Aquatic Species Biological Assessment for the Upper Middle Fork, Lower Middle Fork and Slide Creek Allotments

BLUE MOUNTAIN RANGER DISTRICT

MALHEUR NATIONAL FOREST

GRANT COUNTY, OREGON

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AQUATIC BIOLOGICAL ASSESSMENT
Endangered Species Act Section 7 and Magnuson-Stevens Act Consultation

TABLE 1. HYDROLOGIC UNIT CODE (HUC) NAMES AND NUMBERS FOR THE UPPER MIDDLE FORK, LOWER MIDDLE FORK AND SLIDE CREEK ALLOTMENTS.

4th Field HUC Name	4th Field HUC Number	6th Field HUC Name	6th Field HUC Number
Middle Fork John Day	17070203	Little Boulder Creek	170702030202
5th Field HUC Name	**5th Field HUC Number**	Granite Boulder Creek	170702030203
Bridge Creek	1707020301	Big Boulder Creek	170702030204
Camp Creek	1707020302	Balance Creek	170702030205
Big Creek	1707020303	Lower Camp Creek	170702030208
6th Field HUC Name	**6th Field HUC Number**	Bear Creek	170702030301
Bridge Creek	170702030105	Big Creek	170702030302
Mill Creek	170702030106	Slide Creek	170702030304
Vinegar Creek	170702030201		

TABLE 2. ESA AND EFH EFFECT DETERMINATIONS FOR UPPER MIDDLE FORK (UMF), LOWER MIDDLE FORK (LMF) AND SLIDE CREEK (SC) ALLOTMENTS.

Common Name	Scientific Name	Allotment	Known to Occur?	Potential to Occur?	ESA[1] Status	Critical Habitat Status	Essential Fish Habitat Status	ESA Effect Determination Species/CH[2]	EFH[3] Effect Determin-ation
MCR Steelhead	*Oncorhynchus mykiss*	UMF	Yes	Yes	Threatened	Designated	Not applicable	LAA/LAA[4]	Not applicable
		LMF	Yes	Yes	Threatened	Designated	Not applicable	LAA/LAA[4]	Not applicable
		SC	Yes	Yes	Threatened	Designated	Not applicable	LAA/LAA[4]	Not applicable
MCR Spring Chinook	*Oncorhynchus tshawytscha*	UMF	Yes	Yes	Not warranted	Not applicable	Established	Not applicable/ Not applicable	May Adversely Affect
		LMF	Yes	Yes	Not warranted	Not applicable	Established	Not applicable/ Not applicable	May Adversely Affect
		SC	Yes	Yes	Not warranted	Not applicable	Established	Not applicable/ Not applicable	May Adversely Affect
Bull Trout	*Salvelinus confluentus*	UMF	Yes	Yes	Threatened	Designated	Not applicable	LAA/LAA[4]	Not applicable
		LMF	Yes	Yes	Threatened	Designated	Not applicable	LAA/LAA[4]	Not applicable
		SC	No	No	Threatened	Designated	Not applicable	No effect / No effect	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 activities associated within the Upper Middle Fork, Lower Middle Fork and Slide Creek Allotments. This Biological Assessment (BA) documents the analysis and conclusions of the Forest Service regarding the effects of implementing the livestock grazing activities. The analysis in the BA evaluates the effects on: (1) the Middle Columbia River (MCR) Steelhead Distinct Population Segment (DPS) listed by the National Marine Fisheries Service (NMFS) as Threatened; (2) the Columbia River (CR) bull trout DPS listed by the US Fish and Wildlife Service (FWS) as Threatened; (3) designated critical habitat (CH) for both listed species; and (4) 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 regulations for section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.), and regulations for 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

Recent and ongoing informal and formal consultations that overlap the ESA action area (see BA section 4.4) and the 6th field HUC sub-watersheds of the Upper Middle Fork, Lower Middle Fork and Slide Creek Allotments (Table 1) are described in this section.

1.1.1 INFORMAL CONSULTATIONS (RECENT AND ONGOING)

Informal consultations with either NMFS or FWS on MNF actions have been completed in the 6th field HUC sub-watersheds of the Upper Middle Fork, Lower Middle Fork and Slide Creek Allotments (Table 1). Informal consultations were concluded with NMFS and FWS on road maintenance actions and grazing actions.

1.1.1.1 BLUE MOUNTAIN EXPEDITED SECTION 7 CONSULTATION PROCESS

The MNF informally consulted with NMFS and FWS on the effects of a programmatic Blue Mountain Expedited Section 7 Consultation Process (Process). 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.

Informal consultation was concluded by both NMFS and FWS on the categories of MNF actions addressed by the programmatic Process to listed fish species and designated critical habitat. On May 31, 2007, the MNF received a concurrence letter from *NMFS* (2007/02970) regarding effects to both listed MCR steelhead and their designated critical habitat (NMFS 2007a). Additionally, informal consultation with FWS was concluded regarding effects to CR bull trout and their designated critical habitat on June 04, 2007 (TS Number 07-1661; TAILS: 13420-

2007-I-0154) (FWS 2007) and on July 30, 2010 (TS Number 10-1262; TAILS: 13420-2010-IC-0150) (USDI FWS 2010a), respectively.

With the programmatic Process, 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.

Recent actions covered by the Process and occurring in the allotment areas are:

1. **MNF Road Maintenance:** The MNF has informally consulted with the *NMFS* and *FWS* on Forest wide road maintenance. On January 29, 2010, informal consultation was concluded by NMFS and FWS via a letter 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 Maintenance 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 MCR steelhead and CR bull trout species and their designated CH 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.

1.1.1.2 LIVESTOCK GRAZING

FWS: In 2007, the MNF informally consulted with FWS on the 2007-2011 livestock grazing in the Upper Middle Fork and Lower Middle Fork allotments (FWS TAILS: 13420-2007-I-0098).

NMFS: Although outside the ESA action area of the Upper Middle Fork, Lower Middle Fork and Slide Creek allotment consultation but within two of the same subwatersheds, an informal consultation with NMFS was concluded in 2007 on the Bear Creek Allotment in the Bear Creek 6th field sub-watershed and on the York Allotment in the Slide Creek 6th field sub-watershed (NMFS Reference Number 2007/01239).

1.1.2 FORMAL CONSULTATION (RECENT AND ONGOING)

1.1.2.1 AQUATIC AND RIPARIAN RESTORATION PROGRAMMATIC CONSULTATION

The FS and BLM concluded formal consultation with the NMFS (June 27, 2008, NMFS reference no. 2008/03505) (NMFS 2008) on aquatic restoration activities for administrative units in Oregon and Washington including the MNF. The NMFS biological opinion (BO) applies through CY 2012. The FWS also issued a BO to the FS and BLM for the same activities on June 14, 2007 (TAILS 13420-2007-F-0055). Since the completion of the consultation, the FWS in 2010 published a revised CH designation for bull trout and also designated CH for Oregon chub.

With the new CH designations for these listed species, the FS and BLM requested reinitiation of the consultation. The FWS concluded formal consultation on the reinitiation on April 26, 2011 (TAILS: 13420-2011-F-OI29) (FWS 2011). The BO applies through CY 2012. Both BOs provide 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 allotment area that are covered by the Aquatic and Riparian Restoration Programmatic Consultation:

1. Oxbow Project- Stream restoration (large wood placement) on a small portion of FS land within the Upper Middle Fork Allotment (Butte pasture). It is ongoing with 3 phases and design criteria specified in aquatic restoration program activity type #1.
2. Blue Mountain District Range Fence Construction 2011. This project includes construction of new fencing in the Upper Middle Fork, Lower Middle Fork and Slide Creek allotments to effectively manage cattle distribution across the allotment and protect MCR Steelhead and their designated CH. The project is expected to occur in 2011 and includes design criteria specified in aquatic restoration program activity type #15.
3. Plantation Maintenance – Lower Middle Fork Thinning Project. Fuels reduction/precommercial thinning includes design criteria specified in aquatic restoration program activity type #11 and #13.

1.1.2.2 LIVESTOCK GRAZING

NMFS: In 2007 the MNF formally consulted with NMFS on the 2007-2011 livestock grazing in the Upper Middle Fork, Lower Middle Fork and Slide Creek allotments (NMFS reference number 2007/01290) (NMFS 2007b). Although outside the ESA action area of the Upper Middle Fork, Lower Middle Fork and Slide Creek allotment consultation, but within one of the same sub-watersheds, a formal consultation with NMFS (reference number 2007/01290) was also completed in 2007 for the Long Creek Allotment, which is located in the Lower Camp 6th field sub-watershed. Informal consultation with NMFS was concluded in 2007 in the Bear Creek 6th field sub-watershed for the Bear Creek Allotment, and in the Slide Creek 6th field sub-watershed for the York Allotment.

FWS: There were no formal consultations with FWS on livestock grazing in the Middle Fork John Day River subbasin from 2007 through 2011. However, there was an informal consultation with FWS on the Upper Middle Fork and Lower Middle Fork livestock allotments (see BA section 1.1.1.2 Livestock Grazing Informal Consultations).

2 DESCRIPTION OF PROJECT AREA

2.1 UPPER MIDDLE FORK ALLOTMENT

The Upper Middle Fork allotment is located within the Middle Fork John Day River subbasin (4th Field HUC), the Bridge Creek and Camp Creek watersheds (5th Field HUC), and the Bridge Creek, Mill Creek, Vinegar Creek, Little Boulder and Granite Boulder Creek sub-watersheds (6th Field HUCs). The 4th, 5th and 6th field HUC names and numbers for the Upper Middle Fork allotment are presented in Table 1. Elevations within the allotment range from 8,000 feet near Vinegar Hill to 4,000 feet along County Road (CR) 20 and the Middle Fork John Day River (MFJDR). CR 20 and the Middle Fork John Day River bisect the allotment running east and west.

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 and alpine/shrub lands at the highest elevations. Engelmann spruce and Pacific yew can also be found in a number of drainages within the allotment. Dominant grass species are Idaho fescue, bluebunch wheatgrass and prairie junegrass in the open pine stands, elk sedge/pine grass in the forested areas, and mixed riparian grasses and sedges along the riparian areas.

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 Engelman spruce and Douglas-fir with lesser components of lodgepole pine and Pacific yew. Historically, riparian areas were logged by conventional tractor yarding. Dredge mining and railroad logging also occurred in and along many of the streams within the Upper Middle Fork Allotment. The combination of logging and valley bottom roads and railroad grades, insect epidemic, and historic livestock grazing has reduced riparian shading from hardwood and conifer species.

Throughout this allotment, livestock have varying levels of access to streams and the associated riparian communities. Parameters such as gradient, valley form, geologic substrate, vegetative structure, and forage availability can greatly influence livestock movement, use patterns, and distribution relative to streams. Other factors, such as the presence of “windthrown” or “jack-strawed” timber, may also influence livestock accessibility to streams and riparian communities.

The watersheds encompassing the Upper Middle Fork Allotment support a mix of National Forest System and private lands. Activities that have occurred or continue to occur within these watersheds include historic mining, timber harvest, grazing, roads, trails, water diversions, prescribed and natural fire, noxious weed treatment, and recreation. Approximately 300 acres of private inholdings are intermingled with MNF lands. These inholdings are unfenced and management of these lands has not been waived to the Forest Service.

The Upper Middle Fork Allotment is divided into 10 pastures and contains approximately 50.66 miles of steelhead CH (Table 3 and Figure 1) and 18.94 miles of bull trout CH (Table 3 and Figure 2). The allotment contains approximately 19.5 miles of stream reaches identified as "Most Sensitive Riparian Areas" (MSRA) (Table 3). The MSRA are sensitive spawning and highly productive rearing habitats for MCR Steelhead that are typically accessible and prone to impacts from livestock. A detailed description of MSRA is presented in Section 3.3. The process for determining MSRA can be found in Appendix G, and it was used to determine the MSRAs for the Upper Middle Fork Allotment displayed in Figure 3.

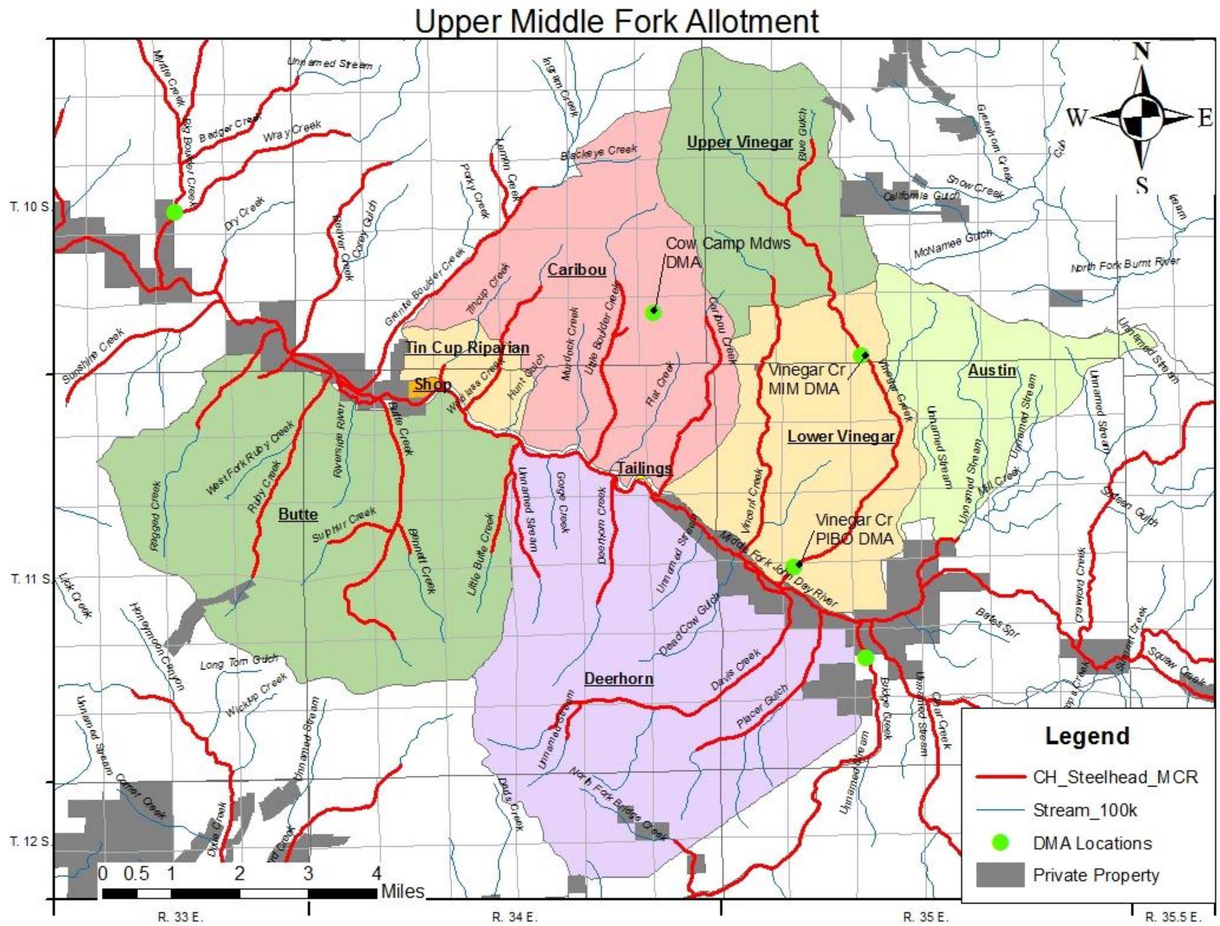

FIGURE 1. UPPER MIDDLE FORK ALLOTMENT AND PASTURES MAP WITH MCR STEELHEAD DESIGNATED CRITICAL HABITAT.

TABLE 3. MCR STEELHEAD CRITICAL HABITAT, MOST SENSITIVE RIPARIAN AREAS (MSRA) AND CR BULL TROUT CRITICAL HABITAT IN THE UPPER MIDDLE FORK ALLOTMENT.

Stream Name	Steelhead Critical Habitat (miles)	Steelhead MSRA (miles)	Bull Trout Critical Habitat (miles)

Stream Name	Steelhead Critical Habitat (miles)	Steelhead MSRA (miles)	Bull Trout Critical Habitat (miles)
Bennett Creek	0.49	-	-
Blue Gulch	1.16	-	-
Butte Creek	4.29	1.1	4.40
Caribou Creek	3.00	1.2	-
Davis Creek	4.24	1.4	-
Deerhorn Creek	1.91	1.7	-
Granite Boulder Creek	2.07	-	2.07
Little Boulder Creek	2.89	-	-
Little Butte Creek	1.72	-	-
MFJD River	3.61	4.4	3.61
Mill Creek	0.20	-	-
North Fork Bridge Creek	0.21	-	-
Placer Gulch	2.71	1.7	-
Ragged Creek	1.43	-	-
Ruby Creek	3.15	1.0	-
Sulphur Creek	1.06	-	-
Tin Cup Creek	0.37	-	-
Vincent Creek	4.32	2.0	-
Vinegar Creek	7.06	5.0	8.86
Windlass Creek	2.25	-	-
Trib. to Little Butte Creek	1.66	-	-
Trib. to Little Boulder Creek	0.24	-	-
Trib. to Davis Creek	0.62	-	-

Stream Name	Steelhead Critical Habitat (miles)	Steelhead MSRA (miles)	Bull Trout Critical Habitat (miles)
Trib. to MFJDR	**(no survey)**	**-**	**-**
Total	**50.66**	**19.5**	**18.94**

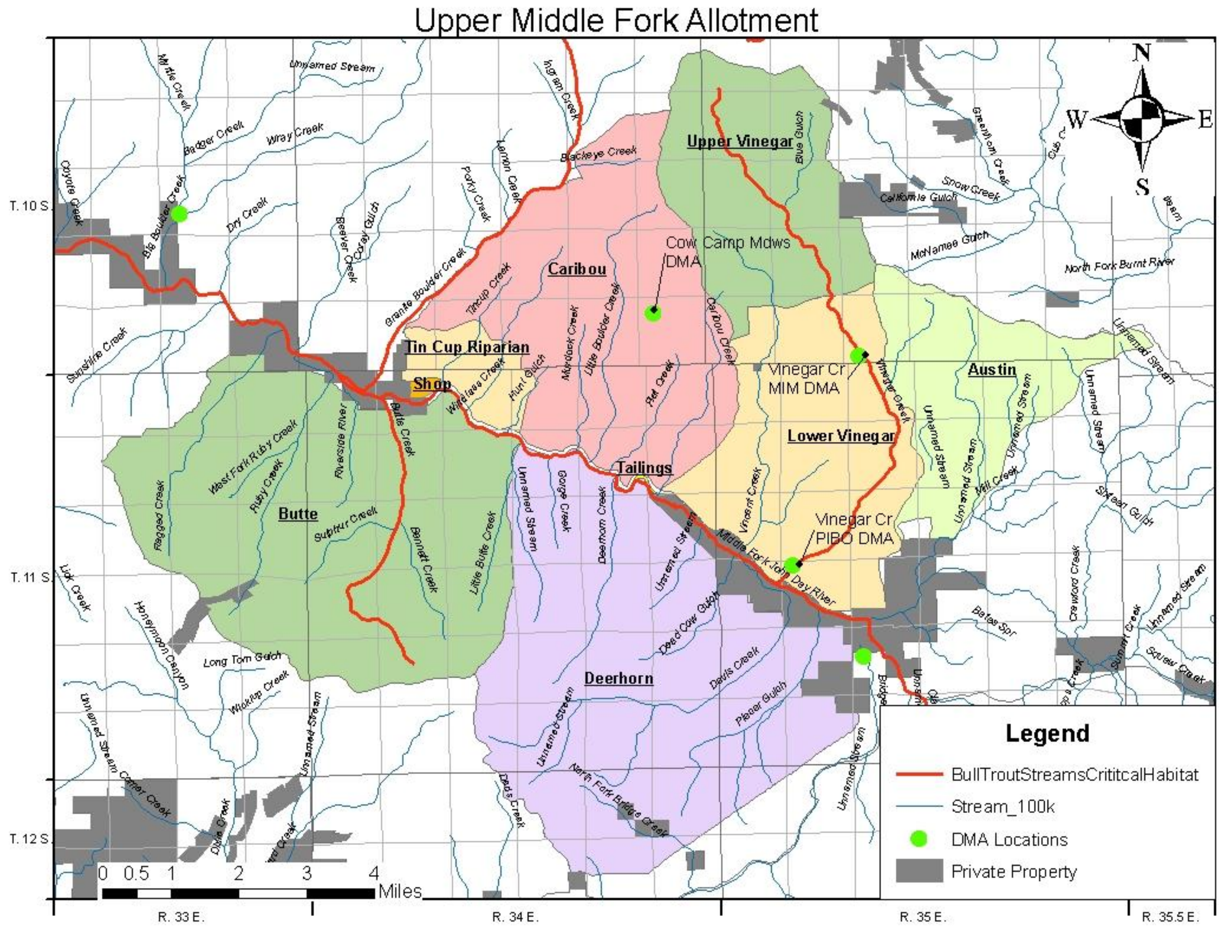

FIGURE 2. UPPER MIDDLE FORK ALLOTMENT AND PASTURES MAP WITH CR BULL TROUT DESIGNATED CRITICAL HABITAT.

