RISK	GEOLOGIC SENSITIVITY	SOIL EROSION SENSITIVITY	OVERALL WATERSHED RISK	NUMBER OF TES SPECIES	STRONGHOLD (HES OR NO)	OVERALL AQUATICS RISK
Blue Mountain Allotment												
SQUAW CREEK	170702030101	E	E	E	E	H	L	L	H	3	N	M
IDAHO CREEK/SUMMIT CREEK	170702030102	H	H	E	E	E	L	L	H	3	N	M
DRY FORK	170702030103	E	E	E	E	H	L	L	H	3	N	M
CLEAR CREEK	170702030104	H	H	H	M	M	L	L	M	4	Y	H
MILL CREEK	170702030106	H	H	E	E	E	L	L	H	3	Y	H
Long Creek Allotment												
COYOTE CREEK/BALANCE CREEK	170702030205	H	H	H	H	E	H	M	H	3	N	M
MIDDLE CAMP CREEK	170702030206	E	E	E	E	E	M	M	E	3	Y	H
LICK CREEK	170702030207	E	E	E	E	E	H	H	E	3	Y	H
LOWER CAMP CREEK	170702030208	H	H	E	E	E	H	M	E	3	Y	H
Camp Creek Allotment												
LOWER CAMP CREEK	170702030208	H	H	E	E	E	H	M	E	3	Y	H

ALLOTMENT NAME & 6TH LEVEL HUC NAME	HUC NUMBER	ROAD DENSITY RISK OML 1-5	ROAD DENSITY RISK 0ML 1-2	ROAD 200' PROXIMITY RISK ML 1-5	ROAD 200' PROXIMITY RISK ML 1-2	ROAD CROSSINGS RISK	GEOLOGIC SENSITIVITY	SOIL EROSION SENSITIVITY	OVERALL WATERSHED RISK	NUMBER OF TES SPECIES	STRONGHOLD (HES OR NO)	OVERALL AQUATICS RISK
MOSQUITO CREEK/BEAR CREEK	170702030301	H	E	E	E	H	M	L	H	3	N	M
COYOTE CREEK/BALANCE CREEK	170702030205	H	H	H	H	E	H	M	H	3	N	M

Road maintenance level (ML) designations are defined as:

> Level 1. These are intermittent service roads during the time they are closed to motorized traffic. The closure period must exceed one year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Roads receiving level 1 maintenance may be of any type, class, or construction standard.
>
> Level 2. Roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor.
>
> Level 3. Roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material.
>
> Level 4. Roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated.
>
> Level 5. Roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated.

6.1.3 MALHEUR NATIONAL FOREST WATER TEMPERATURE MONITORING

Appendix I presents water temperature monitoring information for MCR Steelhead and/or CR bull trout CH streams within the Long Creek, Camp Creek, Blue Mountain Allotments in Tables I-1, I-2 and I-3, respectively. In the tables, data are evaluated using the following criteria: 1) State water quality standards; 2) Amendment 29 DFC; 3) PACFISH RMO; and, 4) NMFS MPI.

There are 18 monitoring sites on 5 streams in the Long Creek Allotment. Data sets are single year observations in the time frame from 2000-2007. Of the 5 streams, Most of Camp Creek and Long Creek are listed by ODEQ as water quality limited for temperature. For the remaining streams, MNF data indicates that state water quality standards are not being met (with the exception of the Camp Creek above plantation site, Coxie Creek across from spring, Lick Creek section 8), but the ODEQ determined the data was insufficient to include the stream on Oregon's 2004/2006 integrated report as 303(d) listed.

There is 1 monitoring site within the Camp Creek Allotment. Data set was monitored from 2001-2005. Camp Creek is listed by ODEQ as water quality limited for temperature on Oregon's 2004/2006 integrated report as 303(d) listed.

There are four monitoring sites on three streams in the Blue Mountain Allotment. Data sets vary from two to five years in the time frame from 2000-2005. Of the three streams, Summit Creek and The Middle Fork of the John Day is listed by ODEQ as water quality limited for temperature. For Idaho Creek, MNF data indicates that state water quality standards are not being met but ODEQ determined the data was insufficient to include on Oregon's 2004/2006 integrated report as 303(d) listed.

Monitoring data indicates that the majority of stream reaches fail to meet state water quality standards, Amendment 29 DFCs and PACFISH RMOs. Consequently, the stream reaches would rate NPF for steelhead or FAUR for bull trout, for spawning, rearing or both.

6.2 PIBO MONITORING

The PACFISH/INFISH-INFISH Biological Opinion (PIBO) monitoring strategy is described in section 3.1.2.3. Monitoring consists of two components: effectiveness and implementation.

6.2.1 EFFECTIVENESS MONITORING

Data collected by the PIBO Effectiveness Monitoring Program (EMP) for monitoring locations within the Long Creek and Camp Creek Allotments is presented and analyzed below. There were no PIBO Effectiveness Monitoring sites within the Blue Mountain Allotment.

Sites included within the summary are both Integrator[4] (I) reaches within randomly selected watersheds as well as Designated Monitoring Area (DMA)[5] reaches that lie within pastures contained by the randomly selected watersheds. There have been Three reach evaluations (sites evaluated two or more times) within (or near) the Long Creek allotment between 2005 and 2010. Also included in Tables 23-27 are eight special monitoring sites (site type S); sites that are part of a separate special study/project and not part of the overall PIBO EMP for long-term monitoring. Again these sites are not part of the effectiveness monitoring but articulate a good snapshot in time of the current condition. Within these monitored reaches the data presented in Tables 23-27 suggest that some stream attributes are improving, most are remaining relatively static, and some are declining.

Long Creek Allotment

Table 23 displays pool characteristics. Based upon bankfull widths and pools per kilometer, there was one PIBO monitoring site that had multiple reads of which showed improvements. All of the monitoring sites within the Long Creek Allotment met the NMFS MPI criterion for pool frequency. However, the pool frequency indicator also includes large woody debris criteria and LWD information is not available.

Percent pool estimates ranged from 12.9-64.4 percent. Of the 10 sites monitored 5 of the sites exceeded 50 percent pool area. The one site that had a multiple read showed an improvement for this indicator. Mean residual pool depth did not exceed 0.52 meters for any site. Raw data are not available to evaluate the NMFS MPI criterion for pool quality (presence of pools greater than one meter in depth).

[4] PIBO monitoring sites chosen within randomly selected subwatersheds to show integrated effects of upstream management—most are located in the most downstream response reach (stream gradient less than 3%), while the remaining at the downstream most transport reach (stream gradient between 3 and 5%)

[5] PIBO monitoring sites located within each randomly selected subwatershed where livestock grazing occurs within the riparian area; locations are selected by Field Units and used for annual implementation monitoring; objective is to develop link between implementation and effectiveness monitoring as part of adaptive management feedback process

TABLE 23. POOL CHARACTERISTICS AT PIBO MONITORING SITES WITHIN THE LONG CREEK ALLOTMENT.

Stream	Site Type	Year	Rosgen Stream Type	Bank full Width (m)	Pool frequency (#pools/km)	Percent Pools	Residual pool depth (m)
Long Cr.	I	2005	C3	3.4	60.6	51.9	0.23
Long Cr.	I	2010	C3	3.9	71.6	64.4	0.23
Long Cr.	K	2005	-	3.0	-	-	-
Long Cr.	K	2010	-	4.2	74.8	53.6	0.52
S. Fk. Long Cr.	K	2005	-	7.8	-	-	-
S. Fk. Long Cr.	K	2010	-	12.4	-	-	-
Camp Cr.	I	2006	C3b	6.0	41.0	32.4	0.44
Camp Cr. (14)	S	2008	-	7.0	37.2	12.9	0.19
Camp Cr. (18)	S	2008	-	4.4	48.2	25.2	0.22
Camp Cr. (25)	S	2008	-	5.1	67.1	29.5	0.21
Camp Cr. (28)	S	2008	-	3.7	98.3	41.1	0.21
Lick Cr. (2)	S	2008	-	4.6	110.4	51.9	0.22
Lick Cr. (4)	S	2008	-	4.3	69.4	64.4	0.26

Table 24 presents stream channel and bank characteristics. In 2010 the Long Creek (K) monitoring site met bankfull width to depth ratio calculations for the NMFS MPI criteria for PF or AR of less than 10 or 10-12, respectively. The remaining monitoring sites within the Long Creek Allotment ranged from 15 to 53.5 for this indicator. There was improvement at the Long

Creek site, where the ratio went down from 20.4 to 15. The NMFS MPI utilizes 90 percent stability for the stream bank condition indicator. Banks were between 93% and 100% Stable which would rate PF using NMFS MPI criteria. Percent undercut bank are showing improvements at the monitoring sites with multiple reads for this allotment.

TABLE 24. STREAM CHANNEL AND BANK CHARACTERISTICS AT PIBO MONITORING SITES WITHIN THE LONG CREEK ALLOTMENT.

Stream	Site Type	Year	Rosgen Stream Type	Bf W/D	Bank Stab. (%)	Bank Angle (°)	Under-cut %
Long Cr.	I	2005	C3	20.4	100	141	4.8
Long Cr.	I	2010	C3	15.0	97	126	25.0
Long Cr.	K	2005	-	-	88	140	2.4
Long Cr.	K	2010	-	8.4	100	135	11.1
S. Fk. Long Cr.	K	2005	-	-	93	130	9.5
S. Fk. Long Cr.	K	2010	-	53.5	98	133	21.4
Camp Cr.	I	2006	C3b	28.0	100	143	9.1
Camp Cr. (14)	S	2008	-	32.6	100	147	2.4
Camp Cr. (18)	S	2008	-	21.9	100	143	2.4
Camp Cr. (25)	S	2008	-	22.7	100	114	28.6
Camp Cr. (28)	S	2008	-	20.5	98	130	14.6
Lick Cr. (2)	S	2008	-	24.4	100	131	11.9
Lick Cr. (4)	S	2008	-	22.1	95	120	21.4

Table 25 presents substrate characteristics at the PIBO Integrator monitoring sites. The D50 (median particle size) of the substrate ranged from 38 to 99 mm (Gravel/Cobble). Amendment 29 of the LRMP sets a desired condition of <20% embeddedness for substrate. Of the 6 stream survey reports (19 reaches) that reported substrate embeddedness data, most were greater than 20% for substrate embeddedness (Appendix J presents PIBO and stream survey results). Percent fine sediment smaller than 2 mm in diameter at pool tail-outs ranged from 0 to 6.7%. The PIBO data for the 2 mm size class is conservative in contrast to the NMFS MPI criterion of fines in gravel <0.85 mm.

TABLE 25: SUBSTRATE CHARACTERISTICS AT THE PIBO INTEGRATOR MONITORING SITES WITHIN THE LONG CREEK ALLOTMENT.

Stream	Site Type	Year	Rosgen Stream Type	Mean Part. Size (D50) (mm)	%Fines <2mm /<6mm
Long Cr.	I	2005	C3	78	2.3/ 3.3
Long Cr.	I	2010	C3	70	3.4/ 4.8
Long Cr.	K	2005	-	-	-
Long Cr.	K	2010	-	-	-
S. Fk. Long Cr.	K	2005	-	-	-
S. Fk. Long Cr.	K	2010	-	-	-
Camp Cr.	I	2006	C3b	90	2.2/ 4.2
Camp Cr. (14)	S	2008	-	60	0.9/ 2.0
Camp Cr. (18)	S	2008	-	99	0.1/ 0.6
Camp Cr. (25)	S	2008	-	77	0.0/ 0.7
Camp Cr. (28)	S	2008	-	52	0.2/ 0.6
Lick Cr. (2)	S	2008	-	38	2.1/ 5.8
Lick Cr. (4)	S	2008	-	75	6.7/ 11.9

Table 26 presents estimates of two vegetative cover characteristics at PIBO monitoring sites. The greenline wetland rating (GWR) is a measure of the abundance of wetland species along the streambank. A wetland rating of 100 indicates all obligate wetland species and a rating of 1 indicates all upland species. The rating is calculated for each reach by summing the product of the relative cover of each species for which a wetland indicator status can be determined and a value corresponding to the species' wetland indicator status (1=upland, 25= facultative upland, 50=facultative, 75=facultative wet, 100=obligate wetland (Coles-Ritchie et al. 2007). The GWR values ranging from 74 to 96 indicate a majority presence of wetland species along the streambank. At the three sites within long Creek and South Fork Long Creek showed improvements for this indicator.

Greenline woody cover (GWC) is the sum of the percent cover of woody species along the greenline. These could be any woody species, such as willows, pines, or currants. Greenline woody cover can be up to 200 percent because cover estimates are a combination of two layers. Estimates were 0 and 57 at the monitored sites.

Table 26: Estimates of two vegetative cover characteristics at PIBO monitoring sites within the Long Creek allotment.

Stream	Site Type	Year	GL Wet Rat	GL Woody CV
Long Cr.	I	2005	70	23
Long Cr.	I	2010	80	22
Long Cr.	K	2005	84	0
Long Cr.	K	2010	96	0
S. Fk. Long Cr.	K	2005	59	0
S. Fk. Long Cr.	K	2010	76	0
Camp Cr.	I	2006	82	20
Camp Cr. (14)	S	2008	77	42
Camp Cr. (18)	S	2008	74	30
Camp Cr. (25)	S	2008	76	4
Camp Cr. (28)	S	2008	80	5
Lick Cr. (2)	S	2008	70	57
Lick Cr. (4)	S	2008	71	50

Table 27. PIBO monitoring Data within the Camp Creek Allotment.

	Camp Cr. (1)	Camp Cr. (2)
Site Type	S	S
Year	2008	2008
Rosgen Stream Type	-	-

Bf W/D	40.9	44.4
Mean Part. Size (D50) (mm)	86	124
Pool% / Res. Pool depth (m)	12.9/0.19	25.2/0.22
%Fines <2mm / <6mm	0.0/0.19	0.0/2.2
Bank Stability. (%)	100	98
Bank Angle (°)	147	143
Under-cut %	6.6	7.1
GL Wet Ratio	76	81
GL Woody CV	10	23

The monitoring sites within this allotment are considered to be "special" sites that are being monitored as part of another project. The data will not show trend but will give a good snap shot of current conditions.

Bank full width/depth ratio for these two sites is high with a dominant substrate of cobble. % pools and residual pool depth values are less than desirable. Percent Fines would considered to be PF. Percent stable banks would be considered to be PF, while undercut banks would be considered to be low. The GWR values of 76 and 81 for the two sites in 2008 indicate a majority presence of wetland species along the streambank.

Summary

In reviewing the data for those sites evaluated two or more times, it appears that the monitoring sites on Long and S. Fk. Long Creeks have shown improvement for most attributes. Overall, bankfull width-to-depth ratios, pool %, greenline wetland rating, as well as bank angle and % undercut banks, percent stable banks, and GL Wet rating have shown considerable improvement while the remaining evaluated attributes, those considered to be potentially affected by livestock grazing – D50, residual pool depth, percent fines <6mm, bank stability, and greenline woody cover, remained relatively unchanged (a few of the attributes lacked data to make an evaluation). It should be noted that besides riparian vegetation, the stream attributes most directly affected by grazing activities are bank stability, bank angle, width to depth ratio, and percent undercut banks. There are too few reference sites within the John Day Basin to determine whether similar changes are occurring in unmanaged watersheds. Although only bankfull width-to-depth ratios, pool %, greenline wetland rating, bank angle, and % undercut banks showed improvement, this is actually a promising indicator given that both Bengeyfield (2006) and Rosgen (1996) have indicated that the relationship between a stream's width and depth is perhaps the most revealing of all stream channel indicators as to whether the stream is in a condition to perform the various tasks that lead to a healthy riparian area.

While some attributes, such as channel shape and the frequent floodplain, are generally formed in 1.5-2 year events, others, such as habitat complexity, are formed during moderately high events of 10-25 year return intervals. If the stream cannot maintain its dimension, pattern, and profile during these moderately high events, then habitat or other desired values will probably not be created or sustained over time. Thus, given the short 5-year time frame between site visits for monitoring and developing trends, and the analysis of data, it is our reasoned opinion that the evaluated attributes are being maintained or showing a slight overall improvement. There has been little change in overall stream habitat conditions with the exception of improvement of bankfull width-to-depth ratios, pool %, greenline wetland rating, bank angle, and % undercut banks, on federal lands of the Malheur National Forest (MNF) within the Long Creek and Camp Creek Allotments.

These results align with those found for integrator and DMA reaches as summarized in Dr. Roper's 2009 declaration (ONDA v. Tidwell, Civ. No. 07-1871-HA, Docket #235). Based on his analysis he also stated that "it is my reasoned conclusion that the trend in the conditions of integrator reaches evaluated on the Malheur National Forest is similar or slightly better than those of other integrator reaches within the John Day Basin … and it is my reasoned conclusion the trend in the DMA reaches within the Malheur National Forest are similar (or slightly better) than those of other DMA reaches within the John Day River Basin."

6.2.1.1 EVALUATION OF EXISTING CONDITIONS TO PIBO MANAGED AND REFERENCE MEANS

Identifying the existing condition of streams within a particular watershed or management area is an important step in evaluating how land management may be affecting the quality of stream habitats. To help assess these conditions, we are utilizing recent information from the PIBO EMP to represent mean habitat conditions for both managed and reference conditions (see Table 16). As part of a recent publication, an index of physical habitat conditions was developed – 8 commonly collected metrics used in stream habitat monitoring – by evaluating the status of the condition of 217 reference and 934 managed streams in the Interior Columbia River and Upper Missouri River Basins (Al-Chokhachy et al. 2010). Comparing our existing condition information to these values helps provide for the evaluation of management practices to determine if they are effective in maintaining the desired and/or proper functioning condition, or improving the structure and function of riparian and aquatic conditions.

The values shown in Table 28 are not intended to replace current RMOs but to illustrate how specific streams on the MNF compare to other managed and reference stream sites within the Interior Columbia Basin. We believe this evaluation is merited as new information/articles are calling for the re-examination of certain RMOs/RMO values. Kershner and Roper (2010) found that many of the PIBO EMP reference reaches did not meet RMOs, such as wetted width-to-depth, percent undercut banks, number of pieces of large wood, and numbers of days exceeding 15°C. These authors also stated that the current RMOs were originally designed as an early warning of potential negative effects of land management on stream/riparian conditions, and values that did not meet RMOs were thought to potentially represent unsuitable habitat conditions for important salmonids. Their analysis of data from federally-managed sites in the interior Columbia River basin indicates that the usefulness of RMOs may be questionable. In summary, they found that none of the 726 reference and managed reaches surveyed met all RMOs, and in a previous analysis (Henderson et al. 2005) found that only 2% of the reference reaches met the RMO for wetted width-to-depth ratio and that 16% met the reference criteria for percent undercut banks. These may be examples of RMOs warranting exclusion or reconsideration.

Modifications in the selection of RMOs and their application are clearly needed if the results in this study are to represent conditions across the broader landscape. The authors also acknowledged that one of the drawbacks of the use of RMOs has been to disregard the role of disturbance in shaping stream habitats. Natural disturbances play an imperative role in shaping the setting of streams and the conditions that are found within them (Benda et al. 1998). They went on to say that it is apparent that all streams will most likely not meet all habitat objectives during some point in their history as the series of natural disturbances both influences and resets them. In fact, some of the PIBO reference sites come from wilderness areas that have experienced severe disturbance from wildfires and associated debris flows. These sites provide valuable information when describing the distribution of conditions that may be possible in a reference setting and provide important information on recovery trajectories in the absence of land management. Based on this information and findings, MNF staff feels it is important to evaluate conditions against selected managed and reference riparian/channel attribute values, shown in Table 28. Again, these values only represent interim aspirations and are intended as a provisional step in the measurement of movement towards existing LRMP RMOs and ESA related MPI habitat values.

TABLE 28. PIBO MANAGED AND REFERENCE MEAN VALUES FOR SELECTED RIPARIAN, CHANNEL MORPHOLOGY, AND HABITAT ATTRIBUTES.

Riparian/Channel Attribute	PIBO Managed Mean	PIBO Reference Mean	RMSE[1]	Source of Information
Bankfull W/D Ratio	23.9	22.6	4.0	Henderson et al. 2005
Percent fines sediment (<6mm)	26.7	18.0	4.9 (4.8)	Al-Chokhachy et al. 2010
Bank angle (°)	108.0	99.3	(6.5)	Al-Chokhachy et al. 2010
Percent undercut banks (%)	26.4	32.7		Al-Chokhachy et al. 2010
Residual pool depth (m):	0.26	0.31	.027 (.016)	Al-Chokhachy et al. 2010
Percent pool habitat (%)	40.9	43.3	12.9 (5.8)	Al-Chokhachy et al. 2010
Bank stability (%)	74.6	79.9		Henderson et al. 2005
D50 (mm)	43.0	58.0	13.8 (8.0)	Al-Chokhachy et al. 2010

[1]RMSE is an estimate of the potential sampling error for selected stream attributes (a measurement of the temporal variability – based on repeat measures analyses at sites over a 9-year period). Values are from Roper et al. 2010 and (Al-Chokhachy et al. 2011).

