

**Aquatic Species Biological Assessment for the  
Dark Canyon (formerly Sugarloaf) & Fawn Springs  
Allotments**

**BLUE MOUNTAIN RANGER DISTRICT  
MALHEUR NATIONAL FOREST  
GRANT COUNTY, OREGON**

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Date:                   October 14, 2011                  

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**Fish Biologist**

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

TABLE 1. PROJECT LOCATION

Dark Canyon Allotment

4th Field HUC	HUC #	6th Field HUC	HUC #	6th Field Acres
Upper John Day	17070201	East Fork Canyon Creek	170702010702	3,431
Silvies	17120002	Upper Canyon Creek	170702010701	15,304
5th Fields	HUC #	Upper Bear Creek	171200020201	9,836
Canyon Creek	1707020107	Middle Bear Creek	171200020202	3,238
Bear Creek	1712000202	Lower Bear Creek	171200020204	41

Fawn Springs Allotment

4th Fields	HUC #	6th Fields	HUC #	6th Field Acres
Upper John Day	17070201	Upper Canyon Creek	170702010701	1,057
5th Fields		East Fork Canyon Creek	170702010702	1,545
Canyon Creek	1707020107	Middle Canyon Creek	170702010703	4,001

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

TABLE 2. ESA & EFH EFFECT DETERMINATIONS (ENDANGERED (E) AND THREATENED (T) SPECIES)

Dark Canyon Allotment

Common Name	Scientific Name	Known to Occur?	Potential to Occur?	ESA <sup>1</sup> Status	Critical Habitat Status	Essential Fish Habitat Status	ESA <sup>1</sup> Effect Determination Species/CH <sup>2</sup>	EFH <sup>3</sup> Effect Determination
<b>MCR steelhead</b>	<i>Oncorhynchus mykiss</i>	Yes	Yes	Threatened	Designated	Not applicable	LAA/LAA <sup>4</sup>	Not applicable
<b>Spring Chinook</b>	<i>Oncorhynchus tshawytscha</i>	No	Yes	Not Warranted	Not Applicable	Established	Not/Applicable /Not Applicable	Will not adversely affect
<b>CR bull trout</b>	<i>Salvelinus confluentus</i>	No	No	Threatened	Designated	Not applicable	No effect / No effect	Not applicable

Fawn Springs Allotment

Common Name	Scientific Name	Known to Occur?	Potential to Occur?	ESA Status	Critical Habitat Status	Essential Fish Habitat Status	ESA Effect Determination Species/CH	EFH Effect Determination
<b>MCR steelhead</b>	<i>Oncorhynchus mykiss</i>	Yes	Yes	Threatened	Designated	Not applicable	LAA/LAA	Not applicable
<b>Spring Chinook</b>	<i>Oncorhynchus tshawytscha</i>	No	Yes	Not Warranted	Not Applicable	Established	Not/Applicable /Not Applicable	Will not adversely affect
<b>CR bull trout</b>	<i>Salvelinus confluentus</i>	No	No	Threatened	Designated	Not applicable	No effect / No effect	Not applicable

<sup>1</sup> Endangered Species Act

<sup>2</sup> Critical Habitat

<sup>3</sup> Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act

<sup>4</sup> May Affect, Likely to Adversely Affect

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## 1 INTRODUCTION

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

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### 1.1 CONSULTATION HISTORY

Past and ongoing informal and formal consultations that overlap the ESA action area and the 6<sup>th</sup> field HUC subwatersheds of Dark Canyon, and Fawn Springs Allotments are described in this section.

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#### 1.1.1 INFORMAL CONSULTATIONS (RECENT AND ONGOING)

##### 1.1.1.1 LIVESTOCK GRAZING

Consultation with NMFS was concluded on the 2007 grazing season for all MNF allotments. A letter of concurrence (LOC) was completed for the 2007 grazing season for the Fawn Springs allotment since the effects were determined to not likely to adversely affect (NLAA) MCR steelhead or designated CH.

##### 1.1.1.2 BLUE MOUNTAIN EXPEDITED SECTION 7 CONSULTATION PROCESS

The MNF received a concurrence letter in 2007 (NMFS 2007a) from NMFS (2007/02970) for a consultation on the effects of the 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.

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, Not Likely to Adversely Affect” applies. The Level 1 team then sends a letter to the

respective action agency official, documenting its finding regarding consistency with the Process and stating that the letter tiers to the concurrence letter.

Actions occurring in the Dark Canyon, and Fawn Springs Allotments that are covered by the Blue Mountain Expedited Section 7 Consultation Process:

### **MNF Road Maintenance**

The MNF has consulted with the NMFS and USFWS on Forest wide road maintenance. On January 29, 2010 a letter was sent to the Malheur National Forrest 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 species and their designated CH for Mid-Columbia River Steelhead and Bull Trout based on the rationale that was presented for consistency with all PDC in the documentation package.” The Malheur Level 1 Team also concluded that the documentation package demonstrated that the action would adequately avoid, minimize or otherwise offset potential effects to designated EFH and fulfilled requirements under the MSA. The letter provided ESA and MSA coverage for the Forests Road Maintenance program from 2010 to 2015.

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## 1.1.2 FORMAL CONSULTATION (RECENT AND ONGOING)

### 1.1.2.1 AQUATIC AND RIPARIAN RESTORATION PROGRAMMATIC CONSULTATION

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

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

18. Removal of Legacy Structures

19. Fisheries, Hydrology, Geomorphology Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration

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

John Day and Sugarloaf Allotments Range Improvement Projects. This project included construction of 2.31 miles of new fence in the Wickiup Pasture of the Sugarloaf Allotment and 5.50 miles of new fence in the Ennis Cr Pasture of the John Day Allotment to restrict livestock use and improve distribution to maintain/restore stream channel, riparian vegetation, and floodplain functions. The project occurred in 2010 and included design criteria specified in aquatic restoration program activity type #15.

### 1.1.2.2 LIVESTOCK GRAZING

In 2007 the MNF formally consulted with NMFS on the 2007-2011 livestock grazing seasons, including what is now the Dark Canyon and Hunter Cabin allotments (NMFS reference number 2007/01290). The MNF has consulted on livestock grazing activities in the area. Biological Opinions (BOs) completed for grazing on the MNF are documented by NMFS reference numbers 2007/01290, 2006/01337, 2005/05693, 2004/00610, 2003/00610, and 2002/00510.

## 2 DESCRIPTION OF PROJECT AREA

### 2.1 DARK CANYON (FORMERLY SUGARLOAF) ALLOTMENT

Grazing activities on the Dark Canyon Allotment are conducted within the Upper John Day (HUC 4# 17070201) and Silvies (HUC 4# 17120002) subbasins. This allotment lies within the Canyon Creek (HUC 5# 1707020107) and Bear Creek (HUC 5# 1712000202) watersheds.

Elevations within the Allotment range from 4,300 feet along Canyon Creek to 7,000 feet in the Strawberry Mountain Wilderness. The allotment is bordered by the Prairie City Ranger District to the east and contains a portion of the Strawberry Mountain Wilderness to the north. County Road (CR) 65/Forest Road (FR) 15 and Canyon Creek bisect the allotment.

Overstory vegetation in the Allotment consists of Ponderosa Pine, Douglas Fir, Western Larch, and Lodgepole Pine. Engelmann Spruce can be found in the drainages at higher elevations along Bear Creek. The pastures in the allotment lying west of Canyon Creek and CR 65/FR 15 are dominated by Ponderosa pine. Dominant grass species throughout the allotment are bluebunch wheatgrass, Idaho fescue, elk sedge, and pine grass. Riparian overstory vegetation generally consists of a mix of hardwood and conifer species along the stream with alder being the dominant species.