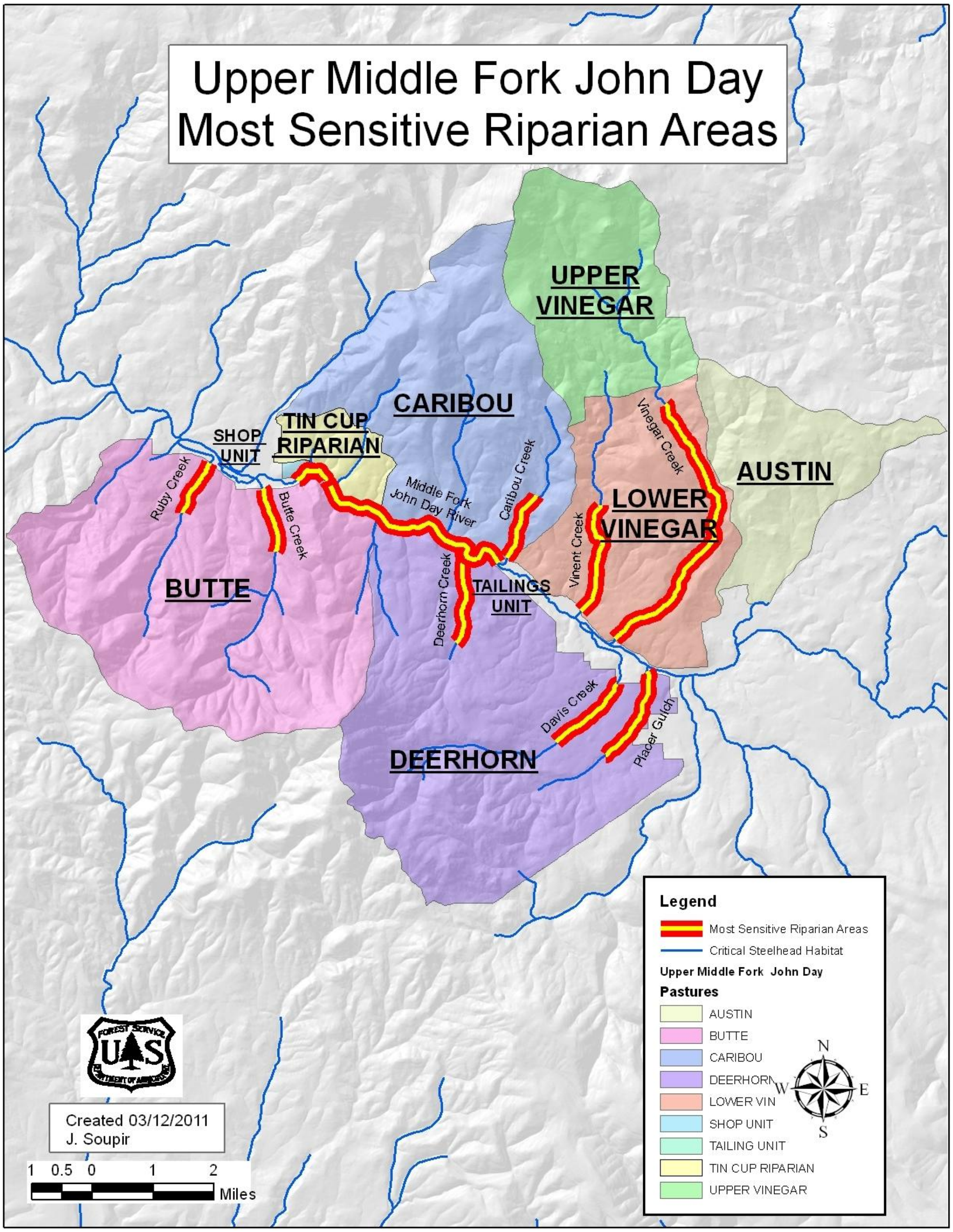

FIGURE 3. MCR STEELHEAD MOST SENSITIVE AREAS MAP FOR THE UPPER MIDDLE FORK ALLOTMENT.

Butte Pasture (including the former Ragged pasture)

Elevations within the pasture vary from approximately 3800 feet near the MFJD River to 7,592 feet at Dixie Butte. The pasture contains primarily mixed conifers with grand fir/western larch dominating the north slopes at higher elevations and ponderosa pine/Douglas-fir at the lower elevations. Understory vegetation consists primarily of mixed wheat grasses and bluebunch wheatgrass and Idaho fescue at the lower elevations, and elk sedge and pine grass in the more timbered, higher elevations. Pacific yew and Engelmann spruce can be found in many of the drainages in this pasture.

Streams in the Butte pasture containing steelhead CH are: Ragged Creek; Ruby Creek; Sulphur Creek; Butte Creek; Bennet Creek; Little Butte Creek; portions of the MFJD River and an unnamed tributary to the MFJD River. Butte Creek contains bull trout CH within the pasture.

Deerhorn Pasture

Elevations within the pasture vary from approximately 3,900 feet near the MFJD River to approximately 7,000 feet near the Dixie Butte summit. The pasture contains primarily mixed conifers with grand fir/western larch dominating the north slopes at higher elevations and ponderosa pine/Douglas-fir at the lower elevations. Understory vegetation consists primarily of mixed wheat grasses, bluebunch wheatgrass and Idaho fescue at the lower elevations and elk sedge and pine grass in the more timbered, higher elevations. Pacific yew and Engelmann spruce can be found in many of the drainages in this pasture.

Streams in the Deerhorn pasture containing steelhead CH are: portions of the Middle Fork John Day River; an unnamed tributary to Little Butte Creek; Deerhorn Creek; Davis Creek; Placer Gulch; North Fork Bridge Creek and an unnamed tributary to Davis Creek.

Austin Pasture

Elevations within the pasture vary from approximately 4,200 feet at the Forest Boundary on the south to 5,600 feet near the Malheur/Wallowa-Whitman Forest Boundary on the north. The pasture contains primarily south facing slopes with a Ponderosa Pine/Douglas Fir overstory and an understory of bluebunch wheatgrass, Idaho fescue, elk sedge, and pine grass.

Lower Vinegar Pasture

Elevations within the pasture vary from approximately 4,000 along CR 20 to 5,400 feet near the Malheur/Wallowa-Whitman Forest Boundary on the northeast. The pasture contains primarily south facing slopes with a Ponderosa Pine/Douglas Fir overstory and an understory of bluebunch wheatgrass, Idaho fescue, elk sedge, and pine grass.

Streams in the Lower Vinegar pasture containing steelhead CH are Vinegar Creek and Vincent Creek. Vinegar Creek also contains bull trout CH within the pasture.

Upper Vinegar Pasture

Elevations within the pasture vary from approximately 4,800 at the boundary with the Lower Vinegar pasture to near 8,000 feet on Vinegar Hill. The pasture contains primarily south facing slopes with a ponderosa pine/Douglas-fir overstory and an understory of bluebunch wheatgrass, Idaho fescue, elk sedge, and pine grass. The Vinegar Hill area supports an alpine/shrubland community containing whitebark pine and sagebrush. Riparian areas are dominated by alder and a grand fir/Engelmann spruce mix.

Streams in the Upper Vinegar pasture containing steelhead CH are Blue Gulch, Vinegar Creek, and Vincent Creek. Vinegar Creek also contains bull trout CH within the pasture.

Caribou Pasture

Elevations within the pasture vary from approximately 3,800 along CR 20 to 6,400 feet near Black Butte. The pasture contains primarily south facing slopes with a ponderosa pine/Douglas-fir overstory and an understory of bluebunch wheatgrass, Idaho fescue, elk sedge, and pine grass. Riparian areas are generally dominated by alder with some streams containing dense stands of Engelmann Spruce and Grand Fir.

Streams in the Caribou pasture containing steelhead CH are: Windlass Creek, Little Boulder Creek, an unnamed tributary to Little Boulder Creek, Caribou Creek, and portions of Granite Boulder Creek. Granite Boulder Creek also contains bull trout CH within the pasture. A new fence was completed in March 2010 that restricts access by cattle to lower Granite Boulder Creek.

Tin Cup Riparian Pasture

A new fence proposal to be completed in 2011 will create the Tin Cup Riparian Pasture. This pasture will provide additional protection to steelhead CH in Tin Cup and Windlass Creeks. The Tin Cup Riparian pasture will become part of the allotment rotation in 2012. Elevations within the pasture vary from approximately 3,800 along CR 20 to 4300 feet. The pasture contains primarily south facing slopes with a ponderosa pine/Douglas-fir overstory and an understory of bluebunch wheatgrass, Idaho fescue, elk sedge, and pine grass. Streams in the Tin Cup Riparian pasture containing steelhead CH are: Tin Cup Creek and Windlass Creek.

Shop, River, and Tailings Pastures

The Shop, River and Tailings pastures are small pastures located along CR 20 and the MFJD River. Although historically these pastures were used for gathering there will be no authorized use and/or gathering unless designated CH is excluded from live stock grazing.

Shop Pasture. A new fence was completed in March 2010 that has excluded the MFJD River from the Shop pasture. A water gap was constructed in the southeast corner of the pasture on Tin Cup Creek. This pasture is used for gathering and short-term (≤ 48 hrs) holding of cattle. Tin Cup Creek is the only steelhead CH in the pasture.

River Pasture. This pasture is a corridor along CR 20 and the MFJD River between the Caribou and Butte pastures. It is not part of the scheduled rotation; cattle are only driven through to access other pastures. No holding occurs in this pasture.

Tailings Pasture. This pasture is located just upstream from the Deerhorn Campground and historically was used for gathering and short-term (24 hours) holding. The Tailings pasture contains 0.3 miles of the MFJD River. When this pasture is authorized for use, electric fence with a water gap will be used to limit cattle access to the MFJD River.

2.2 LOWER MIDDLE FORK ALLOTMENT

The Lower Middle Fork Allotment is located within the Middle Fork John Day subbasin (4th Field HUC), the Camp Creek and Big Creek watersheds (5th field HUCs), and the Big Creek, Bear Creek, Balance Creek, Big Boulder Creek and Granite Boulder Creek sub-watersheds (6th field HUCs). The 4th, 5th and 6th field HUC names and numbers for the Lower Middle Fork allotment are presented in Table 1. Elevations within the Allotment range from 7,300 feet near Indian Rock to 3,500 feet along County Road (CR) 20 and the MFJD River. 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 and alpine/shrub lands at the highest elevations. Dominant grass species are generally Idaho fescue, bluebunch wheatgrass and prairie junegrass, in the open pine stands, elk sedge/pine grass in the forested areas, and mixed riparian grasses and sedges along the riparian areas.

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 Engelman spruce and Douglas-fir with lesser components of lodgepole pine and Pacific yew. Historically, riparian areas were logged by conventional tractor yarding. Dredge mining and railroad logging also occurred in and along many of the streams within the Lower Middle Fork Allotment. The combination of logging and valley bottom roads and railroad grades, insect epidemic, and historic livestock grazing has reduced riparian shading from hardwood and conifer species.

Throughout this allotment, livestock have varying levels of access to streams and the associated riparian communities. Parameters such as gradient, valley form, geologic substrate, vegetative structure, and forage availability can greatly influence livestock movement, use patterns, and distribution relative to streams. Other factors, such as the presence of “windthrown” or “jack-strawed” timber, may also influence livestock accessibility to streams and riparian communities.

In 1996 the Summit Fire burned a large portion of the Susanville pasture and the upper reaches of the Pizer pasture. At 5,000 feet elevation and above thick stands of lodgepole pine with little to no understory dominate the burned area. Below 5,000 feet the majority of overstory was removed and the vegetation consists largely of introduced grasses with a lesser component of native bunchgrasses.

Prior to reauthorization of grazing within the Summit Fire area, Proper Functioning Condition (PFC) assessments were conducted on 4 streams; Deadwood, Elk, Big Boulder, Myrtle, and Badger Creeks. These streams were determined by an Interdisciplinary Team (IDT) to be among the riparian areas that sustained high intensity burn. In addition, a representative segment of Deep Creek that burned with high severity was evaluated. District personnel conducted PFC surveys in 1999, 2001, and 2002. In 1999, the National Riparian Service Team led the PFC assessments. In 2002, all surveyed streams attained a Functional at Risk – Upward Trend rating. It is important to note that in 1998 a debris torrent occurred on Badger Creek. It was estimated that this event was greater than a 100-year discharge event. PFC surveys conducted on Badger Creek in 1999 yielded a Not Functional rating. However, the IDT determined that the mass wasting observed, and subsequent recovery, is within normal limits.

The watersheds encompassing the Lower Middle Fork Allotment support a mix of National Forest System and private lands. Activities that have occurred or continue to occur within these watersheds include historic mining, timber harvest, grazing, roads, trails, water diversions, prescribed and natural fire, noxious weed treatment, and recreation. Approximately 1,310 acres of private inholdings are intermingled with MNF lands. Some private lands within the allotment are fenced while others remain unfenced. The management of private lands within the allotment has not been waived to the Forest Service.

The Lower Middle Fork Allotment is divided into eight pastures and contains approximately 43.64 miles of steelhead CH (Table 4 and Figure 4), and 18.13 miles of bull trout CH (Table 4 and Figure 5). The allotment contains approximately 6.0 miles of stream reaches identified as

MSRA (Table 4). The MSRA are sensitive spawning and highly productive rearing habitats for MCR Steelhead that are typically accessible and prone to impacts from livestock. A detailed description of MSRA is presented in Section 3.3. The process for determining MSRA can be found in Appendix G, and it was used to determine the MSRAs for the Lower Middle Fork Allotment displayed in Figure 6.

TABLE 4. MCR STEELHEAD CRITICAL HABITAT, CR BULL TROUT CRITICAL HABITAT AND STEELHEAD MOST SENSITIVE AREAS IN THE LOWER MIDDLE FORK ALLOTMENT.

Stream Name	Steelhead Critical Habitat (miles)	Steelhead MSRA (miles)	Bull Trout Critical Habitat (miles)
Badger Creek	2.29	-	-
Beaver Creek	3.46	1.2	-
Big Boulder Creek	3.98	-	-
Big Creek	8.27	2.2	8.76
Coyote Creek	1.12	-	-
Deadwood Creek	2.33	1.1	4.45
Deep Creek	3.23	-	-
Dry Creek	0.52	-	-
East Fork Big Creek	2.34	-	-
Elk Creek	1.12	-	-
Granite Boulder Creek	1.72	1.1	4.92
Lemon Creek	1.05	-	-
Lost Creek	1.13	-	-
Mosquito Creek	0.85	-	-
Myrtle Creek	2.59	-	-
North Fork Elk Creek	0.03	-	-
Onion Gulch	0.29	-	-
Pizer Creek	0.70	-	-
Sunshine Creek	2.88	-	-

Stream Name	Steelhead Critical Habitat (miles)	Steelhead MSRA (miles)	Bull Trout Critical Habitat (miles)
Swamp Gulch	0.71	0.4	-
Wray Creek	3.03	-	-
Total	**43.64**	**6.0**	**18.13**

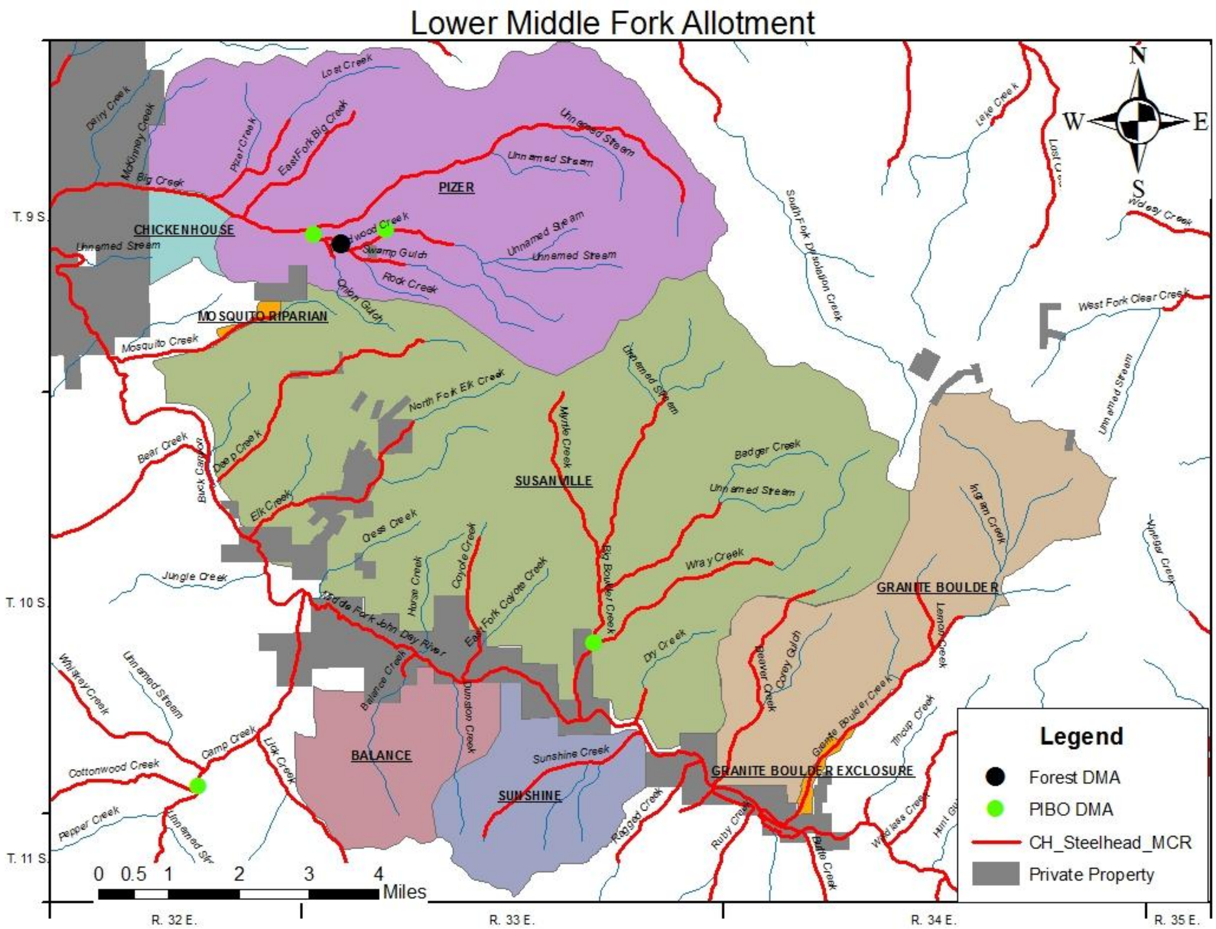

FIGURE 4. LOWER MIDDLE FORK ALLOTMENT AND PASTURES MAP WITH MCR STEELHEAD DESIGNATED CRITICAL HABITAT.

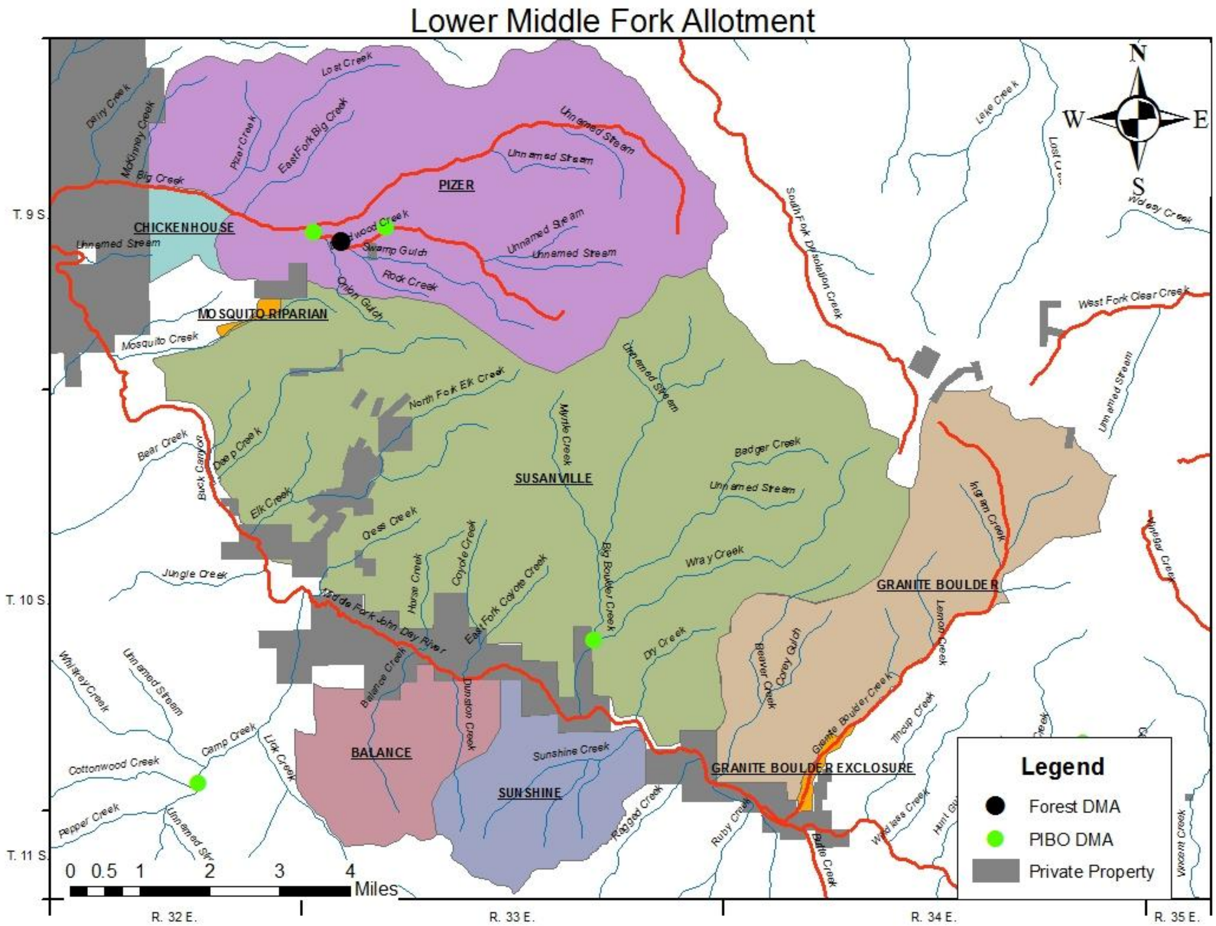

FIGURE 5. LOWER MIDDLE FORK JOHN DAY ALLOTMENT AND PASTURES MAP WITH CR BULL TROUT DESIGNATED CRITICAL HABITAT.