At the scale of the Long Creek and Camp Creek Allotments, half of the twelve monitoring sites presently show bankfull width-depth ratios within PIBO managed mean values, and all sites currently exhibit bank stability, D50, and percent fines <6mm values within managed mean values, while only four or fewer of the twelve monitoring sites exhibit managed mean values for the remaining four stream attributes: pool %, residual pool depth, bank angle, and% undercut banks. Thus, a cursory examination of the Long Creek and Camp Creek Allotments reveals that three of the eight stream attributes considered to be potentially affected by livestock grazing – bank stability, D50, and percent fines <6mm – are found to be within PIBO managed mean values, whereas the other five, bankfull width-depth ratios, pool %, residual pool depth, bank angle, and % undercut banks, are not as good as managed mean values. It should be noted that besides riparian vegetation, the stream attributes most directly affected by grazing activities are bank stability, bank angle, width to depth ratio, and percent undercut banks.

As discussed earlier, a channel's bankfull width-depth ratio is an important indicator of whether a stream is able to perform the various tasks that lead to a healthy riparian area. This indicator, along with appropriate riparian vegetation, is critically important for a stream to maintain its dimension, pattern, and profile even during moderate to high (10-25+ year return intervals) flow events, like those that occurred in 2011. If continued monitoring shows that overall channel shape was maintained, the expected outcome will be improvement in the other stream attributes, thereby enhancing habitat complexity. Based on monitoring results, the current livestock management strategies utilized over the last several years should be continued. In some cases this has been rest and or rest of certain pastures. Continuing to meet the allowable use standards of the BA/BiOp and LRMP, both in the form of "move triggers" and end of season minimum requirements, should avoid any negative effects to riparian or aquatic habitats that would carry over in any meaningful way to the following grazing season. In the absence of site-specific information to the contrary, it is fair to say that livestock grazing that complies with these applicable allowable use standards has a high likelihood of not meaningfully impeding the capacity for the structure and function of riparian and aquatic conditions to achieve recovery, consistent with PACFISH/INFISH S&Gs.

The results of this analysis can further be used to assist in the evaluation of other important parameters, such as water temperature in low-gradient alluvial systems, as they are directly tied to stream morphology (e.g., width/depth ratio) and vegetative cover. For example, as the streams narrow and deepen over time in an improving trajectory, water temperatures will be less susceptible to diurnal fluctuations, and as inflow from stored water in riparian banks increases, cooler water temperatures in summer and warmer temperatures in winter would be expected. Thus, the evaluation of trend in stream morphology attributes such as width/depth ratio can help inform the Line Officer or Manager about other important fish habitat elements.

6.2.2 IMPLEMENTATION MONITORING

An interdisciplinary group using the Multiple Indicator Monitoring (MIM) method acquired monitoring data for pastures of the Long Creek, Blue Mountain, and Camp Creek Allotments. Data was collected from 2008 to 2010, but not all pastures were monitored in each year. Data are presented in Tables 23 to 28.

Long Creek Allotment Monitoring (2008 through 2010)

This allotment contains numerous long term photo monitoring locations with several locations including pictures from the 1930's. These photos show a drastic upward trend in the condition of the allotment and the amount of time and energy that this allotment has received of the last century. Specifically, since the current Range program began administering this allotment, every stream suitable for monitoring, regardless of steelhead habitat, has been monitored every year for the past three years. Several times a week, during the grazing season, for the past three years the Range program has visited this allotment and observed its changing condition as it was grazed one year, rested one year, and grazed one year. Approximately 400 pictures have been recorded at various locations of riparian areas, upland meadows, designated crossings, and updates to the historic 50 years of change on the range document which can now be updated to over 70 years of change.

These monitoring results were acquired by an interdisciplinary group of individuals using the Multiple Indicator Monitoring method. Not Measured (NM)

Bank alteration estimates ranged from 3-51 percent in 2008. The end-point of 10 percent was exceeded at all monitoring sites in 2008. This allotment was in non-use in 2009. In 2010 the allotment received light use in the Hiyu pasture (Flood Meadow 3% bank alteration).

The stubble height end-point of 4 - 6 inches was met at most sites in 2008 with the exception of Keeney Creek (3.1"). again the allotment was in non-use in 2009. At the Flood Meadow monitoring site 13.5" was recorded in 2010.

The end-point standard of "light to moderate" hedging of shrubs was met in 2008 with the exception of Keeney Creek (44.2%). Many of the monitoring sites exceeded the endpoint indicator in 2009 and 2010 due to wildlife use.

Implementation monitoring for livestock grazing provides insight on the effects of wildlife grazing on implementation monitoring indicators. Appendix K presents monitoring results specific to the MNF Long Creek Allotment within the action area from the end-of-year grazing reports for the years 2008-2010. Monitoring results are identified in Tables 29-39 and a summary is presented in Table 40. In several instances in 2009 and 2010 monitoring of the Long Creek Allotment, end-points were exceeded even though no livestock grazing took place. This was attributed to wildlife use. There were also instances in 2009 and 2010 when pastures were in non-use status for livestock, but use was noted by wildlife (deer, elk) that did not exceed the end-point.

TABLE 29.COUGAR CREEK MONITORING RESULTS.

Cougar Creek	2008	2009[1]	2010[1]
Bank Alteration (%)	30	3	6
Stubble Height (inches)	6.8	10.8	12.9
Woody Browse (%)	17.5	16.5	26.2
Bank Stability (%)	NM	82	85

Cougar Creek	2008	2009[1]	2010[1]
Covered Banks (%)	NM	100	93

[1]Results reflect wildlife use, not grazed by livestock

TABLE 30. FLOOD MEADOW MONITORING RESULTS.

Flood Meadow	2008	2009 (not grazed)	2010
Bank Alteration (%)	14	NM	3
Stubble Height (inches)	7.1	NM	13.5
Woody Browse (%)	NM	NM	NM
Bank Stability (%)	NM	NM	100
Covered Banks (%)	NM	NM	100

TABLE 31. KEENEY CREEK MONITORING RESULTS.

Keeney Creek	2008	2009[1]	2010[1]
Bank Alteration (%)	13	10	11
Stubble Height (inches)	14	17	12
Woody Browse (%)	11	S/L(0-40)[1]	8
Bank Stability (%)	NM	NM	90
Covered Banks (%)	NM	NM	90

[1]Not used by livestock. Results reflect wildlife use.

This site is considered a Critical DMA in which results gathered here only reflect the use of the monitored reach and cannot be extrapolated to other riparian areas within the allotment.

Keeney Creek is not Steelhead Critical Habitat

TABLE 32. LONG CREEK MONITORING RESULTS.

Long Creek (Ladd Pasture)	2008	2009[1]	2010[1]
Bank Alteration (%)	27	2	2

Stubble Height (inches)	7.9	11.5	18.4
Woody Browse (%)	6.5	7.3	40.0
Bank Stability (%)	NM	93	100
Covered Banks (%)	NM	100	100

[1]Not used by livestock. Results reflect wildlife use.

TABLE 33. LICK CREEK MONITORING RESULTS.

Lick Creek	**2008**	**2009[1]**	**2010[1]**
Bank Alteration (%)	23	0	1
Stubble Height (inches)	8.6	11.3	14.8
Woody Browse (%)	9.3	62.9	26.4
Bank Stability (%)	NM	84	100
Covered Banks (%)	NM	100	100

[1]Not used by livestock. Results reflect wildlife use.

TABLE 34. CAMP CREEK LOWER RIPARIAN MONITORING RESULTS.

Lower Riparian (Camp Creek)	**2008**	**2009[1]**	**2010[1]**
Bank Alteration (%)	14	1	1
Stubble Height (inches)	10.3	19.7	20.9
Woody Browse (%)	10.4	27.9	53.8
Bank Stability (%)	NM	100	100
Covered Banks (%)	NM	100	100

[1]Not used by livestock. Results reflect wildlife use.

TABLE 35. PEPPER CREEK MONITORING RESULTS.

Pepper Creek	**2008**	**2009[1]**	**2010[1]**
Bank Alteration (%)	NM	3	11

Stubble Height (inches)	4	13.2	9.2
Woody Browse (%)	NM	74.0	83.7
Bank Stability (%)	NM	100	88
Covered Banks (%)	NM	100	98

[1]Not used by livestock. Results reflect wildlife use.

TABLE 36. WEST FORK LICK CREEK MONITORING RESULTS.

West Fork Lick Creek	2008	2009[1]	2010[1]
Bank Alteration (%)	15	2	5
Stubble Height (inches)	NM	8.0	11.5
Woody Browse (%)	10.2	4.2	40.3
Bank Stability (%)	NM	100	90
Covered Banks (%)	NM	100	95

[1]Not used by livestock. Results reflect wildlife use.

Blue Mountain Allotment Monitoring (2008 through 2010)

The Blue Mountain Allotment has been in non-use since 2003.

Camp Creek Allotment Monitoring (2008 through 2010)

Bank alteration estimates ranged from 1-7 percent. The end-point of 10 percent was not exceeded from 2008 to 2010.

The stubble height end-point of 4-6 inches was met at all sites for all years. Stubble height estimates ranged from 5-12 inches. The end-point standard of “light to moderate” hedging of shrubs was met at all pastures for all years. A summary of the monitoring results is presented in Table 24.

TABLE 37. CAMP CREEK MONITORING RESULTS.

Camp Creek	2008	2009	2010
Bank Alteration (%)	2	NM	NM
Stubble Height (inches)	5	6	**

Woody Browse (%)	19	<20	25
Bank Stability (%)	NM[1]	NM	NM
Covered Banks (%)	NM	NM	NM

[1]Not Monitored.

In 2009, BMRD range staff and fisheries biologist along with the USFWS level 1 team member concluded that due to the stream characteristics of Camp Creek within the Campground and Middle Pastures that bank alteration was not an appropriate indicator of cattle use. As a result measurements were not taken in 2009 or 2010

TABLE 38. MIDDLE PASTURE MIM MONITORING RESULTS.

Camp Creek	**2008**	**2009**	**2010**
Bank Alteration (%)	4	NM	NM
Stubble Height (inches)	12	>8	**
Woody Browse (%)	34	<20	**
Bank Stability (%)	NM[1]	NM	NM
Covered Banks (%)	NM	NM	NM

[1]Not Monitored

In 2009, BMRD range staff and fisheries biologist along with the USFWS level 1 team member concluded that due to the stream characteristics of Camp Creek within the Campground and Middle Pastures that bank alteration was not an appropriate indicator of cattle use. As a result measurements were not taken in 2009 or 2010.

** Camp Creek and the Middle Fork John Day River were excluded from use in 2010 by electric fencing.

TABLE 39. LOWER PASTURE MIM MONITORING RESULTS.

Middle Fork John Day River	**2008**	**2009[1]**	**2010[1]**
Bank Alteration (%)	1	3	7
Stubble Height (inches)	12	12	>10
Woody Browse (%)	25	12	18
Bank Stability (%)	NM[1]	85	NM
Covered Banks (%)	NM	98	NM

[1]Not monitored.

Implementation monitoring for livestock grazing provides insight on the effects of wildlife grazing on implementation monitoring indicators. A summary of the monitoring results is presented in Table 40.

TABLE 40. SUMMARY OF IMPLEMENTATION MONITORING RESULTS FOR 2008-2010 FOR THE LONG CREEK, BLUE MOUNTAIN AND CAMP CREEK ALLOTMENTS.

Year	Summary
	Long Creek Allotment
2008	Bank alteration (End point of 10%) was exceeded throughout the allotment. Utilization of herbaceous hydrophytic species and riparian woody shrubs met standards in every pasture with the exception of a 3" average stubble height measurement on Keeney Creek in the Flat Camp unit. Many factors contributed to standards being exceeded on this allotment. Cattle were not cleared from units in a timely manner resulting in overuse and bank alterations exceeding 10%. The Camp Creek riparian unit's annual schedule is as a gather pasture used for a short duration to aid in moving cattle between units. However, during the 2008 grazing season this unit was used as a grazing pasture and because it had not been grazed for a period of years it was unclear to the permittees how long the cattle could utilize this pasture without exceeding standards. As a result of their lack of knowledge of this unit bank alteration exceeded 10%.
2009	The Long Creek Allotment was rested for the 2009 grazing season.
2010	The Long Creek Allotment was grazed at 50% of the permitted numbers and 20% of the permitted time. Grazing was scheduled to occur on the Flat Camp, Hiyu, Keeney Meadows and Lick Creek pastures while resting the Camp Creek and Ladd pastures. The reduction in time and numbers allowed for grazing to be extended on Flat Camp and Hiyu allowing for the Lick Creek pasture to be rested for an additional year. The final rotation was: Flat Camp to Hiyu and gather into Keeney Meadows, then off. Very little of the Hiyu pasture was used especially on the lower end near Coxie Meadows and along county road 18 where logging is occurring.
	Blue Mountain Allotment
2008	Allotment was in non-use
2009	Allotment was in non-use
2010	Allotment was in non-use
	Camp Creek Allotment

2008	A new grazing strategy was adopted in 2007 to reduce the amount of browse on riparian hardwoods. This strategy was again successful in 2008 and grazing standards were met.
2009	The rotation used this year worked very well and the standards were met. Toward the end of the season yearling heifers from the adjacent private property were found in the Lower Camp pasture. The owner was contacted and removed the cattle within a few days, however, a week later range personnel again found the yearlings on the allotment. Once again the owner was contacted and he removed the cattle from the allotment and moved them to a new location. The Middle Camp pasture was only used for 2 weeks due to resource concerns on Camp Creek. This strategy was successful and use was very light throughout.
2010	Grazing on the allotment was very similar to 2009. Turn-out was scheduled to occur on the Lower pasture, however due to extremely wet conditions in early June, turn-out occurred on the North pasture. The Lower pasture contains the Middle Fork John Day River (MFJDR) and at the time of turn-out the river was at or above flood stage making the pasture unsuitable for grazing. Cattle entered the Lower pasture in mid-June after the flood waters had receded and the meadows had dried. The Middle pasture also contains the MFJDR and Camp Creek. For the 2010 season electric fence has been used to restrict cattle access to both the river and Camp Creek. Cattle have had entered the restricted area, but use has been minimal.

6.3 PFC ASSESSMENTS

Table 41 presents PFC ratings for streams within the MNF Blue Mountain Allotment. PFC ratings were either PFC or Functioning at Risk (FAR) with an Upward Trend. No relationships between PFC ratings and NMFS MPI indicator ratings have been developed. However, stream reaches at PFC would generally have MPI indicator ratings of PF or AR and streams that rate FAR with an Upward Trend may have MPI indicator ratings of NPF or AR, but with improving conditions.

TABLE 41. PFC RATINGS FOR STREAMS WITHIN THE MNF BLUE MOUNTAIN ALLOTMENT.

Stream	Reach	PFC Rating	Year	Comments
MFJD River	1	PFC (low end)	2004	Below Crawford Creek; Blue Mountain Allotment (No Trend)
MFJD River	2	Functioning at risk (Low end)	2004	Phipps Meadow inside exclosure; Blue Mountain Allotment (Upward Trend)
Squaw Creek	1	Functioning at risk	2004	Reach between exclosure and

		(mid range)		highway; Blue Mountain Allotment (Upward Trend)
Summit Creek	1	Functioning at risk (high end)	2004	Blue Mountain Allotment (Upward Trend)
Summit Creek	2	PFC (low end)	2004	Blue Mountain Allotment (No Trend)

7 EFFECTS OF THE PROPOSED ACTION

The direct and indirect effects of implementing the action, including interrelated and interdependent actions, on the listed species and designated CH are evaluated in this section. In addition, the probability of directly affecting juveniles, spawning adults, and incubating embryos in redds, will be assessed. The environmental impacts of implementing the project elements (PE) will be evaluated by use of NMFS MPI indicators to determine effects to ESA-listed MCR Steelhead, bull Trout, and designated CH.

As described in this document, the proposed action is expected to allow previously degraded riparian areas/habitat indicators to continue recovery. However, it is anticipated that the proposed grazing activities in all cases will maintain the current environmental baseline condition for each indicator. In some cases indicators are rated as Not Properly Functioning, which suggests that the proposed grazing activities will be maintaining this risk rating. However, because the environmental baseline rating is determined at the subbasin scale, the proposed grazing activities tend to influence only portions of subbasins, and watershed restoration activities needed to improve the baseline indicators at the subbasin scale will not likely occur over the life of this consultation, it is anticipated that the proposed grazing activities will maintain the current environmental baseline condition. Historic and current cattle grazing in the ESA action area likely plays varying roles in the current environmental baseline ratings for these affected subbasins.

7.1 PROJECT ELEMENT AND INTERRELATED ACTION EVALUATION

The component parts of the action are listed in Section 4.1 as six project elements and are also shown below.

1. Livestock use of allotment/pastures
2. Permittee management of livestock and infrastructure maintenance
3. Range improvements
4. Exclusionary fences
5. Monitoring
6. Adaptive management

We determined that unauthorized use (trespass) is not an action. However, the implementation of FS enforcement actions regarding unauthorized use is an interrelated action.

7.1.1 PROJECT ELEMENTS DROPPED FROM FURTHER ANALYSIS

An initial step in the analysis process is to determine if any of the project elements are already provided ESA coverage in a concluded programmatic consultation. The consultation history section (Section 1.1) described the Blue Mountain Expedited Section 7 Consultation (BMESSC) programmatic consultation. Range improvements are covered under that consultation. Range improvements in the BMESSC concurrence letter are described as: "e.g. fencing, off-site water developments." The consultation history section also described the Aquatic and Riparian Restoration Programmatic Consultation (ARRPC). Riparian exclusion fencing with water gaps and stream crossings is a category covered under the ARRPC biological opinion. Consequently, PEs 3 and 4 below already have existing ESA coverage and will not be further evaluated in this BA.

7.1.2 PROJECT ELEMENTS AND INTERRELATED ACTIONS WITH ENTIRELY BENEFICIAL EFFECTS

PE 6, adaptive management, provides a mechanism to adjust management if end-point indicators and desired conditions are not being met. Examples of adaptive management measures include reducing livestock numbers, changing the timing and duration of grazing, adjusting the numeric end-point indicators and constructing more exclusion fences. Making adjustments to ensure that end-point indicators and desired conditions are met will result in positive effects to habitat indicators and therefore to CH. The results would also have beneficial effects to the species, as many adaptive management adjustments will reduce the time that livestock are in or adjacent to streams.

Law enforcement actions to remove cattle not under permit will result in entirely beneficial effects to the species and designated CH.

7.1.3 PROJECT ELEMENTS REMAINING FOR ANALYSIS

Of the six PEs initially developed for this livestock grazing consultation, PEs 3 and 4 have been addressed as already covered by existing programmatic consultations still in effect, and the effect of implementing PE 6 has been determined to be entirely beneficial to CH and to the species. The set of PEs remaining for analysis are:

1. Livestock use of allotment/pastures
2. Permittee management of livestock and infrastructure maintenance
3. Monitoring

7.1.3.1 PE1: LIVESTOCK USE OF ALLOTMENT/PASTURES

Livestock will graze the allotment and individual pastures in the numbers, time frames and locations described in the proposed action section and in the term grazing permit.

7.1.3.2 PE2: PERMITTEE MANAGEMENT OF LIVESTOCK AND INFRASTRUCTURE MAINTENANCE

This PE includes the move-in and move-out of livestock using highway and off-road vehicles, and herding by range riders. While vehicles are also used to access sites for monitoring purposes

(PE 5), the effects of vehicle use to CH and to the species will only be assessed for this PE to reduce redundancy in the analysis. Side-boards for vehicle use are provided by the PDCs described earlier in the proposed action section.

Several hundred troughs, springs and ponds are maintained by grazing permittees to provide off-stream water for livestock. In addition, there are miles of fence and dozens of gates that are maintained each year. Typical maintenance activities involve the use of hand tools or machines on a small footprint of land. Some work such as repairing troughs or replacing wire will not involve any soil or vegetation disturbance. Other maintenance activities may disturb small amounts of soil and vegetation, but rarely within riparian areas adjacent to MCR Steelhead CH. Workers performing maintenance activities rarely walk in riparian areas or in stream channels where listed fish are present or in designated CH.

7.1.3.3 PE5: MONITORING

A variety of implementation and effectiveness monitoring techniques are employed to determine if desired conditions are being met. The MNF Riparian Monitoring Strategy is discussed in detail in the Monitoring section (Section 4.1.5). Workers use manual and electronic equipment to measure vegetation, water quality and stream channel/streambed characteristics. Some monitoring actions include wading in stream channels.