Livestock use of this allotment has undergone many changes in the last five years. Historically the land contained within this allotment was run in conjunction with the Seneca allotment. Grazing occurred late in the season, year after year. At some point the allotments were combined creating what was the Sugarloaf and Seneca allotments. In 2007 the permit holder at the time divided his estate creating 3 new grazing permits. Each new permittee was authorized to graze individual pastures. It became evident that for simplicity of management for both the permittees and the Forest Service the Seneca and Sugarloaf allotments needed to be split back

out. Doing so returned the Dark Canyon allotment to its former boundaries and created the Hunter Cabin allotment.

TABLE 3. MILES OF STEELHEAD CRITICAL HABITAT – DARK CANYON ALLOTMENT

<b>Stream Name</b>	<b>Miles of Steelhead Critical Habitat</b>	<b>Miles of MSRA</b>
Middle Fork Canyon Creek	5.61	1.23
Canyon Creek	5.28	2.54
Crazy Creek	1.91	0
Wall Creek	1.77	0.26
Unnamed trib. to Wall Creek	0.80	0
<b>TOTAL</b>	<b>15.37</b>	<b>4.03</b>

### Dark Canyon Allotment

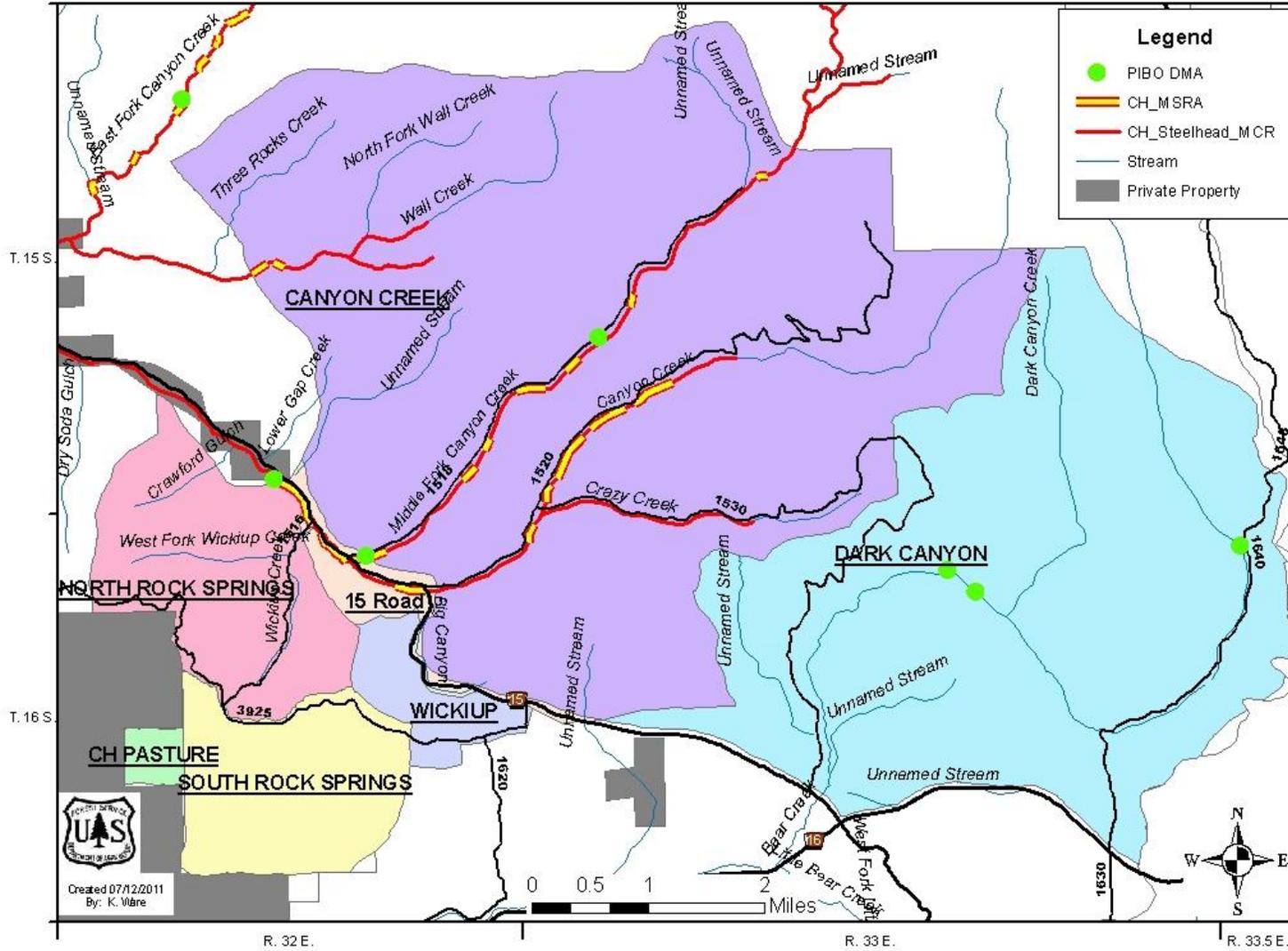


FIGURE 1. DARK CANYON ALLOTMENT AND PASTURE MAP WITH STEELHEAD DCR AND MSRA

This allotment consists of 7 pastures (Figure 1) and contains 15.37 miles of steelhead critical habitat (Table 3). There is no bull trout critical habitat within the Dark Canyon allotment. Within streams containing steelhead critical habitat, the Forest Service has identified areas that are the most accessible and sensitive to livestock impacts. These areas are typically production flats and generally contain valuable spawning grounds. They are located in low gradient, open meadow reaches of a stream. Because of the life-cycle stages of MCR steelhead relevant to the streams within these allotments, the Forest Service decided to focus the identification of the “Most Sensitive Riparian Areas” (MSRA) on the known and likely spawning areas for MCR steelhead. Riparian areas adjacent to spawning areas can be considered relatively more sensitive for the species because they occur on low gradient sections of a stream and often prove to be particularly attractive to grazing livestock as a water and shade source for much the same reasons. The process for determining MSRA can be found in Appendix G. The application of the criteria in respect to the Dark Canyon Allotment is displayed in Table 3 and Figure 1.

### *Canyon Creek*

Elevations within the Canyon Creek pasture vary from 4,500 feet near FR 15 and 7,000 at the allotment boundary within the Strawberry Wilderness.

Vegetation varies from mixed conifer at the higher elevations to Ponderosa pine in the lower elevations. Understory vegetation consists of bluebunch wheatgrass and Idaho fescue associated with a pine overstory and pine grass and elk sedge in the mixed conifer areas.

Streams within the Canyon Creek pasture containing steelhead critical habitat are: Canyon Creek, Middle Fork Canyon Creek, Crazy Creek, Wall Creek, and an unnamed tributary to Wall Creek.

### *15 Road*

The 15 Road pasture is a riparian pasture of approximately 490 acres. This pasture was created by the construction of a new fence in the Wickiup pasture to exclude livestock access to Canyon Creek when grazing the Wickiup pasture. Livestock use will be limited in duration consisting primarily of short-term holding to facilitate moves between the larger pastures. The 15 Road pasture contains Canyon Creek and the confluence of the Middle Fork Canyon Creek with Canyon Creek. Both Canyon Creek and the Middle Fork Canyon Creek within the pasture are heavily wooded with alder and some dogwood.

### *North Rock Springs and Wickiup pastures*

The North Rock Springs and Wickiup pastures are within the Upper John Day watershed, which supports anadromous fish and their habitat. However, these pastures do not have any streams containing steelhead critical habitat within their boundaries and therefore will not be discussed further.

### *South Rock Springs, Dark Canyon, and CH pastures*

The South Rock Springs, Dark Canyon, and CH pastures are within the Silvies watershed. This watershed does not contain anadromous fish or their habitat. Therefore these pastures will not be discussed or analyzed further.