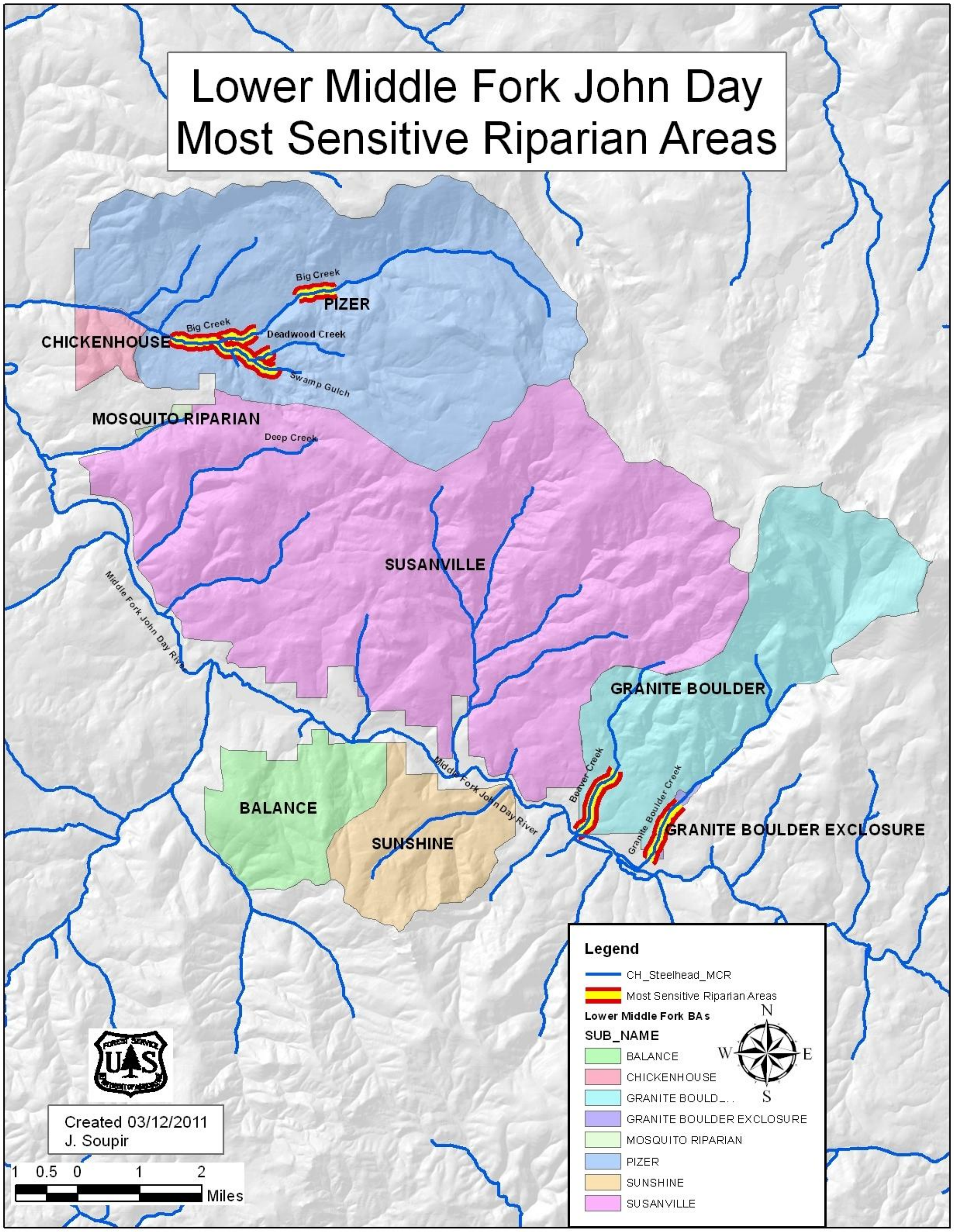

FIGURE 6. LOWER MIDDLE FORK ALLOTMENT AND PASTURES MAP WITH MOST SENSITIVE RIPARIAN AREAS.

Balance Pasture

The Balance pasture does not contain CH for MCR Steelhead or CR bull trout and will not be discussed further.

Chicken House Pasture

The Chicken House pasture contains a water gap on Big Creek approximately 200-300 feet long at the northeastern pasture boundary. This water gap is used to enter and exit the pasture. It will be closed when grazing is authorized in the pasture and not used for livestock watering. Substrate in and along the channel of Big Creek at the water gap is large cobble, which is resilient to use by cattle. Big Creek contains CH for MCR Steelhead and CR bull trout within the pasture.

Granite Boulder Pasture

Elevations within the pasture vary from approximately 3,800 feet along CR 20 to 7,700 feet at Sunrise Butte. The pasture contains primarily south and east facing slopes with a ponderosa pine/Douglas-fir overstory on the south facing slopes and a grand fir/Douglas-fir overstory on the more easterly slopes. The understory consists of bluebunch wheatgrass, Idaho fescue, elk sedge, and pine grass. The Granite Boulder Pasture was reduced in size due to the construction of a new fence in 2007. The other portion of the pasture was added to the Susanville pasture.

Streams containing steelhead CH in the Granite Boulder pasture are Beaver Creek, Granite Boulder Creek, and Lemon Creek. Granite Boulder Creek is the only stream containing bull trout CH.

Granite Boulder Exclosure

Elevations within the pasture vary from approximately 3,800 feet to 4,200 feet. This pasture is a riparian exclosure on Granite Boulder Creek. No authorized livestock grazing occurs within this pasture. MCR Steelhead and CR bull trout CH is found in the pasture in Granite Boulder Creek.

Mosquito Riparian Pasture

A new fence proposal to be completed in 2011 will create the Mosquito Riparian Pasture. This pasture will provide additional protection to steelhead CH in Mosquito Creek. Cattle grazing will only occur as cattle are being driven though during turn-out and turn-off of the allotment. Elevations within the pasture vary from approximately 4,000 feet to 4,400 feet. The pasture contains primarily east and west facing slopes with a ponderosa pine/Douglas-fir/grand fir overstory and an understory of riparian vegetation. Mosquito Creek is the only stream in the pasture containing steelhead CH.

Pizer Pasture

Elevations within the pasture vary from approximately 3,700 at the Forest Boundary on the west to 7,100 feet near the headwaters of Big Creek. The pasture contains primarily south and west facing slopes. Overstory vegetation consists of grand fir and Douglas-fir with lesser amounts of ponderosa pine and western larch. Understory vegetation consists primarily elk sedge and pine grass with Idaho fescue and prairie junegrass dominating the more open westerly slopes.. Riparian areas are generally dominated by alder and dogwood with some streams containing dense stands of Engelmann spruce and grand fir.

Streams in the pasture containing steelhead CH are: Big Creek; Pizer Creek; Lost Creek; East Fork Big Creek; Deadwood Creek; Onion Gulch and Swamp Gulch. Streams within this pasture are generally well armored with large cobble and rocks, downed logs and dense stands of alder and dogwood. Bull trout CH is also found in Big Creek and Deadwood Creek.

Sunshine Pasture

Elevations within the pasture vary from approximately 3,700 near the MFJD River to 6,000 feet near Ragged Rocks. The pasture contains primarily northeast facing slopes with a ponderosa pine/Douglas-fir overstory and an understory of introduced wheatgrass, bluebunch wheatgrass, Idaho fescue, elk sedge, and pine grass. Sunshine Creek is the only stream within the Sunshine pasture containing steelhead CH.

Susanville Pasture

Elevations within the pasture vary from approximately 3,400 near Galena to 7,500 feet near the Malheur National Forest/Wallowa-Whitman National Forest boundary. The Susanville pasture was increased in size due to a new fence constructed in 2007 changing the pasture boundaries for Susanville and Granite Boulder pastures.

The 1996 Summit Fire burned approximately 28,300 acres of the original Susanville and Granite Boulder Pastures. An administrative decision was made to temporarily suspend grazing in the portion of the allotment burned by the Summit Fire, with the resumption of grazing dependent on achievement of certain parameters (MNF 1997 – Summit ROD). Grazing resumed on the burned portions in 2003 at a conservative level. As a result of the fire, the overstory vegetation in the uplands and many of the riparian areas in the Susanville pasture was removed. The part of the pasture greater than 5,000 feet in elevation is now dominated by thick stands of lodgepole regeneration. Introduced grasses, bluebunch wheatgrass, and Idaho fescue dominate the remainder of the pasture.

Streams in the Susanville pasture containing steelhead CH are: Deep Creek; Elk Creek; Coyote Creek; Myrtle Creek; Big Boulder Creek; Badger Creek; Wray Creek and Beaver Creek. There is a debris jam and a rockslide on Big Boulder Creek approximately 0.5 and 0.7 miles (respectively) upstream from the Forest Boundary, which are at least partial fish passage barriers depending on flows (MNF 2011b). These potential barriers would also affect the ability of steelhead to reach Myrtle and Badger creeks, tributaries of Big Boulder Creek. In addition, there is a chute type waterfall on Wray Creek approximately 0.5 miles upstream from FS road 4550 that is a barrier to steelhead passage (MNF 2011b).

2.3 SLIDE CREEK ALLOTMENT

The Slide Creek Allotment is located within the Middle Fork John Day subbasin (4th Field HUC), the Camp Creek and Big Creek watersheds (5th field HUCs), and the Lower Camp Creek, Bear Creek and Slide Creek sub-watersheds (6th field HUCs). The 4th, 5th and 6th field HUC names and numbers for the Slide creek allotment is presented in Table 1. Elevations within the allotment range from approximately 3,600 feet near Camp Creek to 5,500 feet near the center of the allotment. The Slide Creek Allotment is one of the most productive grazing allotments on the MNF. Large timber harvests in the early 1960S and 1970s created a mosaic of upland meadows with a diverse variety of bunchgrasses and forbs. Several designated livestock driveways (Hawkins, Swickey and Bear Creek) facilitate proper cattle distribution and effective pasture moves.

Overstory vegetation in the allotment varies from dominant ponderosa pine stands with associated species of Douglas-fir, western larch, and lodgepole pine. Dominant grass species are bluebunch wheatgrass/Idaho fescue and Sandberg bluegrass in the grasslands, elk sedge/pine grass in the forested areas and mixed riparian grasses and sedges along the riparian areas.

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 grand fir and Douglas-fir with lesser components of lodgepole pine.

Livestock have varying levels of access to streams and the associated riparian communities. Parameters such as gradient, valley form, geologic substrate, vegetative structure, and forage availability can greatly influence livestock movement, use patterns, and distribution relative to streams. Other factors, such as the presence of “windthrown” or “jack-strawed” timber, may also influence livestock accessibility to streams and riparian communities.

The watersheds encompassing the Slide Creek Allotment support a mix of National Forest System and private lands. Activities that have occurred or continue to occur within these watersheds include historic mining, timber harvest, grazing, roads, trails, water diversions, prescribed and natural fire, noxious weed treatment, and recreation.

The Slide Creek Allotment is divided into nine pastures and contains approximately 9.2 miles of steelhead CH displayed by stream in Table 5 and illustrated in Figure 7. Approximately 2.4 miles of stream reaches are identified as MSRA. The miles of MSRA by stream are displayed in Table 5 and illustrated in Figure 8. The MSRA are sensitive spawning and highly productive rearing habitats for MCR Steelhead that are typically accessible and prone to impacts from livestock. A detailed description of MSRA is presented in Section 3.3. The process for determining MSRA can be found in Appendix G. There are no bull trout or bull trout CH in this allotment.

TABLE 5. MCR STEELHEAD CRITICAL HABITAT AND STEELHEAD MOST SENSITIVE RIPARIAN AREAS IN THE SLIDE CREEK ALLOTMENT.

Stream Name	Steelhead Critical Habitat (miles)	Most Sensitive Riparian Areas (miles)
Bear Creek	2.3	-
Camp Creek	1.3	1.4
Lick Creek	.05	-
Slide Creek	2.9	0.95
Whiskey Creek	2.6	-
Total	**9.15**	**2.35**

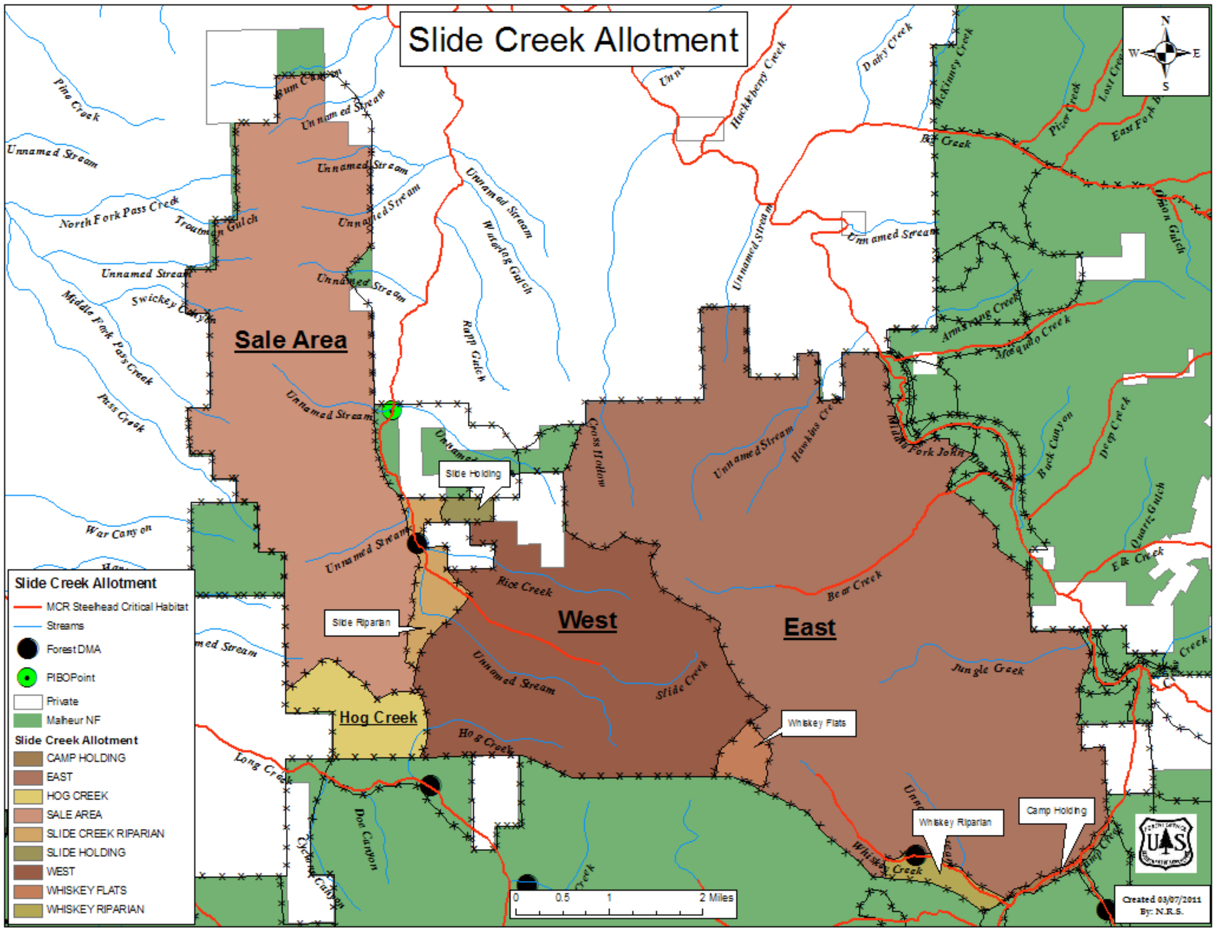

FIGURE 7. SLIDE CREEK ALLOTMENT AND PASTURES MAP WITH MCR STEELHEAD DESIGNATED CRITICAL HABITAT.

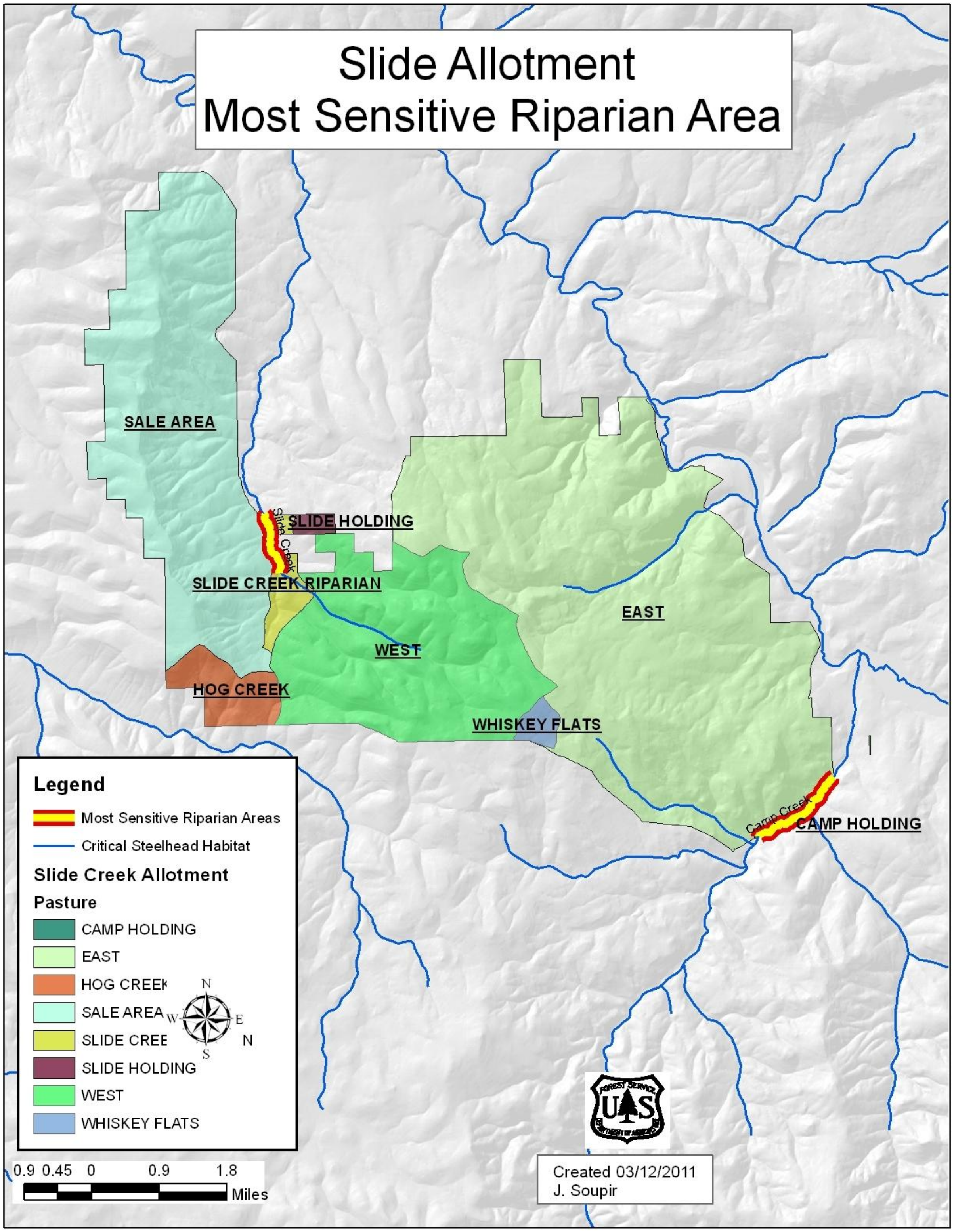

FIGURE 8. SLIDE CREEK ALLOTMENT AND PASTURES MAP WITH MOST SENSITIVE AREAS.

In addition to the MSRA, the Forest Service and the permittees have identified reaches of steelhead CH that are the most difficult to manage and have built riparian enclosures around them. These enclosures effectively eliminate grazing in these areas and are not authorized for grazing. Creating these enclosures has increased the permittees' ability to effectively manage the larger pastures in a more uniform manner. These enclosures account for approximately 3.95 miles of steelhead CH on Whiskey Creek and Slide Creek.

Camp Riparian Pasture

Elevations in the Camp Riparian pasture vary from approximately 3,600 feet to approximately 3,800 feet. The Camp Riparian pasture is a 68 acre pasture with 1.3 miles of Camp Creek in it. Camp Creek includes steelhead CH within the pasture. The pasture is used to facilitate pasture moves between the East pasture and the next pasture in the rotation.

East Pasture

Elevations in the East pasture vary from approximately 3,600 feet at Camp Creek to approximately 5,500 feet near the East/West pasture boundary. Bear Creek and Whiskey Creek have steelhead CH in the East pasture.