7.2 ANALYSIS OF EFFECTS TO DESIGNATED CRITICAL HABITAT

The three PEs will be analyzed first for their effects to designated CH, then for effects to the species. The freshwater primary constituent elements (PCE) of MCR Steelhead CH applicable to the action area are presented in Table 42 and the PCE of CR bull trout CH are presented in Table 43..

TABLE 42. PRIMARY CONSTITUENT ELEMENTS OF MCR STEELHEAD CRITICAL HABITAT APPLICABLE TO THE ACTION AREA.

PCE	Description
1	Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
2	Freshwater rearing sites with: (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (ii) Water quality and forage supporting juvenile development; and (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
3	Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

TABLE 43. PRIMARY CONSTITUENT ELEMENTS OF BULL TROUT CRITICAL HABITAT APPLICABLE TO THE ACTION AREA.

PCE	Description
1	Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.
2	Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.
3	An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
4	Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.
5	Water temperatures ranging from 2 to 15° C (36 to 59 ° F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; and local groundwater influence.
6	In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.
7	A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.
8	Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
9	Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

The effects to each PCE, and ultimately to designated CH as a whole, can be determined by evaluating the effects to indicators of the NMFS MPI that correspond to each PCE. The MNF uses a crosswalk table format for this purpose. Table 44 presents the analysis for effects of the action to the PCEs of MCR Steelhead designated CH. Table 46 presents the analysis for effects of the action to the PCEs of CR bull trout designated CH. Measurable effects to several habitat indicators that correspond to specific PCEs were concluded for each analysis. The effects by indicator and PCE are summarized in Table 45 for the MCR Steelhead PCEs and in Table 47 for the CR bull trout PCEs.

TABLE 44. ANALYSIS OF EFFECTS TO MPI INDICATORS CORRESPONDING TO PCES OF DESIGNATED CRITICAL HABITAT FOR MCR STEELHEAD WITHIN THE LONG CREEK, CAMP CREEK, BLUE MOUNTAIN ALLOTMENTS.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;	Water Quantity	Flow/ Hydrology	Changes in Peak/Base Flows	Riparian vegetation has been linked to the water-holding capacity of streamside aquifers (Platts 1991). As riparian vegetation is removed by grazing and streamside soils are compacted by hooves, the ability of areas to retain water is decreased. Decreased evapotranspiration and infiltration increase and hasten surface runoff, resulting in a more rapid hydrologic response of streams to rainfall. When this occurs, high flows in the spring tend to increase in volume, leading to bank damage and erosion, and channel downcutting. Summer and fall base flows are decreased, often resulting in flows that are insufficient to provide suitable rearing habitat for juvenile salmonids. If aquifers lose their capacity to hold and slowly deliver water to the stream, differences between peak and base discharge rates increase dramatically (EPA 1993). Some streams that typically flowed perennially may experience periods of no flow in the summer or fall. Li *et al*. (1994) found that flow in a heavily grazed eastern Oregon stream became intermittent during the summer, while a nearby, well-vegetated reference stream in a similar-sized watershed had permanent flows. They suggested that the difference in flow regimes was due to diminished interaction between the stream and floodplain with resultant lowering of the water table. Indirect effects of historic livestock grazing in the ESA action area (including trailing and watering), on channel and bank features such as bank stability, undercut banks and width to depth ratio, as well as impacts to shrub recruitment and green line plant vigor, have likely affected peak and base flows on some streams. It is anticipated that PE 1 (livestock use) will have negative effects to this indicator, but they will **be too small** to be **meaningfully measured**, particularly to flows at the time of year when spawning, incubation and larval development occur. The use of BMPs, end point indicators, and adaptive management should minimize effects. If hydrophytic vegetation, bank stability, width-depth ratio, and undercut banks show a static and/or downward trend and the Forest is not meeting RMOs, grazing practices will be modified (See Adaptive Management Section VI). PE 2 (permittee mgt. and mtce.) includes off-road vehicle use. This has the potential to increase soil compaction, but it will be minimized by use of PDCs. Little to no riparian vegetation is affected by vehicle use, range riding or maintenance activities. PE 2 overall will have slight negative effects to the indicator that are too small to be meaningfully measured. PE5 (monitoring) will not increase compaction or remove vegetation, and therefore does not have

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				a mechanism to affect peak/base flow. The effect to the indicator is neutral.
			Increase in Drainage Network	None of the PEs has road construction, so no change to the drainage network will occur. The proposed action would have a neutral effect on the indicator.
	Water Quality	Flow/ Hydrology	Temperature	The temperature monitoring data for the Camp Creek (above plantation) monitoring site met state water quality standards. The Coxie Creek (at Spring) and Lick Creek (8) were within proximity to meeting standards with only 2 to 10 days over 64*F but rated NPF using the NMFS MPI criteria (see Section 6.1.3) There were approximately 15 sites within the Long Creek Allotment, 1 within the Camp Allotment, and 4 within the Blue Mountain Allotments that exceeded Oregon State standards for durations ranging from 32 to 96 days over 64*F. These sited would be considered to be NPF using the NMFS MPI criteria (see Section 6.1.3). Interpretation of utilization monitoring results from pastures that were rested from livestock grazing in the ESA action area suggest that shade-producing vegetation along stream channels is being grazed or browsed to some degree by wild ungulates. However, this use has been light. Many grass/grass-like species found on the MNF have an ungrazed potential height of 2 to 3 feet (MNF 2007). In meadow streams with narrow channels, they often are the plants that provide stream shade. PE 1 (livestock use) will potentially reduce vegetation heights to 4 or 6 inches. This will considerably reduce stream shade in those circumstances compared to the ungrazed potential vegetation heights (see discussion that follows in Effects to Listed Species section).

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				Livestock use (PE 1) is likely to result in measurable water temperature increases for certain stream reaches. These impacts are expected to be generally confined to low gradient stream channels less than 10 feet wide with grass/grass-like vegetation providing shade. The effect to this indicator by livestock use is **not** expected to be **insignificant** and **discountable** but is expected to be **meaningfully measurable**. It should be noted that water temperatures typically are below concern thresholds when spawning, incubation and larval development of MCR Steelhead occurs, as flows are greater than later in the year. PE 2 (permittee livestock management and infrastructure maintenance) and PE 5 (monitoring) activities will not remove vegetation that provides shade nor affect channel-forming processes that might widen stream channels. Consequently, there is no mechanism for PEs 2 and 3 to affect water temperature and the effect of the PE for the indicator is neutral. Livestock grazing on federal land in the ESA action area is managed to attain the endpoint indicators, which were developed to meet PACFISH grazing standards and guidelines as well as water quality BMPs. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, W/D ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives, and thereby maintain water temperatures. If monitoring fails to show this trend, adaptive management would be implemented and endpoint indicators would be modified to minimize adverse impacts to this element of the PCE.
			Sediment/ Turbidity	The monitoring results presented above indicate that livestock use (PE 1), as well as use by wild ungulates, results in trampled and grazed riparian vegetation, and altered stream banks to some degree. Livestock also use trails to access streams for water. Livestock occasionally will concentrate their use in certain areas, potentially creating patches of relatively bare soil. Some of these areas may be adjacent to stream sections used by MCR Steelhead for spawning, incubation and larval development. Bare soil is prone to erosion and can result in fine sediment entering stream channels and resultant increases in turbidity. Habitat impacts are likely to include areas of exposed streambank up to a few feet wide where livestock access streams to drink or cross, and areas of bank disturbance where livestock graze in riparian areas. Exposed areas and other bank disturbances that occur are likely to result in a slight increase in turbidity for a short distance downstream during rainstorms or runoff events. However, given background levels of turbidity during runoff events it will be

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				difficult to distinguish between turbidity resulting from these grazing impacts and background turbidity. A slight increase in fine sediment deposition for a short distance downstream of exposed and disturbed areas is also likely to occur. Endpoint indicators were developed in order to meet PACFISH grazing standards and guidelines as well as water quality BMPs. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet our Riparian Objectives. If monitoring fails to show this trend, adaptive management would be implemented and endpoint indicators would be modified to minimize adverse effects to critical habitat. However, livestock grazing will increase the amount of sediment entering streams by the mechanisms described above. These impacts are expected to be localized and short-term. Consequently, the effect to this indicator by PE1 (livestock use) is negative and **not** expected to be **insignificant** and **discountable** but is expected to be **meaningfully measurable**. PE 2 involves use of vehicles on and off roads, as well as infrastructure maintenance. There is the potential for fine sediment to be transported from unpaved roads to stream channels, primarily at road crossings, during rainstorms or runoff events. However, it is impossible to determine the proportion of the suspended sediment attributable to road use by permittees, given the use of the roads for other purposes. In addition, background levels of suspended sediment in streams will be high during rainstorms and runoff events, and the contribution by permittee use of roads to increased turbidity cannot be meaningfully measured. Use of off-road vehicles should not result in measurable effects due to use of PDCs. Range riding with horses will not cause any meaningfully measured increases in streambed sediment or turbidity. Maintenance activities are typically distant from designated CH, disturb little to no soil, and are not hydrologically connected to stream channels. There is no mechanism for maintenance activities to affect the indicator. Overall, the effects of PE 2 to the indicator are negative and **not meaningfully measured**.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				Monitoring (PE 3) activities such as pebble counts and measuring cross-sections involve wading in stream channels. Other monitoring activities involve walking or riding horses in riparian areas. The timing of these activities is typically after spawning, incubation and larval development of MCR Steelhead, although there may be some overlap in timing. Spawning surveys also involve wading. Wading may result in very small increases in turbidity downstream for a short distance (a few feet) that will quickly dissipate. Walking and riding horses in riparian areas should not result in fine sediment delivery to stream channels. However, there may be very small and transient increases in turbidity when a stream is being crossed. The monitoring PE effect to the indicator is negative, but **not meaningfully measured**.
			Chemical Contamination/ Nutrients	Urine and dung from livestock use (PE 1) in riparian areas increases the likelihood that nitrogen and phosphorous will enter streams. Increased nutrients will likely increase stream productivity at the source of nutrients and for a short distance downstream. It is anticipated that livestock grazing will have slight negative impacts to the indicator, but they are **not expected to be meaningfully measured**. PE 2 (permittee management and infrastructure maintenance) includes vehicle use. The risk of chemical contamination to streams will be minimized by use of PDC. Maintenance activities are typically distant from designated CH, and at locations not hydrologically connected to stream channels. Therefore, there is no mechanism for petroleum products spilling from power tools to affect CH. Use of horses for range riding will have similar effects (but much smaller scale) than that of PE 1, above. Maintenance activities are typically distant from stream channels. The overall effect of PE 2 is for slight negative effects to the indicator that are **not expected to be meaningfully measured**. Monitoring (PE 5) does not involve the use of chemicals and does not have the potential to affect nutrients in streams. PE 5 will have a **neutral effect** to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
	Suitable Substrate	Habitat Elements	Substrate Embeddedness	The analysis of effects to the sediment/turbidity indicator, above, determined that use of riparian areas by livestock is expected to increase the amount of sediment entering streams. A slight increase in fine sediment deposition for a short distance downstream of exposed and disturbed areas is likely to occur. There is the potential for fine sediment to slightly increase embeddedness within gravels suitable for spawning when the gravel is located immediately downstream from exposed and disturbed streambank areas. The effect to this indicator by livestock use (PE 1) **is negative and meaningfully measurable**. The analysis for sediment/turbidity determined that PE 2 would have a slightly negative, but **not meaningfully measured** effect to the indicator. Therefore, the same conclusion is made for the substrate embeddedness indicator. As described above, monitoring (PE 5) would not introduce fine sediment into stream channels. The monitoring PE will have a **neutral effect** to the indicator.
(2) Freshwater rearing sites with: (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support	Water Quantity	Flow/ Hydrology	Changes in Peak/Base Flows	See discussion above.
			Increase in Drainage Network	See discussion above.
	Water Quality	Water Quality	Temperature	See discussion above. The rearing period includes the summer months when elevated water temperatures are most concerning for juvenile salmonids, and the sun's position in the sky results in the greatest potential for increased solar radiation to streams. It is this time period when the small, **but measurable increases** to water temperature would take place.
			Sediment/ Turbidity	See discussion above.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
juvenile growth and mobility; (ii) Water			Chemical Contamination/ Nutrients	See discussion above. The conclusion was for a slight negative effect to the indicator from livestock use (PE 1) and permittee management and infrastructure maintenance (PE 2) since there would be an increase in nutrients into streams. However, the introduction of nutrients may lead to small increases in stream productivity.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
quality and forage supporting juvenile development; and (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks	Flood-plain Connect-ivity	Channel Condition and Dynamics	Floodplain Connectivity	Channel entrenchment is the main concern for loss of floodplain connectivity. Indirect effects of livestock use (PE 1), including trailing and watering, on things such as bank stability, undercut banks, width depth ratio, shrub recruitment, and green line plant vigor have limited some streams' ability to access their flood plains, thus concentrating energies within confined channels and causing additional erosion. Many of these streams are still experiencing this phenomenon. Channel entrenchment as a result of livestock use (PE 1) will be prevented by use of endpoint indicators to meet PACFISH grazing standards and guidelines as well as water quality BMPs. The conclusion is that the effect to the indicator by livestock use is negative but **not meaningfully measured**. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives. If monitoring fails to show this trend, adaptive management would be implemented and endpoint indicators would be modified to minimize negative effects to floodplain connectivity. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect floodplain connectivity. PDC for off-road use will prevent channel downcutting. Range riding with horses will occasionally cross a stream but effects to streambanks and beds will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect floodplain connectivity. The overall effect of PE 2 is a **neutral affect** to the indicator. Monitoring (PE 5) does not remove riparian vegetation or otherwise have mechanisms to destabilize stream channels. PE 5 will have a **neutral effect** to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Width/Depth Ratio	There was a fair amount of data to analyze for this indicator. PIBO and Stream Survey data (**Post 2000**) was used to formulate the ranges below. Actual Stream survey data can be found in Appendix J. ***Long Creek Allotment****;* A combination of 4 PIBO sites, 6 special PIBO sites and 6 stream surveys were utilized to formulate the following of bankfull width-depth ratios ranging from 6.13 to 53, with 4 of 20 stream reaches meeting the NMFS MPI criterion for PF (<10) (see Appendix J for PIBO and stream survey monitoring data). The Long Creek integrator site was the only PIBO site that had a multiple read for this indicator. The results showed an improvement from 2005 to 2010. *Camp Creek Allotment*; Stream Surveys within the Camp Creek Allotment indicate that the MFJD has a width/Depth ratio's of 23.9 to 26.9 where as Lower Camp Creek ranges from 30.2 to 36.4. The PIBO reads within the Allotment were a onetime read ranging from 40.9 to 44.4. Blue Mountain Allotment; This Allotments has been rested since 2003. There is no PIBO information for this Allotment. The stream survey data for this allotment suggests that the indicator is PF to FAR. The lower ends of Squaw and Summit creeks are entrenched due to the loss of beaver dams above Phipps meadow. Legacy effects of Livestock Management, Rail Roads, Timber Harvert, Road Building and Log Weir placement within the allotments likely contributed to degradation of this indicator. Livestock use (PE 1) is anticipated to have a negative, but **not meaningfully measured** effect to the indicator. The potential for increases in width-depth ratio is less than in the past because of implementation of endpoint indicators for livestock grazing (which includes use by wild ungulates) and adaptive management. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect W/D ratio. PDC for off-road use will prevent bank damage and effects to W/D ratio. Range riding with horses will occasionally cross a stream but effects to streambanks and beds will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect W/D ratio. The overall effect of PE 2 is a **neutral affect** to the indicator. PE 5 (monitoring) does not remove vegetation or destabilize stream banks. There

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
	Forage	Habitat Elements	Substrate Embeddedness	See discussion above for this indicator for the suitable substrate PCE habitat feature. The conclusion for livestock use (PE 1) was that a slight increase in fine sediment deposition for a short distance downstream of exposed and disturbed areas is likely to occur. This would result in small areas of increased embeddedness. Increased embeddedness may result in a decrease in the potential for production of aquatic macroinvertebrates (a forage item for rearing salmonids) in small, isolated patches. The conclusion is that PE 1 will have a slight negative effect on substrate embeddedness with respect to the production of forage. Consistent with the analysis for the suitable substrate PCE habitat feature, the effect of PCE 2 to the indicator is negative but not meaningfully measured, and the effect of PCE 5 is neutral.
			Large Woody Debris	Livestock grazing does not affect this indicator in conifer-dominated riparian forests. Livestock use can negatively affect this indicator when grazing occurs within hardwood stands such as aspen, alder, birch, and cottonwoods that could contribute larger pieces of wood to small streams. In sites in the action area that would be naturally dominated by cottonwood gallery riparian forests, livestock use (PE 1) will likely result in altering the level of cottonwood stocking and future large tree (and subsequent large woody debris) recruitment (Kaufmann et al. 1983, Case and Kaufmann 1997, Beschta and Ripple 2005). Therefore it is anticipated that livestock will graze young cottonwoods at levels meaningfully measured with respect to the future production of large woody debris. The effect to this indicator by livestock use (PE 1) is **negative and meaningfully measured**. Using BMPs, end point indicators, and adaptive management will result in discouraging browse on existing hardwoods and willows but may not promote regeneration of new cottonwoods. PE 2 and PE 5 do not affect trees and associated LWD in any way. Therefore there is no mechanism for an effect and the effect is neutral to the indicator for both PEs.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Pool Frequency	Pool frequency at the PIBO monitoring sites and stream survey reaches within the allotments are not currently meeting the DFC as described within Amendment 29 of the MNF LRMP and would be considered to be NPF using NMFS MPI criteria. See Appendix J for PIBO and stream survey results. Indirect effects of livestock grazing (including trailing and watering), on bank stability, undercut banks, width-depth ratio, shrub recruitment, green line plant composition and vigor have the potential to affect this indicator. The use of BMP's for livestock management, end point indicators and adaptive management, should result in an overall effect by PE 1 (livestock use) to pool frequency that is **not meaningfully measured** and unlikely to occur. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect pool frequency. PDC for off-road use will prevent bank damage and effects to pool frequency. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect pool frequency. The overall effect of PE 2 is a **neutral effect** to the indicator. PE 5 (monitoring) does not have any mechanisms to affect plants or bank and channel features that would impact pool frequency. The monitoring PE has a **neutral effect** to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Pool Quality	PIBO data within the allotments indicate that undercut banks are at less than the desired condition. Residual pool depth is generally low with very few to no pools greater than 1 meter deep in surveyed stream reaches. Stream Surveys conducted in Long Creek (2004) reported 3 pools greater than 1 meter deep. The remainder of the monitoring sites as well as approxamatly12 stream surveys concluded that pool depths were less than 1 meter. See Appendix J for PIBO and stream survey results. Based upon the PIBO and stream survey data, pool quality would be considered to be NPF using NMFS MPI criteria. Indirect effects of livestock grazing (including trailing and watering), on bank stability, undercut banks, width-depth ratio, shrub recruitment, green line plant composition and vigor have the potential to affect this indicator. The use of BMP's for livestock management, end point indicators (which are inclusive of wild ungulate use), and adaptive management, should result in an overall effect by PE 1 (livestock use) to pool quality that is negative and **not meaningfully measured**. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect pool quality. PDC for off-road use will prevent bank damage and effects to pool quality. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect pool frequency. The overall effect of PE 2 is a **neutral affect** to the indicator. PE 5 (monitoring) does not have any mechanisms to affect plants or bank and channel features that would impact pool quality. The monitoring PE has a **neutral effect** to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Off-Channel Habitat	There is very little off-channel habitat within tributaries of the MFJD River. *<u>Long Creek Allotment</u>* Of the 6 stream surveys (19 reaches) that reported side-channel information, values ranged from 0 to 6% *<u>Camp Creek Allotment</u>* Of the 2 stream surveys (4 reaches) that reported side-channel information, values ranged from 3.27 to 6.7% *<u>Blue Mountain Allotment</u>* Of the 4 stream surveys (8 reaches) that reported side-channel information, values ranged from .28 to 15% It should be acknowledged that past livestock management in the allotments likely contributed to degradation of this indicator. The use of BMP's for livestock management, end point indicators (which are inclusive of wild ungulate use), and adaptive management, should result in an overall effect by PE 1 (livestock use) to off-channel habitat that is negative and **not meaningfully measured**. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect pool frequency. PDC for off-road use will prevent bank damage and effects to off-channel habitat. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect pool frequency. The overall effect of PE 2 is a **neutral affect** to the indicator. PE 5 (monitoring) does not have any mechanisms to affect off-channel habitat. The monitoring PE has a **neutral effect** to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Refugia	The availability of refugia is a limiting factor identified in the recovery plan for the Oregon steelhead population of the MCR Steelhead distinct population segment (NMFS 2009). The NMFS MPI (NMFS 1996) defines the refugia indicator as: "important remnant habitat for sensitive aquatic species." All of the habitat indicators in this crosswalk table are potential components of Refugia. Analysis for previous indicators has determined that PE 1 (livestock use) will have negative and meaningfully measured effects to several of them. This may occur in areas that meet the definition of Refugia. Therefore, PE 1 (livestock use) will have negative and **meaningfully measured** or evaluated effects to the refugia indicator. The highest level of effect to previous indicators by PE 2 (permittee management and infrastructure maintenance) was "negative but not meaningfully measurable." This level of effects will not impact the function of Refugia to provide important remnant habitat. Therefore, the effect conclusion is neutral for PE 2. The highest level of effect to previous indicators by PE 5 (monitoring) was "negative but not meaningfully measurable" for small and transient increases in turbidity by wading in stream channels or crossing streams on foot or by horse. This level of effects will not impact the function of Refugia to provide important remnant habitat. Therefore, the effect conclusion is neutral for the monitoring PE.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
		Watershed Condition	Riparian Reserves	As described above, PE 1 (livestock use) will result in negative effects within riparian areas to indicators. A negative effect to Riparian Management Areas (RMA) (east-side analog of Riparian Reserves) is indicated. However, the negative effects should not rise to the level that impacts to the processes and functions of RMAs are meaningfully measurable. Endpoint indicators were developed with seral class in mind to meet PACFISH grazing standards and guidelines, enclosure B of the LMRP and water quality BMPs. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives. If monitoring fails to show this trend, adaptive management would be implemented and endpoint indicators would be modified to minimize adverse effects to Riparian Reserves. The highest level of effect to previous indicators by PE 2 (permittee management and infrastructure maintenance) was “negative but not meaningfully measurable.” This level of effects will not impact the processes and functions of RMAs. Therefore, the effect conclusion is neutral for PE 2. The monitoring PE does not have any mechanisms to affect the processes and functions of RMAs. The monitoring PE has a neutral effect to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
	Natural Cover	Habitat Elements	Substrate	This indicator focuses on the composition of streambed substrate rather than its embeddedness, which was evaluated earlier. *Long Creek Allotment* PIBO data(10 sites) for this allotment has mean particle sizes (D50; mm) ranging from 38mm to 99mm which falls within the classification of Gravel/Cobble. Stream Surveys (19 reaches) within the Allotment reported 6 reaches with a dominant substrate of gravel, 12 reaches with a dominate substrate of cobble, and one that was not measured. *Camp Creek Allotment* PIBO data(2 sites) for this allotment has mean practical sizes (D50; mm) ranging from 86mm to 124mm which falls within the classification of Gravel/Cobble. Stream Surveys (4 reaches) within the Allotment reported 2 reaches with a dominant substrate of gravel, 2 reaches with a dominate substrate of cobble. *Blue Mountain Allotment* Stream Surveys (10 reaches) within the Allotment reported 2 reaches with a dominant substrate of sand, 8 reaches with a dominate substrate of gravel. Based on the PIBO and stream survey data the Substrate indicator would be classified as "PF" using NMFS MPI criteria for most of the stream reaches. The analysis of effects to the sediment/turbidity indicator for PCE 1, above, determined that use of riparian areas by livestock is expected to increase the amount of sediment entering streams. A slight increase in fine sediment deposition for a short distance downstream of exposed and disturbed areas is likely to occur. However, this is not expected to measurably change the composition of existing substrate with regard to its function as cover for juvenile or adult MCRS Steelhead. Therefore, the effect to this indicator by PE 1 (livestock use) is negative and not meaningfully measurable. The use of BMP's for livestock management, end point indicators (which are inclusive of wild ungulate use), and adaptive management,