## 2.2 FAWN SPRINGS ALLOTMENT

The Fawn Springs Allotment lies entirely within the Upper John Day (HUC 4# 17070201) subbasin and the Canyon Creek (HUC 5# 1707020107) watersheds.

Elevations within the allotment range from 4,100 feet to 6,200 feet. The allotment is bordered by the Strawberry wilderness on the north and east and private property on the west. This allotment is primarily west and south facing slopes. Terrain tends to gently slope downward towards Canyon Creek.

Overstory vegetation in the Allotment consists of Ponderosa Pine, Douglas Fir, and Western Larch. Dominant grass species throughout the allotment are bluebunch wheatgrass, Idaho fescue, elk sedge, and pine grass. Riparian overstory vegetation generally consists of a mix of hardwood and conifer species along the stream with alder being the dominant species

This allotment consists of 5 pastures and contains 2.32 miles of steelhead critical habitat (Table 4). There is no bull trout critical habitat within the Fawn Springs allotment. Within streams containing steelhead critical habitat, the Forest Service has identified areas that are the most accessible and sensitive to livestock impacts. These areas are typically production flats and generally contain valuable spawning grounds. They are located in low gradient, open meadow reaches of a stream. Because of the life-cycle stages of MCR steelhead relevant to the streams within these allotments, the Forest Service decided to focus the identification of the “Most Sensitive Riparian Areas” (MSRA) on the known and likely spawning areas for MCR steelhead. Riparian areas adjacent to spawning areas can be considered relatively more sensitive for the species because they occur on low gradient sections of a stream and often prove to be particularly attractive to grazing livestock as a water and shade source for much the same reasons. The process for determining MSRA can be found in Appendix G. The application of the criteria in respect to the Fawn Springs Allotment is displayed in Table 4 and Figure 2. Figure 2 shows 2 short sections of MSRA between G4 and Lake pastures. Although this part of East Fork Canyon Creek is not fenced, livestock access is controlled due to terrain.

TABLE 4. MILES OF STEELHEAD CRITICAL HABITAT – FAWN SPRINGS ALLOTMENT

Stream Name	Miles of Steelhead Critical Habitat	Miles of MSRA
East Fork Canyon Creek	0.58	.16
Wall Creek	1.74	0
<b>TOTAL</b>	<b>2.32</b>	<b>.16</b>

### Fawn Springs Allotment

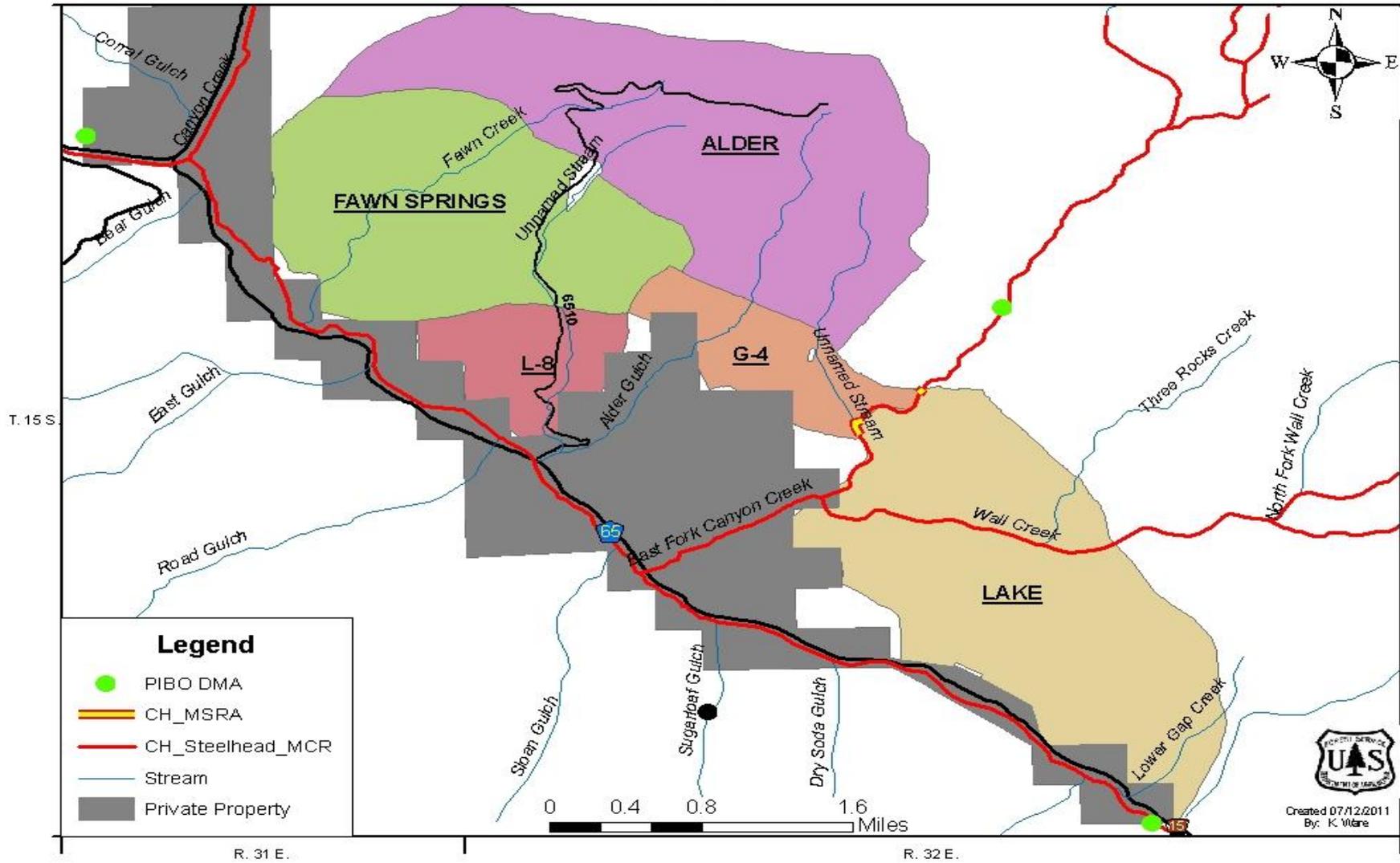


FIGURE 2. FAWN SPRINGS ALLOTMENT AND PASTURE MAP WITH STEELHEAD DCH AND MSRA

### *Lake Pasture*

Elevations within the Lake pasture vary from 4,200 feet at the confluence of Wall Creek with East Fork Canyon Creek to 5,200 feet on the ridge south of Wall Creek. The Strawberry Wilderness boundary divides this unit in half with Wall Creek being entirely within the Wilderness boundary. Excluding Wall Creek, water is limited in this unit; much of the area is scablands or savannah-like vegetation on mainly southern aspects. The east portion of the unit has ponderosa pines with elk sedge/bunch grass understories.

East Fork Canyon Creek serves as a boundary separating the Lake and G-4 pastures. This section of East Fork Canyon Creek is partially confined by nearly vertical canyon walls comprised of columnar granite.

### *G-4 Pasture*

As noted above East Fork Canyon Creek serves as a boundary between the G-4 and Lake pastures. This section of East Fork Canyon Creek is partially confined by nearly vertical canyon walls comprised of columnar granite. This is the only stream containing steelhead critical habitat within the G-4 pasture.

### *L-8, Alder, and Fawn Springs Pastures*

The L-8, Alder, and Fawn Springs pastures do not contain steelhead critical habitat and therefore will not be discussed further.

### 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).

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#### 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.