Hog Pasture

Elevations in the Hog Creek pasture vary from approximately 4,300 feet to approximately 5,400 feet. The Hog Creek pasture does not contain steelhead CH and will not be discussed further.

Sale Area Pasture

Elevations in the Sale Area pasture vary from approximately 3,700 feet to approximately 5,300 feet. The Sale Area pasture does not contain steelhead CH and will not be discussed further.

West Pasture

Elevations in the West pasture vary from approximately 4,200 to 5,500 feet. Slide Creek is the only stream containing steelhead CH within the West pasture.

Whiskey Flats Pasture

Whiskey Flats is 168 acres and contains a 101 acre cultural resource site. This pasture does not have steelhead CH.

Whiskey Riparian Pasture

Elevations vary in the Whiskey Riparian pasture from approximately 3,800 feet to 4,500 feet. The Whiskey Riparian pasture is 211 acres in size and contains approximately 1.5 miles of steelhead CH on Whiskey Creek. A 2010 spawning survey found one potential redd located just inside the pasture boundary fence on Whiskey Creek.

Slide Holding Pasture

The Slide Holding pasture is a small holding pasture that does not contain any fish-bearing streams. This pasture will not be discussed further.

Slide Riparian

The Slide Riparian pasture is 380 acres and contains approximately 1.3 miles of steelhead CH on Slide Creek. This riparian pasture is generally excluded from grazing. However, it will be used to facilitate moves between the Sale Area and West pastures.

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 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) water quality (water temperature – Forest wide or by fish species), 3) channel morphology (large woody debris, bank stability, lower bank angle, width to depth ratios, 4) riparian vegetation (ground cover, percentage of stream bank vegetated), and 5) shade/canopy closure (hardwood/meadow complex). DFCs 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 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 species (MCR Steelhead, CR bull trout) and its designated CH. Table 6 presents Amendment 29 DFCs and PACFISH 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.

Numeric values were developed for the Resource/Habitat Elements (features) of the MNF LRMP management areas 3A and 3B in amendment 29 (Appendix A). Amendment 29 states, "*These values are based upon the best information currently available and are considered to be consistent with management area desired future condition. If new information becomes available in the future which indicates changes in the numeric values to achieve the stated desired condition, these values may be inserted as a clarification/correction to the individual standard.*" Since the Forest Service adopted the Inland Native Fish Strategy (INFS) in 1995, it has been considered to contain better numeric values for bull trout water temperatures to achieve the stated desire conditions of amendment 29 (USDA FS 1995). Please note that the term INFISH and the acronym INFS are interchangeable terms for the Inland Native Fish Strategy.

In general, the MNF applies the INFS RMO for water temperature to bull trout rather than standards from PACFISH or Amendment 29. INFS established a water temperature RMO that used the best available published and non-published scientific literature to define favorable water temperatures for inland native fish. The PACFISH RMO for water temperature was developed to meet the habitat needs of anadromous fish such as steelhead and chinook salmon rather than bull trout. The INFS RMO for water temperature identified maximum water temperatures below 59°F within adult holding habitat and below 48°F within spawning and rearing habitats. The INFS RMO is more conservative for bull trout than the water temperature standards of either Amendment 29 or PACFISH (Table 6). The MNF considers the INFS water temperature standard to be the best available, favorable water temperatures for inland native fish such as bull trout.

TABLE 6. IDENTIFICATION OF MORE STRINGENT HABITAT INDICATOR NUMERIC VALUES OR CRITERIA BETWEEN AMENDMENT 29 DESIRED FUTURE CONDITIONS OR PACFISH RIPARIAN MANAGEMENT OBJECTIVES.

Habitat Indicator	**Desired Future Condition or Riparian Management Objective**		**More Stringent Condition or Objective**
	Amendment 29	**PACFISH RMO**	
Cobble embeddedness	<20%	NA	Amendment 29
Water temperature	Forestwide: No increase if < 68°F, reduce to 68°F if >68°F ≤ 55°F Bull Trout spawning and rearing habitat	No measurable increase. Max below 64°F for migration/rearing, max below 60°F for spawning	MCR steelhead: PACFISH RMO CR bull trout: Amendment 29 but MNF uses INFS RMO.[1]
Large Woody Debris Stream Densities	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. 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 RMO
W/D ratio	<10	<10	Same
Potential LWD forest	To provide a rate of input to maintain LWD standard	NA	Amendment 29

[1] Bull trout have the coldest water temperature requirements of any native salmonid in the Pacific Northwest. The MNF considers INFS to contain better numeric values for bull trout water temperature to achieve the stated desire conditions of amendment 29.

Habitat Indicator	Desired Future Condition or Riparian Management Objective		More Stringent Condition or Objective
	Amendment 29	PACFISH RMO	
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 complex 80% shaded	NA	Amendment 29

3.1.2 PACFISH LRMP AMENDMENT

PACFISH applies specifically to the MNF lands within the range of anadromy including the Upper Middle Fork, Lower Middle Fork and Slide Creek allotments. PACFISH amended Forest Service Land and Resource Management Plans (LRMPs). PACFISH 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 in improving aquatic habitat on federal lands.

Riparian Goals provide management context for proposed activities. The goals of PACFISH 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 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 RIPARIAN MANAGEMENT OBJECTIVES

Interim quantitative Riparian Management Objectives (RMOs) for stream channel, riparian and watershed conditions were also developed as a 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 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 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 (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).
- 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 MONITORING

The PACFISH 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 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 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 strategy. Thus, monitoring sites selected for evaluating the effectiveness of PACFISH 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 in PACFISH (NMFS 2009).

3.1.2.4 PACFISH ENCLOSURE B: LIVESTOCK GRAZING GUIDELINES

A revision of PACFISH Enclosure B, the "Recommended Livestock Grazing Guidelines," was sent to the PACFISH Forest Supervisors on August 14, 1995 (Appendix C). 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 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:

- <u>Early seral</u>. 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 F 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 amendments. See Appendix D 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; standards 15-21 in Forest Plan (see Chapter IV).
- Management Objectives for stream and riparian areas are described in PACFISH & INFISH amendments (RMO's) and in Amendment 29 of Forest Plan for Management Area 3A/3B (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) supplementdated 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 any 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 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 too. The development of the project design criteria, grazing end-points and grazing strategies for the three allotments considered the PACFISH RMOs and Grazing Management Standards, desired conditions and standards from amendment 29 to the MNF LRMP, PACFISH livestock grazing guidelines -Enclosure B (Appendix C) and MSRAs (Appendix G). Forest policies on Riparian Monitoring were also informed by the LRMP direction and Clean Water Act. 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 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;
- Water temperature criteria are from the MNF LRMP; and
- Width-depth ratio criteria are from PACFISH

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

The Upper Middle Fork John Day Allotment is located mostly within T. 10 S and 11 S, R. 34 and 35 E. The allotment includes approximately 54,580 acres of National Forest System (NFS) lands (Figure 1). The Upper Middle Fork John Day Allotment has ten pastures: Austin; Butte; Caribou; Deerhorn; Lower Vinegar; River; Tailings; Tin Cup; Shop and Upper Vinegar.

The Lower Middle Fork Allotment is located mostly within T. 10 S and 9 S, R. 33 and 34 E. The allotment includes approximately 58,644 acres of NFS lands. The Lower Middle Fork Allotment has eight pastures: Balance; Chicken House; Granite Boulder; Granite Boulder Exclosure; Mosquito Riparian; Pizer; Sunshine and Susanville.

The Slide Creek Allotment is located approximately 20-miles northeast of John Day. It is loosely defined by the forest boundary to the west, County Road 20 along the Middle Fork to the northeast, Camp Creek & Gibbs Creek to the east, and the ridge between Slide Creek and Keeney Creek to the south. The approximate legal location is Townships 9 and 10 S., Ranges 31 and 32 E. The allotment includes approximately 25,256 acres of NFS lands. The Slide Creek Allotment has nine pastures: Camp Riparian; East; Hog; Sale Area; Slide Holding; Slide Riparian; West; Whiskey Flats and Whiskey Riparian.

4.1.1 PERMIT INFORMATION AND GRAZING SYSTEMS

Permit information for the three allotments is presented in Table 7. The Upper Middle Fork Allotment is currently permitted for 485 cow/calf pairs for a total of 2,883 animal unit months (AUM) from 6/1 to 10/15. The Lower Middle Fork Allotment is currently permitted for 549 cow/calf pairs (3,646 AUM) from 6/1 to 10/31. The Slide Creek Allotment is currently permitted for 777 cow/calf pairs (304 AUMs) from 6/1 to 10/15. Permits expire at different dates from end of calendar year 2013 to 2020. The MNF is proposing the duration of the consultation on these permits be five years (2012-2016).

TABLE 7. PERMIT INFORMATION FOR THE UPPER MIDDLE FORK, LOWER MIDDLE FORK AND SLIDE CREEK ALLOTMENTS.

Allotment	Permit Number	Permitted Livestock (Cow/Calf Pairs)/AUMs	Permit Issuance Date	Permit Expiration Date
Upper Middle Fork	01807	485 / 2883	04/20/2005	12/31/2014
Lower Middle Fork	01807	209 / 1387	04/20/2005	12/31/2014
Lower Middle Fork	01825*	190 / 1262	01/31/2006	12/31/2015
Lower Middle Fork	01728A	150 / 997	02/16/2010	12/31/2019
Slide Creek	01790	546 / 3246	5/19/2004	12/31/2013
Slide Creek	01856	61 / 363	6/1/2007	12/31/2016
Slide Creek	01744A	170 / 1011	4/11/2011	12/13/2020

Grazing System:

Upper Middle Fork Allotment

The Upper Middle Fork Allotment consists of six main pastures.

- Cattle will continue to be managed under three permits.
    - Herd 1 (242 c/c pairs) grazes pastures north of CR 20 (Caribou, Upper Vinegar, Lower Vinegar and Austin).
    - Herd 2 (243 c/c pairs) grazes pastures south of CR 20 (Butte and Deerhorn).
- The Upper Middle Fork Allotment's grazing rotation system will continue to emphasize a deferred rotation with a staggered season of use entry system. Herd 1 will utilize a rest-rotation grazing strategy (a deferred rotation may be implemented following implementation of the Galena Project in 2013). An example rest-rotation system is presented in Table 8.
- Range Readiness and utilization levels may vary on/off dates and pasture rotations within the parameters of authorize use.

TABLE 8. EXAMPLE OF PASTURE ROTATION (ACTUAL ROTATION MAY DIFFER).

Herd 1				
Pasture	Year 1	Year 2	Year 3	Year 4

Tin Cup	1	Rest	4	1
Caribou	2	1	Rest	2
Lower Vinegar	Rest	2	3	3
Upper Vinegar	3	4	2	Rest
Austin	4	3	1	4
Herd 2				
Butte	1	2	1	2
Deerhorn	2	1	2	1

Lower Middle Fork Allotment

The Lower Middle Fork Allotment consists of six main pastures.

- Cattle will continue to be managed in two herds.
    - Permit 01807 grazes the Susanville pasture
    - Permit 01825 grazes the Chickenhouse and Pizer pastures
    - Permit 01728A grazes the Sunshine, Balance, and Granite Boulder pastures
- The Lower Middle Fork Allotment's grazing rotation system will continue to emphasize a deferred rotation with a staggered season of use entry system.
- Permit 01807 will continue to utilize low-stress livestock management techniques on the Susanville pasture. This pasture is managed in three unfenced areas, the Susanville area, the Big Boulder area, and the Dry Creek area.
- Range Readiness and utilization levels may vary on/off dates and pasture rotations within the parameters of authorize use.

Slide Creek Allotment

The Slide Creek Allotment consists of three main pastures; Sale Area, East, and West.

- The Slide Creek Allotment will continue to emphasize a deferred rotation with a staggered season of use entry system.
- Range Readiness and utilization levels may vary on/off dates and pasture rotations within the parameters of authorize use.
- This allotment is managed through a grazing association with full-time riders.
- Hog Creek, Slide Creek Riparian, Camp Creek Riparian, and Slide Holding will continue to be used for gathering purposes or to trail through when moving from one pasture to another during the season.

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 turnout.
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. Steelhead 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).
5. All pastures containing occupied bull trout streams will be surveyed for redds if livestock grazing is scheduled to occur after August 15 (Appendix F).
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 EM 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. All pastures will be monitored prior to turnout. If endpoint indicators are at or within proximity to allowable use, cattle will not be allowed to turnout or will be moved to the next pasture.
12. 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 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 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. The DMA site locations on MCR steelhead maps for the Upper Middle Fork, Lower Middle Fork and Slide Creek allotments are displayed on Figures 1, 4 and 7, respectively. The DMA site locations on CR bull trout maps for the Upper Middle Fork and Lower Middle Fork allotments are displayed on Figures 2 and 5, respectively..

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 of or 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 for the Upper Middle Fork allotment (Table 9), Lower Middle Fork allotment (Table 10) and Slide Creek allotment (Table 11). 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, to 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 Tables 9-11.

TABLE 9. UPPER MIDDLE FORK ALLOTMENT LIVESTOCK MOVE TRIGGER AND END-POINT INDICATORS BY PASTURE.

Pasture Name/ DMA or Key area Name / Creek Name/MSRA	Monitoring Attribute	Key Species	Move Trigger[2]	Endpoint Indicator
Upper Vinegar (DMA site yet to be determined) MSRA - None	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		15%	20%
Lower Vinegar/ Vinegar Creek MIM DMA MSRA - Present	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season use) 6 in. (late season use)

Pasture Name/ DMA or Key area Name / Creek Name/MSRA	Monitoring Attribute	Key Species	Move Trigger[2]	Endpoint Indicator
	Streambank Alteration		10%	15%
Deerhorn (DMA site yet to be determined) MSRA - Present	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
Butte (DMA site yet to be determined) MSRA - Present	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
Caribou Cow Camp Meadow (until a new DMA site can be located on CH) MSRA - Present	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
Tin Cup Riparian (DMA site yet to be determined) MSRA - Present	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%

Pasture Name/ DMA or Key area Name / Creek Name/MSRA	Monitoring Attribute	Key Species	Move Trigger[2]	Endpoint Indicator
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 a "standard." They are designed to function as a tool to help permittees 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 permittees 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 10. LOWER MIDDLE FORK ALLOTMENT LIVESTOCK MOVE TRIGGER AND END-POINT INDICATORS BY PASTURE.

Pasture Name/ DMA or Key area Name / Creek Name/MSRA	Monitoring Attribute	Key Species	Move Trigger[2]	Endpoint Indicator
Pizer/Deadwood Creek DMA/Deadwood Creek MSRA - Present	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
Chickenhouse No riparian habitat MSRA - None	Browse use		NA	NA
	Greenline stubble[1]	Deep-rooted hydric spp.	NA	NA

Pasture Name/ DMA or Key area Name / Creek Name/MSRA	Monitoring Attribute	Key Species	Move Trigger[2]	Endpoint Indicator
	Streambank Alteration		NA	NA
Susanville/Dry Creek will be used until a new DMA site is located on CH. MSRA - None	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		15%	20%
Granite Boulder/Beaver Creek (DMA site yet to be determined) MSRA - Present	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
Sunshine (DMA site yet to be determined) MSRA - None	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		15%	20%
Upland Sites (All Pastures)	% Utilization	Upland grass species	35%	45%
Riparian Areas (All Pastures)	% Utilization	Riparian grass species	35%	45%

Pasture Name/ DMA or Key area Name / Creek Name/MSRA	Monitoring Attribute	Key Species	Move Trigger[2]	Endpoint Indicator

[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 a "standard." They are designed to function as a tool to help permittees 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 permittees 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 11. SLIDE CREEK ALLOTMENT LIVESTOCK MOVE TRIGGER AND END-POINT INDICATORS BY PASTURE.

Pasture Name/ DMA or Key area Name / Creek Name/MSRA	Monitoring Attribute	Key Species	Move Trigger[2]	Endpoint Indicator
West MSRA - None	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season) 6 in. (late season)
	Streambank Alteration		15%	20%
Slide Riparian/ Slide Creek DMA/ Slide Creek MSRA - Present	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season) 6 in. (late season)
	Streambank Alteration		10%	15%
Camp Creek Riparian	Browse use		40%	50% (early season use) 40% (late season use)

Pasture Name/ DMA or Key area Name / Creek Name/MSRA	Monitoring Attribute	Key Species	Move Trigger[2]	Endpoint Indicator
MSRA - Present	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season) 6 in. (late season)
	Streambank Alteration		10%	15%
East MSRA - None	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season) 6 in. (late season)
	Streambank Alteration		15%	20%
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 a "standard." They are designed to function as a tool to help permittees 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 permittees 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.

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 C - PACFISH 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 C-PACFISH 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 9-11. The numeric values in Tables 9-11 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 at 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 9-11. 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[2]; 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[3] by large herbivores (% of linear length of greenline altered) (Multiple Indicator Monitoring

[2] 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.

[3] 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).

(MIM) of Stream Channels and Streamside Vegetation (Burton et al 2011)[4]. The estimated combined variability, observer error and 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 for the Upper Middle Fork, Lower Middle Fork and Slide Creek allotments are listed in Tables 3, 4 and 5, respectively. The MCR steelhead MSRA locations for the Upper Middle Fork, Lower Middle Fork and Slide Creek allotments are displayed in Figures 3, 6 and 8, 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

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[4] 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.

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.

4.1.4 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 1737-23 (2011) 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.

4.1.5 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 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. Or, the MNF may choose to rest the pasture or allotment. 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 4.1.5.1 below.

4.1.5.1 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.

4.1.6 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 4.1.5.1).

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 rarely, if ever, occurs in the allotments, and is unlikely to occur in the future.

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. <u>Livestock use of allotment/pastures</u>. 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. <u>Permittee management of livestock and infrastructure maintenance.</u> 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. <u>Range improvements</u>. This includes the construction of fences for riparian pastures, and the construction/development of off-stream water sources.
4. <u>Exclusionary fencing</u>. 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. <u>Monitoring</u>. 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 sections 3.2 and 4.1.4. 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 4.1.5.

4.4 ESA ACTION AREA

NMFS: The MCR Steelhead ESA action area for the Upper Middle Fork, Lower Middle Fork and Slide Creek allotments is displayed in Figure 9, and the entire 4th, 5th and 6th field HUCs are listed in Table 1. The ESA action area in figure 9 is displayed by crosshatched area within the allotment boundaries of the 6th field HUCs listed in Table 1.

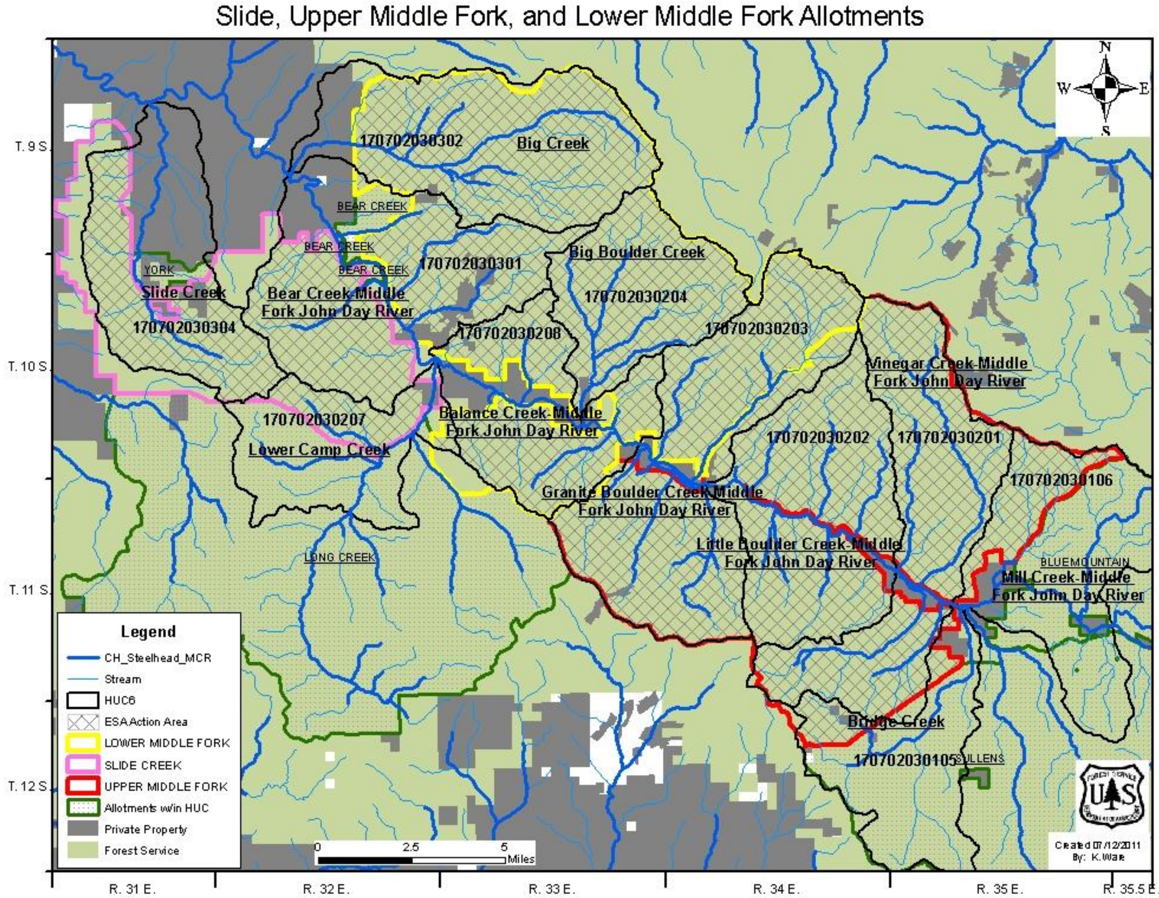
The ESA action area by allotment is the allotment area within the following sub-watersheds (6th Field HUCs):

Upper Middle Fork Allotment: Vinegar Creek, Little Boulder Creek, Granite Boulder Creek, Mill Creek and Bridge Creek sub-watersheds (Table 1);
Lower Middle Fork Allotment: Big Creek, Bear Creek, Big Boulder Creek, Balance Creek and Granite Boulder Creek sub-watersheds (Table 1);
Slide Creek Allotment: Lower Camp Creek, Bear Creek and Slide Creek sub-watersheds (Table 1).