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Large Woody Debris	See Above.
			Pool Frequency	See Above.
			Pool Quality	See Above
			Off-Channel Habitat	See Above
			Refugia	See Above
		Watershed Condition	Riparian Reserves	See Above

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
(3) Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival;	Migration Corridors Free of Obstruct-ion	Habitat Access	Physical Barriers	No barriers will be created or removed by the actions of any PE. All PEs have a neutral effect on the physical barriers indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;	Water Quantity	Flow/ Hydrology	Changes in Peak/Base Flows	Riparian vegetation has been linked to the water-holding capacity of streamside aquifers (Platts 1991). As riparian vegetation is removed by grazing and streamside soils are compacted by hooves, the ability of areas to retain water is decreased. Decreased evapotranspiration and infiltration increase and hasten surface runoff, resulting in a more rapid hydrologic response of streams to rainfall. When this occurs, high flows in the spring tend to increase in volume, leading to bank damage and erosion, and channel downcutting. Summer and fall base flows are decreased, often resulting in flows that are insufficient to provide suitable rearing habitat for juvenile salmonids. If aquifers lose their capacity to hold and slowly deliver water to the stream, differences between peak and base discharge rates increase dramatically (EPA 1993). Some streams that typically flowed perennially may experience periods of no flow in the summer or fall. Li *et al*. (1994) found that flow in a heavily grazed eastern Oregon stream became intermittent during the summer, while a nearby, well-vegetated reference stream in a similar-sized watershed had permanent flows. They suggested that the difference in flow regimes was due to diminished interaction between the stream and floodplain with resultant lowering of the water table. Indirect effects of historic livestock grazing in the ESA action area (including trailing and watering), on channel and bank features such as bank stability, undercut banks and width to depth ratio, as well as impacts to shrub recruitment and green line plant vigor, have likely affected peak and base flows on some streams. These effects were probably exacerbated by wild horse use, particularly when the wild horse population was larger and there were more frequent areas of heavy concentration. It is anticipated that PE 1 (livestock use) will have negative effects to this indicator, but they will be too small to be meaningfully measured, particularly to flows at the time of year when spawning, incubation and larval development occur. The use of BMPs, end point indicators, and adaptive management should minimize effects. If hydrophytic vegetation, bank stability, width-depth ratio, and undercut banks show a static and/or downward trend and the Forest is not meeting RMOs, grazing practices will be modified (See Adaptive Management Section VI). PE 2 (permittee mgt. and mtce.) includes off-road vehicle use. This has the potential to increase soil compaction, but it will be minimized by use of PDCs. Little to no riparian vegetation is affected by vehicle use, range riding or maintenance activities. PE 2 overall will have slight negative effects to the indicator that are too small to be meaningfully measured. PE5 (monitoring) will not increase compaction or remove vegetation, and therefore does not have a mechanism to affect

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				peak/base flow. The effect to the indicator is neutral.
			Increase in Drainage Network	None of the PEs has road construction, so no change to the drainage network will occur. The proposed action would have a neutral effect on the indicator.
	Water Quality	Flow/ Hydrology	Temperature	The temperature monitoring data for the Camp Creek (above plantation) monitoring site met state water quality standards. The Coxie Creek (at Spring) and Lick Creek (8) were within proximity to meeting standards with only 2 to 10 days over 64*F but rated NPF using the NMFS MPI criteria (see Section 6.1.3) There were approximately 15 sites within the Long Creek Allotment, 1 within the Camp Allotment, and 4 within the Blue Mountain Allotments that exceeded Oregon State standards for durations ranging from 32 to 96 days over 64*F. These sited would be considered to be NPF using the NMFS MPI criteria (see Section 6.1.3). Interpretation of utilization monitoring results from pastures that were rested from livestock grazing in the ESA action area suggest that shade-producing vegetation along stream channels is being grazed or browsed to some degree by wild ungulates. However, this use has been light. Many grass/grass-like species found on the MNF have an ungrazed potential height of 2 to 3 feet (MNF 2007). In meadow streams with narrow channels, they often are the plants that provide stream shade. PE 1 (livestock use) will potentially reduce vegetation heights to 4 or 6 inches. This will considerably reduce stream shade in those circumstances compared to the ungrazed potential vegetation heights (see discussion that follows in Effects to Listed Species section).

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				Livestock use (PE 1) is likely to result in measurable water temperature increases for certain stream reaches. These impacts are expected to be generally confined to low gradient stream channels less than 10 feet wide with grass/grass-like vegetation providing shade. The effect to this indicator by livestock use is **not** expected to be **insignificant** and **discountable** but is expected to be **meaningfully measurable**. It should be noted that water temperatures typically are below concern thresholds when spawning, incubation and larval development of MCR Steelhead occurs, as flows are greater than later in the year. PE 2 (permittee livestock management and infrastructure maintenance) and PE 5 (monitoring) activities will not remove vegetation that provides shade nor affect channel-forming processes that might widen stream channels. Consequently, there is no mechanism for PEs 2 and 3 to affect water temperature and the effect of the PE for the indicator is neutral. Livestock grazing on federal land in the ESA action area is managed to attain the endpoint indicators, which were developed to meet PACFISH grazing standards and guidelines as well as water quality BMPs. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, W/D ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives, and thereby maintain water temperatures. If monitoring fails to show this trend, adaptive management would be implemented and endpoint indicators would be modified to minimize adverse impacts to this element of the PCE.
			Sediment/ Turbidity	The monitoring results presented above indicate that livestock use (PE 1), as well as use by wild horses and other wildlife, results in trampled and grazed riparian vegetation, and altered stream banks to some degree. Livestock also use trails to access streams for water. Livestock occasionally will concentrate their use in certain areas, potentially creating patches of relatively bare soil. Some of these areas may be adjacent to stream sections used by MCR Steelhead for spawning, incubation and larval development. Bare soil is prone to erosion and can result in fine sediment entering stream channels and resultant increases in turbidity. Habitat impacts are likely to include areas of exposed streambank up to a few feet wide where livestock access streams to drink or cross, and areas of bank disturbance where livestock graze in riparian areas. Exposed areas and other bank disturbances that occur are likely to result in a slight increase in turbidity for a short distance downstream during rainstorms or runoff events. However, given background levels of turbidity during runoff

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				events it will be difficult to distinguish between turbidity resulting from these grazing impacts and background turbidity. A slight increase in fine sediment deposition for a short distance downstream of exposed and disturbed areas is also likely to occur. Endpoint indicators were developed in order to meet PACFISH/INFISH grazing standards and guidelines as well as water quality BMPs. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet our Riparian Objectives. If monitoring fails to show this trend, adaptive management would be implemented and endpoint indicators would be modified to minimize adverse effects to critical habitat. However, livestock grazing will increase the amount of sediment entering streams by the mechanisms described above. These impacts are expected to be localized and short-term. Consequently, the effect to this indicator by PE1 (livestock use) is negative and expected to be measurable. PE 2 involves use of vehicles on and off roads, as well as infrastructure maintenance. There is the potential for fine sediment to be transported from unpaved roads to stream channels, primarily at road crossings, during rainstorms or runoff events. However, it is impossible to determine the proportion of the suspended sediment attributable to road use by permittees, given the use of the roads for other purposes. In addition, background levels of suspended sediment in streams will be high during rainstorms and runoff events, and the contribution by permittee use of roads to increased turbidity cannot be meaningfully measured. Use of off-road vehicles should not result in measurable effects due to use of PDCs. Range riding with horses will not cause any meaningfully measured increases in streambed sediment or turbidity. Maintenance activities are typically distant from designated CH, disturb little to no soil, and are not hydrologically connected to stream channels. There is no mechanism for maintenance activities to affect the indicator. Overall, the effects of PE 2 to the indicator are negative and not meaningfully measured.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				Monitoring (PE 3) activities such as pebble counts and measuring cross-sections involve wading in stream channels. Other monitoring activities involve walking or riding horses in riparian areas. The timing of these activities is typically after spawning, incubation and larval development of MCR Steelhead, although there may be some overlap in timing. Spawning surveys also involve wading. Wading may result in very small increases in turbidity downstream for a short distance (a few feet) that will quickly dissipate. Walking and riding horses in riparian areas should not result in fine sediment delivery to stream channels. However, there may be very small and transient increases in turbidity when a stream is being crossed. The monitoring PE effect to the indicator is negative, but not meaningfully measured.
			Chemical Contamination/ Nutrients	Urine and dung from livestock use (PE 1) in riparian areas increases the likelihood that nitrogen and phosphorous will enter streams. Increased nutrients will likely increase stream productivity at the source of nutrients and for a short distance downstream. It is anticipated that livestock grazing will have slight negative impacts to the indicator, but they are not expected to be meaningfully measured. PE 2 (permittee management and infrastructure maintenance) includes vehicle use. The risk of chemical contamination to streams will be minimized by use of PDC. Maintenance activities are typically distant from designated CH, and at locations not hydrologically connected to stream channels. Therefore, there is no mechanism for petroleum products spilling from power tools to affect CH. Use of horses for range riding will have similar effects (but much smaller scale) than that of PE 1, above. Maintenance activities are typically distant from stream channels. The overall effect of PE 2 is for slight negative effects to the indicator that are not expected to be meaningfully measured. Monitoring (PE 5) does not involve the use of chemicals and does not have the potential to affect nutrients in streams. PE 5 will have a neutral effect to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
	Suitable Substrate	Habitat Elements	Substrate Embeddedness	The analysis of effects to the sediment/turbidity indicator, above, determined that use of riparian areas by livestock is expected to increase the amount of sediment entering streams. A slight increase in fine sediment deposition for a short distance downstream of exposed and disturbed areas is likely to occur. There is the potential for fine sediment to slightly increase embeddedness within gravels suitable for spawning when the gravel is located immediately downstream from exposed and disturbed streambank areas. The effect to this indicator by livestock use (PE 1) is negative and meaningfully measurable. The analysis for sediment/turbidity determined that PE 2 would have a slightly negative, but not meaningfully measured effect to the indicator. Therefore, the same conclusion is made for the substrate embeddedness indicator. As described above, monitoring (PE 5) would not introduce fine sediment into stream channels. The monitoring PE will have a neutral effect to the indicator.
(2) Freshwater rearing sites with: (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support	Water Quantity	Flow/ Hydrology	Changes in Peak/Base Flows	See discussion above.
			Increase in Drainage Network	See discussion above.
	Water Quality	Water Quality	Temperature	See discussion above. The rearing period includes the summer months when elevated water temperatures are most concerning for juvenile salmonids, and the sun's position in the sky results in the greatest potential for increased solar radiation to streams. It is this time period when the small, but measurable increases to water temperature would take place.
			Sediment/ Turbidity	See discussion above.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
juvenile growth and mobility; (ii) Water quality and			Chemical Contamination/ Nutrients	See discussion above. The conclusion was for a slight negative effect to the indicator from livestock use (PE 1) and permittee management and infrastructure maintenance (PE 2) since there would be an increase in nutrients into streams. However, the introduction of nutrients may lead to small increases in stream productivity and the potential for increased production of aquatic macroinvertebrates (a forage item for rearing salmonids).

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
forage supporting juvenile development; and (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks	Flood-plain Connect-ivity	Channel Condition and Dynamics	Floodplain Connectivity	Channel entrenchment is the main concern for loss of floodplain connectivity. Indirect effects of livestock use (PE 1), including trailing and watering, on things such as bank stability, undercut banks, width depth ratio, shrub recruitment, and green line plant vigor have limited some streams' ability to access their flood plains, thus concentrating energies within confined channels and causing additional erosion. Many of these streams are still experiencing this phenomenon. These effects were probably exacerbated by wild horse use, particularly when the wild horse population was larger and there were more frequent areas of heavy concentration. Channel entrenchment as a result of livestock use (PE 1) will be prevented by use of endpoint indicators to meet PACFISH/INFISH grazing standards and guidelines as well as water quality BMPs. The conclusion is that the effect to the indicator by livestock use is negative but not meaningfully measured. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives. If monitoring fails to show this trend, adaptive management would be implemented and endpoint indicators would be modified to minimize negative effects to floodplain connectivity. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect floodplain connectivity. PDC for off-road use will prevent channel downcutting. Range riding with horses will occasionally cross a stream but effects to streambanks and beds will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect floodplain connectivity. The overall effect of PE 2 is a neutral affect to the indicator. Monitoring (PE 5) does not remove riparian vegetation or otherwise have mechanisms to destabilize stream channels. PE 5 will have a neutral effect to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Width/Depth Ratio	There was a fair amount of data to analyze for this indicator. PIBO and Stream Survey data (**Post 2000**) was used to formulate the ranges below. Actual Stream survey data can be found in appendix J. ***Long Creek Allotment***; A combination of 4 PIBO sites, 6 special PIBO sites and 6 stream surveys were utilized to formulate the following of bankfull width-depth ratios ranging from 6.13 to 53, with 4 of 20 stream reaches meeting the NMFS MPI criterion for PF (<10) (see Appendix J for PIBO and stream survey monitoring data). The Long Creek integrator site was the only PIBO site that had a multiple read for this indicator. The results showed an improvement from 2005 to 2010. *Camp Creek Allotment*; Stream Surveys within the Camp Creek Allotment indicate that the MFJD has a width/Depth ratio's of 23.9 to 26.9 where as Lower Camp Creek ranges from 30.2 to 36.4. The PIBO reads within the Allotment were a onetime read ranging from 40.9 to 44.4. Blue Mountain Allotment; This Allotments has been rested sence 2003. There is no PIBO information for this Allotment. The stream survey data for this allotment suggests that the indicator is PF to FAR. The lower ends of Squaw and Summit creeks are entrenched due to the loss of beaver dams above Phipps meadow. Legacy effects of Livestock Management, Rail Roads, Timber Harvert, Road Building and Log Weir placement within the allotments likely contributed to degradation of this indicator. Livestock use (PE 1) is anticipated to have a negative, but **not meaningfully measured** effect to the indicator. The potential for increases in width-depth ratio is less than in the past because of implementation of endpoint indicators for livestock grazing (which includes use by wild ungulates) and adaptive management. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect W/D ratio. PDC for off-road use will prevent bank damage and effects to W/D ratio. Range riding with horses will occasionally cross a stream but effects to streambanks and beds will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect W/D ratio. The overall effect of PE 2 is a **neutral affect** to the indicator. PE 5 (monitoring) does not remove vegetation or destabilize stream banks. There