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##### 3.1.1 LRMP AMENDMENT 29 DESIRED FUTURE CONDITIONS

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

See Amendment 29 for the specific numeric values (Appendix A). The numerical DFCs were selected to protect water quality, features of riparian vegetation, and components of fish habitat.

Amendment 29 did not set specific quantifiable standards for livestock grazing activities. However, grazing activities can directly affect the attainment of Amendment 29 DFCs for: 1) sediment/substrate (cobble embeddedness), 2) channel morphology (bank stability, lower bank angle, width to depth ratios, 3) riparian vegetation (ground cover, percentage of stream bank vegetated), and 4) shade/canopy closure (hardwood/meadow complex). 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 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 MCR Steelhead and its designated CH. Table 5 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.

TABLE 5. 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 temp.	No increase if <68°F, reduce to 68°F if >68°F (See Appendix A for DFC details)	No measurable increase. Max below 64°F for migration/rearing, max below 60°F for spawning	PACFISH RMO
Large Woody Debris	Varies by ponderosa (20-70/mi), Mixed conifer (80-120/mi), lodgepole (100-350/mi). Sizes vary.	>20/mi >12" dia >35' length	Amendment 29 is more specific
Pool frequency	Range expected for Rosgen B&C streams, upper limits adjusted for streams >75 ft. to be consistent	Table provided shows pools/mile by wetted width. All values fall within ranges by BFW	Same

	w/PACFISH. Provides table w/ranges by bankfull width	of Amendment 29	
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
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 Dark Canyon, and Fawn Springs 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 part of PACFISH to provide criteria against which attainment or progress of the strategy's riparian goals may be measured. The need to be evaluated and assessed temporally to reflect the ecological capabilities of specific ecosystems and the fact that attainment of our 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 75<sup>th</sup> 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

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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

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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 B). The guidelines were recommended for use in modifying applicable allotment management plans, annual operating plans, project decision documents and instructions to permittees to provide a high degree of assurance that objectives for conservation and restoration of anadromous fish habitat would be met.

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

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

- Maintain or allow for improvement of conditions where criteria for late-seral ecological status are met or exceeded.

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

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

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

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

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### 3.2 MALHEUR NATIONAL FOREST RIPARIAN MONITORING STRATEGY

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

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

1. Information Gathering and Interpretation
  - Proper Functioning Condition (PFC) Assessment –qualitative condition assessment over a stream reach (geomorphic or unit specific)

- Multiple Indicator Monitoring (MIM) – quantitative monitoring protocol at designated DMAs
  - Analysis – interpretation and evaluation of assessment and monitoring information to determine current riparian condition and, to the extent feasible, trend)
  - Channel cross-section, streambed particle size distribution, and reach description measurements (i.e. Rosgen Channel Type)
  - Forest Service Region 6 Level II Stream Inventory Surveys – extensive quantitative assessment of stream channel, riparian vegetation, aquatic habitat condition, and biota to determine condition of selected stream systems
  - Spawning Surveys – quantitative assessment of redd vulnerability to disturbance
2. Support determinations of plan compliance -Provide information on which MNF can assess compliance with Forest Plan, including PACFISH & INFISH amendments. See Appendix C. for further discussion of Forest Plan standards and objectives related to riparian areas, water quality and fish habitat.
- Standards are GM 1-4 in PACFISH & INFISH; 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 MA3A/B (DFC's).
3. Recommendations
- Shows linkage between condition, trend, and past/current management activities
    - A process that provides support for grazing management decisions or any necessary or appropriate adaptive management adjustments
      - Allows annual adjustment of management strategies, as needed, to achieve compliance with plan direction

### *Proper Functioning Condition Assessments*

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

### *Multiple Indicator Monitoring*

The July 1, 2003 PACFISH/INFISH Implementation Monitoring Program Manual provides the background and direction for monitoring. The Multiple Indicator Monitoring (MIM) supplement by Cowley/Burton, dated May 2005 with addendums, provides the procedures in use by the MNF to monitor stream banks and riparian vegetation. The Interagency Implementation Team created the above documents; see Appendix E for these documents. The authors of MIM recently issued a 2011 technical guide as well (Burton et. al. 2011). MIM for grazing activities is

designed to determine whether or not livestock grazing management is resulting in “Near Natural Rates of Recovery” as defined by PACFISH/INFISH. Below are the three components, which comprise MIM. Monitoring is to be conducted by an interdisciplinary professional team trained in riparian plant identification and channel classification. Multiple indicator monitoring consists of implementation (endpoint indicator) monitoring and effectiveness (riparian objective) monitoring at designated locations (i.e. designated monitoring areas).

#### *Designated Monitoring Areas*

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

#### *Implementation Monitoring - Endpoint Indicators*

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

#### *Effectiveness Monitoring - Riparian Objectives*

Effectiveness (riparian objective) monitoring is designed to address the question of whether or not management practices currently applied to the area are achieving the desired results. These procedures are designed to assess the current condition and measure changes in streambanks, channels, and streamside vegetation over time, i.e., trend. They help determine if local livestock grazing management strategies and other land management actions are making progress toward achieving the long-term goals and objectives for streamside riparian vegetation and aquatic resources. The goal is to conduct effectiveness monitoring every three to five years on riparian areas and streambanks. This period of time is considered to be the minimum necessary to detect changes, although unusually wet years and/or flood events may result in short-term changes that validate the need to monitor more frequently, or at least at the time of the event. Budget and personnel constraints may limit the extent in which monitoring of this type will be conducted. Presently, effectiveness monitoring includes: modified greenline composition (adapted from Winward 2000 and USDI BLM 1996a), 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 Apt 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*” (Interagency Technical Reference 1996, BLM/RS/ST-96/004+1730). (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 Dark Canyon, and Fawn Springs Allotments. Public laws such as Clean Water Act were considered. The development of the project design criteria, grazing end-points and grazing strategies for the 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) and MSRAs (Appendix G). Forest policies on Riparian Monitoring and MSRAs 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.

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### 4.1 PROPOSED ACTION

#### *Dark Canyon Allotment*

The Dark Canyon Allotment is located south of the town of John Day on National Forest System Lands, mostly within T. 15, and 16 S, R. 32 and 33 E. The Allotment encompasses approximately 31,854 acres and is divided into 7 pastures: Canyon Creek, Dark Canyon, North Rock Springs, South Rock Springs, CH, Wickiup, and 15 Road (Figure X1).

#### *Fawn Springs Allotment*

The Fawn Springs Allotment is located south of the town of John Day on National Forest System Lands, mostly within T 15 S, R 31 and 32 E. The Allotment encompasses approximately 6,614

acres and is divided into 5 pastures: Lake, Alder, Fawn Springs, G-4, and L-8 (Figure X3 and X4).

#### 4.1.1 PERMIT INFORMATION AND GRAZING SYSTEMS

##### *Dark Canyon Allotment*

The Dark Canyon Allotment is currently permitted for 194 cow/calf pairs (1,297 AUM's) from 6/1 to 10/30. Permittees, permitted livestock numbers, and permit issuance and expiration dates are identified in Table 6.

TABLE 6. PERMIT INFORMATION FOR THE DARK CANYON ALLOTMENT

Permit Number	Permitted Livestock (Cow/Calf Pairs) / AUMs	Permit Issuance Date	Permit Expiration Date
01846	194 / 1297	06/01/2007	12/31/2016

##### *Grazing System:*

The Dark Canyon Allotment consists of 5 main pastures.

- The Dark Canyon Allotment's grazing rotation system will utilize a deferred rotation with a staggered season of use entry system.
- The Canyon Creek pasture will utilize a deferred rotation system, alternating areas of use between the Table Mtn/Middle Fork Canyon Creek area and the Chamber Spring/Canyon Creek area. During years of abundant forage this type of rotation will allow for a rest rotation to be implemented.
- Range Readiness and utilization levels may vary on/off dates and pasture rotations within the parameters of authorize use.