FWS: The CR bull trout ESA action area is displayed by the crosshatch area in four 6th field HUCs within the Upper Middle Fork and Lower Middle Fork allotments (Figure 10). Bull trout are not known to occur in the Slide Creek allotment, and critical habitat is not designated. The Lower Middle Fork allotment occurs in both the Camp Creek and Big Creek watersheds (5th field HUCs), and the ESA action area is within the Big Creek and Granite Boulder Creek sub-watersheds (6th field HUCs) (Table 12). The Upper Middle Fork allotment occurs only in the Camp Creek watershed, and the ESA action area is within the Vinegar Creek, Little Boulder and Granite Boulder Creek sub-watersheds (Table 12). Both the Upper Middle Fork and Lower Middle Fork allotments are within the Granite Boulder Creek 6th field HUC of the Middle Fork John Day River (Figure 10).

TABLE 12. HYDROLOGIC UNIT CODE (HUC) NAMES AND NUMBERS WITHIN THE BULL TROUT ESA ACTION AREAS OF THE UPPER MIDDLE FORK AND LOWER MIDDLE FORK ALLOTMENTS.

4th Field HUC Name	4th Field HUC Number	6th Field HUC Name	6th Field HUC Number
Middle Fork John Day	17070203	Vinegar Creek	170702030201
5th Field HUC Name	**5th Field HUC Number**	Little Boulder Creek	170702030202
Camp Creek	1707020302	Granite Boulder Creek	170702030203
Big Creek	1707020303	Big Creek	170702030302



and Pastures map

FIGURE 9. ESA CONSULTATION ACTION AREA MAP FOR MIDDLE COLUMBIA RIVER STEELHEAD FOR THE UPPER MIDDLE FORK, LOWER MIDDLE FORK AND SLIDE CREEK ALLOTMENTS.

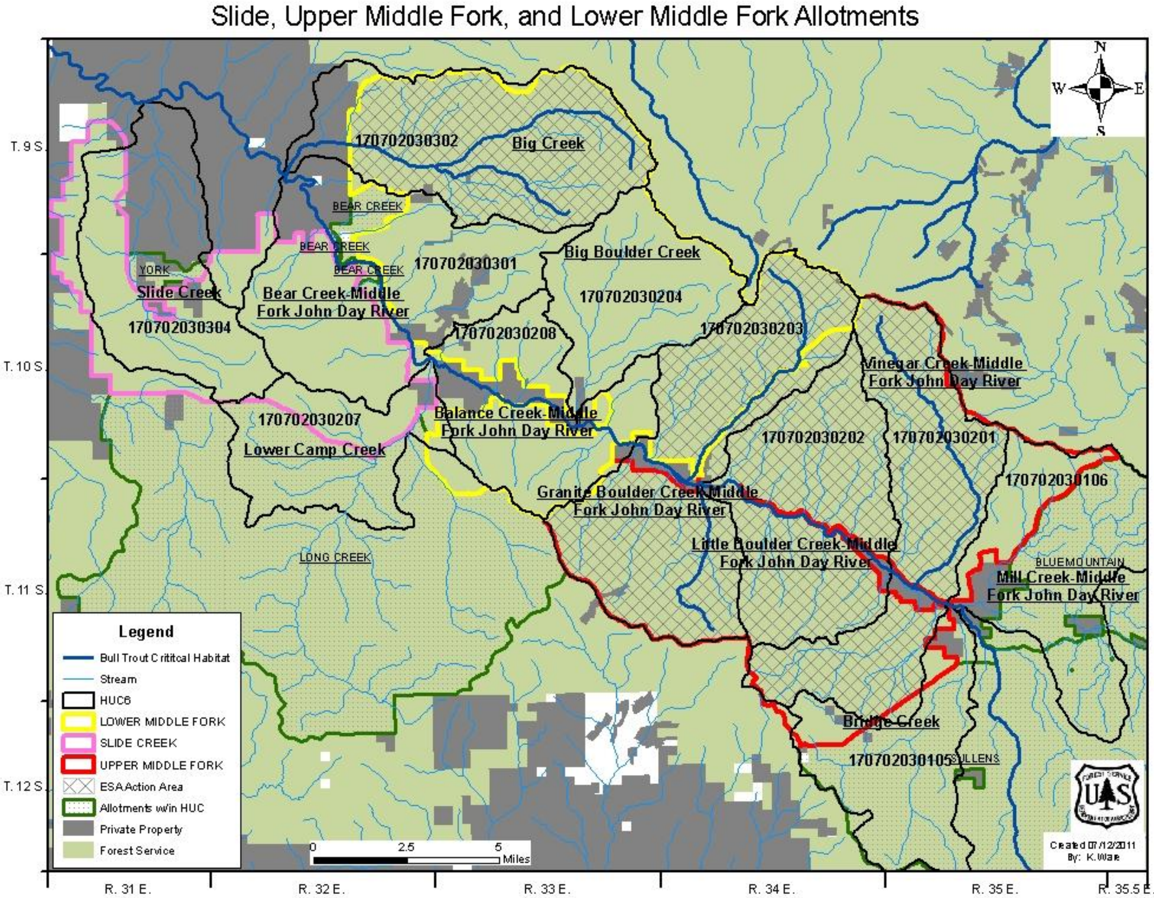


FIGURE 10. ESA CONSULTATION ACTION AREA FOR COLUMBIA RIVER BULL TROUT FOR THE UPPER MIDDLE FORK AND LOWER MIDDLE FORK ALLOTMENTS.

5 STATUS OF THE SPECIES AND DESIGNATED CRITICAL HABITAT

Two ESA-listed fish species are found in the action area: the Middle Columbia River (MCR) Steelhead distinct population segment (DPS) and Columbia River (CR) bull trout DPS. The status of both species and their respective 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, NFJD, 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 Abundance/Productivity Risk and Spatial Structure/Diversity Risk (Figure 11). These criteria are defined as:

- *Abundance* – the average number of spawners in a population over a generation or more
- *Productivity* – the performance of a population over time in terms of recruits produced per spawner
- *Spatial Structure* – a population's geographic distribution and the processes that affect that distribution
- *Diversity* – the distribution of genetic, life history and phenotypic variation within and among populations.

The NFJD MPG rates low/very low by the two criteria. The MFJD and SFJD MPGs rate low/moderate and the LMJD and UMJD 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 13. 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.

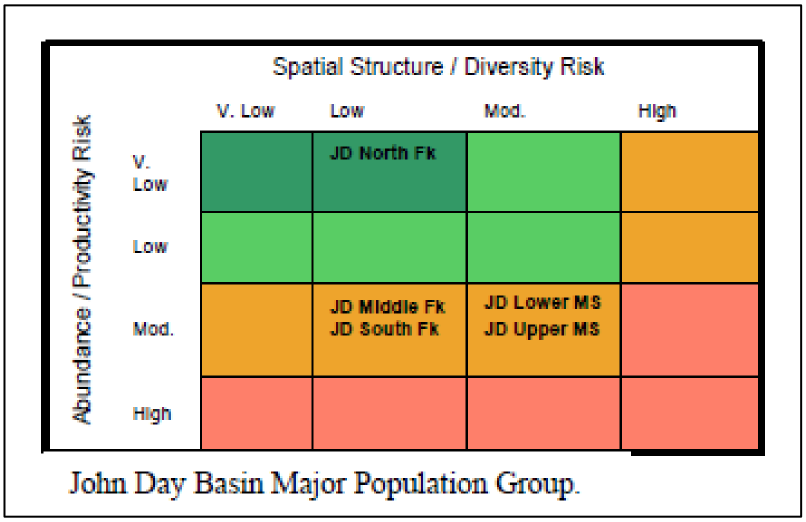


FIGURE 11. VIABILITY RATINGS FOR THE MCR STEELHEAD MPG (NMFS 2009). SHADES OF GREEN INDICATE LOWER RISK OF EXTINCTION AND SHADES OF RED INDICATE HIGHER RISK.

TABLE 13. MCR STEELHEAD JOHN DAY RIVER MPG - SUMMARY OF ABUNDANCE, PRODUCTIVITY, RISK RATINGS, AND MINIMUM ABUNDANCE THRESHOLDS (NMFS 2009).

Population	Abundance Threshold[1]	Size Category	Run Timing	10-year Geomean abundance	Abundance Range	10-yr Hatchery Fraction[2]	Productivity[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	Intermediate	Summer	524	185-5169	0.08	2.14	0.33	M	M
Middle Fork John Day	1000	Intermediate	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 14. MaSAs have enough habitat to support 500 spawners.

TABLE 14. HABITAT LIMITING FACTORS FOR MIDDLE FORK JOHN DAY RIVER 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.		X	X	X	X		

MiSA							

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 NMFS final rule for critical habitat described 6 PCEs, but only 3 PCEs would apply to freshwater habitat in the JDR basin. The PCEs of MCR Steelhead CH that pertain to the JDR 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 John Day River 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 (CWA) 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 (NPCC 2005) 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 Subbasins 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 LMJD River, 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 5-YEAR 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) 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. 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 (USDI 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) 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; Saint Mary; Columbia Headwaters; Coastal; Klamath; and Upper Snake. The current John Day River RU would become part of the Mid-Columbia RU. These six new biologically based RUs will be proposed to replace the 27 RUs previously identified in the bull trout Draft Recovery Plan (DRP) (USDI FWS 2002).

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), which is herein incorporated by reference.

5.3.3 CR BULL TROUT POPULATIONS

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). Isolated sightings of bull trout have been confirmed in Vinegar Creek (USDI FWS in litt. 2004).

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). 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 CR BULL TROUT VIABILITY STATUS

The FWS conducted a conservation status assessment for 121 core areas (USDI FWS 2005a). 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 15.

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

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

TABLE 16. RESULTS OF 2005 CONSERVATION STATUS ASSESSMENT FOR BULL TROUT IN THE JOHN DAY RIVER BASIN

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.

The FWS provided updated information on 121 bull trout core areas in a document titled "Bull Trout Core Area Templates – Complete Core Area by Core Area Analysis" (USDI FWS 2005b) to inform its 5-Year Review of the status of bull trout. The updated information for the Middle Fork John Day (MFJD) Core Area is presented here. Bull trout in the MFJD Core Area are still in danger of extirpation. Recent evidence suggests that bull trout are slowly expanding their distribution within this core area, but the extremely small population levels will make recovery a very long-term goal. Overall trend for the MFJD Core Area is upward. Habitat fragmentation, connectivity and water quality issues still abound. The resident life form predominates within the core area. The relatively small population size continues to be a concern. This core area has started towards recovery, but it may take many years before habitat improves sufficiently to allow the population increases needed to reach recovery.

5.3.6 POPULATION 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 1999a).

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 Fork JDR 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 5.4. CRITICAL HABITAT FOR COLUMBIA RIVER 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 (USDI FWS 2010b). The effective date of the final rule was November 17, 2010. Figures 1, 4 and 7 display streams designated as CH within the Upper Middle Fork, Lower Middle Fork and Slide Creek Allotments, respectively.

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:

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.

5.4.3 STATUS OF CR 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 proposed Federal livestock grazing which have undergone formal consultation have been taken into account in the following description of the environmental baseline.

6.1 NMFS MATRIX OF PATHWAYS AND INDICATORS AND FWS BULL TROUT MATRIX

A NMFS process paper titled “Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale” (NMFS 1996) is used to describe the environmental baseline for steelhead. It is commonly known as the NMFS Matrix of Pathways and Indicators, hereafter referenced as the “NMFS 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.

In February 1998, the USFWS also issued a matrix, providing guidelines for assessing habitat condition within bull trout streams (USDI FWS 1998), hereafter referred to as the "bull trout matrix." The bull trout matrix identifies important bull trout habitat and population elements and three condition levels for each: "Functioning Appropriately (FA)," "Functioning At Risk (FAR)," and "Functioning At Unacceptable Risk (FAUR)." Table 17 presents the current status of the environmental baseline using both the NMFS MPI and the bull trout matrix for the MFJD River sub-basin. The action area is entirely located within the sub-basin. **Table cells in bold print indicate the current status of each indicator**. The habitat indicators in the NMFS matrix and bull trout matrix also correspond to the PCEs of designated CH for MCR Steelhead and CR bull trout. The relationship between NMFS MPI and bull trout matrix habitat indicators and the PCEs of CH for each species is discussed in Section 7.2 (Analysis of Effects to Designated Critical Habitat).

TABLE 17. STATUS OF THE ENVIRONMENTAL BASELINE FOR THE MIDDLE FORK JOHN DAY RIVER SUB-BASIN.[1]

Pathway	Indicators	Properly Functioning (steelhead) or Functioning Appropriately (bull trout	At Risk (steelhead) or Functioning at Risk (bull trout)	Not Properly Functioning (steelhead) or Functioning at Unacceptable Risk (bull trout)
Subpopulation Characteristics Within Subpopulation Watersheds **(Bull Trout only)**	Subpopulation Size	Mean total subpopulation size or local habitat capacity more than several thousand individuals. All life stages evenly represented in the subpopulation.	Adults in subpopulation are less than 500 but >50.	**Adults in subpopulation is 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. 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.**
	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	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.**

Pathway	Indicators	Properly Functioning (steelhead) or Functioning Appropriately (bull trout	At Risk (steelhead) or Functioning at Risk (bull trout)	Not Properly Functioning (steelhead) or Functioning at Unacceptable Risk (bull trout)
		for the species. Neighboring subpopulations are large with high likelihood of producing surplus individuals or straying adults that will mix with other subpopulation groups.		
	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.
Water Quality	Temperature	*MCR Steelhead* 50 – 57° F (max 7-day average)	*MCR Steelhead* 57 – 61° F (spawning, max 7-day average) 57 – 64° F (migration and rearing, max 7-day average)	***MCR Steelhead*** **> 61° F (spawning, max 7-day average)** **> 64° F (migration and rearing, max 7-dayavg.)**

Pathway	Indicators	Properly Functioning (steelhead) or Functioning Appropriately (bull trout	At Risk (steelhead) or Functioning at Risk (bull trout)	Not Properly Functioning (steelhead) or Functioning at Unacceptable Risk (bull trout)
		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)	*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	***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 15**° C **(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
Habitat Access	Physical Barriers	Any man-made barriers present in watershed allow upstream and downstream fish passage at all	Any man-made barriers present in watershed do not allow upstream and/or downstream fish passage	**Any man-made barriers present in watershed do not allow upstream and/or**

Pathway	Indicators	Properly Functioning (steelhead) or Functioning Appropriately (bull trout	At Risk (steelhead) or Functioning at Risk (bull trout)	Not Properly Functioning (steelhead) or Functioning at Unacceptable Risk (bull trout)
		flows	at base/low flows	**downstream fish passage at a range of flows**
Habitat Element	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. 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
	Pool Frequency	*MCR Steelhead*	*MCR Steelhead*	***MCR Steelhead***

Pathway	Indicators	Properly Functioning (steelhead) or Functioning Appropriately (bull trout	At Risk (steelhead) or Functioning at Risk (bull trout)	Not Properly Functioning (steelhead) or Functioning at Unacceptable Risk (bull trout)
		Meets pool frequency standards and meets large woody debris recruitment standards for Properly Functioning habitat *Bull Trout* Pool frequency in a reach closely approximates: <u>Wetted width (ft)</u> <u>Pools/mile</u> 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	Meets pool frequency standards but large woody debris recruitment inadequate to maintain pools over time	**Does not meet pool frequency standards**
	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 (steelhead) or Functioning Appropriately (bull trout	At Risk (steelhead) or Functioning at Risk (bull trout)	Not Properly Functioning (steelhead) or Functioning at Unacceptable Risk (bull trout)
	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 (>1meter)**
	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
	Floodplain	Off-channel areas are frequently	**Reduced linkage of wetland,**	Severe reduction in

Pathway	Indicators	Properly Functioning (steelhead) or Functioning Appropriately (bull trout	At Risk (steelhead) or Functioning at Risk (bull trout)	Not Properly Functioning (steelhead) or Functioning at Unacceptable Risk (bull trout)
	Connectivity	hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation, and succession	**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**	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, base flow, and/or flow timing relative to an undisturbed watershed of similar size, geology, and geography**	Pronounced changes in peak flow, base flow, 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**
Watershed Condition	Road Density & Location	*MCR Steelhead* < 2 mi/mi^2; no Valley bottom roads	*MCR Steelhead* 2 – 3 mi/mi^2; some valley bottom roads	***MCR Steelhead*** **> 3 mi/mi^2; many valley bottom roads**

Pathway	Indicators	Properly Functioning (steelhead) or Functioning Appropriately (bull trout	At Risk (steelhead) or Functioning at Risk (bull trout)	Not Properly Functioning (steelhead) or Functioning at Unacceptable Risk (bull trout)
		Bull Trout <1mi/mi^2 ; no valley bottom roads	*Bull Trout* 1 - 2.4 mi/mi^2; some 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 subwatersheds, 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%
	Disturbance Regime	Environmental disturbance is short lived; predictable hydrograph, high quality habitat and watershed complexity	**Scour events, debris torrents, or catastrophic fire are localized events that occur in several minor parts of the watershed.**	Frequent flood or drought producing highly variable and unpredictable flows, scour events, debris torrents,

Pathway	Indicators	Properly Functioning (steelhead) or Functioning Appropriately (bull trout	At Risk (steelhead) or Functioning at Risk (bull trout)	Not Properly Functioning (steelhead) or Functioning at Unacceptable Risk (bull trout)
		providing refuge and rearing space for all life stages or multiple life-history forms. Natural processes are stable.	**Resiliency of habitat to recover from environmental disturbances is moderate.**	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 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 pre-disturbance 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]

[1]Bold text in table cells indicates current status of the indicator

The environmental baseline using the NMFS MPI and the FWS bull trout matrix ratings (Table 17) 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 Middle Columbia River Steelhead Recovery Plan (NMFS 2009) describes habitat conditions for the MFJD River population. The recovery plan, citing MNF (1999a), states that channels have been disconnected from their floodplains in several locations. Rosgen E-channels characteristic of wide grassy valley bottoms have likely been altered to type G and C channels by past overgrazing and road construction within floodplains (MNF 1999a). Areas with this condition include the mainstem MFJD River, Squaw Meadow, Summit Creek and Squaw Creek near their mouths, and Olmstead Creek at Olmstead meadows. Historic mining also altered floodplains along the Middle Fork and tributaries. Where channels are entrenched, water tables are lowered and water storage capacity is reduced, resulting in lower base flows.

Roads have contributed to degraded habitat conditions. Portions of Bridge, Dry Fork Clear, Crawford, Summit, and Squaw creeks have significant lengths of their channels impacted by streamside roads. Road construction has altered and constricted channels in many tributaries and along the Middle Fork mainstem. Roads, along with grazing activities, past forestry, mining, and channel alterations all contribute sediment to streams in the watershed. Culverts and improperly screened water diversions pose fish passage problems on tributaries of the MFJD River.

The greatest water quality concern for the MFJD River is high water temperatures. The recovery plan displays 23 stream segments listed by ODEQ as water quality limited for water temperature. The recovery plan cites NPPC (2005) when stating that vegetation disturbance, stream straightening/relocation, livestock grazing, forest practices, road building, irrigation water withdrawals, and historical mining and dredging cause elevated summer water temperatures.

The recovery plan states that riparian corridors have been altered with resultant reductions in levels of instream large woody debris (LWD). Loss of LWD has resulted in fewer pools, increased stream velocities, reduced sediment trapping, and an overall reduction in channel diversity and key habitat (MNF1999a). Exceptions include the Clear Creek and Lunch Creek watersheds that contain high levels of woody material and good riparian conditions. Log weir 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 1999a).

There are additional sources of information to inform the condition of the environmental baseline at finer scales than the MFJD River population. They include a MNF roads analysis report, water temperature monitoring information, PIBO EM results, annual end-of-year grazing reports for the years 2008-2010 (MNF 2009a, MNF 2009b and MNF 2011) and Multiple Indicator Monitoring (MIM) (Burton et al. 2011) monitoring results at Designated Monitoring Areas (DMA) for specific pastures in the allotments for years ranging from 2004 to 2010. The information provided by each of these sources is presented and interpreted below.

6.1.2 BULL TROUT DRAFT RECOVERY PLAN

The 2002 Draft Recovery Plan (DRP) for bull trout describes altered processes and habitat conditions in the MFJD River subbasin that support FAR and FAUR characterizations of indicators in the Bull Trout Matrix. MNF BAs (1998a, 1998b and 1999b) are cited that describe key bull trout habitat concerns in the MFJD River subbasin as high water temperatures, substrate embeddedness and high road densities. The high road densities and large wild fires (Summit Fire 1996) have contributed to altered stream hydrology and increased sediment delivery (ODFW in litt. 2000).