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
	Forage	Habitat Elements	Substrate Embeddedness	See discussion above for this indicator for the suitable substrate PCE habitat feature. The conclusion for livestock use (PE 1) was that a slight increase in fine sediment deposition for a short distance downstream of exposed and disturbed areas is likely to occur. This would result in small areas of increased embeddedness. Increased embeddedness may result in a decrease in the potential for production of aquatic macroinvertebrates (a forage item for rearing salmonids) in small, isolated patches. The conclusion is that PE 1 will have a slight negative effect on substrate embeddedness with respect to the production of forage. Consistent with the analysis for the suitable substrate PCE habitat feature, the effect of PCE 2 to the indicator is negative but not meaningfully measured, and the effect of PCE 5 is neutral.
			Large Woody Debris	Livestock grazing does not affect this indicator in conifer-dominated riparian forests. Livestock use can negatively affect this indicator when grazing occurs within hardwood stands such as aspen, alder, birch, and cottonwoods that could contribute larger pieces of wood to small streams. In sites in the action area that would be naturally dominated by cottonwood gallery riparian forests, livestock use (PE 1) will likely result in altering the level of cottonwood stocking and future large tree (and subsequent large woody debris) recruitment (Kaufmann et al. 1983, Case and Kaufmann 1997, Beschta and Ripple 2005). Therefore it is anticipated that livestock will graze young cottonwoods at levels meaningfully measured with respect to the future production of large woody debris. The effect to this indicator by livestock use (PE 1) is negative and meaningfully measured. Using BMPs, end point indicators, and adaptive management will result in discouraging browse on existing hardwoods and willows but may not promote regeneration of new cottonwoods. PE 2 and PE 5 do not affect trees and associated LWD in any way. Therefore there is no mechanism for an effect and the effect is neutral to the indicator for both PEs.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Pool Frequency	Pool frequency at the PIBO monitoring sites and stream survey reaches within the allotments are not currently meeting the DFC as described within Amendment 29 of the MNF LRMP and would be considered to be NPF using NMFS MPI criteria. See Appendix J for PIBO and stream survey results. Indirect effects of livestock grazing (including trailing and watering), on bank stability, undercut banks, width-depth ratio, shrub recruitment, green line plant composition and vigor have the potential to affect this indicator. The use of BMP's for livestock management, end point indicators and adaptive management, should result in an overall effect by PE 1 (livestock use) to pool frequency that is **not meaningfully measured** and unlikely to occur. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect pool frequency. PDC for off-road use will prevent bank damage and effects to pool frequency. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect pool frequency. The overall effect of PE 2 is a **neutral effect** to the indicator. PE 5 (monitoring) does not have any mechanisms to affect plants or bank and channel features that would impact pool frequency. The monitoring PE has a **neutral effect** to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Pool Quality	PIBO data within the allotments indicate that undercut banks are at less than the desired condition. Residual pool depth is generally low with very few to no pools greater than 1 meter deep in surveyed stream reaches. Stream Surveys conducted in Long Creek (2004) reported 3 pools greater than 1 meter deep. The remainder of the monitoring sites as well as approxamatly12 stream surveys concluded that pool depths were less than 1 meter. See Appendix J for PIBO and stream survey results. Based upon the PIBO and stream survey data, pool quality would be considered to be NPF using NMFS MPI criteria. Indirect effects of livestock grazing (including trailing and watering), on bank stability, undercut banks, width-depth ratio, shrub recruitment, green line plant composition and vigor have the potential to affect this indicator. The use of BMP's for livestock management, end point indicators (which are inclusive of wild ungulate use), and adaptive management, should result in an overall effect by PE 1 (livestock use) to pool quality that is negative and **not meaningfully measured**. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect pool quality. PDC for off-road use will prevent bank damage and effects to pool quality. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect pool frequency. The overall effect of PE 2 is a **neutral affect** to the indicator. PE 5 (monitoring) does not have any mechanisms to affect plants or bank and channel features that would impact pool quality. The monitoring PE has a **neutral effect** to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Off-Channel Habitat	There is very little off-channel habitat within tributaries of the MFJD River. *Long Creek Allotment* Of the 6 stream surveys (19 reaches) that reported side-channel information, values ranged from 0 to 6% *Camp Creek Allotment* Of the 2 stream surveys (4 reaches) that reported side-channel information, values ranged from 3.27 to 6.7% *Blue Mountain Allotment* Of the 4 stream surveys (8 reaches) that reported side-channel information, values ranged from .28 to 15% It should be acknowledged that past livestock management in the allotments likely contributed to degradation of this indicator. The use of BMP's for livestock management, end point indicators (which are inclusive of wild ungulate use), and adaptive management, should result in an overall effect by PE 1 (livestock use) to off-channel habitat that is negative and **not meaningfully measured**. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect pool frequency. PDC for off-road use will prevent bank damage and effects to off-channel habitat. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect pool frequency. The overall effect of PE 2 is a **neutral affect** to the indicator. PE 5 (monitoring) does not have any mechanisms to affect off-channel habitat. The monitoring PE has a **neutral effect** to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Refugia	The availability of refugia is a limiting factor identified in the recovery plan for the Oregon steelhead population of the MCR Steelhead distinct population segment (NMFS 2009). The NMFS MPI (NMFS 1996) defines the refugia indicator as: "important remnant habitat for sensitive aquatic species." All of the habitat indicators in this crosswalk table are potential components of Refugia. Analysis for previous indicators has determined that PE 1 (livestock use) will have negative and meaningfully measured effects to several of them. This may occur in areas that meet the definition of Refugia. Therefore, PE 1 (livestock use) will have negative and meaningfully measured or evaluated effects to the refugia indicator. The highest level of effect to previous indicators by PE 2 (permittee management and infrastructure maintenance) was "negative but not meaningfully measurable." This level of effects will not impact the function of Refugia to provide important remnant habitat. Therefore, the effect conclusion is neutral for PE 2. The highest level of effect to previous indicators by PE 5 (monitoring) was "negative but not meaningfully measurable" for small and transient increases in turbidity by wading in stream channels or crossing streams on foot or by horse. This level of effects will not impact the function of Refugia to provide important remnant habitat. Therefore, the effect conclusion is neutral for the monitoring PE.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
		Watershed Condition	Riparian Reserves	As described above, PE 1 (livestock use) will result in negative effects within riparian areas to indicators. A negative effect to Riparian Management Areas (RMA) (east-side analog of Riparian Reserves) is indicated. However, the negative effects should not rise to the level that impacts to the processes and functions of RMAs are meaningfully measurable. Endpoint indicators were developed with seral class in mind to meet PACFISH/INFISH grazing standards and guidelines, enclosure B of the LMRP and water quality BMPs. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives. If monitoring fails to show this trend, adaptive management would be implemented and endpoint indicators would be modified to minimize adverse effects to Riparian Reserves. The highest level of effect to previous indicators by PE 2 (permittee management and infrastructure maintenance) was “negative but not meaningfully measurable.” This level of effects will not impact the processes and functions of RMAs. Therefore, the effect conclusion is neutral for PE 2. The monitoring PE does not have any mechanisms to affect the processes and functions of RMAs. The monitoring PE has a neutral effect to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
	Natural Cover	Habitat Elements	Substrate	This indicator focuses on the composition of streambed substrate rather than its embeddedness, which was evaluated earlier. Stream survey data indicates that 36% of stream reaches within the allotment have substrate that is dominated by sand. See Substrate Embeddedness indicator above. Based on the stream survey data the Substrate indicator would be classified as "NPF" using NMFS MPI criteria. The analysis of effects to the sediment/turbidity indicator for PCE 1, above, determined that use of riparian areas by livestock is expected to increase the amount of sediment entering streams. A slight increase in fine sediment deposition for a short distance downstream of exposed and disturbed areas is likely to occur. However, this is not expected to measurably change the composition of existing substrate with regard to its function as cover for juvenile or adult MCRS Steelhead. Therefore, the effect to this indicator by PE 1 (livestock use) is negative and not meaningfully measurable. The use of BMP's for livestock management, end point indicators (which are inclusive of wild horse use), and adaptive management, should further minimize the magnitude of potential negative effects by PE 1. The analysis of effects to the sediment/turbidity indicator for PCE 1, above, determined that the effect of PE 2 (permittee management and infrastructure maintenance) was "negative and not meaningfully measured." This level of effects is not expect to measurably change the composition of existing substrate with regard to its function as cover for juvenile or adult MCRS Steelhead. Therefore, the effect to this indicator by PE 1 (livestock use) is negative and not meaningfully measurable. As described above, PE 5 (monitoring) would not introduce fine sediment into stream channels. The monitoring PE will have a neutral effect to the indicator.
			Large Woody Debris	See Above.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Pool Frequency	See Above.
			Pool Quality	See Above
			Off-Channel Habitat	See Above
			Refugia	See Above
		Watershed Condition	Riparian Reserves	See Above

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
(3) Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival;	Migration Corridors Free of Obstruct-ion	Habitat Access	Physical Barriers	No barriers will be created or removed by the actions of any PE. All PEs have a neutral effect on the physical barriers indicator.

TABLE 45. SUMMARY OF EFFECTS OF THE PROPOSED ACTION BY THE PROJECT ELEMENTS OF LIVESTOCK GRAZING IN THE LONG CREEK, CAMP CREEK, AND BLUE MOUNTAIN ALLOTMENTS TO THE INDICATORS ASSOCIATED WITH HABITAT FEATURES OF EACH PRIMARY CONSTITUENT ELEMENT OF MCR STEELHEAD CRITICAL HABITAT.

Primary Constituent Element	**PCE Habitat Feature**	**Indicator**	**Effect Conclusion by Project Element**		
			PE1: Livestock Use	**PE2: Permittee Management of Livestock and Infrastructure Maintenance**	**PE 5: Monitoring**
1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development	Water quantity	Changes in Peak/Base Flows	NNMM[1]	NNMM	Neutral
		Increase in Drainage Network	Neutral	Neutral	Neutral
	Water quality	Temperature	***NMM***[2]	Neutral	Neutral
		Sediment/Turbidity	***NMM***	NNMM	NNMM
		Chemical Contamination/Nutrients	NNMM	NNMM	Neutral
	Suitable substrate	Substrate Embeddedness	***NMM***	NNMM	Neutral
2. Freshwater rearing sites with: (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (ii) Water quality and forage supporting juvenile development; and (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and	Flow/hydrology	Changes in Peak/Base Flows	NMM	NNMM	Neutral
		Increase in Drainage Network	Neutral	Neutral	Neutral
	Water quality	Temperature	***NMM***	Neutral	Neutral
		Sediment/Turbidity	***NMM***	NNMM	NNMM
		Chemical Contamination/Nutrients	NNMM	NNMM	Neutral
	Floodplain connectivity	Floodplain Connectivity	NNMM	Neutral	Neutral
		Width/Depth Ratio	NNMM	Neutral	Neutral

Primary Constituent Element	PCE Habitat Feature	Indicator	Effect Conclusion by Project Element		
			PE1: Livestock Use	PE2: Permittee Management of Livestock and Infrastructure Maintenance	PE 5: Monitoring
undercut banks	Forage	Substrate Embeddedness	***NMM***	NNMM	Neutral
		Large Woody Debris	***NMM***	Neutral	Neutral
		Pool Frequency	NNMM	Neutral	Neutral
		Pool Quality	NNMM	Neutral	Neutral
		Off-Channel Habitat	NNMM	Neutral	Neutral
		Refugia	***NMM***	Neutral	Neutral
		Riparian Reserves	NNMM	Neutral	Neutral
	Natural cover	Substrate	NNMM	NNMM	Neutral
		Large Woody Debris	***NMM***	Neutral	Neutral
		Pool Frequency	NNMM	Neutral	Neutral
		Pool Quality	NNMM	Neutral	Neutral
		Off-Channel Habitat	NNMM	Neutral	Neutral
		Refugia	***NMM***	Neutral	Neutral
		Riparian Reserves	NNMM	Neutral	Neutral
3. Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhang-	Migration corridors free of obstruction	Physical Barriers	Neutral	Neutral	Neutral

Primary Constituent Element	PCE Habitat Feature	Indicator	Effect Conclusion by Project Element		
			PE1: Livestock Use	PE2: Permittee Management of Livestock and Infrastructure Maintenance	PE 5: Monitoring
ing large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival					

[1]NNMM = Negative, not meaningfully measured

[2]***NMM*** = Negative, meaningfully measured

Primary Constituent Element	PCE Habitat Feature	Indicator	Effect Conclusion by Project Element		
			PE1: Livestock Use	PE2: Permittee Management of Livestock and Infrastructure Maintenance	PE 5: Monitoring
1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development	Water quantity	Changes in Peak/Base Flows	NNMM[1]	NNMM	Neutral
		Increase in Drainage Network	Neutral	Neutral	Neutral
	Water quality	Temperature	***NMM***[2]	Neutral	Neutral
		Sediment/Turbidity	***NMM***	NNMM	NNMM
		Chemical Contamination/Nutrients	NNMM	NNMM	Neutral
	Suitable substrate	Substrate Embeddedness	***NMM***	NNMM	Neutral
2. Freshwater rearing sites with:	Flow/hydrology	Changes in Peak/Base Flows	NMM	NNMM	Neutral

Primary Constituent Element	PCE Habitat Feature	Indicator	Effect Conclusion by Project Element		
			PE1: Livestock Use	PE2: Permittee Management of Livestock and Infrastructure Maintenance	PE 5: Monitoring
(i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (ii) Water quality and forage supporting juvenile development; and (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks		Increase in Drainage Network	Neutral	Neutral	Neutral
	Water quality	Temperature	***NMM***	Neutral	Neutral
		Sediment/Turbidity	***NMM***	NNMM	NNMM
		Chemical Contamination/Nutrients	NNMM	NNMM	Neutral
	Floodplain connectivity	Floodplain Connectivity	NNMM	Neutral	Neutral
		Width/Depth Ratio	NNMM	Neutral	Neutral
	Forage	Substrate Embeddedness	***NMM***	NNMM	Neutral
		Large Woody Debris	***NMM***	Neutral	Neutral
		Pool Frequency	NNMM	Neutral	Neutral
		Pool Quality	NNMM	Neutral	Neutral
		Off-Channel Habitat	NNMM	Neutral	Neutral
		Refugia	***NMM***	Neutral	Neutral
		Riparian Reserves	NNMM	Neutral	Neutral
	Natural cover	Substrate	NNMM	NNMM	Neutral
		Large Woody Debris	***NMM***	Neutral	Neutral
		Pool Frequency	NNMM	Neutral	Neutral

Primary Constituent Element	PCE Habitat Feature	Indicator	Effect Conclusion by Project Element		
			PE1: Livestock Use	PE2: Permittee Management of Livestock and Infrastructure Maintenance	PE 5: Monitoring
		Pool Quality	NNMM	Neutral	Neutral
		Off-Channel Habitat	NNMM	Neutral	Neutral
		Refugia	***NMM***	Neutral	Neutral
		Riparian Reserves	NNMM	Neutral	Neutral
3. Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival	Migration corridors free of obstruction	Physical Barriers	Neutral	Neutral	Neutral

[1]NNMM = Negative, not meaningfully measured

[2]***NMM*** = Negative, meaningfully measured

TABLE 46. ANALYSIS OF EFFECTS TO BULL TROUT MPI INDICATORS CORRESPONDING TO PCES OF DESIGNATED CRITICAL HABITAT FOR COLUMBIA RIVER BULL TROUT WITHIN THE CAMP CREEK AND BLUE MOUNTAIN ALLOTMENT.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
1) Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia	Floodplain Connectivity	Channel Condition and Dynamics	Floodplain connectivity	Channel entrenchment is the main concern for loss of floodplain connectivity. Indirect effects of livestock use (PE 1), including trailing and watering, on things such as bank stability, undercut banks, width depth ratio, shrub recruitment, and green line plant vigor have limited some streams' ability to access their flood plains, thus concentrating energies within confined channels and causing additional erosion. Many of these streams are still experiencing this phenomenon. Channel entrenchment as a result of livestock use (PE 1) will be prevented by use of endpoint indicators to meet PACFISH / INFISH grazing standards and guidelines as well as water quality BMPs. The conclusion is that the effect to the indicator by livestock use is negative but **not meaningfully measured**. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives. If monitoring fails to show this trend, adaptive management would be implemented and endpoint indicators would be modified to minimize negative effects to floodplain connectivity. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect floodplain connectivity. PDC for off-road use will prevent channel downcutting. Range riding with horses will occasionally cross a stream but effects to streambanks and beds will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect floodplain connectivity. The overall effect of PE 2 is **neutral** to the indicator. Monitoring (PE 5) does not remove riparian vegetation or otherwise have mechanisms to destabilize stream channels. PE 5 will have a **neutral** effect to the indicator.
	Water Quantity	Flow/ Hydrology	Change in peak/base flows	Riparian vegetation has been linked to the water-holding capacity of streamside aquifers (Platts 1991). As riparian vegetation is removed by grazing and streamside soils are compacted by hooves, the ability of areas to retain water is decreased. Decreased evapotranspiration and infiltration increase and hasten surface runoff, resulting in a more rapid hydrologic response of

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
				streams to rainfall. When this occurs, high flows in the spring tend to increase in volume, leading to bank damage and erosion, and channel downcutting. Summer and fall base flows are decreased, often resulting in flows that are insufficient to provide suitable rearing habitat for juvenile salmonids. If aquifers lose their capacity to hold and slowly deliver water to the stream, differences between peak and base discharge rates increase dramatically (EPA 1993). Some streams that typically flowed perennially may experience periods of no flow in the summer or fall. Li *et al*. (1994) found that flow in a heavily grazed eastern Oregon stream became intermittent during the summer, while a nearby, well-vegetated reference stream in a similar-sized watershed had permanent flows. They suggested that the difference in flow regimes was due to diminished interaction between the stream and floodplain with resultant lowering of the water table. Indirect effects of historic livestock grazing in the ESA action area (including trailing and watering), on channel and bank features such as bank stability, undercut banks and width to depth ratio, as well as impacts to shrub recruitment and green line plant vigor, have likely affected peak and base flows on some streams. It is anticipated that PE 1 (livestock use) will have negative effects to this indicator, but they will be **too small to be meaningfully measured**, particularly to flows at the time of year when spawning, incubation and larval development occur. The use of BMPs, end point indicators, and adaptive management should minimize effects. If hydrophytic vegetation, bank stability, width-depth ratio, and undercut banks show a static and/or downward trend and the Forest is not meeting RMOs, grazing practices will be modified (See Adaptive Management Section VI). PE 2 (permittee mgt. and mtce.) includes off-road vehicle use. This has the potential to increase soil compaction, but it will be minimized by use of PDCs. Little to no riparian vegetation is affected by vehicle use, range riding or maintenance activities. PE 2 overall will have slight negative effects to the indicator that are too **small to be meaningfully measured**. PE5 (monitoring) will not increase compaction or remove vegetation, and therefore does not have a mechanism to affect peak/base flow. The effect to the indicator is **neutral**.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
2) Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.	Obstruction	Water Quality	Chemical contaminants/ nutrients, temperature	***Chemical Contaminants/Nutrients:*** Urine and dung from livestock use (PE 1) in riparian areas increases the likelihood that nitrogen and phosphorous will enter streams. Increased nutrients will likely increase stream productivity at the source of nutrients and for a short distance downstream. It is anticipated that livestock grazing will have slight negative impacts to the indicator, but they are **not expected to be meaningfully measured**. PE 2 (permittee management and infrastructure maintenance) includes vehicle use. The risk of chemical contamination to streams will be minimized by use of PDC. Maintenance activities are typically distant from designated CH, and at locations not hydrologically connected to stream channels. Therefore, there is no mechanism for petroleum products spilling from power tools to affect CH. Use of horses for range riding will have similar effects (but much smaller scale) than that of PE 1, above. Maintenance activities are typically distant from stream channels. The overall effect of PE 2 is for slight negative effects to the indicator that are not **expected to be meaningfully measured**. Monitoring (PE 5) does not involve the use of chemicals and does not have the potential to affect nutrients in streams. PE 5 will have a neutral effect to the indicator. ***Temperature:*** Currently the majority of the temperature monitoring data for the Camp Creek and Blue Mountain Allotments indicates that State water quality standards are not being met. Most of the streams monitored within the allotments would be considered to be functioning at unacceptable risk using the bull trout matrix criteria (see Section 6.1.3) Interpretation of utilization monitoring results from pastures that were rested from livestock grazing in the ESA action area suggest that shade-producing vegetation along stream channels is being grazed or browsed to some degree by wild ungulates. Many grass/grass-like species found on the MNF have an ungrazed potential height of 2 to 3 feet (MNF 2007). In meadow streams with narrow channels, they often are the plants that

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
				provide stream shade. PE 1 (livestock use) will potentially reduce vegetation heights to 4 or 6 inches. This will considerably reduce stream shade in those circumstances compared to the ungrazed potential vegetation heights (see discussion that follows in Effects to Listed Species section). *Camp Creek Allotment* Livestock use (PE 1) is not likely to result in measurable water temperature increases for the MFJD River. The effect to this indicator by livestock use is **negative but not meaningfully measured**. PE 2 (permittee livestock management and infrastructure maintenance) and PE 5 (monitoring) activities will not remove vegetation that provides shade nor affect channel-forming processes that might widen stream channels. Consequently, there is no mechanism for PEs 2 and 5 to affect water temperature and the effect of the PE for the indicator is **neutral**. *Blue Mountain Allotment* Livestock use (PE 1) is likely to result in measurable water temperature increases for Clear Creek (MFJD River). The effect to this indicator by livestock use is **negative and meaningfully measured**. PE 2 (permittee livestock management and infrastructure maintenance) and PE 5 (monitoring) activities will not remove vegetation that provides shade nor affect channel-forming processes that might widen stream channels. Consequently, there is no mechanism for PEs 2 and 5 to affect water temperature and the effect of the PE for the indicator is **neutral**.
		Flow/ Hydrology	Change in peak/base flows	See discussion on change in peak/base flows for PCE 1. The effects are the same.
3) An abundant	Forage	Water	Temperature	See discussion on temperature for PCE 2. The effects are the same.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.		Quality, Habitat Elements, Channel Condition and Dynamics, Habitat Access	Sediment	The monitoring results presented above indicate that livestock use (PE 1), as well as use by wild ungulates, results in trampled and grazed riparian vegetation, and altered stream banks to some degree. Livestock also use trails to access streams for water. Livestock occasionally will concentrate their use in certain areas, potentially creating patches of relatively bare soil. Bare soil is prone to erosion and can result in fine sediment entering stream channels and resultant increases in turbidity. Habitat impacts are likely to include areas of exposed streambank up to a few feet wide where livestock access streams to drink or cross, and areas of bank disturbance where livestock graze in riparian areas. Exposed areas and other bank disturbances that occur are likely to result in a slight increase in turbidity for a short distance downstream during rainstorms or runoff events. However, given background levels of turbidity during runoff events it will be difficult to distinguish between turbidity resulting from these grazing impacts and background turbidity. A slight increase in fine sediment deposition for a short distance downstream of exposed and disturbed areas is also likely to occur. Endpoint indicators were developed in order to meet PACFISH / INFISH grazing standards and guidelines as well as water quality BMPs. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives. If monitoring fails to show this trend, adaptive management would be implemented and endpoint indicators would be modified to minimize adverse effects to CH. However, livestock grazing will increase the amount of sediment entering streams by the mechanisms described above. This is likely to result in a decrease in the potential for production of aquatic macroinvertebrates (a forage item for salmonids) in small, isolated patches. These impacts are expected to be localized and short-term. *Camp Creek Allotment* The effect to this indicator by PE1 (livestock use) is **negative and not expected to be measurable**.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
				Blue Mountain Allotment Consequently, the effect to this indicator by PE1 (livestock use) is **negative and expected to be measurable**. PE 2 involves use of vehicles on and off roads, as well as infrastructure maintenance. There is the potential for fine sediment to be transported from unpaved roads to stream channels, primarily at road crossings, during rainstorms or runoff events. However, it is impossible to determine the proportion of the suspended sediment attributable to road use by permittees, given the use of the roads for other purposes. In addition, background levels of suspended sediment in streams will be high during rainstorms and runoff events, and the contribution by permittee use of roads to increased turbidity **cannot be meaningfully measured**. Use of off-road vehicles should not result in measurable effects due to use of PDCs. Range riding with horses will not cause any meaningfully measured increases in streambed sediment or turbidity. Maintenance activities are typically distant from designated CH, disturb little to no soil, and are not hydrologically connected to stream channels. There is no mechanism for maintenance activities to affect the indicator. Overall, the effects within both Allotments of PE 2 to the indicator are **negative and not meaningfully measured**. Monitoring (PE 5) activities such as pebble counts and measuring cross-sections involve wading in stream channels. Other monitoring activities involve walking or riding horses in riparian areas. The timing of these activities is typically after spawning, incubation and larval development of MCR Steelhead, although there may be some overlap in timing. Spawning surveys also involve wading. Wading may result in very small increases in turbidity downstream for a short distance (a few feet) that will quickly dissipate. Walking and riding horses in riparian areas should not result in fine sediment delivery to stream channels. However, there may be very small and transient increases in turbidity when a stream is being crossed. Within Both Allotments the monitoring PE effect to the indicator is negative, **but not meaningfully measured**.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
			Chemical contaminants/ nutrients	See discussion on Chemical Contaminants/Nutrients for PCE 2. The effects are the same.
			Physical barriers	No barriers will be created or removed as part of the proposed action. The proposed action would have a **neutral (0) effect** on physical barriers.
			Large woody debris	Livestock grazing does not affect this indicator in conifer-dominated riparian forests. Livestock use can negatively affect this indicator when grazing occurs within hardwood stands such as aspen, alder, birch, and cottonwoods that could contribute larger pieces of wood to small streams. In sites in the action area that would be naturally dominated by cottonwood gallery riparian forests, livestock use (PE 1) will likely result in altering the level of cottonwood stocking and future large tree (and subsequent large woody debris) recruitment (Kaufmann et al. 1983, Case and Kaufmann 1997, Beschta and Ripple 2005). Therefore it is anticipated that livestock will graze young cottonwoods at levels meaningfully measured with respect to the future production of large woody debris. *<u>Camp Creek Allotment</u>* The effect to this indicator by livestock use (PE 1) is negative but will **not be meaningfully measured** in relation to the Middle Fork of the John Day. *<u>Blue Mountain Allotment</u>* The effect to this indicator by livestock use (PE 1) is **negative and meaningfully measured**. Using BMPs, end point indicators, and adaptive management will result in discouraging browse on existing hardwoods and willows but may not promote regeneration of new cottonwoods. PE 2 and PE 5 do not affect trees and associated LWD in any way. Therefore