##### *Fawn Springs Allotment*

The Fawn Springs Allotment is currently permitted for 107 cow/calf pairs (636 AUMs) from 6/1 to 10/15. Permittees, permitted livestock numbers, and permit issuance and expiration dates are identified in Table 7.

TABLE 7. PERMIT INFORMATION FOR THE FAWN SPRINGS ALLOTMENT

Permit Number	Permitted Livestock (Cow/Calf Pairs) / AUMs	Permit Issuance Date	Permit Expiration Date
01706	107 / 636	04/05/2005	12/31/2014

##### *Grazing System:*

- The Fawn Springs allotment will utilize a deferred rotation grazing system.
- The Lake pasture will continue to be used during the early season. This will lessen impacts to steelhead critical habitat on Wall Creek.

- Currently cattle are removed from the allotment by mid-late August. This strategy will continue.
- When forage allows the Lake pasture will be rested. It is expected that during the life of this consultation the Lake pasture may be rested 2 out of the 5 years.
- Range Readiness and utilization levels may vary on/off dates and pasture rotations within the parameters of authorize use.

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#### 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 and designated CH. The MNF regards these PDC as integral components of the proposed action and expects that all proposed project activities will be completed consistent with those measures.

1. Management will be framed in a manner that will allow managers to manipulate grazing strategies (dates, stocking levels, rotational patterns) depending on annual environmental factors and permittee success at meeting standards during the previous year.
2. Permittees must maintain perimeter and interior fences prior to turn-out.
3. Standards that are required of the permittee (e.g., turn on dates, move triggers, end point standards) will be outlined in an addendum to Part III of the grazing permit.
4. MSRA will be located and used to identify stream sections that are most vulnerable to livestock impacts. Identifying MSRA locations will guide application of bank alteration values.
5. Spawning surveys will occur within all pastures containing MSRA's where turn out is expected to occur prior to June 30. Of the remaining CH reaches 20% will be randomly surveyed for redds where turn out is prior to June 30 (See Appendix F. Strategy to minimize Redd Trampling "Take" of Steelhead and Bull trout).
6. Where there is significant risk for redd trampling, the Forest and permittees will utilize a number of tools to protect redds, which include but are not limited to: alternative rotation, rest, exclusion with water gaps, temporary electric fences, additional riding.
7. Complete all required monitoring at PIBO Effectiveness Monitoring DMAs. DMA's to be monitored are provided to the Forest yearly by the EM Team via the Regional Office. This will effectively satisfy Interagency Implementation Team (IIT) monitoring requirements.
8. The Forest Service will visually inspect riparian livestock use in each pasture containing steelhead CH near the mid-point of the grazing rotation for that pasture, and will conduct applicable Multiple Indicator Monitoring ("MIM") on any such pasture where it appears that riparian conditions are approaching one or more move triggers or end-point indicators. This will help meet our long term riparian resource objectives.
9. Annual use indicators will dictate when livestock are moved between units or off the allotment, within the terms of the term grazing permit, including moves in response to fish spawning. This will help us meet our long term riparian resource objectives.
10. The Forest Service will provide the Services with an End of Year Grazing Report by March 1 of each year.
11. Use of roads and off-road travel by permittees and staff will follow these PDC:

- a. Vehicles are not authorized to travel through seeps, springs or streams except for use of existing fords on road crossings;
- b. All refueling activities and fuel storage will occur at least 150 feet away from live streams;
- c. OHV routes within 100 feet of streams will be camouflaged so that access routes do not become new trails and minimize disturbance to riparian vegetation;
- d. OHV travel off established roads within 100 feet of streams would occur only during periods when soil is dry.

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#### 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 (Figure 1).

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 (Table 8, 10 and 11). The ranges of values are starting points based on research and the MNF’s best collective professional judgement for establishing desired riparian conditions. The end-point indicator values (allowable use in riparian areas) are, to the extent feasible and appropriate data are available, be site-specifically designed to prevent any meaningful carry-over effects. They also provide for the evaluation of management practices to determine if they are effective in maintaining the desired and/or proper functioning condition, or improving the structure and function of riparian and aquatic conditions. These values could be adjusted as more site-specific information is gathered. End-point indicators (allowable use in riparian areas) should be adjusted for timing, intensity, frequency, and duration. The rationale for the development of the move trigger and end-point grazing use indicators is discussed below.

Livestock grazing along the greenline of stream channels will be limited to attain the numeric move trigger and end-point indicator values in Table 8 , 10 and 11.

Annual Indicators will be adjusted if resource objectives are not being met.

TABLE 8 – DARK CANYON ALLOTMENT ANNUAL USE INDICATORS

Pasture Name/ DMA or Key area Name / Creek Name	Monitoring Attribute	Key Species	Move Trigger <sup>2</sup>	Endpoint Indicator
Canyon Creek To be determined/Canyon Creek	Browse use		40%	50% (early season use) 40% (late season use)
MSRA - Present	Greenline stubble <sup>1</sup>	Deep-rooted hydric spp.	4 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		10%	15%
15 Road PIBO DMA/Middle Fork Canyon Creek	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble <sup>1</sup>	Deep-rooted	4 in.	4 in. (early season use)

MSRA-Present		hydric spp.		6 in. (late season use)
	Streambank Alteration		10%	15%
Upland Sites (All Pastures)	% Utilization	Upland grass species	35%	45%
Riparian Areas (All Pastures)	% Utilization	Riparian grass species	35%	45%

<sup>1</sup>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.

<sup>2</sup>The move triggers identified in this document are not intended to be used as a “standard.” They are designed to function as a tool to help 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 9 – FAWN SPRINGS ALLOTMENT ANNUAL USE INDICATORS

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

<sup>1</sup>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.

<sup>2</sup>The move triggers identified in this document are not intended to be used as a “standard.” They are designed to function as a tool to help 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 sediment 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 (UI Stubble Height Review Team Report 2004, Clary and Leininger 2000, Clary et al. 1996, Hall and Bryant 1995, PACFISH Enclosure B – Recommended Livestock Grazing Guidelines 1995, 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 (Benneyfield, 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, Benneyfield 2006, Cowley 2002, Benneyfield and Svoboda 1998). Benneyfield (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. 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, Utilization Studies and Residual Measurements – USDI BLM 1996b, PACFISH Enclosure B – Recommended Livestock Grazing Guidelines 1995). 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 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<sup>4</sup>; and

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<sup>4</sup> The exact dates and times of "early", "mid" and "late" can vary across the Forest and between given years, and therefore are not specified. However, to provide some typical guidelines, "early" is usually defined as the beginning of the growing season to mid-July, "mid" season from mid-July to mid-August, and "late" season from mid-August to the end of the growing season.

2. >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<sup>5</sup> by large herbivores (% of linear length of greenline altered) (Multiple Indicator Monitoring (MIM) of Stream Channels and Streamside Vegetation (Interagency Technical Reference 1737-23 2010)<sup>6</sup>. 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:**

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<sup>5</sup> 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).

<sup>6</sup> 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.

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

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

- Rest Rotation – 1 year of complete rest during a grazing cycle (grazing cycle is typically 3-4 pastures)
- Double Rest Rotation – pasture is rested for two consecutive years, then grazed either early or late to following year depending on recovery needs (i.e. herbaceous or shrubs)
- Corridor Fencing – complete rest from grazing for a specified period of time or until specified objectives are met.

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

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

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#### 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 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. 2010). 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 USDI BLM 1996a), 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 Apt 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.

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

When the annual utilization data is collected at the end of the growing season, the MNF will consider adjustments of livestock numbers, timing of grazing, and duration of grazing. 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

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The MNF acknowledges that there is a  $\pm 6\%$  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  $\leq 6\%$  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 cancellation of grazing permits as per direction outlined in FSH 2209.13, 10, 16.2 and 36 CFR 222.4,

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#### 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).