The amount of large wood has been reduced, as well as a reduction of pool depths in many stream reaches in the subbasin (MNF 1998a). The Oregon Department of Environmental Quality (1998) identified all streams inhabited by bull trout in the MFJD River subbasin (MFJD River, Big Creek, Granite Boulder Creek, and Clear Creek) as water quality limited, primarily for high summer temperatures, but also flow modification of the Middle Fork. High water temperatures are a factor contributing to isolating bull trout population in the Middle Fork (ODFW in litt. 2000).

Livestock grazing has led to damaged riparian zones, particularly where summer and fall livestock grazing occurs. Several areas of the MFJD River lack adequate riparian vegetation to prevent bank erosion and to provide shade, and grazing is attributed as the cause of the lack of shrubs and deciduous trees in meadows in the upper reaches of the MFJD River (ODFW, in litt. 2000).

An extensive road network in the MFJD River subbasin has impacted water quality by altering run-off patterns, constraining movement of stream channels and serving as a conveyance for introduction of non-native species, poachers and toxic substances as a result of spills. The Bull Trout Core Areas Conservation Status Assessment (USDI FWS 2005a) determined by a Geographic Information Systems analysis that the MFJD River subbasin has a road density of 3.8 miles per square mile. Road densities in roaded areas within the sub-watersheds supporting bull trout range from 1.5 to 3.5 kilometers per square kilometer (2.4 to 5.7 miles per square mile), with approximately 20 percent of roads occurring in the riparian habitat conservation areas (MNF 1999b and 1999c). There is a strong negative correlation between the population status of bull trout and road density (Lee et al. 1997).

Mining has had an impact on habitat in the MFJD River subbasin. Many areas have been dredged or placer mined. While mining activity is currently relatively minimal, the MFJD River subbasin has some of the highest mining activity on the MNF (MNF 1999c). The majority of the larger stream substrate has been removed from the channels in Elk, Deep, Big, Placer Gulch, Davis, Vinegar, and Vincent creeks in the Granite Boulder subwatershed as a result of hand dredging (MNF 1999c). Stream rocks were lifted, washed and stacked in the adjacent floodplain or terraces.

Streams are a focal point for recreation. Campgrounds and dispersed sites along the MFJD River receive moderate to heavy continuous use, especially during big game hunting season (MNF 1999c). Recreation impacts to aquatic habitat occur as a result of damage to riparian vegetation from camping, vehicle use and sanitation practices (MNF 1999c).

6.1.3 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 2004). Among the issues analyzed was the risk of the existing road network to general watershed health at the scale of 6th 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 Roads Analysis 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 18). 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 18. RANGES OF VALUES BY RISK CATEGORY FOR ELEMENTS USED IN THE WATERSHED RISK ANALYSIS.

	Risk Category			
Risk Element	Low	Moderate	High	Extreme
Total Road	0 - 1	1 - 3	3 - 5	>5

Risk Element	Risk Category			
	Low	Moderate	High	Extreme
Density (miles/mile^2)				
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 Sensitive Soils	1 - 20	20 – 50	50 – 100	Not applicable

The results for the eleven 6th field HUCs represented in the ESA action area for MCR Steelhead and the subset of four 6th field HUCs in the ESA action area for CR bull trout in this consultation are shown in Table 19. A discussion of how the MNF Roads Analysis Report results relate to the environmental baseline classifications for indicators in the NMFS MPI and Bull Trout Matrix follows, by species. The analysis below generally affirms the NMFS MPI and Bull Trout Matrix characterizations of the environmental baseline in Table 17. Differences (for example, conclusions below of NPF/FAUR when Table 17 indicates AR/FAR) are attributed to the differences in scale between conclusions based on subwatersheds (6th field HUCs) in contrast to the subbasin scale conclusions in Table 17.

6.1.3.1 MCR STEELHEAD

The ESA action area subwatersheds for MCR steelhead are listed in Table1 and described by allotment in section 4.4 of the BA. The sub-watershed segregation by allotment is repeated here for the reader’s convenience.

Upper Middle Fork Allotment: Vinegar Creek, Little Boulder Creek, Granite Boulder Creek, Mill Creek and Bridge Creek sub-watersheds;

Lower Middle Fork Allotment: Big Creek, Bear Creek, Big Boulder Creek, Balance Creek and Granite Boulder Creek sub-watersheds;

Slide Creek Allotment: Lower Camp Creek, Bear Creek and Slide Creek sub-watersheds.

The risk ratings of the existing road network to general subwatershed health in the ESA action area for MCR Steelhead are as follows: Granite Boulder Creek and Lower Camp Creek were given an "extreme" risk rating; Bridge Creek, Mill Creek, Vinegar Creek, Little Boulder/Deerhorn Creek, Coyote Creek/Balance Creek, Mosquito Creek/Beer Creek and Slide Creek were given a "high" watershed risk rating; and Big Creek and Big Boulder Creek were given a "moderate" watershed risk rating.

The individual risk ratings for the road density, road proximity within 200 feet, and road crossings elements were "high" or "extreme" for the Granite Boulder Creek, Lower Camp Creek Bridge Creek, Mill Creek, Vinegar Creek, Coyote Creek/Balance Creek, Mosquito Creek/Beer Creek and Slide Creek 6th field HUCs. This suggests that the legacy road system has negatively impacted riparian and aquatic environmental baseline conditions in these eight sub-watersheds.

TABLE 19. SUB-WATERSHED RISK RATINGS FOR SIXTH FIELD HYDROLOGIC UNITS IN THE ESA ACTION AREAS FOR THE UPPER MIDDLE FORK, LOWER MIDDLE FORK AND SLIDE CREEK ALLOTMENTS CONSULTATION (FROM MNF 2004).

6TH FIELD HYDROLOGICUNIT NAME	6TH FIELD HYDROLOGIC UNIT CODE NUMBER	ROAD DENSITY RISK ML 1-5	ROAD DENSITY RISK ML 1-2	ROAD 200' PROXIMITY RISK ML 1-5	ROAD 200' PROXIMITY RISK ML 1-2	ROAD STREAM CROSSINGS DENSITY	GEOLOGIC SENSITIVITY	SOIL EROSION SENSITIVITY	OVERALL WATERSHED RISK
BRIDGE CREEK	170702030105	E[1]	E	E	E	H[2]	L[3]	L	H
MILL CREEK	170702030106	H	H	E	E	E	L	L	H
VINEGAR CREEK[5]	170702030201	H	H	E	E	E	M[4]	L	H
LITTLE BOULDER CREEK / DEERHORN	170702030202	M	M	H	H	H	H	M	H
GRANITE BOULDER CREEK	170702030203	H	H	E	E	E	H	M	E
BIG BOULDER CREEK	170702030204	M	M	M	M	H	M	L	M
COYOTE CREEK / BALANCE CREEK	170702030205	H	H	H	H	E	H	M	H
LOWER CAMP CREEK	170702030208	H	H	E	E	E	H	M	E

MOSQUITO CREEK / BEAR CREEK	170702030301	H	E	E	E	H	M	L	H
BIG CREEK	170702030302	M	M	H	M	H	M	L	M
SLIDE CREEK	170702030304	H	E	E	E	E	L	L	H

[1]E = extreme
[2]H = high
[3]L = low
[4]M = moderate
[5]**Streams in bold text contain both MCR Steelhead and CR Bull Trout.**

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 same eight 6th field HUCs are NPF for RDL. The road density risk rating of "moderate" assigned to the Little Boulder Creek/Deerhorn, Big Boulder Creek and Big Creek 6th field HUCs 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 no other roads risk analysis elements 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 Increase in Drainage Network (IDN) indicator. The "extreme" and "high" risk scores for the RSCD risk element for all eleven of the 6th field HUCs supports 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 all eleven of the 6th field HUCs would logically support classification of NPF for the Change in Peak/Base Flows, Sediment and Substrate NMFS MPI indicators.

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 MNF has tallied road crossing structures that may have fish passage concerns from Level II stream inventory reports. More than thirty culverts with potential fish passage problems were tallied in streams within the ESA action area. The culverts that may have fish passage concerns are located in the following allotments by stream. Upper Middle Fork Allotment: Sulphur Creek, Ragged Creek, Ruby Creek, Mill Creek, Vincent Creek, Vinegar Creek, Blue Gulch, Windlass Creek, Little Boulder Creek and an unnamed tributary to it, and Caribou Creek. Lower Middle Creek streams with potential fish passage culverts include Mosquito Creek, Deadwood Creek, Swamp Gulch, Pizer Creek, Lost Creek, East Fork Big

Creek, Deep Creek, Elk Creek and North Fork Elk Creek. In the Slide Creek Allotment, potential fish passage culvert barriers are found in Whiskey Creek and Slide Creek. This information supports a classification of NPF for the Physical Barriers indicator. The MNF has replaced culverts to improve fish passage in a number of streams in the allotments, including Placer Gulch, Butte Creek, Granite Boulder Creek and Beaver Creek.

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 eleven 6th field HUCs represented in the three allotments. However, the “extreme” or “high” risk ratings for the two risk elements for all but the Big Boulder Creek and Big Creek 6th field HUCs would tend to support a NMFS MPI classification of NPF for the two indicators for the remaining nine 6th field HUCs.

6.1.3.2 CR BULL TROUT

The subwatersheds of the bull trout ESA action areas for the Upper Middle Fork and Lower Middle Fork allotments are described in section 4.4 of this BA. The Upper Middle Fork allotment ESA action area is within the Vinegar Creek, Little Boulder and Granite Boulder Creek sub-watersheds (6th field HUCs) (Table 12). The Lower Middle Fork allotment ESA action area is within the Big Creek and Granite Boulder Creek sub-watersheds (Table 12). Both the Upper Middle Fork and Lower Middle Fork allotments are within the Granite Boulder Creek 6th field HUC of the Middle Fork John Day River (Figure 10). The risk ratings of the existing road network to general subwatershed health in the bull trout ESA action area are: Big Creek was given a “moderate” risk rating; Little Boulder Creek and Vinegar Creek were given a “high” risk rating, and Granite Boulder Creek was given an “extreme” risk rating.

The individual risk ratings for the road density, road proximity within 200 feet, and road crossings elements were “high” or “extreme” for the Granite Boulder Creek and Vinegar Creek 6th field HUCs. This suggests that the legacy road system has negatively impacted riparian and aquatic environmental baseline conditions in these three sub-watersheds.

Values for the Bull Trout Matrix Road Density and Location (RDL) indicator are <1, 1-2.4 and >2.4 miles/mile^2 for the FA, FAR and FAUR categories, respectively. The FA category would be “low” by the roads analysis criteria, the FAR category would be “moderate” and the FAUR category would include both the “high” and “extreme” roads analysis categories. For those 6th field HUCs in the bull trout ESA action area, Big Creek and Little Boulder Creek would be FAR; and Vinegar Creek and Granite Boulder Creek would be FAUR.

While no other roads risk analysis elements are directly comparable to Bull Trout Matrix indicators, it is logical that the Road Stream Crossing Density (RSCD) watershed risk element would inform an analysis of the Increase in Drainage Network (IDN) indicator. Fifty percent (2 of 4)of the bull trout subwatersheds had “high” risk scores for the RSCD risk element and the other two subwatersheds had an “extreme” risk score. This information supports a Bull Trout Matrix classification of FAUR 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 RSCD risk element “extreme” and “high” risk ratings for the bull trout 6^{th} field HUCs would logically support the FAUR classification for the Change in Peak/Base Flows, Sediment and Substrate indicators.

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 MNF has tallied road-crossing structures that may have fish passage concerns from Level II stream inventory reports. Four culverts with potential fish passage problems are located in Vinegar Creek in the Upper Middle Fork Allotment. The MNF has replaced three culverts to allow or improve fish passage in Granite Boulder Creek.

The two risk elements for road density within 200 feet of streams do not have a comparable Bull Trout Matrix indicator. However, roads within floodplains have the potential to negatively affect the Off-channel Habitat and Floodplain Connectivity 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 four 6^{th} field HUCs in the bull trout ESA action area. However, there were “extreme” or “high” risk ratings for the two risk elements for all four 6^{th} HUCs with one exception: a moderate risk rating for roads in maintenance levels 1 and 2 for the Big Creek 6^{th} field HUC. This information supports a Bull Trout Matrix classification of FAUR for the Off-channel Habitat and Floodplain Connectivity indicatorsRoad maintenance level (ML) designations are defined as:

<u>Level 1.</u> 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.

<u>Level 2.</u> Roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor.

<u>Level 3.</u> 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.

<u>Level 4.</u> 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.

6.1.4 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 Upper Middle Fork, Lower Middle Fork and Slide Creek 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 26 monitoring sites on 15 streams in the Upper Middle Fork Allotment. Data sets vary from single years to multiple years in the time frame from 1995-2005. Of the 15 streams, segments of 10 streams are listed by ODEQ as water quality limited for water temperature. For the remaining five streams, MNF data indicates that state water quality standards are not being met (with the exception of the Ruby Creek upstream reach), but the ODEQ determined the data was insufficient to include the stream on Oregon's 2004/2006 integrated report as 303(d) listed.

There are 22 monitoring sites on 13 streams in the Lower Middle Fork Allotment. Data sets vary from single years to multiple years in the time frame from 1995-2005. Of the 13 streams, segments of 4 streams are listed by ODEQ as water quality limited for water temperature. Of the remaining nine streams, MNF data indicates that state water quality standards are not being met (with the exception of the farthest upstream Big Boulder Creek reach), but the ODEQ determined the data was insufficient to include the stream on Oregon's 2004/2006 integrated report as 303(d) listed.

There are five monitoring sites on three streams in the Slide Creek Allotment. Data sets vary from two to five years in the time frame from 1996-2000. Of the three streams, Camp Creek is listed by ODEQ as water quality limited for water temperature. For Slide Creek and Rice Creek, MNF data indicates that state water quality standards are not being met for both streams in the lower reach, but are being met in the upper reach. The ODEQ determined the data was insufficient to include the lower stream reach of either Slide Creek or Rice Creek on Oregon's 2004/2006 integrated report as 303(d) listed.

Monitoring data indicates that the majority of stream reaches fail to meet water temperature standards for State water quality, Amendment 29 DFCs and PACFISH RMOs. Forty-seven of 53 monitoring sites in the three allotments rate water temperature as NPF by NMFS MPI criteria for MCR steelhead. The exceptions by site designation in the Upper Middle Fork Allotment are Davis Creek 10 (PF) and Ruby Creek 25 (AR). In the Lower Middle Fork Allotment the exceptions are Granite Boulder Creek 4 (PF) and Granite Boulder Creek 23 (PF). In the Slide Creek Allotment, Deadwood Creek 22 rated AR. All of the 14 sites in the Upper Middle Fork and Lower Middle Fork Allotments rated water temperature as FAUR using the bull trout matrix criteria. The Slide Creek Allotment does not contain bull trout CH.

6.2 PIBO MONITORING

The PACFISH-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 Upper Middle Fork, Lower Middle Fork and Slide Creek Allotments is presented and analyzed below. Sites included within the summary are both Integrator[5] (I) reaches within randomly selected watersheds as well as Designated Monitoring Area (DMA)[6] 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) these allotments between 2001 and 2006. Although information for the integrator site on Slide Creek is included in the table below, the site is located just downstream of the allotment within a corridor fence around HWY 395; however, information may be useful in determining effects of upstream management activities. Within these monitored reaches the data presented in Tables 20-23 suggest that some stream attributes are improving, most are remaining relatively static, and some are declining.

Table 20 displays pool characteristics. Based upon bankfull widths and pools per kilometer, all of the sites for each year would meet the NMFS MPI/bull trout matrix criterion for pool frequency. However, the pool frequency indicator also includes large woody debris (LWD) criteria and LWD information is not available that is compatible with NMFS MPI/bull trout matrix LWD dimensions. Pool frequency increased at two of three sites and remained static at the other.

Percent pool estimates remained relatively static between years at the three sites. Mean residual pool depth did not exceed 0.3 meters for any site. Raw data are not available to evaluate the NMFS MPI criterion for the pool quality indicator or the bull trout matrix large pools indicator. Each requires counts of pools > 1 meter in depth.

TABLE 20. POOL CHARACTERISTICS AT PIBO MONITORING SITES WITHIN THE UPPER MIDDLE FORK, LOWER MIDDLE FORK AND SLIDE CREEK ALLOTMENTS.

Stream	Site Type	Year	Rosgen Channel Type	Bankfull Width (M)	Pools per km	Percent Pools	Residual pool depth (m)
Vinegar Cr.	I	2001	F4	5.3	43	28	0.27
Vinegar Cr.	I	2006	C4	4.9	46	30	0.23

[5] 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%)

[6] 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

Stream	Site Type	Year	Rosgen Channel Type	Bankfull Width (M)	Pools per km	Percent Pools	Residual pool depth (m)
Deadwood Cr.	I	2005	B4c	5.1	54	48	0.24
Deadwood Cr.	I	2010	B4c	6.0	68	64	0.21
Big Boulder Cr.	I	2006	B4	8.2	39	27	0.21
Slide Cr.	I	2005	B4	3.0	109	53	0.16
Slide Cr.	I	2010	B4	3.3	120	45	0.16

Table 21 presents stream channel and bank characteristics. The NMFS MPI bankfull width-to-depth ratio criteria for PF or AR of less than 10 or 10-12 was met at Slide Creek. The five other site measurements would rate NPF. The bull trout matrix specifies that width-to-depth ratio measurements be taken at scour pools, which is not the method used by PIBO monitoring. Therefore, an evaluation to determine a bull trout matrix rating cannot be performed. Bankfull width-to-depth ratio improved at the three sites with repeat measurements.

The NMFS MPI utilizes 90 percent stability for the stream bank condition indicator. All sites met the criterion for PF all years, with the Vinegar Creek site improving from 93 to 100 percent, the Deadwood Creek site decreasing from 100 to 92 percent and the Slide Creek site remaining static between years at 98 percent. Bank angle remained relatively static at the three sites between years. Percent undercut bank remained static at Vinegar Creek while increasing greatly at Deadwood Creek (17 to 47 percent) and Slide Creek (13 to 33 percent).

TABLE 21. STREAM CHANNEL AND BANK CHARACTERISTICS AT PIBO MONITORING SITES WITHIN THE UPPER MIDDLE FORK, LOWER MIDDLE FORK AND SLIDE CREEK ALLOTMENTS.

Stream	Site Type	Year	Rosgen Channel Type	Bankfull Width/Depth Ratio	Percent Stable Bank	Bank Angle (degrees)	Percent Under-cut Bank
Vinegar Cr.	I	2001	F4	38	93	117	33
Vinegar Cr.	I	2006	C4	29	100	118	32
Deadwood Cr.	I	2005	B4c	23	100	127	17
Deadwood Cr.	I	2010	B4c	16	92	102	47
Big Boulder Cr.	I	2006	B4	28	100	137	10
Slide Cr.	I	2005	B4	12	98	124	13
Slide Cr.	I	2010	B4	8	98	114	33

Table 22 presents substrate characteristics at the PIBO Integrator monitoring sites. The D50 (median particle size) of the substrate increased from 51 to 59 mm at the Vinegar Creek site, decreased from 28 to 20 mm at the Deadwood Creek Site, and decreased from 61 to 50 mm at the Slide Creek Site. Amendment 29 of the LRMP sets a desired condition of <20%

embeddedness for substrate. Of the 46 stream survey reports that reported substrate embeddedness data at 636 sites, 574 sites (90 %) exceeded a 30 percent substrate embeddedness criterion. Therefore, the vast majority of stream reaches did not meet the Amendment 29 desired condition criterion of <20 percent (Appendix J presents PIBO and stream survey results) and would rate NPF/FAUR by the NMFS MPI and bull trout matrix criterion of >30 percent.

Regarding fine sediment, the PIBO data for the 2 mm size class is conservative in contrast to the NMFS MPI and bull trout matrix criterion of fines in gravel <0.85 mm. The data available for percent fine sediment smaller than 2 mm in diameter at pool tail-outs place the following sites at PF or FA (>12 percent fines percent fines) for the NMFS MPI/bull trout matrix: Vinegar Creek 2006; Deadwood Creek 2005; Big Boulder Creek 2006 and Slide Creek 2010. Deadwood Creek 2010 would rate AR/FAR and Slide Creek 2005 would rate NPF/FAUR. The Deadwood Creek site had an increase in percent pool tail fines between 2005 and 2010, from 7.1 percent to 18.0 percent while the Slide Creek site decreased considerably between 2005 and 2010, from 32 percent to 7 percent.

TABLE 22. SUBSTRATE CHARACTERISTICS AT PIBO MONITORING SITES WITHIN THE UPPER MIDDLE FORK, LOWER MIDDLE FORK AND SLIDE CREEK ALLOTMENTS.

Stream	Site Type	Year	Rosgen Channel Type	Median Particle Size (D50) (mm)	Percent Pool Tail Fines	
					<2 mm	<6 mm
Vinegar Cr.	I	2001	F4	51	-	-
Vinegar Cr.	I	2006	C4	59	5	8
Deadwood Cr.	I	2005	B4c	28	7	14
Deadwood Cr.	I	2010	B4c	20	18	35
Big Boulder Cr.	I	2006	B4	62	9	12
Slide Cr.	I	2005	B4	61	32	33
Slide Cr.	I	2010	B4	50	7	10

Table 23 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 of 67 and 68 for the Deadwood Creek site and 57 and 61 at the Slide Creek site indicate that the sites remained static between visits. Both had a majority presence of wetland species.