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
				there is no mechanism for an effect and the effect is neutral to the indicator for both PEs.
			Pool frequency	Pool frequency at the PIBO monitoring sites and stream survey reaches within the allotment is not currently meeting the DFC as described within Amendment 29 of the MNF LRMP and would be considered to be FAR using bull trout matrix criteria. See Appendix J for PIBO and stream survey results. Indirect effects of livestock grazing (including trailing and watering), on bank stability, undercut banks, width-depth ratio, shrub recruitment, green line plant composition and vigor have the potential to affect this indicator. The use of BMP's for livestock management, end point indicators and adaptive management, should result in an overall effect by PE 1 (livestock use) to pool frequency that is **not meaningfully measured** and unlikely to occur. PE 2 (permittee management and infrastructure maintenance) includes on and off-road vehicle use. Road use has no mechanism to affect pool frequency. PDC for off-road use will prevent bank damage and effects to pool frequency. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect pool frequency. The overall effect of PE 2 is a **neutral affect** to the indicator. PE 5 (monitoring) does not have any mechanisms to affect plants or bank and channel features that would impact pool frequency. The monitoring PE has a **neutral effect** to the indicator.
			Pool quality	PIBO and stream survey data within the allotment indicates that undercut banks are less than the desired condition. Residual pool depth is generally low with very few to no pools greater than 1 meter deep. Although Width/Depth ratio's at the PIBO sites within the John Day Basin

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
				seem to be improving most streams are still considered to be too wide. See Appendix J for PIBO and stream survey results. Based upon the PIBO and stream survey data, pool quality would be considered to be FAR using bull trout matrix criteria. Indirect effects of livestock grazing (including trailing and watering), on bank stability, undercut banks, width-depth ratio, shrub recruitment, green line plant composition and vigor have the potential to affect this indicator. The use of BMP's for livestock management, end point indicators (which are inclusive of wild ungulate use), and adaptive management, should result in an overall effect by PE 1 (livestock use) to pool quality that is **negative and not meaningfully measured.** PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect pool quality. PDC for off-road use will prevent bank damage and effects to pool quality. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect pool frequency. The overall effect of PE 2 is a **neutral affect** to the indicator. PE 5 (monitoring) does not have any mechanisms to affect plants or bank and channel features that would impact pool quality. The monitoring PE has a **neutral effect** to the indicator.
			Off-channel habitat	Generally there is very little Off-Channel Habitat within the Middle Fork of the John Day. The use of BMP's for livestock management, end point indicators (which are inclusive of wild ungulate use), and adaptive management, should result in an overall effect by PE 1 (livestock use) to off-channel habitat that is **negative and not meaningfully measured**. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect pool frequency. PDC for off-road use will prevent bank damage and effects to off-channel habitat. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
				Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect pool frequency. The overall effect of PE 2 is a **neutral affect** to the indicator. PE 5 (monitoring) does not have any mechanisms to affect off-channel habitat. The monitoring PE has a **neutral effect** to the indicator.
			Refugia	Refugia is considered to be a limiting factor identified within the Draft Bull trout recovery plan (FWS 2002) and the John Day Sub-basin plan (NPPC 2005). All of the habitat indicators in this crosswalk table are potential components of Refugia. *<u>Camp Creek Allotment</u>* Analysis for previous indicators has determined that PE 1 (livestock use) will have negative but not meaningfully measured effects to several of them. This may occur in areas that meet the definition of Refugia. Therefore, PE 1 (livestock use) will have negative but not meaningfully measured in relation to the Middle Fork John Day River. *<u>Blue Mountain Allotment</u>* Analysis for previous indicators has determined that PE 1 (livestock use) will have negative and meaningfully measured effects to several of them. This may occur in areas that meet the definition of Refugia. Therefore, PE 1 (livestock use) will have negative and meaningfully measured or evaluated effects to the refugia indicator. The highest level of effect to previous indicators by PE 2 (permittee management and infrastructure maintenance) was “negative but not meaningfully measurable.” This level of effects will not impact the function of Refugia to provide important remnant habitat. Therefore, the effect conclusion **is neutral** for PE 2. The highest level of effect to previous indicators by PE 5 (monitoring) was “negative but not

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
				meaningfully measurable" for small and transient increases in turbidity by wading in stream channels or crossing streams on foot or by horse. This level of effects will not impact the function of Refugia to provide important remnant habitat. Therefore, the effect conclusion is **neutral** for the monitoring PE.
			Width/Depth ratio	Over-utilization of riparian vegetation, bank alteration and increases in sediment delivery are primary causes of increased W/D ratios. The MFJD within the allotment is still exhibiting over widened channel (See Appendix E. for PIBO and stream survey results.), although monitoring data is showing improvements for this indicator at the Basin scale. Legacy effects of livestock management in the allotment likely contributed to degradation of this indicator. Livestock use (PE 1) is anticipated to have a negative, but **not meaningfully measured** effect to the indicator. The potential for increases in width-depth ratio is less than in the past because of implementation of endpoint indicators for livestock grazing (which includes use by wild ungulates) and adaptive management. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect W/D ratio. PDC for off-road use will prevent bank damage and effects to W/D ratio. Range riding with horses will occasionally cross a stream but effects to streambanks and beds will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect W/D ratio. The overall effect of PE 2 is a **neutral affect** to the indicator. PE 5 (monitoring) does not remove vegetation or destabilize stream banks. There is no potential for it to increase W/D ratio. The monitoring PE will have a **neutral effect** to the indicator.
			Floodplain connectivity	See discussion on Floodplain Connectivity for PCE 1. The effects are the same.
4) Complex river, stream, lake, reservoir, and marine	Complex Condition	Habitat Elements	Large woody debris	See discussion on Large Woody Debris for PCE 3. The effects are the same.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
shoreline aquatic environments and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.				
			Pool frequency and quality	See discussion on Pool Frequency and Pool Quality for PCE 3. The effects are the same.
			Streambank condition	Stream bank conditions are highly variable throughout the allotments. Historic land use practices (livestock grazing, mining, channelization, road building, timber production, and wildfire) have altered many of the streams as well as the Middle Fork of the John Day from its historic and or desired condition. *Camp Creek Allotment*

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
				Of the available stream survey data, 2 of 2 stream reaches in the allotment had greater than 90 percent stable streambank. *Blue Mountain Allotment* Currently there is no data for this indicator within the Blue Mountain Allotment pertaining to bull trout CH. Livestock use (PE 1) is anticipated to have a **negative, but not meaningfully measured** effect to the indicator. The potential for reducing bank stability is less than in the past because of implementation of endpoint indicators for livestock grazing (which includes use by wild ungulates) and adaptive management. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect streambank stability. PDC for off-road use will prevent bank damage and effects to streambank stability. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect streambank stability. The overall effect of PE 2 is a **neutral affect** to the indicator. PE 5 (monitoring) does not remove vegetation or destabilize streambanks. There is no potential for it to reduce streambank stability. The monitoring PE will have a **neutral effect** to the indicator.
			Large pools	PIBO and stream survey data within the Allotments indicates that residual pool depth is generally low with very few to no pools greater than 1 meter deep. Historic land use practices (livestock grazing, mining, channelization, road building, timber production, and wildfire) have altered many of the streams as well as the Middle Fork of the John Day from its historic and or desired condition. Many of these streams are still in a state of recovery based on stream type, soil type, and vegetation seral stage. Mechanisms to affect large pools include impacts to large woody debris and increased sedimentation. Effects to the large woody debris indicator are described above (see PCE 3 analysis) as **negative, but not meaningfully measured** for PE 1 and neutral for PEs 2 and 5.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
				The sediment analysis for PCE 3 concluded that there would be negative and meaningfully measured effects for PE1 and negative but not meaningfully measured effects for PEs 2 and 5. The amounts of sediment generated are expected to be slight and affect the streambed for a short distance downstream, and are not likely to measurably affect pool depth. This will result in **negative, but not meaningfully measured** effects to the Large Pools indicator.
			Off-channel habitat	See discussion on Off-channel Habitat for PCE 3. The effects are the same.
			Refugia	See discussion on Refugia for PCE 3. The effects are the same.
5). Water temperatures ranging from 2 to 15° C (36 to 59 ° F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form;	Water Quality	Water Quality	Temperature	See discussion above. *Camp Creek Allotment* Currently there is no Temperature Data for the MFJD within the Allotment. Monitoring sites upstream of the confluence of Camp Creek indicate that the MFJD is not meeting state water quality standards. Livestock use (PE 1) is not likely to result in measurable water temperature increases for the MFJD River due to its width. Blue Mountain Allotment Livestock use (PE 1) is likely to result in measurable water temperature increases for Clear Creek (MFJD River). The effect to this indicator by livestock use is **negative and**

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; and local groundwater influence.				**meaningfully measured**. PE 2 (permittee livestock management and infrastructure maintenance) and PE 5 (monitoring) activities will not remove vegetation that provides shade nor affect channel-forming processes that might widen stream channels. Consequently, there is no mechanism for PEs 2 and 5 to affect water temperature and the effect of the PE for the indicator is neutral.
6). In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size	Suitable Substrate	Water Quality	Sediment	There are no PIBO sites within the MFJD portion of the Allotment nor in the bull trout CH portions of the Blue Mountain Allotment. *<u>Camp Creek Allotment</u>* Stream surveys conducted in the MFJD reaches of bull trout CH reported Gravel as the dominate substrate. Low pool frequency, poor pool quality, and high water temperatures may be a limiting factor for bull trout within the allotment. Analysis for the Sediment indicator for PCE 3 above concluded that there would be negative but not meaningfully measured effects for PE 1 and negative but not meaningfully measured effects for PEs 2 and 5. The amounts of sediment generated are expected to be slight and affect the streambed for a short distance downstream. This will result in negative, but not meaningfully measured effects to the sediment indicator with respect to suitable substrate for bull trout spawning as there is no spawning within the allotment (MFJD). *<u>Blue Mountain Allotment</u>* Analysis for the Sediment indicator for PCE 3 above concluded that there would be negative and meaningfully measured effects for PE 1 and negative but not meaningfully measured

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.				effects for PEs 2 and 5. The amounts of sediment generated are expected to be slight and affect the streambed for a short distance downstream. This will result in negative, and meaningfully measured effects to the sediment indicator with respect to suitable substrate for bull trout spawning where spawning areas are immediately downstream from exposed soils and disturbed areas.
		Habitat Elements	Substrate Embeddedness	Amendment 29 of the LMRP sets a desired condition of <20% embedded. Currently there is no data to discuss sub-strate embeddedness with the two allotments. The analysis of effects to the sediment/turbidity indicator (see analysis for PCE 3) determined that use of riparian areas by livestock is expected to increase the amount of sediment entering streams. A slight increase in fine sediment deposition for a short distance downstream of exposed and disturbed streambank areas is likely to occur. There is the potential for fine sediment to slightly increase embeddedness within gravels suitable for spawning when the gravel is located immediately downstream from exposed and disturbed streambank areas. *Camp Creek Allotment* The effect to this indicator by livestock use (PE 1) is **negative but not meaningfully measurable**.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
				Blue Mountain Allotment The effect to this indicator by livestock use (PE 1) is **negative and meaningfully measurable**. The analysis for sediment/turbidity determined that PE 2 would have a slightly negative, but not meaningfully measured effect to the indicator. Therefore, the same conclusion is made for the substrate embeddedness indicator. As described above, monitoring (PE 5) would not introduce fine sediment into stream channels. The monitoring PE will have a neutral effect to the indicator.
7). A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.	Water Quantity	Flow/ Hydrology	Change in peak/base flows	See discussion for the Change in Peak/Base Flows indicator for PCE 1. The effects are the same.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
8). Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	Water Quality	Water Quality	Temperature	See discussion for the Temperature indicator for PCE 2 and the refugia indicator for PCE 2. The effects are the same.
			Sediment	See discussion for the Sediment indicator for PCE 3. The effects are the same.
			Chemical Contaminants/ Nutrients	See discussion for the Chemical Contaminants/Nutrients indicator sediment for PCE 2. The effects are the same.
	Water Quantity	Flow/ Hydrology	Change in Peak/Base Flows	See discussion for the Change in Peak/Base Flows indicator for PCE 1. The effects are the same.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
9). Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.	Species	Subpopulation characteristics	Persistence and Genetic Integrity	There is no element of the federal action that will introduce, or alter habitat conditions to favor, non-native predatory fish species, fish species with the potential for inbreeding with bull trout, or fish species with the potential to compete with bull trout. Therefore there is no causal mechanism to affect this PCE.

TABLE 47. SUMMARY OF EFFECTS OF THE PROPOSED ACTION BY THE PROJECT ELEMENTS OF LIVESTOCK GRAZING IN THE CAMP AND BLUE MOUNTAIN ALLOTMENTS TO THE INDICATORS ASSOCIATED WITH HABITAT FEATURES OF EACH PRIMARY CONSTITUENT ELEMENT OF BULL TROUT CRITICAL HABITAT.

Primary Constituent	**PCE Habitat**	**Indicator**		**Effect Conclusion by Project Element**

Element	Feature		Camp Creek Allotment PE1: Livestock Use	Blue Mountain Allotment PE1: Livestock Use	Camp Creek and Blue Mountain Allotments PE2: Permittee Management of Livestock and Infrastructure Maintenance	Camp Creek and Blue Mountain Allotments PE 5: Monitoring
1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development	Water quantity	Changes in Peak/Base Flows	NNMM[1]	NNMM[1]	NNMM	Neutral
		Increase in Drainage Network	Neutral	Neutral	Neutral	Neutral
	Water quality	Temperature	NNMM	***NMM***[2]	Neutral	Neutral
		Sediment/Turbidity	NNMM	***NMM***	NNMM	NNMM
		Chemical Contamination/Nutrients	NNMM	NNMM	NNMM	Neutral
	Suitable substrate	Substrate Embeddedness	NNMM	***NMM***	NNMM	Neutral
2. Freshwater rearing sites with: (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (ii) Water quality and forage supporting juvenile development; and (iii) Natural cover such as	Flow/hydrology	Changes in Peak/Base Flows	NMM	NNMM	NNMM	Neutral
		Increase in Drainage Network	Neutral	Neutral	Neutral	Neutral
	Water quality	Temperature	NNMM	***NMM***	Neutral	Neutral
		Sediment/Turbidity	NNMM	***NMM***	NNMM	NNMM
		Chemical Contamination/Nutrients	NNMM	NNMM	NNMM	Neutral
	Floodplain	Floodplain Connectivity	NNMM	NNMM	Neutral	Neutral

Primary Constituent Element	**PCE Habitat Feature**	**Indicator**	**Effect Conclusion by Project Element**			
			Camp Creek Allotment **PE1: Livestock Use**	**Blue Mountain Allotment** **PE1: Livestock Use**	**Camp Creek and Blue Mountain Allotments** **PE2: Permittee Management of Livestock and Infrastructure Maintenance**	**Camp Creek and Blue Mountain Allotments** **PE 5: Monitoring**
shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks	connectivity	Width/Depth Ratio	NNMM	NNMM	Neutral	Neutral
	Forage	Substrate Embeddedness	NNMM	***NMM***	NNMM	Neutral
		Large Woody Debris	NNMM	***NMM***	Neutral	Neutral
		Pool Frequency	NNMM	NNMM	Neutral	Neutral
		Pool Quality	NNMM	NNMM	Neutral	Neutral
		Off-Channel Habitat	NNMM	NNMM	Neutral	Neutral
		Refugia	NNMM	***NMM***	Neutral	Neutral
		Riparian Reserves	NNMM	NNMM	Neutral	Neutral
	Natural cover	Substrate	NNMM	NNMM	NNMM	Neutral
		Large Woody Debris	NNMM	***NMM***	Neutral	Neutral
		Pool Frequency	NNMM	NNMM	Neutral	Neutral
		Pool Quality	NNMM	NNMM	Neutral	Neutral
		Off-Channel Habitat	NNMM	NNMM	Neutral	Neutral
		Refugia	***NMM***	***NMM***	Neutral	Neutral

Primary Constituent Element	PCE Habitat Feature	Indicator	Effect Conclusion by Project Element			
			Camp Creek Allotment **PE1: Livestock Use**	**Blue Mountain Allotment** **PE1: Livestock Use**	**Camp Creek and Blue Mountain Allotments** **PE2: Permittee Management of Livestock and Infrastructure Maintenance**	**Camp Creek and Blue Mountain Allotments** **PE 5: Monitoring**
		Riparian Reserves	NNMM	NNMM	Neutral	Neutral
3. Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhang- ing large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival	Migration corridors free of obstruction	Physical Barriers	Neutral	Neutral	Neutral	Neutral

[1]NNMM = Negative, not meaningfully measured

[2]***NMM*** = Negative, meaningfully measured

7.3 ANALYSIS OF EFFECTS TO LISTED SPECIES

7.3.1 GENERAL EFFECTS

Effects to MCR Steelhead from livestock grazing can be in the form of direct impacts to individual fish or indirectly through habitat disturbance. Direct disturbance includes trampling on MCR Steelhead redds, resulting in injury or death to incubating embryos or alevin; disturbing holding or spawning adults, forcing them to alter their behavior and seek cover; or disturbing rearing juveniles, forcing them to alter their behavior and seek cover.

Grazing can have a number of detrimental effects on riparian and aquatic habitat (Belsky et al. 1999). When riparian habitat is negatively affected, the survival and growth of listed fish species may also be negatively affected. For example, if temperatures increase to critical levels due to reduced shade, salmonid survival can decrease and some habitat may be abandoned as fish migrate to seek cooler temperatures. Loss of overhead cover in the form of overhanging vegetation or undercut banks is likely to result in increased predation of juvenile salmonids. Increases in fine sediment are likely to increase turbidity that can alter salmonid behavior, and is also likely to increase fine sediment in spawning gravels that decreases egg-to-fry survival.