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## 4.2 INTERRELATED ACTIONS

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

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

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

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## 4.3 PROJECT ELEMENTS

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

1. Livestock use of allotment/pastures. Livestock will utilize the allotment/pastures consistent with the permitted numbers, season of use and grazing system described above and in the term grazing permit.
2. Permittee management of livestock and infrastructure maintenance. This includes move-in and move-out of cattle, herding, placement of nutrient (salt blocks) in the uplands, and maintenance of troughs, springs, ponds, fences and gates. Use of highway and off-road vehicles is included in this PE.
3. Range improvements. This includes the construction of fences for riparian pastures, and the construction/development of off-stream water sources.

4. Exclusionary fencing. Fences are constructed or placed to exclude areas from grazing. This is done to prevent livestock damage of riparian areas and in the case of electric fencing, to eliminate the potential for cattle stepping on redds.
5. Monitoring. A variety of implementation and effectiveness monitoring techniques are employed to determine if desired conditions are being met. The MNF Riparian Monitoring Strategy is discussed in detail in Section 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.

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#### 4.4 ESA ACTION AREA

The ESA action area for this consultation is defined by the cross-hatched area within the allotment boundaries of the 6th field HUCs listed in Table 1 and displayed in Figure 3.

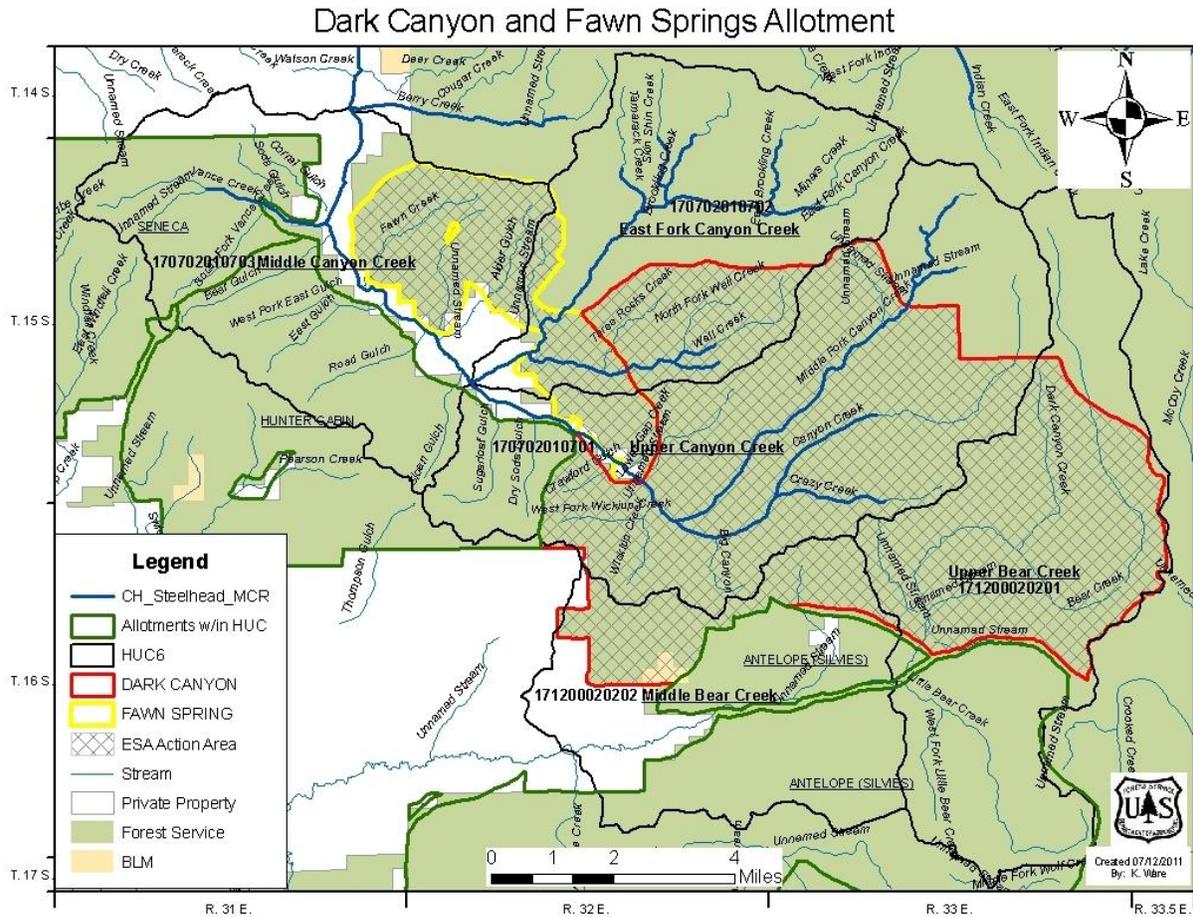


FIGURE 3. ESA ACTION AREA MAP FOR THE CANYON AND FAWN SPRINGS ALLOTMENTS CONSULTATION

## 5 STATUS OF THE SPECIES AND DESIGNATED CRITICAL HABITAT

The status of the Middle Columbia River Steelhead distinct population segment (DPS) and its designated critical habitat (CH) is presented in this section. No bull trout are found in the action area. Therefore, no description of the status of bull trout and its designated CH is presented.

### 5.1 MIDDLE COLUMBIA RIVER STEELHEAD DISTINCT POPULATION SEGMENT

#### 5.1.1 LISTING HISTORY AND LOCATION

The Middle Columbia River Steelhead Distinct Population Segment 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).

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### 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).

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### 5.1.3 MCR STEELHEAD POPULATIONS

The Interior Columbia Basin Technical Recovery Team (ICTRT) (2003) identified 15 populations in four major population groups (Cascades Eastern Slopes Tributaries, John Day River, 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 Slope major population group (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 SFJD population. The SFJD population contains three MaSAs and no MiSAs. SFJD MaSAs include Upper SFJD, Murderers Creek, and Lower SFJD.

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### 5.1.4 MCR STEELHEAD DPS VIABILITY STATUS

The status of a salmon or steelhead species is expressed in terms of likelihood of persistence over

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

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

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

Viability ratings for the MCR Steelhead MPG are presented in Figure 4. The risk of extinction is displayed as a combination of ratings for Spatial Structure/Diversity Risk and Abundance/Productivity Risk. The North Fork John Day MPG rates low/very low by the two criteria. The Middle Fork and South Fork MPGs rate low/moderate and the Lower Mainstem and Upper Mainstem MPGs have the highest extinction risk at moderate/moderate.

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#### 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 10. 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.

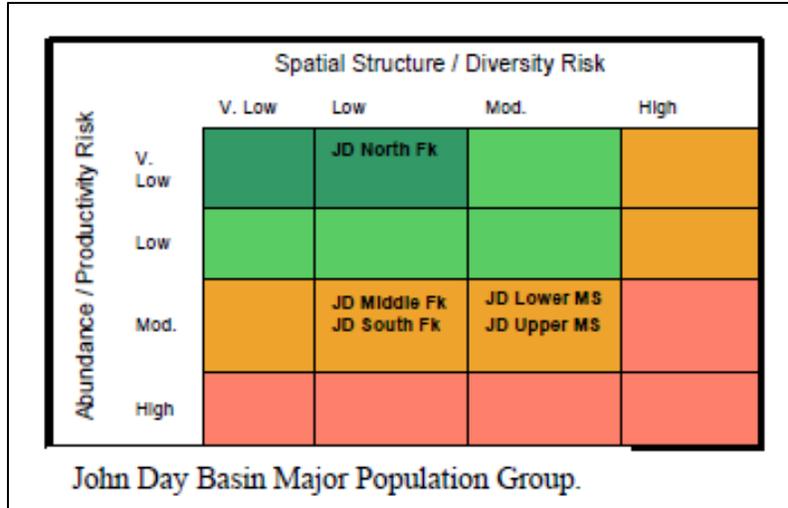


FIGURE 4. VIABILITY RATINGS FOR THE MCR STEELHEAD MAJOR POPULATION GROUP (NMFS 2009). SHADES OF GREEN INDICATE LOWER RISK OF EXTINCTION AND SHADES OF RED INDICATE HIGHER RISK.