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.

At sites with data for repeat visits, Deadwood Creek remained relatively static while Slide Creek went down from 77 to 55 for unknown reasons.

TABLE 23. RESULTS FOR TWO PIBO VEGETATIVE COVER ESTIMATES FOR SITES WITHIN THE UPPER MIDDLE FORK, LOWER MIDDLE FORK AND SLIDE CREEK ALLOTMENTS.

Stream	Site Type	Year	Greenline Wetland Rating	Greenline Woody Cover
Vinegar Cr.	I	2001	-	-
Vinegar Cr.	I	2006	62	26
Deadwood Cr.	I	2005	67	34
Deadwood Cr.	I	2010	68	39
Big Boulder Cr.	I	2006	50	12
Slide Cr.	I	2005	57	77
Slide Cr.	I	2010	61	55

In summary, it appears that the monitoring sites on Slide and Deadwood Creeks have shown improvement for most attributes, while the Vinegar Creek site has essentially remained static. Overall, bankfull width-to-depth ratios as well as bank angle and undercut banks (2 of the 3 sites) have shown considerable improvement while the remaining evaluated attributes, those considered to be potentially affected by livestock grazing (D50, percent pools, residual pool depth, percent fines <6mm, bank stability, greenline wetland rating and greenline woody cover), remained relatively unchanged. A few of the attributes lacked data to make an evaluation.

There are too few reference sites within the JDR Basin to determine whether similar changes are occurring in unmanaged watersheds. Although only bankfull width-to-depth ratios, 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 would probably not be created or sustained over time. Thus, given the short five 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, bank stability and undercut banks, on federal lands of the MNF within the Upper Middle Fork, Lower Middle Fork and Slide 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 (Table 24). 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 24 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 24. 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 24. 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 Upper Middle Fork, Lower Middle Fork and Slide Creek allotments, two of the four monitoring sites presently show bankfull width-depth ratios within PIBO managed mean values, and at least three of the four sites currently exhibit bank stability, D50, percent undercut banks, and percent fines <6mm values within managed mean values, while only two or fewer of the four monitoring sites exhibit managed mean values for the remaining three stream attributes: percent pools, residual pool depth, and bank angle. Thus, a cursory examination of the Upper Middle Fork, Lower Middle Fork and Slide Creek Allotments reveals that five of the eight stream attributes considered to be potentially affected by livestock grazing (bankfull width-depth ratios, bank stability, D50, percent undercut banks, and percent fines <6mm) are found to be within PIBO managed mean values. The other three (percent pool, residual pool depth and bank angle) are not as good as managed mean values.

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 upon monitoring results, the current livestock management strategies utilized over the last several years should be continued. Continuing to meet the allowable use standards of the 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 Standards and Guidelines.

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 Upper Middle Fork, Lower Middle Fork and Slide Creek allotments. Data are presented in Tables 25 to 32. The monitoring data reflects use by wild ungulate use only in years when pastures were rested from livestock grazing, and combined use of wild ungulates and cattle, when cattle were grazed. Data presented is from the Blue Mountain Ranger District end-of-year grazing reports for the years 2008-2010 (MNF 2009a, MNF 2009b and MNF 2011).

Upper Middle Fork Allotment

The Upper Middle Fork Allotment has five MIM monitoring sites. The Windless Creek (Table 25) and Davis Creek (Table 28) sites are located in steelhead CH, and the Cow Camp Meadow site (Table 25) is located upstream from steelhead CH in a tributary to Little Boulder Creek. The Cow Camp Meadow site is not an official MIM site, is not on CH, and will not be surveyed in the future. The Vinegar Creek (Table 26) and Butte Creek (Table 27) sites are located in both steelhead and bull trout CH.

In 2008, the proposed end-point of 20 percent bank alteration was exceeded at the Cow Camp Meadow and Windlass Creek sites in the Caribou Pasture of the Upper Middle Fork Allotment (Table 25). It was met for all other sites that were monitored from 2008-2010 (Tables 25-28). The proposed stubble height end-point of 6 inches was exceeded in 2008 at two sites: the Cow Camp Meadow site in the Caribou Pasture (Table 25) and the Butte Creek site in the Butte

Pasture (Table 27). It was met for all other sites monitored from 2008-2010 (Tables 25, 26 and 28). The proposed woody browse end-point of 40 percent was exceeded four times ("moderate or "heavy" hedging) between 2008 and 2010 (Tables 25 and 25) and was met five times ("none," "slight," or "light" hedging) (Tables 26, 27 and 28).

Only three estimates were made for percent stable stream bank in this time period. The Vinegar Creek DMA in the Lower Vinegar Pasture had estimates of percent stable bank of 52 and 61percent for 2009 and 2010 respectively (Table 26), while the Cow Camp Meadow site in the Caribou Pasture was estimated at 100 percent (Table 25). The NMFS MPI/bull trout matrix criteria for a stream reach is PF/FA if > 80% of any stream reach has > 90% stability, AR/FAR if 50 – 80% of any stream reach has > 90% stability and NPF/FAUR if <50% of any stream reach has >90% stability. At the scale of the sites monitored, the environmental baseline characterization for the Vinegar Creek DMA would be NPF/FAUR and the Cow Camp Meadow site would be NPF (there are no bull trout at this site).

Percent covered banks estimates were done only at the same sites as the percent stable stream bank estimates. The Vinegar Creek DMA in the Lower Vinegar Pasture had estimates of percent covered bank of 56 and 68 percent for 2009 and 2010 respectively (Table 26), while the Cow Camp Meadow site in the Caribou Pasture was estimated at 100 percent (Table 25). There is no NMFS MPI or bull trout matrix criterion for percent covered banks.

TABLE 25. CARIBOU PASTURE MIM MONITORING RESULTS.

Cow Camp Meadows and Windlass Creek	**2008**		**2009 Non-Use**	**2010**
	Cow Camp Meadows	**Windlass Creek**	**Cow Camp Meadows**	**Cow Camp Meadows**
Bank Alteration (%)	23	26	NM[1]	8
Stubble Height (inches)	4	6	NM	8
Woody Browse (%)	Heavy	Moderate	NM	Moderate
Bank Stability (%)	NM	NM	NM	100
Covered Banks (%)	NM	NM	NM	100

[1]Not monitored

TABLE 26. LOWER VINEGAR PASTURE MIM MONITORING RESULTS.

Vinegar Creek MIM DMA	**2008**	**2009 Non-Use**	**2010**
Bank Alteration (%)	14	4	6

Vinegar Creek MIM DMA	**2008**	**2009 Non-Use**	**2010**
Stubble Height (inches)	7	10	10
Woody Browse (%)	Light	Light	Moderate
Bank Stability (%)	NM[1]	52	61
Covered Banks (%)	NM	56	68
[1]Not monitored			

TABLE 27. BUTTE PASTURE MIM MONITORING RESULTS.

Butte Creek[1]	**2008**	**2009 Non-Use**	**2010**
Bank Alteration (%)	8	NM[2]	NM
Stubble Height (inches)	5	NM	NM
Woody Browse (%)	Light	NM	Slight
Bank Stability (%)	NM	NM	NM
Covered Banks (%)	NM	NM	NM

[1]Butte Creek is dominated by thick alder and the greenline consists of bedrock. The dense overstory vegetation **and rocky greenline does not allow for an adequate sampling of aquatic sedges and rushes. This type of greenline is also very stable and is not easily altered by cattle.**

[2]**Not monitored**

TABLE 28. DEERHORN PASTURE MIM MONITORING RESULTS.

Davis Creek	**2008[1]**	**2009 Non-Use**	**2010[1]**
Bank Alteration (%)	0	NM[2]	NM
Stubble Height (inches)	20+	NM	NM
Woody Browse (%)	None-Slight	NM	NM

Davis Creek	2008[1]	2009 Non-Use	2010[1]
Bank Stability (%)	NM[2]	NM	NM
Covered Banks (%)	NM	NM	NM

[1]Cattle did not graze this area of the pasture in either 2008 or 2010.

[2]Not monitored

Lower Middle Fork Allotment

The Lower Middle Fork Allotment has three MIM monitoring sites. The Dry Creek and Elk Creek (Table 29) sites are located on steelhead CH. The Deadwood Creek site (Table 30) contains both steelhead and bull trout CH.

The proposed end-point of 20 percent bank alteration was met for all sites that were monitored from 2008-2010, with estimates ranging from 5 to 12 percent (Tables 29 and 30). The proposed stubble height end-point of 6 inches was also met for all sites (range 13-19 percent) (Tables 29 and 29). The proposed woody browse end-point of 40 percent was exceeded at two sites in 2010 as shown in Tables 29 and 30 for the Elk Creek site in the Susanville Pasture and Dry Creek site in the Granite Boulder Pasture. However, it was met in 2005 and 2007 at the Deadwood Creek site in the Pizer Pasture and at the Elk Creek site in the Susanville Pasture in 2009 (Tables 29 and 30).

Three of four estimates for percent stable stream bank would rate PF (range 96-98 percent) using NMFS MPI criteria at the scale of the sites monitored (Table 29). The sites were on Dry Creek in the Granite Boulder Pasture in 2009 and 2010, and on Elk Creek in the Susanville Pasture in 2010. The sites have steelhead CH but no bull trout CH. The Deadwood Creek site in the Pizer Pasture has CH for both species. The estimate of 80 percent stable bank at the Deadwood Creek site (Table 30) in 2005 would rate NPF/FAUR by the NMFS MPI/bull trout matrix, respectively. Percent covered banks estimates ranged from 95-100 percent (Tables 29 and 30). There is no NMFS MPI or bull trout matrix criterion for percent covered banks.

TABLE 29. GRANITE BOULDER AND SUSANVILLE PASTURES MIM MONITORING RESULTS.

Dry Creek – Granite Boulder Pasture	2008	2009	2010
Bank Alteration (%)	NM[1]	6	7
Stubble Height (inches)	NM	14	14
Woody Browse (%)	NM	35	75
Bank Stability (%)	NM	96	98

Dry Creek – Granite Boulder Pasture	**2008**	**2009**	**2010**
Covered Banks (%)	NM	99	98
Elk Creek – Susanville Pasture			
Bank Alteration (%)	NM[1]	NM	12
Stubble Height (inches)	NM	NM	13
Woody Browse (%)	NM	NM	43
Bank Stability (%)	NM	NM	98
Covered Banks (%)	NM	NM	100

[1]Not monitored

TABLE 30. PIZER PASTURE MIM MONITORING RESULTS.

Deadwood Creek	**2005**	**2007**
Bank Alteration (%)	5	7
Stubble Height (inches)	19	14
Woody Browse (%)	27	18
Bank Stability (%)	80	NM[1]
Covered Banks (%)	95	NM

[1]Not monitored

Slide Creek Allotment

The Slide Creek Allotment has two MIM monitoring sites: Slide Creek in the Slide Riparian Pasture (Table 31) and Whiskey Creek in the Whiskey Riparian Pasture (Table 32). Both streams have steelhead CH, but no bull trout CH.

In 2009 and 2010 the Whiskey Riparian Pasture was excluded from livestock grazing by fencing. There was evidence of use by wild ungulates when pastures were monitored in years of non-use by livestock. In 2009 and 2010 in the Whiskey Riparian Pasture, wild ungulate use exceeded the proposed end-point of 40 percent woody browse at 64 percent and 87 percent (Table 32). The 2008 estimate for the site was 19 percent (Table 32).

The proposed end-point of 20 percent bank alteration was exceeded at the Whiskey Creek site in the Whiskey Riparian Pasture in 2008 at 27 percent (Table 32). It was met for five other estimates in the Slide Riparian and Whiskey Riparian pastures in the 2008 to 2010 time period (Tables 31 and 32). The proposed end point of 6 inches stubble height was not met in 2008 at either of the two MIM sites in the Slide Allotment (Tables 31 and 32). However, the proposed end-point was met for both sites in 2009 and 2010 (Tables 31 and 32).

The woody browse estimate of 76 percent in 2010 for the Slide Creek site in the Slide Riparian Pasture (Table 31) was a result of vandalism of a cattle guard. The proposed end-point of 40 percent was met in 2008 and 2009 at the same site with identical estimates of 15 percent (Table 31).

No estimates of percent stable bank and percent covered banks were made in 2008 (Tables 31 and 32). Percent stable bank estimates would rate PF using NMFS MPI criteria at the Whiskey Creek site of the Whiskey Riparian Pasture (93 percent for both 2009 and 2010 as shown in Table 32) and NPF at the Slide Creek site in the Slide Riparian Pasture (79 percent in 2009 and 66 percent in 2010 as shown in Table 31). The decline between years in the Slide Riparian Pasture site was due to the cattle guard vandalism described earlier. For the same reason, the percent covered banks estimate declined between 2009 and 2010 at that site (Table 31). The percent covered banks estimate at the Whiskey Riparian Pasture site was 100 percent for both 2009 and 2010 (Table 32). There is no NMFS MPI criterion for percent covered banks.

TABLE 31. SLIDE RIPARIAN PASTURE MIM MONITORING RESULTS.

Slide Creek	2008	2009	2010[1]
Bank Alteration (%)	11	6	17
Stubble Height (inches)	3	9	8
Woody Browse (%)	15	15	76
Bank Stability (%)	NM[2]	79	66
Covered Banks (%)	NM	100	82

[1]2010 results are due to vandalism to the cattle guard that was in place to keep cattle off the creek. This site is in an exclosure pasture. As an exclosure pasture, it will not be grazed.

[2]Not monitored

TABLE 32. WHISKEY RIPARIAN PASTURE MIM MONITORING RESULTS.

Whiskey Creek	2008	2009[1]	2010[1]
Bank Alteration (%)	27	0	3

Whiskey Creek	**2008**	**2009[1]**	**2010[1]**
Stubble Height (inches)	4	10	13
Woody Browse (%)	19	64	87
Bank Stability (%)	NM[2]	93	93
Covered Banks (%)	NM	100	100

[1]2009 and 2010 results are after the exclosure was built and are attributed to wild ungulates

[2]Not monitored

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 with habitat and/or biological indicators from the NMFS MPI and the FWS Matrix to determine effects to ESA-listed MCR Steelhead, CR bull trout and their respective 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:

PE 1 - Livestock use of allotment/pastures

PE 2 - Permittee management of livestock and infrastructure maintenance

PE 5 - Monitoring

7.1.3.1 PE 1: 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 PE 2: 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.

Troughs, springs and ponds are maintained by grazing permittees to provide off-stream water for livestock. In addition, there are miles of fence and numerous 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 PE 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 the Monitoring section (Sections 3.2 and 4.1.4). 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

First, these three PEs will be analyzed for their effects to designated CH, and then for their effects to the species. The freshwater primary constituent elements (PCE) of MCR Steelhead CH applicable to the action area are presented in Table 33 and the PCE of CR bull trout CH are presented in Table 34.

TABLE 33. 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 34. PRIMARY CONSTITUENT ELEMENTS OF BULL TROUT CRITICAL HABITAT.

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 35 presents the analysis for effects of the action to the PCEs of MCR Steelhead designated CH. Table 36 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 37 for the MCR Steelhead PCEs and in Table 38 for the CR bull trout PCEs.

TABLE 35. ANALYSIS OF EFFECTS TO ANADROMOUS FISH MPI INDICATORS CORRESPONDING TO PCEs OF DESIGNATED CRITICAL HABITAT FOR MCR STEELHEAD WITHIN THE UPPER MIDDLE FORK, LOWER MIDDLE FORK AND SLIDE CREEK ALLOTMENTS

Analysis of effects to bull trout matrix indicators corresponding to PCEs of designated critical habitat for

PCE	PCE Habitat Feature	MPI Pathway	MPI 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 4.1.5). 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	MPI Pathway	MPI 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 majority of the temperature monitoring data for the Upper Middle Fork, Lower Middle Fork and Slide Creek allotments indicate that State water quality standards are not being met. The MCR steelhead recovery plan cites NPPC (2005) when stating that vegetation disturbance, stream straightening/relocation, livestock grazing, forest practices, road building, irrigation water withdrawals, and historical mining and dredging cause elevated summer water temperatures in the MFJD River (NMFS 2009). Most of the streams monitored within the allotments would be considered NPF. 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 7.3.3.1). 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 negative and meaningfully measured. 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 5 to affect water temperature and the effect of the PE for the indicator is

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
				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 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 (Section 4.1.5) 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

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
				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, but 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. The monitoring PE effect to the indicator is negative, but not meaningfully measured.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
			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.
	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.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
(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	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.
			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).
	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 grazing standards and guidelines as well as water quality BMPs. The conclusion is that the effect to the indicator by livestock use is negative

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks				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.
			Width/Depth Ratio	Over-utilization of riparian vegetation, bank alteration and increases in sediment delivery are primary causes of increased W/D ratios. Many of the streams within the three allotments are still exhibiting over widened channels (See Appendix J. for PIBO and stream survey results.). PIBO monitoring data is showing improvements for this indicator at all three sites, and one site would currently rate PF/FA using NMFS MPI/bull trout matrix criteria. Legacy effects of livestock management in 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

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
				indicator. PE 5 (monitoring) does not remove vegetation or destabilize stream banks. There is no potential for it to increase W/D ratio. PE-5 (monitoring) will have a neutral effect to the indicator.
	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 PE 2 and 5.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
			Pool Frequency	Pool frequency at the PIBO monitoring sites currently meet the numbers of pools/km that would rate PF/FA using NMFS MPI and bull trout matrix criteria. However, the indicator includes a LWD criterion and the PIBO monitoring LWD dimensions are not compatible with those of the MPI/matrix and therefore cannot be compared. Many stream survey reaches within the allotments currently do not meet 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 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.

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
			Pool Quality	PIBO data within the allotments indicate that undercut banks at the three sites with repeat measurements currently exceed the mean for all managed sites in the PIBO program data set. However, for stream surveys, residual pool depth is generally low with very few to no pools greater than 1 meter deep in surveyed stream reaches. 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 quality. 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	MPI Pathway	MPI Indicator	Rationale
			Off-Channel Habitat	There is very little off-channel habitat within tributaries within the allotments. Historic dredge mining and other management activities including past livestock management in the allotments may have 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 off-channel habitat. 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 off-channel habitat. 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	MPI Pathway	MPI 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	MPI Pathway	MPI 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	MPI Pathway	MPI Indicator	Rationale
	Natural Cover	Habitat Elements	Substrate	This indicator focuses on the composition of streambed substrate rather than its embeddedness, which was evaluated earlier. PIBO monitoring data shows that the median particle size (D50) of streambed particles was in the range of 2.0 to 2.4 inches for the most current measurements at three of four sites. The other had a D50 of 0.8 inches. PIBO data also indicates generally low levels of fine sediments at three of four sites. 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, 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 MCR Steelhead. Therefore, the effect to this indicator by PE 1 (livestock use) is negative, but 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.
			Pool Frequency	See Above.
			Pool Quality	See Above

PCE	PCE Habitat Feature	MPI Pathway	MPI Indicator	Rationale
			Off-Channel Habitat	See Above
			Refugia	See Above
		Watershed Condition	Riparian Reserves	See Above

PCE	PCE Habitat Feature	MPI Pathway	MPI 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 36. ANALYSIS OF EFFECTS TO BULL TROUT MATRIX INDICATORS CORRESPONDING TO PCEs OF DESIGNATED CRITICAL HABITAT FOR COLUMBIA RIVER BULL TROUT WITHIN THE UPPER MIDDLE FORK AND LOWER MIDDLE FORK ALLOTMENTS.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix 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 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 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

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				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 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.
2) Migration habitats with minimal physical, biological, or water quality impediments	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

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.				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 both the Upper and Lower Middle Fork John Day allotments indicate that State water quality standards are not being met. Most of the streams monitored within the two 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 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). 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 negative and meaningfully measured. PE 2 (permittee

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				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 food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	Forage	Water Quality, Habitat Elements, Channel Condition and Dynamics, Habitat Access	Temperature	See discussion on temperature for PCE 2. The effects are the same.
			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 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 (Section 3.1.2.1.2) 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

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				production of aquatic macroinvertebrates (a forage item for salmonids) in small, isolated patches. 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. 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. The monitoring PE effect to the indicator is negative, but not meaningfully measured.
			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

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				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 PE 2 and 5.
			Pool frequency	Pool frequency at the PIBO monitoring sites currently meet the numbers of pools/km that would rate FA using bull trout matrix criteria. However, the indicator includes a LWD criterion and the PIBO monitoring LWD dimensions are not compatible with those of the bull trout matrix and therefore cannot be compared. Many stream survey reaches within the allotments currently do not meet 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.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Pool quality	PIBO data within the allotments indicate that undercut banks at the three sites with repeat measurements currently exceed the mean for all managed sites in the PIBO program data set. However, for stream survey data, residual pool depth is generally low with very few to no pools greater than 1 meter deep in surveyed stream reaches. Although Width/Depth ratio's at the PIBO sites 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 quality. 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	There is very little off-channel habitat in tributaries within the allotments. 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 off-channel habitat. The overall effect of PE 2 is a neutral effect to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				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 (USDI 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. 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
			Width/Depth ratio	Over-utilization of riparian vegetation, bank alteration and increases in sediment delivery are primary causes of increased W/D ratios. Many of the streams within the two allotments are still exhibiting over widened channels (See Appendix J for PIBO and stream survey results.), PIBO monitoring data is showing improvements for this indicator, and one of three sites would currently rate PF/FA using NMFS MPI/bull trout matrix criteria. Legacy effects of livestock management in 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 effect 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 shoreline aquatic environments and processes that establish and maintain	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	Matrix Pathway	Matrix Indicator	Rationale
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 two 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. Many of these streams are still in a state of recovery based on stream type, soil type, and vegetation seral stage. Of the available stream survey data, 22 of 26 stream reaches in the two allotments had greater than 90 percent stable streambank. PIBO and MIM data show improvement or maintaining streambank stability between years at three sites (52-61%, 96-98% and 93-100%) and reducing from 100% to 92% for another site (but still within the PF category for the bull trout matrix). 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

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				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 effect 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 upon 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. 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.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
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.	Water Quality	Water Quality	Temperature	Currently the majority of the temperature monitoring data for both the Upper and Lower Middle Fork allotments indicate that State water quality standards are not being met. Most of the streams monitored within the two allotments would be considered to be FAR 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 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). 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 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.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
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	Suitable Substrate	Water Quality	Sediment	PIBO monitoring (3 sites within the 2 allotments) results indicate that the D50 of the substrate is 0.8 to 2.4 inches within the two allotments that is considered to be PF using bull trout matrix criteria. These monitoring sites are in lower Vinegar, lower Big Boulder just above private, and Deadwood Creek. See Appendix J for PIBO monitoring results. Stream surveys conducted in the upper reaches of bull trout CH (with the exception of Deadwood Creek) reported low pool frequency ranging from 5 to 15 % and where spawning should be occurring, 50% of the substrate is reported to be cobble. Based on the stream survey data, low pool frequency, poor pool quality, and 50 % of the substrate being cobble, adequate spawning areas may be a limiting factor for bull trout within the two allotments. 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 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.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
vary from system to system.				
		Habitat Elements	Substrate Embeddedness	Amendment 29 of the LMRP sets a desired condition of <20% embedded. Currently the PIBO information within the allotments show percent fines as ranging from 5 to 35% and 50% of the substrate tended to be less than 2.4 inches on average. The majority of the stream surveys (71 stream reaches within UMF and 64 stream reaches within LMF) for both allotments reported stream embeddedness to be greater than 30% (See Appendix J for PIBO and stream survey results). Deadwood Creek is showing an increase in percent fines as monitored by PIBO. 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. 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.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
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.
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.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
	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.
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	The description of this sub-population indicator in the environmental baseline table (Table 17 focuses on two items: connectivity between subpopulations and the probability of hybridization or displacement by competing species. No migration barriers would be created by any PE of the proposed action. Connectivity between sub-populations would not be affected. The proposed action does not introduce any fish species. Genetic integrity of bull trout would not be affected. The localized, small magnitude and short-term adverse environmental impacts to the water temperature, sediment, substrate embeddedness and large woody debris indicators described in the analysis of effects to the PCEs of bull trout CH above and in more detail in Section 7.3.3 (Direct and Indirect Effects to Aquatic and Riparian Habitat) should not result in displacement of bull trout by competing species. In summary, 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. . Therefore the overall effect to the indicator by all PEs is neutral.