However, the livestock grazing end-point indicators were developed to meet PACFISH grazing standards and guidelines, enclosure B of the LMRP and water quality BMPs. The assumption is that meeting the endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives. This will allow recovery of degraded riparian habitat to occur. Recovery of riparian vegetation results in the development of more complex habitat. Riparian recovery allows roots to stabilize streambanks, and stems and foliage to slow water velocities, trap fine sediment, provide overhead cover for fish, provide shade that may aid in keeping stream temperatures cool, and provide surfaces for macroinvertebrates to inhabit. Stable stream banks and fine sediment trapping result in less fine sediment in spawning substrate that would improve egg-to-fry survival (Bjornn and Reiser 1991). Reduced water velocities along stream edges increase the amount of available habitat for young salmonids (Bjorn and Reiser 1991). Spawning salmonids appear to prefer spawning in areas in close proximity of overhead cover (Bjorn and Reiser 1991), and overhead cover protects juvenile salmonids from predation. Shade provided by vegetation can be important in keeping stream temperatures cool for salmonids. Li *et al.* (1994) found that trout abundance decreased as solar input and water temperature increased. Macroinvertebrates inhabiting overhanging vegetation provide forage for juvenile MCR Steelhead and Bull Trout when they fall into the stream. Each of these benefits contributes to increasing the amount and quality of habitat available for all freshwater life stages of MCR Steelhead and Bull Trout.

7.3.2 DIRECT EFFECTS TO SPECIES

The Camp Creek, Blue Mountain, and Long Creek allotments contain MCR Steelhead spawning and rearing habitat. The Camp Creek Allotment contains bull trout migratory habitat. The Blue Mountain Allotment contains bull trout spawning and rearing habitat. At certain times and under various conditions it is possible for livestock use (PE 1) to directly impact listed MCR Steelhead and/or CR bull trout. These effects could manifest themselves as direct impacts to individual fish, fry, or incubating embryos.

Direct impacts are likely to occur if livestock wade into a stream and disturb rearing juveniles or spawning adults, and/or step on redds. Juveniles in close proximity to stream crossings or watering sites are likely to move out of an area when livestock enter or approach the stream. Juveniles are likely to be at increased risk of predation. Livestock will have access to spawning CH in the allotments during the spawning period. It is likely that spawning behavior will be interrupted, forcing adults to retreat to nearby cover, and that redds will be at risk of being stepped on. However, these risks will be minimized with the implementation of the *Malheur National Forest Strategy to Minimize Redd Trampling "Take" of Steelhead and Bull Trout* (Appendix F). Additionally, MNF staff (range and aquatic specialists) will take extra effort to monitor these sites when they are in the field. If active redds are located, mitigation actions will be taken to eliminate or significantly minimize the potential for redd trampling (PDC 4-6).

The potential for direct impacts from PE 2 (permittee management and infrastructure maintenance) is much smaller. Road use has no potential for direct impacts to the species. The PDCs do not allow off-road vehicles to cross streams except for use of existing fords on road crossings. Range riders on horses will occasionally cross streams, but redds will be identified and avoided, and any disturbance to adults or juveniles should be sufficiently brief to not result in significant disruption of normal behavioral patterns. Infrastructure maintenance actions are not located in stream channels, so there is no mechanism for direct impacts to the species.

Some monitoring activities (PE 5) involve walking in stream channels. Actions such as pebble counts and redd surveys will result in individuals walking across stream channels for time periods that may result in MCR Steelhead and CR bull trout being disturbed and moving out of the area, resulting in direct impacts to the species.

Bull Trout

The *Camp Creek Allotment* contains CH for Bull Trout. The portion of the MFJD that flows through the allotment is considered to be CH (a migratory corridor). No spawning and or rearing is known to occur within the allotment. PE1, PE2, and PE5 should be **no effect** to Spawning bull trout and or rearing juveniles.

The *Blue Mountain Allotment* also contains CH for Bull Trout. The portion of Clear Creek that flows through the Allotment is considered to be spawning and rearing habitat for bull trout. Livestock will have access to spawning CH within the allotment during the spawning period. It is likely that spawning behavior will be interrupted, forcing adults to retreat to nearby cover, and that redds will be at risk of being stepped on. However, these risks will be minimized with the implementation of the *Malheur National Forest Strategy to Minimize Redd Trampling "Take" of Steelhead and Bull Trout* (Appendix F). Additionally, MNF staff (range and aquatic specialists) will take extra effort to monitor these sites when they are in the field. If active redds are located, mitigation actions will be taken to eliminate or significantly minimize the potential for redd trampling (PDC 4-6).

7.3.3 DIRECT AND INDIRECT EFFECTS TO AQUATIC AND RIPARIAN HABITAT

Use of the NMFS MPI to determine effects to listed fish species is based upon using the effects of the action on habitat indicators as a surrogate for effects to the species. The premise is that the indicators and the range of environmental baseline conditions provided by the three classifications (PF, AR, NPF) depict the biological requirements of the listed fish species. Since there is a direct relationship between habitat condition and the growth and survival of individual fish at various life stages, the effects of the action on habitat variables can be linked to effects to individuals of the species, and ultimately to an ESA effect determination.

The analysis in the "Effects to Critical Habitat" section (Section 7.2) evaluated specific NMFS MPI indicators that correspond to the PCEs of CH. The PCEs are used to describe "those physical or biological features that are essential to the conservation of the listed species." The same sub-set of NMFS MPI indicators evaluated for effects to PCEs also apply to the analysis of effects to the species. To eliminate redundancy, only those indicator/PE combinations for which a conclusion of effect to a component of a PCE was "negative and meaningfully measured" will be brought forward for further evaluation in this section, as they have the potential to adversely affect listed MCR Steelhead and Bull Trout. This conclusion was only found for PE 1 (livestock use) and not for PE 2 (permittee management and infrastructure maintenance) or PE 5 (monitoring). The indicators for which "negative and meaningfully measured" effects were concluded are:

- Water Temperature
- Sediment/Turbidity
- Substrate embeddedness
- Refugia
- Large woody debris

7.3.3.1 EFFECTS ON WATER TEMPERATURE

Stream temperatures are also of particular interest and concern within the John Day Subbasin. This is highlighted in the John Day Subbasin Plan (NWPCC 2004), MCR Steelhead recovery plan (Middle Columbia Steelhead ESA Recovery Plan; September 30, 2009) as well as the Draft Bull trout recovery plan(2002). Degraded water quality (high temperatures, nutrients, pesticides and other chemicals) is identified as a Limiting Factor within the plans.

Water temperature is an important factor affecting distribution and abundance of salmonids within the action area. Water temperatures influence water chemistry, as well as every phase of salmonid life history. Optimal temperatures for steelhead are 50˚ to 61˚ F (10˚ to 16˚ C), and the lethal temperature is approximately 77˚ F (25˚ C) where as temperatures for bull trout are much less typically ranging from 36 to 59˚ F (2 to 15˚ C). Water temperatures in excess of 59˚ F (15˚ C) are thought to limit the distribution of bull trout (Buchanan and Gregory 1997). Light et al. (1996) reported that temperatures above 59˚ F (15˚ C) may favor competitive species, while sustained temperatures above 64˚ F (18˚ C) may cause harmful effects to bull trout. They further report that water temperatures above 77˚ F (25˚ C) are expected to be lethal to bull trout. These temperature ranges may vary depending on bull trout life history stage and form, geography, elevation, diurnal and seasonal variation, shade, such as that is provided by riparian habitat, and local groundwater influence. Within the Subbasins, high stream temperatures occur near the end of July or the beginning of August and coincide with low stream flows and warm daytime temperatures. By the end of August, stream temperatures are typically dropping. Criteria for anadromous salmonid freshwater temperatures are found in the NMFS/USFWS matrix above.

The temperature monitoring data within the Long Creek Allotment for Camp Creek (above plantation) monitoring site met state water quality standards of 64*F. The Coxie Creek (at Spring) and Lick Creek (8) were within proximity to meeting standards with only 2 to 10 days over 64*F but rated NPF using the NMFS MPI criteria (see Section 6.1.3)

Within the three allotments there were approximately 15 sites within the Long Creek Allotment, 1 within the Camp Allotment, and 4 within the Blue Mountain Allotments that exceeded Oregon State standards for durations ranging from 32 to 96 days over 64*F. These sited would be considered to be NPF using the NMFS MPI criteria (see Section 6.1.3).

Stream temperature is driven by the interaction of site conditions, weather, riparian vegetation, and the input of radiant energy to a stream system. Energy exchange that affects a change in water temperature may involve solar radiation, long wave radiation, evaporative heat transfer, convective heat transfer, conduction, and advection (Lee 1980; Beschta and Weatherred 1984) (Figure 11). Solar radiation is the most important source of radiant energy affecting stream temperature (Brown 1969; Beschta 1997). With the exception of solar radiation that only delivers heat energy, all the other processes are capable of both introducing and removing heat from a stream. While the process of introducing and removing heat from a stream is complex, certain processes are more important than others in determining how stream temperature is affected by solar inputs (Beschta et al. 1987). In terms of water temperature increases, the principle source of heat energy is solar radiation directly striking the stream (Brown 1972) (Figure 11[6])

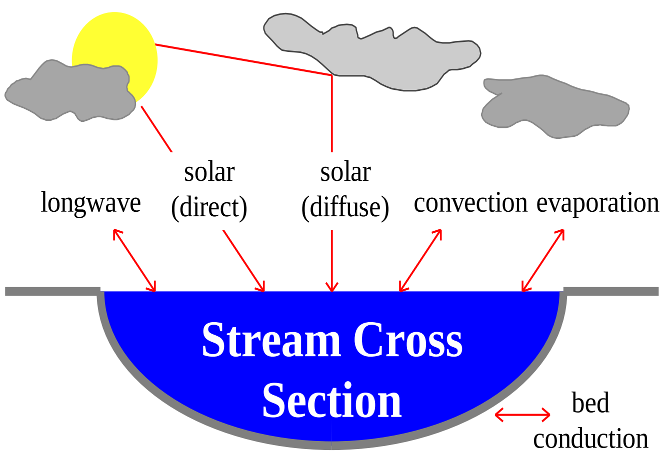


FIGURE 11. HEAT EXCHANGE BETWEEN A STREAM AND ITS ENVIRONMENT.

Canopy density and height are the dominant factors in the ability of streamside vegetation to intercept incoming solar radiation and reduce the rate of warming. Decline in the abundance and vigor of riparian plants in a floodplain may also cause streams to become shallow and wide,

[6] Stream temperature is an expression of heat energy per unit volume, which in turn is an indication of the rate of heat exchange between a stream and its environment.

which increases the surface area that is exposed to solar radiation. Platts (1981) cited studies by Claire and Storch (1977) and others that found that removal of streamside vegetation contributed to increases in water temperatures in small headwater streams as well as influencing suspended sediment concentrations. Small streams (especially Rosgen C and E channels) are more susceptible to warming because they have a lower volume of water to absorb solar energy. They are also more susceptible to warming because grazing impacts herbaceous vegetation and shrubs that typically provide shade to the stream channel.

Effective shade is the total solar radiation blocked from reaching the stream over a twenty-four hour period, expressed as a percentage of the total solar radiation:

$$\text{Effective Shade} = \frac{\text{Total Solar Radiation} - \text{Total Solar Radiation Reaching the Stream}}{\text{Total Solar Radiation}}$$

Effective shade is provided by features such as topography and vegetation (ODEQ 2010b). Effective shade is influenced by slope steepness, vegetation species composition, tree height, vegetation density, tree distance from the stream bank, and stream width. Thus, although riparian vegetation is a physical barrier between the stream and incoming solar radiation, only a portion of the riparian canopy contributes to effective shade. The relationship of variables influencing effective shade can be simplified, to some degree, using geometry and computer models that simulate shade (Boyd 1996, Park 1993).

Figure 12 and Table 48 illustrate the relationship between shade and stream channel width. As stream channel width increases beyond the point where vegetation is not tall enough to cast a shadow across the stream channel, shade values decrease. The model analysis results in Table 48 are based on the shadow cast by vegetation at a distance of 1 foot and farther from the edge of the channel.

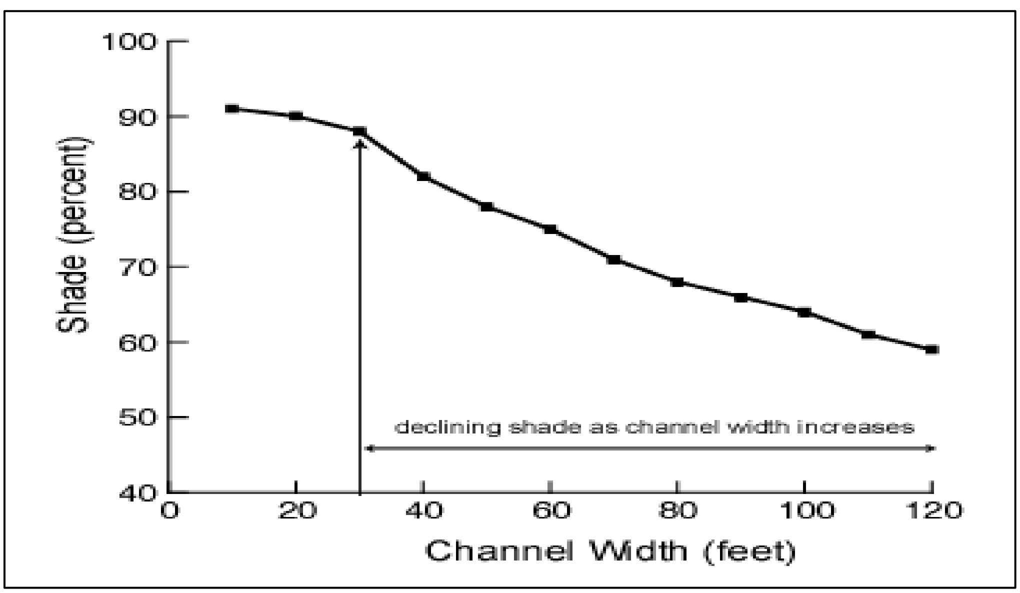


FIGURE 12. SHADE PROVIDED BY 150-FOOT TALL CONIFERS (PLATTS ET AL 1987), (PARK, 1993).

TABLE 48. EFFECTIVE SHADE PROVIDED BY THREE HEIGHTS OF GREENLINE VEGETATION AT VARYING ACTIVE STREAM CHANNEL WIDTHS.[1]

Active Channel Width (feet)	Percent Effective Shade at Varying Vegetation Heights		
	0.5 feet	2 feet	3 feet
1	0	46	57
3	0	22	41
7	0	9	18
10	0	7	12
12	0	5	10
14	0	5	9
16	0	4	8
18	0	4	7
20	0	3	6
22	0	0	3
24	0	0	1
26	0	0	0

[1]Effective shade values are based on the shadow cast by continuous vegetation growing at a distance of 1 foot and farther from the edge of the channel

Figure 12, Table 48 and the discussion above illustrate that decreasing vegetation height will reduce effective shade, and as a result increase solar radiation to the surface of the water in the stream. If the potential height of ungrazed vegetation is in the two to three feet range, then a considerable loss of effective shade takes place when the vegetation is grazed to an end-point of 0.5 feet (six inches) or less. The potential for stream warming is greatly increased, particularly for streams with narrow active channel widths.

Ungrazed height for 13 grass or grass-like plant species in the MNF ranged from 14 to 36 inches, with a mean of 26 inches (MNF 2007). The vegetation heights in Table 48 of two and three feet encompass the approximate mean ungrazed height and maximum ungrazed height of the 13 species. An end-point of 6 inch (0.5 feet) stubble height is used when livestock are grazed, which also reflects use by wild horses, elk and deer. In meadow streams with narrow channels, grass/grass-like species often are the plants that provide stream shade. Model results presented in Table 48 indicate that managing to a six-inch vegetation height will reduce effective shade to zero for channel widths that are 1 foot and greater when the model criterion is for vegetation beginning at 1 foot distance from the active channel, and to no more than 18 percent if modeled for vegetation at the edge of the active channel. This is considerably less than effective shade provided by potential vegetation heights of two to three feet for similar active channel widths.

A conservative conclusion is that implementation of PE 1 (livestock use) will reduce effective shade for a bank distance sufficient to result in a measurable water temperature increase. These impacts are expected to be generally confined to narrow stream channels with grass/grass-like vegetation providing shade.

Platts (1991) states that grasses are too short to keep much solar radiation from reaching the water, except along very small streams (stream orders 1 and 2). Wright and Li (2002) measured wetted widths in late July and early August 1996-1998 for five 1st and 2nd order streams in the Middle Fork John Day River drainage. These are likely to have similar dimensions to streams of the same orders in the SFJD River drainage. The mean wetted width was 2.0 meters with a standard error of 0.5 meter (6.6 feet with a standard error of 1.6 feet). There is 90% confidence that the true mean wetted width is within 6.6 +/- 3.4 feet (3.2 to 10.0 feet). The greatest probability of measurable temperature increases as a result of livestock grazing is therefore likely to occur in channels less than 10 feet wide.

Figure 12 and Table 48 also indicate that effective shade is reduced as channel width increases. Grazing by large hooved animals has the potential to increase channel width by bank alteration (Armour et al. 1991; Clary and Webster 1989; Kaufman and Kruger 1984). However, the analysis presented for effects to width-depth ratio in Table 44 for the Floodplain Connectivity habitat feature of PCE 2 (rearing critical habitat) concluded that the livestock use PE is anticipated to have a negative, but not meaningfully measured effect to the indicator. The potential for increases in width-depth ratio is less than in the past because of implementation of endpoint indicators for livestock grazing (which includes all use by wild horses) and adaptive management. Effective shade will not be measurably reduced as a result of effects to the width-to-depth ratio indicator.

Conclusion. The discussion above described negative effects to habitat and vegetation characteristics from the livestock use PE. Effects to these characteristics result in negative impacts to water temperature. It is probable that livestock use will result in small, but measurable increases in water temperature in streams with narrow channels (<10 feet) where grass/grass-like vegetation is providing stream shade. This will occur as a result of reducing the height of shade-producing vegetation by grazing.

These effects to water temperature will be minimized by use of endpoint indicators and PDC. As described earlier, if pre-season monitoring indicates that wild horse and other wildlife use is resulting in measurements near or exceeding an endpoint indicator, cattle will not be turned-out into that specific pasture. These indicators were developed to meet PACFISH/INFISH grazing standards and guidelines as well as water quality BMPs. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives. If monitoring fails to show this upward trend, adaptive management and administrative actions would be implemented to continue to minimize adverse effects to CH and the listed MCR Steelhead. It should be noted some impacts from past management activities (e.g., logging, roads, grazing) will persist over the life of this consultation and likely much longer in some cases.

7.3.3.2 EFFECTS ON SEDIMENT/TURBIDITY, SUBSTRATE AND SUBSTRATE EMBEDDEDNESS

Grazing by large herbivores can result in hoof shear to streambanks, and trampling and consumption of streamside vegetation. The result is a potential increase in the supply of fine sediment available for transport. This can occur when grazing results in compacted soils and bare areas; and when grazing results in decreased bank stability through mechanical damage to streambanks or reductions in rooting strength of streambank stabilizing vegetation. Both result in an increase in erosion rates and subsequent increases in fine sediment levels in streams.

Small amounts of fine sediment are likely to enter streams where livestock access streams to cross or water. Small amounts of fine sediment are likely to become deposited in substrate that can decrease egg-to-fry survival and slightly reduce available substrate cover for juveniles and macro-invertebrates.

Increased fine sediment is detrimental to MCR Steelhead through increased turbidity and sediment deposition in the substrate. Increases in fine sediment lead to greater substrate embeddedness and a decrease in the interstitial spaces between gravel substrate important for salmonid spawning. Successful salmonid spawning requires clean gravels with low fine sediment content (Spence et al. 1996). Well-oxygenated water must be able to reach eggs and pre-emergent fry during incubation and emergence. Suffocation of these life stages may occur if redds become covered with fine sediment. Emerging fry may be physically blocked from escaping a redd. Increased sediment load is also detrimental to juvenile salmon by introducing suspended particulate matter that interferes with feeding and territorial behavior (Berg and Northcote 1985). Increased fine sediment deposition in the substrate is likely to decrease MCR Steelhead egg-to-fry survival (Spence et al. 1996).

In addition, inputs of fine sediment resulting from livestock trampling banks can reduce benthic invertebrate abundance and lead to a shift from aquatic insects to mollusks, which are less palatable to salmonids. Studies have shown that sediment inputs resulting in substrate embeddedness of greater than one-third can result in a decrease in benthic invertebrate abundance and thus a decrease in food available for juvenile salmonids (Waters 1995).

There are no streams in the proposed action area that have been identified on the 303(d) list for sedimentation. Fine sediment levels vary across the allotments. Currently the PIBO information within the allotments show percent fines < 2mm in the pool tail-outs as ranging from 0 to 25 percent (sample size of 12) Sample sites that had multiple reads showed an increase in fines but were well below 20%. Amendment 29 of the LMRP sets a desired condition of <20% embedded.