TABLE 10. MCR STEELHEAD JOHN DAY RIVER MPG SUMMARY OF ABUNDANCE, PRODUCTIVITY, RISK RATINGS, AND MINIMUM ABUNDANCE THRESHOLDS (SOURCE: MIDDLE COLUMBIA RIVER STEELHEAD DPS RECOVERY PLAN SUMMARY 2009).

Population	Abundance Threshold <sup>1</sup>	Size Category	Run Timing	10-year Geomean abundance	Abundance Range	10-yr Hatchery Fraction <sup>2</sup>	Productivity <sup>3</sup>	Productivity Standard Error	A&P Risk Rating <sup>4</sup>	SSD Risk Rating
Lower Mainstem John Day	2250	Very Large	Summer	1800	563-6257	0.1	2.99	0.24	M	M
North Fork John Day	1500	Large	Summer	1740	369-10,235	0.08	2.41	0.22	VL	L
Upper Mainstem John Day	1000	Intermed.	Summer	524	185-5169	0.08	2.14	0.33	M	M
Middle Fork John Day	1000	Intermed.	Summer	756	195-3538	0.08	2.45	0.16	M	M
South Fork John Day	500	Basic	Summer	259	76-2729	0.08	2.06	0.27	M	M

<sup>1</sup> Abundance threshold for viability based on habitat intrinsic potential

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

<sup>3</sup> Geomean return per spawner calculated over most recent 20 years in data series.

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

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### 5.1.6 POPULATION LIMITING FACTORS

The Middle Columbia River 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 (key habitat quantity, habitat diversity, channel stability), altered sediment routing, water quality (temperature), and altered hydrology. For the MFJD population they are degraded floodplain and channel structure (key habitat quantity/diversity), altered sediment routing, altered hydrology and water temperature.

The primary tributary limiting factors for the SFJD population include altered sediment routing, degraded floodplain and channel structure (key habitat quantity and habitat diversity), altered hydrology, water quality (temperature) and blocked or impaired fish passage. Limiting factors for the UMJD population include degraded floodplain and channel structure (key habitat quantity and habitat diversity), altered sediment routing, water quality (temperature) and altered hydrology. Impaired fish passage is also a priority limiting factor for Beech and Laycock creeks.

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## 5.2 CRITICAL HABITAT FOR MIDDLE COLUMBIA RIVER STEELHEAD DPS

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### 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.

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### 5.2.2 PRIMARY CONSTITUENT ELEMENTS

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

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

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

### 5.2.3 STATUS OF MIDDLE COLUMBIA RIVER STEELHEAD CRITICAL HABITAT

Migratory habitat quality for MCR steelhead has been severely degraded by the development of the Federal Columbia River Power System. Depending on their natal watershed, adults and out-migrating juvenile steelhead encounter between one and three mainstem Columbia River dams migrating to and from the ocean. Hydroelectric development has modified natural flow regimes resulting in higher water temperatures, changes in fish community structure, and increased travel time for migrating adults and juvenile salmonids. Physical features of dams such as turbines also kill migrating fish. The only substantial habitat blockages at present for this species are Pelton Dam on the Deschutes River and Condit Dam on the White Salmon River. However, minor blockages from smaller dams, impassable culverts, and irrigation dams occur throughout the region. Several dams in the 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 critical habitat 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 (NWPPCC 2004) indicate that habitat complexity has been greatly reduced in many areas of designated critical habitat. 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 LJD, UJD, MFJD, and NFJD watersheds that are water quality limited for high temperatures, dissolved oxygen, or biological criteria. Additionally, the ODEQ identified total phosphates and fecal coliform as water quality limitations for many streams within the Lower Mainstem John Day 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 action area occurs within two 5<sup>th</sup>-field HUCs: Canyon Creek and Bear Creek. Both have a high conservation value. Mid-Columbia CHART members noted that PCEs in these HUCs support unique genetic resources since there is minimal hatchery influence on these populations.

The John Day Subbasin Plan (NPCC 2005) included an Ecosystem and Diagnostic Treatment (EDT) analysis of habitat conditions for the 5<sup>th</sup> field HUCs located in the action area. The approach was to display the top quartile protection and/or restoration 5<sup>th</sup> field HUCs and their important restoration attributes. Fifteen 5<sup>th</sup> field HUCs identified as important to Upper Mainstem John Day summer steelhead were evaluated and the top six were displayed. The Canyon Creek 5<sup>th</sup> field HUC in the action area made the list for protection benefit.

## 6 ENVIRONMENTAL BASELINE

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

### 6.1 NMFS MATRIX OF PATHWAYS AND INDICATORS

A NMFS process paper titled "Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale" (NMFS 1996) is used to describe the

environmental baseline. 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. Table 11 presents the current status of the environmental baseline for the Upper John Day River sub-basin, which includes the action area, utilizing the NMFS MPI. Table cells in bold print indicate the current status of each indicator. The habitat indicators in the NMFS matrix also correspond to the PCEs of designated CH. The relationship between NMFS MPI habitat indicators and PCEs of CH is discussed in Section 7.2 (Analysis of Effects to Designated Critical Habitat).

TABLE 11. STATUS OF ENVIRONMENTAL BASELINE FOR THE UPPER JOHN DAY SUB-BASIN.<sup>1</sup>

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
Water Quality	Temperature	50 – 57° F (max 7-day average)	57 – 61° F (spawning, max 7-day average)  57 – 64° F (migration and rearing, max 7-day average)	> 61° F (spawning, max 7-day average)  > 64° F (migration and rearing, max 7-day average)
		Sediment	< 12% fines (<0.85mm) in gravel	12 – 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	<b>Moderate levels of chemical contamination from agricultural, industrial, and other sources; some excess nutrients; one CWA 303d designated reach</b>	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 flows	Any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at base/low flows	<b>Any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows</b>

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
Habitat Elements	Substrate	Dominant substrate is gravel or cobble (interstitial spaces clear), or embeddedness <20%	Gravel and cobble is subdominant, or if dominant, embeddedness 20 – 30%	<b>Bedrock, sand, silt, or small gravel dominant, or if gravel and cobble dominant, embeddedness &gt;30%</b>
	Large Woody Debris	> 20 pieces/mile (> 12 inch diameter and > 35 ft. length), and adequate sources of woody debris recruitment in riparian areas	Currently meets standards for Properly Functioning, but lacks potential sources from riparian areas of woody debris recruitment to maintain that standard	<b>Does not meet standards for Properly Functioning and lacks potential large woody debris recruitment</b>
	Pool Frequency	Meets pool frequency standards and meets large woody debris recruitment standards for Properly Functioning habitat	Meets pool frequency standards but large woody debris recruitment inadequate to maintain pools over time	<b>Does not meet pool frequency standards</b>
	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	<b>No deep pools (&gt; 1 meter) and inadequate cover/temperature; major reduction of pool volume by fine sediment</b>
	Off Channel Habitat	Backwaters with cover, and low energy off-channel areas (ponds, oxbows, etc.)	<b>Some backwaters and high energy side channels</b>	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)	<b>Adequate habitat refugia do not exist</b>
Channel Condition & Dynamics	Width/Depth Ratio	< 10	10 – 12	> 12