TABLE 37. SUMMARY OF PROJECT ELEMENT EFFECTS OF THE UPPER MIDDLE FORK, LOWER MIDDLE FORK AND SLIDE CREEK ALLOTMENTS TO THE MPI INDICATORS ASSOCIATED WITH HABITAT FEATURES OF EACH PRIMARY CONSTITUENT ELEMENT OF MCR STEELHEAD CRITICAL HABITAT.

Primary Constituent Element	PCE Habitat Feature	MPI Indicator	Effect Conclusion by Project Element[3] 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	NNMM	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	MPI Indicator	Effect Conclusion by Project Element[3]		
			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	MPI Indicator	Effect Conclusion by Project Element[3]		
			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
[3] Project element effect conclusions do not vary by allotment.

TABLE 38. SUMMARY OF PROJECT ELEMENT EFFECTS OF THE UPPER MIDDLE FORK AND LOWER MIDDLE FORK ALLOTMENTS TO THE MATRIX INDICATORS ASSOCIATED WITH HABITAT FEATURES OF EACH PRIMARY CONSTITUENT ELEMENT OF COLUMBIA RIVER BULL TROUT CRITICAL HABITAT.

Primary Constituent Element	PCE Habitat Feature	Matrix Indicator	Effect Conclusion by Project Element[3]		
			PE1: Livestock Use	PE2: Permittee Management of Livestock and Infrastructure Maintenance	PE 5: Monitoring
1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia	Floodplain Connectivity	Floodplain connectivity	NNMM[1]	Neutral	Neutral
	Water Quantity	Change in peak/base flows	NNMM	NNMM	Neutral

Primary Constituent Element	PCE Habitat Feature	Matrix Indicator	Effect Conclusion by Project Element[3]		
			PE1: Livestock Use	PE2: Permittee Management of Livestock and Infrastructure Maintenance	PE 5: Monitoring
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	Chemical contaminants/ nutrients	NNMM	NNMM	Neutral
		Temperature	***NMM***[2]	Neutral	Neutral
		Change in peak/base flows	NNMM	NNMM	Neutral
3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	Forage	Temperature	***NMM***	Neutral	Neutral
		Sediment	***NMM***	NNMM	NNMM
		Chemical contaminants/nutrients	NNMM	NNMM	Neutral
		Physical barriers	Neutral	Neutral	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
		Width/Depth ratio	NNMM	Neutral	Neutral

Primary Constituent Element	PCE Habitat Feature	Matrix Indicator	Effect Conclusion by Project Element[3]		
			PE1: Livestock Use	**PE2: Permittee Management of Livestock and Infrastructure Maintenance**	**PE 5: Monitoring**
		Floodplain connectivity	NNMM	Neutral	Neutral
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.	Complex environments and processes	Large woody debris	***NMM***	Neutral	Neutral
		Pool frequency and quality	NNMM	Neutral	Neutral
		Streambank condition	NNMM	Neutral	Neutral
		Large pools	NNMM	Neutral	Neutral
		Off-channel habitat	NNMM	Neutral	Neutral
		Refugia	***NMM***	Neutral	Neutral
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.	Water Quality	Temperature	***NMM***	Neutral	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 from silt to coarse sand, embedded in larger	Suitable Substrate	Sediment	***NMM***	NNMM	NNMM
		Substrate Embeddedness	***NMM***	NNMM	Neutral

Primary Constituent Element	PCE Habitat Feature	Matrix Indicator	Effect Conclusion by Project Element[3]		
			PE1: Livestock Use	PE2: Permittee Management of Livestock and Infrastructure Maintenance	PE 5: Monitoring
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.	Water Quantity	Change in peak/base flows	NNMM	NNMM	Neutral
8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	Water Quality	Temperature	***NMM***	Neutral	Neutral
		Sediment	***NMM***	NNMM	Neutral
		Chemical Contaminants/ Nutrients	NNMM	NNMM	Neutral
	Water Quantity	Change in Peak/Base Flows	NNMM	NNMM	Neutral
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	Persistence and Genetic Integrity	Neutral	Neutral	Neutral

[1] NNMM = Negative, not meaningfully measured
[2] ***NMM*** = Negative, meaningfully measured
[3] Project element effect conclusions do not vary by allotment.

7.3 ANALYSIS OF EFFECTS TO LISTED SPECIES

7.3.1 GENERAL EFFECTS

Effects to MCR Steelhead and CR bull trout from livestock grazing can be in the form of direct impacts to individual fish or indirectly through habitat disturbance. Direct disturbance includes trampling on 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 juvenile and adult CR 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 as well as for CR bull trout.

7.3.2 DIRECT EFFECTS TO THE SPECIES

The Upper Middle Fork and Lower Middle Fork allotments contain both MCR Steelhead and CR bull trout spawning and rearing habitat. The Slide Creek Allotment only contains MCR Steelhead 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. Spawning survey monitoring activities (PE 5) involve walking in stream channels for periods of time that may result in MCRS steelhead being disturbed and moving out of the area, resulting in direct impacts to the species.

7.3.3 DIRECT AND INDIRECT EFFECTS TO AQUATIC AND RIPARIAN HABITAT

Use of the NMFS MPI/bull trout matrix 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 for the NMFS MPI; FA/FAR/FAUR for the bull trout matrix) 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 and bull trout matrix 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 and bull trout matrix 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 CR bull trout. These conclusions were 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 for MCR Steelhead and CR bull trout are:

- Temperature
- Sediment/Turbidity
- Substrate embeddedness
- Refugia

7.3.3.1 EFFECTS ON WATER TEMPERATURE

Water temperature is an important factor affecting distribution and abundance of salmonids within the separate action areas for MCR Steelhead and CR bull trout. 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). Bull trout are more sensitive to warm water, typically inhabiting waters 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.

Stream temperatures are of particular concern within the John Day Subbasin. This is highlighted in the John Day Subbasin Plan (NPCC 2005) and the MCR Steelhead recovery plan (NMFS 2009). Degraded water quality, which includes elevated water temperatures, is identified as a limiting factor in both plans.

Temperature 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. Within the action area, 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.

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 12). 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 12[7])

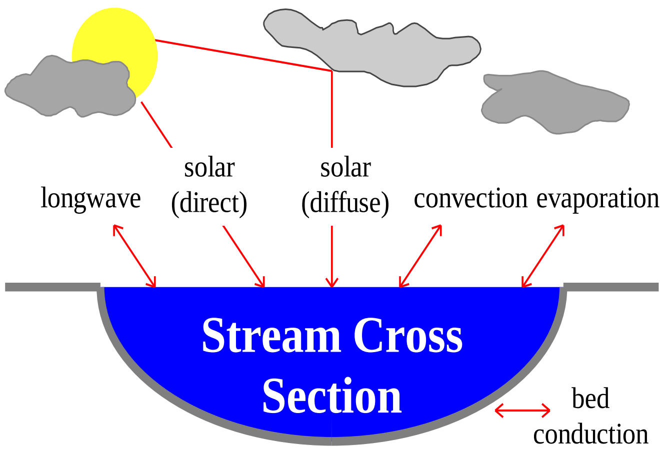


FIGURE 12. HEAT EXCHANGE BETWEEN A STREAM AND ITS ENVIRONMENT.

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, 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:

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

Effective shade is provided by features such as topography and vegetation (ODEQ 2010). Effective shade is influenced by slope steepness, vegetation species composition, tree height,

[7] 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.

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 13 and Table 39 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 39 are based on the shadow cast by vegetation at a distance of 1 foot and farther from the edge of the channel.

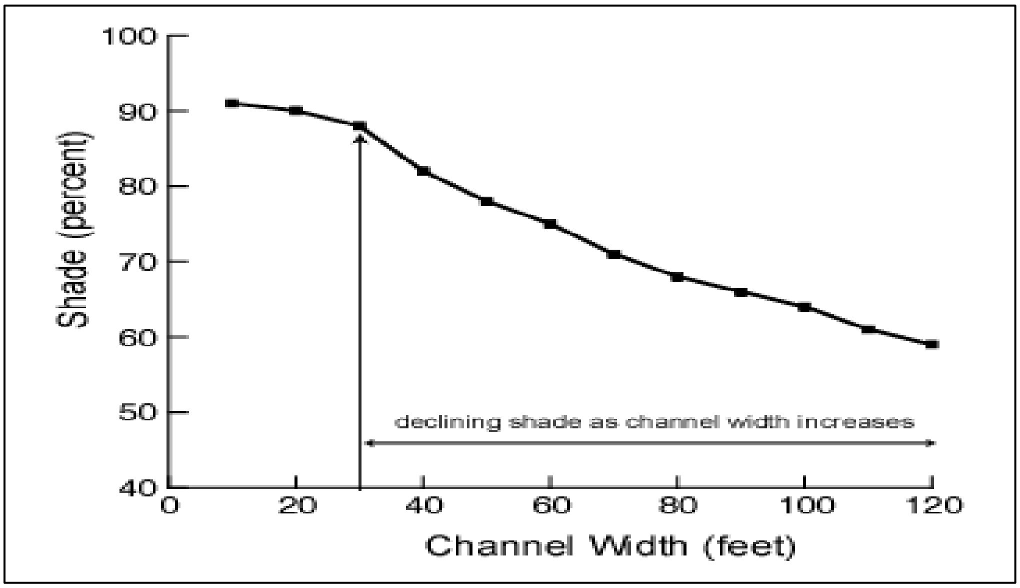


FIGURE 13. SHADE PROVIDED BY 150 FT TALL CONIFERS (PLATTS ET AL 1987, PARK 1993).

TABLE 39. 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

Active Channel Width (feet)	Percent Effective Shade at Varying Vegetation Heights		
	0.5 feet	2 feet	3 feet
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 13, Table 39 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 39 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 ungulates. In meadow streams with narrow channels, grass/grass-like species often are the plants that provide stream shade. Model results presented in Table 39 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 MFJD River drainage. These are likely to have similar dimensions to streams of the same orders in the two action areas. 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 13 and Table 39 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 35 for the Floodplain Connectivity habitat feature of PCE 2 (rearing CH) for MCR Steelhead (and in Table 36 for CR bull trout) 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 ungulates) 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 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 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 and CR bull trout. 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 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 and CR bull trout 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 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 that have been identified on the 303(d) list for sedimentation. Fine sediment levels vary across the Upper Middle Fork, Lower Middle Fork and Slide Creek Allotments. Amendment 29 of the LMRP sets a desired condition of <20% embedded. Current PIBO monitoring information within the allotments show percent fines < 2 mm as ranging from 5 to 18 percent and D50 ranged from 0.8 to 2.4 inches at the four sites. The majority of the stream surveys for the three allotments reported stream embeddedness as greater than 30%. Deadwood Creek is showing an increase in percent fines as monitored by PIBO. (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 and bull trout matrix indicators.

These effects to the Sediment/Turbidity and Substrate Embeddedness indicators will be minimized by use of endpoint indicators and PDC. If pre-season monitoring 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 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 and CR bull trout. 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) (see Table 17 earlier in this document) and not described in the bull trout matrix (USDI FWS 1998a). The definition provided in NMFS (1998) is: "important remnant habitat for sensitive aquatic species." The availability of various types of habitat refugia are described as limiting factors in the NMFS 2009 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).

The analysis of effects to PCEs of CH for MCR Steelhead and CR bull trout in Tables 35 and 36 and summarized in Tables 37 and 38, indicate that the livestock use PE will have negative and meaningfully measured effects to several of the NMFS MPI and bull trout matrix indicators that correlate to components of PCEs. Specifically, the indicators 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 for MCR Steelhead and CR bull trout in Tables 35 and 36 and summarized in Tables 37 and 38, 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 indicator of the NMFS MPI and the FWS Matrix. Negative impacts to the large woody debris indicator will be minimized by use of the endpoint indicators and PDC.

8 ESA EFFECT DETERMINATIONS

ESA effect determinations are presented in Table 2. The determination is “May Affect, Likely to Adversely Affect” MCR Steelhead and its designated CH for each of the three allotments. The determination is “May Affect, Likely to Adversely Affect” CR bull trout and its designated CH for the Upper Middle Fork and Lower Middle Fork allotments. The determination is “No Effect” to CR bull trout and its designated CH for the Slide Creek Allotment because CR bull trout and designated CH are not present in the allotment. The negative and measureable effects to MPI or Matrix indicators associated with the PCEs of MCR steelhead or CR bull trout critical habitat are summarized below. The negative and measureable effects to the species, MCR steelhead or CR bull trout, are also presented below.

8.1 RATIONALE

MCR Steelhead CH:

The PCEs are the physical or biological features of CH essential to the conservation of the MCR steelhead. 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:

- PCE 1: 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 would be **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:

- PCE 2: 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

CR Bull Trout CH:

The PCE analysis for CR bull trout critical habitat are described as follows. For PCE 2 (Migration habitats with minimal impediments), the analysis determined that there wouild be **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 would be **negative and measurable effects** to the *temperature*, *sediment, large woody debris, 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
        - Large woody debris indicator
        - Refugia indicator

For PCE 4 (Complex environments and processes), the analysis determined that there would be **negative and measurable effects** to the *large woody debris and 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
        - Large woody debris indicator
        - Refugia indicator

For PCE 5 (Appropriate water temperatures), the analysis determined that there would be **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 would be **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 indicator
        - Substrate embeddedness indicator

For PCE 8 (Water quality and quantity), the analysis determined that there would be **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” for each of the three allotments and “May Affect, Likely to Adversely Affect” CR bull trout designated CH for the Upper Middle Fork and Lower Middle Fork allotments. The determination is “No Effect” to CR bull trout designated CH for the Slide Creek Allotment because there is no CR bull trout designated CH in the allotment.

Effects to Species, MCR steelhead or CR bull trout:

The same NMFS MPI and bull trout matrix 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 would affect habitat characteristics that would in turn result in measurable increases in water temperature, increased sediment and turbidity, and increased substrate embeddedness, were described in detail. The biological consequences to MCRS Steelhead and CR bull trout 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 and CR bull trout from the livestock use PE, because livestock will have access to streams during the spawning, incubation, and rearing periods of the life cycle of both fish species. 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 F), which incorporates PDC 4 and 5 (Section 4.1.4). 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 5 (Section 4.1.4) will be taken to eliminate or significantly minimize the potential for redd trampling. Direct negative effects to adults, juveniles or incubating embryos from in-channel monitoring activities (PE 5) are likely to occur as a result of spawning surveys.

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 in each of the three allotments. For the same reasons, the effect determination is "May Affect, Likely to Adversely Affect" CR bull trout for the Upper Middle Fork and Lower Middle Fork allotments. Since there are no CR bull trout in the Slide Creek Allotment, the effect determination is "No Effect."

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 within two state of Oregon Wildlife Management Units (WMU): Northside and Desolation. The Slide Creek Allotment is entirely within the Northside WMU. The Upper Middle Fork Allotment and Lower Middle Fork Allotment are in both WMUs. Pastures south of the MFJD River are in the Northside WMU and pastures north of the MFJD River are in the Desolation 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.

There is a potential for cumulative effects to MCR Steelhead and CR bull trout species and their respective designated CH from use by wild ungulates. Such effects are identical to those described in the effects analyses for the MCR Steelhead and CR bull trout: (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; and (3) reduction of refugia and future large woody debris.

Table 40 presents Rocky Mountain elk and mule deer management objectives (MO) and population estimates from 2004-2010 for the Northside and Desolation WMUs. As described above, the Slide Creek Allotment is within the Northside WMU and portions of the Upper Middle Fork and Lower Middle Fork Allotments are found in both WMUs. 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 (pers. comm. 2011).

TABLE 40. ROCKY MOUNTAIN ELK AND MULE DEER MANAGEMENT OBJECTIVES AND WINTER POPULATION ESTIMATES FROM 2004-2010 FOR THE NORTHSIDE AND DESOLATION WILDLIFE MANAGEMENT UNITS IN OREGON.

	Northside Wildlife Management Unit		Desolation Wildlife Management Unit	
Year	Elk Mgmt. Objective = 2,000	Deer Mgmt. Objective = 15,500	Elk Mgmt. Objective = 1,300	Deer Mgmt. Objective = 2,500
2004	2,000	7,950	1,196	1,946
2005	2,000	7,954	1,400	1,951
2006	2,000	8,137	1,400	2,023
2007	2,400	7,358	1,239	1,604
2008	2,500	7,325	1,124	1,520
2009	2,500	7,085	1,267	1,459

2010	2,500	7,228	1,300	1,508

ODFW has managed the elk population of the Northside WMU at or above the population MO. Beginning in 2007, the elk population has exceeded the MO for four consecutive years. The mule deer population MO was not exceeded during 2004-2010 in the WMU. ODFW has managed the elk population of the Desolation WMU close to the MO, with winter populations estimates ranging between 1,124 and 1,400 from 2004 to 2010. The mule deer population MO was not exceeded during 2004-2010 in the Desolation WMU. It is not known what elk or mule deer population level in the WMUs would result in detectable effects to the PCEs of CH for MCR Steelhead and CR bull trout.

Monitoring data suggests that combined wild ungulate use (i.e., deer and elk) alone may result in exceeding endpoints in a pasture. The 2009 and 2010 monitoring results for percent woody browse in the Whiskey Riparian Pasture of the Slide Creek Allotment illustrate this point. The pasture has an exclosure that prevents livestock from accessing the riparian area. The percent woody browse was 64% and 87% for 2009 and 2010, respectively, which would exceed the FS proposed action endpoint of 40%. As noted above, the Slide Creek Allotment is in the Northside WMU which exceeded the elk population MO in 2009 and 2010

9.2 UNAUTHORIZED LIVESTOCK GRAZING

Unauthorized livestock grazing has occurred in the allotments, and is reasonably certain to occur in the future. The unauthorized use has been resolved in a timely manner once MNF staff notified livestock owners. As long as the MNF takes timely action whenever trespass occurs, habitat degradation is likely to be minimized.

9.3 ACTIONS ON PRIVATE PROPERTY

There are private property in-holdings primarily along the mainstem of the MFJD River. There is potential for properties to be developed. However, we do not have any information on specific proposals at this time. The effects of activities on private property to PCEs of CH are not known.

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 MFJD River 4th field HUC (HUC 17070203), 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 Spring Chinook salmon spawning, rearing or migration habitat. They are Beaver Creek; Camp Creek; Big Boulder Creek; Granite Boulder Creek; Davis Creek; Dearhorn Creek and Butte Creek. One or more of the streams is found in each allotment (Tables 3, 4 and 5).

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 would be 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 for each of the three allotments (Table 2).

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