Long Creek Allotment

The most current stream survey data (2000 to present) available reported that the reaches within the Long Creek allotment (19 stream reaches) have substrate embeddedness values ranging from 5 to 86%. Of the 19 reaches 2 did not measure embeddedness, 7 were greater than 20% embedded and 10 reaches were less than 20% embedded. (See Appendix J for PIBO and Stream Survey results).

Camp Creek Allotment

The most current stream survey data (2000 to present) available reported that the reaches within the Camp Creek allotment (2 stream reaches) have substrate embeddedness less than 20% (See Appendix J for PIBO and Stream Survey results).

Blue Mountain Allotment

The most current stream survey data (2000 to present) available reported that the reaches within the Blue Mountain allotment (8 stream reaches) have substrate embeddedness all greater than 20%. Substrate embeddedness ranges from 45% to 80% (See Appendix J for PIBO and Stream Survey results).

Conclusion. The livestock use PE will result in sediment entering stream channels. The mechanisms include: 1) mechanical bank damage from hoof chisel and trampling; 2) trailing; and, 3) impacts to soil-holding vegetation by being eaten and trampled. These mechanisms negatively impact bank stability, resulting in increased erosion. The increases in fine sediment will negatively and measurably affect the Sediment/Turbidity and Substrate Embeddedness NMFS MPI indicators.

These effects to the Sediment/Turbidity and Substrate Embeddedness indicators will be minimized by use of endpoint indicators and PDC. If during range readiness reviews, conditions on the ground indicates that wild ungulate use is resulting in measurements near or exceeding an endpoint indicator, cattle will not be turned-out into that specific pasture. These indicators were developed to meet PACFISH/INFISH grazing standards and guidelines as well as water quality BMPs. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives. If monitoring fails to show this upward trend, adaptive management and administrative actions would be implemented to continue to minimize adverse effects to designated CH and the listed MCR Steelhead. It should be noted some impacts from past management activities (logging, roads, grazing) will persist over the life of this consultation and likely much longer in some cases.

7.3.3.3 EFFECTS ON REFUGIA

The concept of "Refugia" is not described in detail in the NMFS MPI (NMFS 1996). The definition provided therein is: "important remnant habitat for sensitive aquatic species." The availability of various types of habitat refugia are described as limiting factors in the recovery plan for the Oregon steelhead populations of the MCR Steelhead DPS (e.g., loss of side-channels that provided high flow refugia; cold water refugia provided by Columbia River tributary streams such as the Deschutes River (NMFS 2009).

The analysis of effects to PCEs of CH provided in Table 44, and summarized in Table 45, indicate that the livestock use PE will have negative and meaningfully measured effects to several of the MPI indicators that correlate to components of PCEs. Specifically, they are "Water Temperature," "Sediment/Turbidity," and "Substrate Embeddedness." This may occur in stream reaches providing refugia conditions for one or more of these habitat characteristics (areas with cooler water temperatures, low levels of sediment in substrate or the water column, and low levels of substrate embeddedness). Therefore, PE 1 will have a negative effect to the refugia indicator.

Conclusion. The livestock use PE will result in negative and meaningfully measured impacts to several habitat indicators associated with refugia. Consequently, there will be negative and meaningfully measured, evaluated or detected impacts to the refugia indicator. The effects are not expected to be distributed evenly across the ESA action area because stream reaches providing characteristics of refugia are not ubiquitous. Negative impacts to the refugia indicator will be minimized by use of the endpoint indicators and PDC.

7.3.3.4 EFFECTS ON LARGE WOODY DEBRIS

Large woody debris (aka large wood) is one of the most important habitat components in many fish-bearing streams (Gurnell et al. 2002). Large wood helps provide cover, scour pools, stabilize banks, retain spawning gravels, create off-channel habitats, and provide habitat for macroinvertebrate production (Gregory et al. 2003).

In streams within the action area, large wood is usually provided by fallen conifers that have no effect from the project elements. However, in some areas where hardwoods—particularly black cottonwood and quaking aspen—play an important role in riparian species composition, ungulate grazing can prevent future large wood recruitment by limiting sapling regeneration and large tree recruitment. Young cottonwoods are desirable forage to both domestic and wild ungulates (Braatne et al. 1996).

Kaufmann et al. (1983) found late season riparian cattle grazing retarded regeneration of black cottonwood saplings in northeastern Oregon. Another study found when cattle were removed from a riparian pastures, but wild ungulates were not exclosed, the number of black cottonwood seedlings/saplings increased 56% 3 years after livestock removal (Case and Kaufmann 1997). Clearly, cattle grazing can influence the abundance of black cottonwoods in a riparian area, which can have measurable and foreseeable future effects to riparian structure and future large wood recruitment. Beschta and Ripple (2005) surveyed a 40-mile reach of the Middle Fork John Day River nearby the action area for cottonwood abundance and stand structure and found very little cottonwood seedling/sapling regeneration or recruitment into large trees and described wild and domestic ungulate browsing as the primary causal factor.

The analysis of effects to PCEs of CH provided in Table 44, and summarized in Table 45, indicate that the livestock use PE will have negative and meaningfully measured effects to the "Large Woody Debris" MPI indicator that correlates to components of PCEs. Therefore, PE 1 will have a negative effect to the large woody debris indicator.

Conclusion. The livestock use PE will likely result in negative effects to future large woody debris recruitment. The effects will likely be observed in areas where adequate cattle forage overlaps low-gradient stream sections such as MSRAs that have relatively open canopy and have potential to develop a cottonwood gallery forest. The mechanisms include: 1) browsing on young cottonwoods seedings/saplings, 2) retarding cottonwood succession and large tree recruitment; and, 3) reduction in future levels of instream large wood. These mechanisms will negatively and measurably affect the large woody debris NMFS MPI indicator. Negative impacts to the large woody debris indicator will be minimized by use of the endpoint indicators and PDC.

8 ESA EFFECT DETERMINATIONS

All Allotments

ESA effect determinations are presented in Table 2. The determinations are "May Affect, Likely to Adversely Affect" for MCR Steelhead and its designated CH.

Long Creek Allotment

No bull trout present within the Allotment. Consequently, the effect determinations for bull trout are "No Effect."

Camp Creek Allotment

ESA effect determinations are presented in Table 2. The determinations are "May Affect, Not Likely to Adversely Affect" for bull trout and its designated CH.

Blue Mountain Allotment

ESA effect determinations are presented in Table 2. The determinations are "May Affect, Likely to Adversely Affect" for bull trout and its designated CH.

8.1 RATIONAL

The PCEs are the physical or biological features of critical habitat essential to the conservation of the species. For PCE 1 (Freshwater spawning sites), the analysis determined that there were **negative and measurable effects** to the *temperature* and *sediment* indicators corresponding to the *water quality* feature of the PCE, and the *substrate embeddedness* indicator corresponding to the *suitable substrate* feature of the PCE, as diagrammed below:

- PCE1: Freshwater spawning sites.
  - Water quality PCE feature
    - Temperature indicator
    - Sediment indicator
  - Suitable substrate PCE feature
    - Substrate embeddedness indicator

In addition, for PCE 2 (Freshwater rearing sites), the analysis determined that there were **negative and measurable effects** to the *temperature* and *sediment* indicators corresponding to the *water quality* feature of the PCE, the *substrate embeddedness* indicator corresponding to the *forage* feature of the PCE, and the *refugia* and *large woody debris* indicator for both the *forage* and *natural cover* features of the PCE, as diagrammed below:

- PCE2: Freshwater rearing sites.
  - Water quality PCE feature
    - Temperature indicator
    - Sediment indicator
  - Forage PCE feature
    - Substrate embeddedness indicator
    - Large woody debris indicator
    - Refugia indicator

  - Natural cover PCE feature
    - Large woody debris indicator
    - Refugia indicator

The PCE analysis for CR bull trout and its ESA effects are described as follows. For PCE 2 (Migration habitats with minimal impediments), the analysis determined that there were **negative and measurable effects** to the *temperature* indicator corresponding to the *obstruction* feature of the PCE, as diagrammed below:

- PCE 2: Migration habitats with minimal impediments
  - Obstruction PCE feature
    - Temperature indicator

For PCE 3 (Abundant food base), the analysis determined that there were **negative and measurable effects** to the *temperature*, *sediment and refugia* indicators corresponding to the *forage* feature of the PCE, as diagrammed below:

- PCE 3: Abundant food base
  - Forage PCE feature
    - Temperature indicator
    - Sediment indicator
    - Refugia indicator
    - Large Wood

For PCE 4 (Complex environments and processes), the analysis determined that there were **negative and measurable effects** to the *refugia* indicator corresponding to the *complex environments and processes* feature of the PCE, as diagrammed below:

- PCE 4: Complex environments and processes
  - Complex environments and processes PCE feature
    - Refugia indicator
    - Large Wood

For PCE 5 (Appropriate water temperatures), the analysis determined that there were **negative and measurable effects** to the *temperature* indicator corresponding to the *water quality* feature of the PCE, as diagrammed below:

- PCE 5: Appropriate water temperatures
  - Water quality PCE feature
    - Temperature indicator

For PCE 6 (Appropriate spawning and rearing substrate), the analysis determined that there were **negative and measurable effects** to the *sediment* and *substrate embeddedness* indicators corresponding to the *suitable substrate* feature of the PCE, as diagrammed below:

- PCE 6: Appropriate spawning and rearing substrate
  - Suitable substrate PCE feature
    - Sediment
    - Substrate embeddedness

For PCE 8 (Water quality and quantity), the analysis determined that there were **negative and measurable effects** to the *temperature* and *sediment* indicators corresponding to the *water quality* feature of the PCE, as diagrammed below:

- PCE 8: Water quality and quantity
    - Water quality PCE feature
        - Temperature indicator
        - Sediment indicator

Negative measurable effects do not meet the definition of "insignificant" effects and they are not "discountable" because the effects are likely to occur. Consequently, the effect determination for MCR Steelhead designated CH overall is "May Affect, Likely to Adversely Affect."

The same NMFS MPI indicators determined to have negative, measurable effects during the PCE analysis were brought forward in the analysis of effects to the species. The mechanisms by which the livestock use (PE 1) would affect habitat characteristics that would in turn result in measurable increases in water temperature, increased sediment and turbidity, increased substrate embeddedness, and decreased large woody debris were described in detail. The biological consequences to MCRS Steelhead were also described. The conclusion was that the effects to the indicators would result in negative effects to each indicator that were measurable, and therefore did not meet the definition of "insignificant" effects. They are not "discountable" because the effects are likely to occur.

In addition, there are likely to be direct effects to individual MCR Steelhead from the livestock use PE, because livestock will have access to streams during the spawning, incubation, and rearing periods of the MCR Steelhead life cycle. Direct impacts are likely to occur if livestock wade into a stream and disturb rearing juveniles or spawning adults, and/or step on redds. Juveniles in close proximity to stream crossings or watering sites are likely to move out of an area when livestock enter or approach the stream. Juveniles forced into open water are likely to be at increased risk of predation. It is likely that spawning behavior will be interrupted forcing adults to retreat to nearby cover and that redds will be at risk of being stepped on. However, these risks will be minimized with the implementation of the *Malheur National Forest Strategy to Minimize Redd Trampling "Take" of Steelhead and Bull Trout* (Appendix E), which incorporates PDC 5 and 6 (Section 4.1.2). Additionally, MNF staff (range and aquatic specialists) will take extra effort to monitor these sites when they are in the field. If active redds are located, mitigation actions consistent with PDC 6 (Section 4.1.2) will be taken to eliminate or significantly minimize the potential for redd trampling,

In summary, because the proposed action will result in measurable negative effects to components of MCR Steelhead habitat, with indirect effects to the species, and it is likely there will be direct negative effects to adults, juveniles and possibly incubating embryos in redds, the effect determination is "May Affect, Likely to Adversely Affect" the species.

9 ESA CUMULATIVE EFFECTS

ESA cumulative effects are those effects of future State, tribal, local or private activities that are reasonably certain to occur in the area of the Federal action subject to consultation. Future Federal actions that are unrelated to the proposed action are not considered in this section because they are subject to separate consultation pursuant to section 7 of the ESA. There are several future State or private activities that are reasonably certain to occur.

9.1 ODFW ELK AND DEER MANAGEMENT

The ODFW manages Rocky Mountain elk and mule deer populations in the action area. The action area is located entirely within the state of Oregon's Northside and Sumpter Wildlife Management Units (WMU).

Elk and mule deer utilize streamside vegetation differently. Both animals eat riparian vegetation, but have different forage preferences. The diets of elk, mule deer, and cattle are very different during early summer and become increasingly similar during late summer. Cattle diets have more grasses, deer diets have more shrubs and forbs, and elk diets are in between those of cattle and deer. (USDA 2006). There is overlap between what each species will eat dependent upon season and availability. Additionally, Coe et al. (2005) found a cascading effect of larger ungulates displacing smaller ungulates. They found that the presence of livestock displaced smaller ungulates including mule deer and elk, and that livestock chose resources such as forage before smaller ungulates.

Table 49 and Table 50 presents Rocky Mountain elk and mule deer management objectives (MO) and population estimates from 2004-2010 for the Northside and Sumpter WMU that encompasses the Long Creek, Camp Creek and Blue Mountain allotments. The mule deer population MO was obtained from ODFW (2003), available online at: http://www.dfw.state.or.us/wildlife/management_plans/docs/MuleDeerPlanFinal.PDF. Mule deer population estimates, and Rocky Mountain elk MOs and population estimates, were obtained from ODFW wildlife biologist Ryan Torland, Joel Hurtado, and Nick Myatt (pers. comm. 2011).

TABLE 49. ROCKY MOUNTAIN ELK AND MULE DEER MANAGEMENT OBJECTIVES AND WINTER POPULATION ESTIMATES FROM 2004-2010 FOR THE NORTHSIDE WILDLIFE MANAGEMENT UNIT IN OREGON LONG CREEK AND CAMP CREEK ALLOTMENTS.

Year	Northside Wildlife Management Unit	
	Elk Mgmt. Objective (2,000)	Deer Mgmt. Objective (15,500)
2004	2,000	7,950
2005	2,000	7,954
2006	2,000	8,137
2007	2,400	7,358
2008	2,500	7,325
2009	2,500	7,085

2010	2,500	7,228

TABLE 50. ROCKY MOUNTAIN ELK AND MULE DEER MANAGEMENT OBJECTIVES AND WINTER POPULATION ESTIMATES FROM 2004-2011 FOR THE SUMPTER WILDLIFE MANAGEMENT UNIT IN OREGON BLUE MOUNTAIN ALLOTMENT.

Year	Sumpter Wildlife Management Unit	
	Elk Mgmt. Objective = 2,000	Deer Mgmt. Objective = 7,000
2004	1,650	6,800
2005	1,800	6,700
2006	1,765	5,727
2007	1,591	6,534
2008	1,581	5,958
2009	1,449	5,853
2010	1,511	5,180
2011	1,413	3,850

ODFW has managed the elk population of the Northside and Sumpter WMU at the population MO of 2,000. Beginning in 2007, the elk population has exceeded the MO for four consecutive years within the Northside Unit and has remained below the MO for the Sumpter Unit. The mule deer population MO was not exceeded during 2004-2011 in either WMU and has remained below. It is not known what elk or mule deer population level in the WMU would result in detectable effects to the PCEs of CH for MCR Steelhead.

Long Creek Allotment

There are data available regarding combined wild ungulate use (i.e., deer and elk) in specific pastures in the allotments within the action area that were not grazed in 2009 and 2010 (Table 51). The MNF proposed grazing use endpoints were approached in a few instances.

TABLE 51. WILDLIFE USE WITHIN RESTED PASTURES.

Cougar Creek	**2009***	**2010***
Bank Alteration (%)	3	6
Stubble Height (inches)	10.8	12.9

Woody Browse (%)	16.5	26.2
% Bank Stability	82	85
% Covered Banks	100	93
Keeney Creek	**2009***	**2010***
Bank Alteration (%)	8	7
Stubble Height (inches)	11.3	9.8
Woody Browse (%)	50.8	90
% Bank Stability	100	98
% Covered Banks	100	100
Long Creek (Ladd)	**2009***	**2010***
Bank Alteration (%)	2	2
Stubble Height (inches)	11.5	18.4
Woody Browse (%)	7.3	40.0
% Bank Stability	93	100
% Covered Banks	100	100
Lick Creek	**2009***	**2010***
Bank Alteration (%)	0	1
Stubble Height (inches)	11.3	14.8
Woody Browse (%)	62.9	26.4
% Bank Stability	84	100
% Covered Banks	100	100
Lower Riparian (Camp Creek)	**2009***	**2010***
Bank Alteration (%)	1	1
Stubble Height (inches)	19.7	20.9

Woody Browse (%)	27.9	53.8
% Bank Stability	100	100
% Covered Banks	100	100
Pepper Creek	**2009***	**2010***
Bank Alteration (%)	3	11
Stubble Height (inches)	13.2	9.2
Woody Browse (%)	74.0	83.7
% Bank Stability	100	88
% Covered Banks	100	98
West Fork Lick Creek	**2009***	**2010***
Bank Alteration (%)	2	5
Stubble Height (inches)	8.0	11.5
Woody Browse (%)	4.2	40.3
% Bank Stability	100	90
% Covered Banks	100	95

* Not used by livestock. Results reflect wildlife use.

There is a potential for cumulative effects to MCR Steelhead, bull trout and designated CH from use by wild ungulates. Such effects are identical to those described in the effects to MCR Steelhead CH section: (1) increased sediment in stream channels resulting in increased turbidity, substrate embeddedness, a reduction in macroinvertebrate production, and reduced quality of spawning gravel; (2) and an increase in water temperature as a result of shade loss along stream channels from grazing/browsing of riparian vegetation.

9.2 UNAUTHORIZED LIVESTOCK GRAZING

Unauthorized livestock grazing has occurred in the allotment, and is reasonably certain to occur in the future. As long as the MNF takes timely action whenever trespass occurs, habitat degradation is likely to be minimized.

9.3 ACTIONS ON PRIVATE PROPERTY

The ESA action area includes private property in-holdings. There is the potential for properties to be developed. However, we do not have any information on specific proposals at this time. The effects to PCEs of CH of activities on private property, such as cattle grazing, are expected to continue at the same rate as they have been.

10 ESSENTIAL FISH HABITAT FOR CHINOOK SALMON

The Magnuson-Stevens Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan. The MSA requires Federal agencies to consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH.

The Pacific Fisheries Management Council (PFMC) is one of eight regional fishery management councils established under the Magnuson-Stevens Act. PFMC develops and carries out fisheries management plans for salmon, groundfish and coastal pelagic species off the coasts of Washington, Oregon, and California, and recommends Pacific halibut harvest regulations to the International Pacific Halibut Commission.

As required by the Magnuson-Stevens Act, the PFMC described and identified Essential Fish Habitat (EFH) in each of its fisheries management plans. The EFH includes "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity." All streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California are designated as EFH for affected salmon stocks with management plans. The Upper John Day 4th field HUC (HUC 17070201), which encompasses the project area, has been designated as EFH for Chinook salmon (73 FR 200:60987 October 15, 2008). However, finer resolution of what constitutes waters "currently or historically accessible to salmon" is dependent upon local information.

The Magnuson-Stevens Act (MSA) also established an EFH consultation process. Federal agencies are required to consult with NMFS on all actions that may adversely affect EFH. The NMFS interprets the scope of these consultations to include actions by Federal agencies that occur outside designated EFH, such as upstream or upslope, but which nonetheless may have an adverse effect on habitat conditions necessary for the long-term survival of the species within EFH. NMFS must provide conservation recommendations for any Federal or State activity that may adversely affect EFH. Within 30 days of receiving EFH conservation recommendations from NMFS, Federal agencies must conclude EFH consultation by responding to NMFS with a written description of conservation measures the agency will use to avoid, mitigate or offset the impact of its action on EFH. If the Federal agency selects conservation measures, which are inconsistent with the conservation recommendations of NMFS, the Federal agency must explain in writing its reasons for not following NMFS recommendations.

The MNF searched for information to determine if the action under EFH consultation includes areas currently or historically accessible to Spring Chinook salmon. An ODFW website provides access to maps titled *Spring Chinook Habitat: Bates Quad, Spring Chinook Habitat: Boulder Butte Quad and Spring Chinook Habitat: Susanville Quad* that display current Chinook salmon distribution in the vicinity of the three allotments. The maps display seven tributary streams to the MFJD River within the three allotments that have been determined by ODFW to provide spawning, rearing or migration habitat: MFJD; Camp Creek, Clear Creek, Summit Creek and Squaw Creek. The ODFW maps are accessible at: http://nrimp.dfw.state.or.us/nrimp/default.aspx?pn=chs_dist).

The analysis of effects to designated CH for MCR Steelhead concluded that there were measurable negative effects to several PCEs. These effects are a proxy for effects to Chinook salmon EFH as they have similar habitat requirements. Consequently, the MNF concludes that the proposed action may adversely affect EFH for MSA-managed Chinook salmon (Table 2).

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