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
	Stream Bank Condition	> 80% of any stream reach has > 90% stability	<b>50 – 80% of any stream reach has &gt; 90% stability</b>	< 50% of any stream reach has > 90% stability
	Floodplain Connectivity	Off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation, and succession	Reduced linkage of wetland, floodplains, and river areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function and riparian vegetation/succession	<b>Severe reduction in hydrologic connectivity between off-channel, wetland, floodplain, and riparian areas; wetland extent drastically reduced, and riparian vegetation/success altered significantly</b>
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	<b>Pronounced changes in peak flow, base flow, and/or timing relative to an undisturbed watershed of similar size, geology, and geography</b>
	Increase in Drainage Network	Zero or minimum increases in drainage network density due to roads	Moderate increases in drainage network density due to roads (e.g., 5%)	<b>Significant increases in drainage network density due to roads (e.g., 20 – 25%)</b>
Watershed Condition	Road Density & Location	< 2 mi/mi <sup>2</sup> ; no valley bottom roads	2 – 3 mi/mi <sup>2</sup> ; some valley bottom roads	<b>&gt; 3 mi/mi<sup>2</sup>; many valley bottom roads</b>
	Disturbance History	< 15% ECA (entire watershed) with no concentration of disturbance in unstable or potentially unstable areas, and/or refugia, and/or riparian areas	<b>&lt; 15% ECA (entire watershed) but disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian areas</b>	> 15% ECA (entire watershed) and disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian areas

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
	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	<b>Riparian reserve system is fragmented, poorly connected, or provides inadequate protection of habitats and refugia for sensitive aquatic species (&lt; 70% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/ composition &lt; 25%</b>

<sup>1</sup>Bold text in table cells indicates current status of the indicator

The environmental baseline using the NMFS MPI ratings (Table 11) 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 Upper Mainstem John Day River steelhead population occupies the John Day Basin above the mouth of the South Fork John Day River at Dayville. The population has five MaSAs: Upper John Day, Upper Middle Mainstem John Day, Beech, Laycock, and Canyon. It does not have any MiSAs. Spawning is distributed broadly across the population including mainstem reaches in the Upper John Day River, Canyon Creek, and Beech Creek, as well as in numerous tributaries from Dayville upstream to the headwaters.

The John Day River steelhead populations are currently managed entirely as wild populations. No hatchery production or supplementation occurs within the John Day River subbasin. Hatchery releases of summer and winter run steelhead occurred historically in the John Day River subbasin between 1925 and 1969. Hatchery steelhead were last released into the John Day River subbasin in 1969. Hatchery steelhead released between 1966 and 1969 were for experimental use only and were not meant for production purposes (ODFW 1990, Olsen et al. 1994).

The Upper Mainstem John Day River Summer Steelhead population is at moderate risk based on current abundance and productivity. Spawner abundance in recent years has been moderately variable, the most recent 10-year geomean number of natural-origin spawners was 524 (572 total spawners). During the period 1969-1998, returns per spawner for steelhead in the Upper Mainstem John Day River ranged from 0.19 (1992) to 5.43 (1979). The most recent 20-year (1979-1998) SAR adjusted and delimited geomean of returns per spawner was 2.14.

The integrated Spatial Structure/Diversity rating is moderate risk for the Upper Mainstem John Day River population. The rating for Goal A “allowing natural rates and levels of spatially mediated processes” was very low risk. A rating of “very low” was achieved because the current distribution is nearly identical to the historical distribution. The rating for Goal B “maintaining natural levels of variation” was moderate risk. This risk rating was a result of a moderate rating for changes in major life history strategies. Additional genetics information needs to be assessed to determine current genetic variation and to examine for the degree of introgression of hatchery fish. The population was rated as high risk for out-of-DPS hatchery strays based on a limited time series of composite John Day population hatchery fish observation data. Better population specific spawner composition data are needed to better determine the out-of-DPS hatchery fraction. If there is significant hatchery introgression that affects the genetic variation of this population through time, then the risk rating for Goal B will increase, and the overall risk rating for Spatial Structure/Diversity will increase.

### **Overall Risk Rating**

The Upper Mainstem John Day River Summer Steelhead population does not currently meet the ICTRT criteria for viable status, although it does meet criteria for a “maintained” population. The 10-year geomean abundance of 524 is well below the viable goal of 1,000 natural-origin spawners for an “intermediated” size population; however, the abundance is above the 500 minimum recommended for maintained status of an intermediate size population. The productivity point estimate of 2.14 is above the minimum needed at an abundance of 1,000, and the lower end of the adjusted standard error is above the 25% risk level. An increase in abundance is needed for this population to achieve viable Abundance/Productivity criteria. In addition, the Spatial Structure/Diversity rating was moderate risk due to loss in life history diversity and high risk for spawner composition.

**Upper Mainstem John Day River Population, Tributary Habitat Limiting Factors** The primary tributary habitat limiting factors identified by the recovery planning team for the Upper Mainstem John Day River steelhead population are degraded floodplain and channel structure (key habitat quantity and habitat diversity), altered sediment routing, water quality (temperature) and altered hydrology. Impaired fish passage is also a priority limiting factor for Beech and Laycock creeks.

### **Degraded floodplain connectivity and function**

There has been a loss of off-channel and side-channel habitats that once provided habitat for spawning and rearing, and refugia from high flows. Degraded floodplain connectivity and function has led to more extreme flows and summer water temperatures.

### **Degraded channel structure and complexity**

EDT results rated key habitat quantity as either a high or medium priority restoration need for all areas of the Upper Mainstem John Day River population and habitat diversity ranked as either a medium or low priority restoration need in all Upper John Day reaches (NPCC 2005). In addition, the Malheur National Forest rated LWD conditions and potential recruitment as “functioning at risk” in their Environmental Baseline for the Upper John Day (MNF 2004). Levels of big LWD are well below benchmark conditions for all areas outside wilderness boundaries (Unterwegner 2005, personal communication). Beech, Laycock, Fields, and Strawberry creeks are areas where restoration needs are highest for key habitat quantity and habitat diversity. Removal of beaver and their associated dams has reduced habitat complexity, floodplain function, and the amount of stored water. Livestock grazing has contributed to increased channelization, reductions in LWD, cover and bank stability, particularly in lower reaches of tributaries.

### **Altered sediment routing**

Canyon Creek has a large supply of spawning gravels, with most good spawning habitat in upper meadow reaches. However, surveys of substrate embeddedness for the Upper John Day watershed show that, for measured streams, more than 50% of their summaries showed >35% embeddedness. Substrate embeddedness is a problem in 5 of 8 Canyon Creek reaches measured and 10 of 32 mainstem John Day reaches measured (MNF 2004).

### **Altered hydrologic processes**

The upper John Day River experienced intensive stream channelization, flow modifications and drainage (including some tiling of drainage ditches) projects between 1943 and 1951. These and other activities altered the routing and timing of water delivery to streams; often increasing peak flows and reducing summer low flows. Irrigation withdrawals further reduce summer low flows, especially considering that the vast majority of the irrigation is from surface waters of the John Day and its tributaries (NPCC 2005). Livestock grazing, logging, road construction, beaver removal and fire suppression have all contributed to altered flow regimes. Today, summer low streamflows are below what would have existed historically. Water withdrawals dewater the lower reaches of Pine, Strawberry, Indian, Riley, Moon, McClellan, Laycock, and Fields creeks.

### **Degraded water quality**

Water quality is fair in the upper watershed during most of the year, as compared to ODEQ water quality standards (USDI 2000 cited in NPCC 2005). Low summer flows on the mainstem John Day River above Dayville contribute to elevated temperatures; higher streamflows during the winter/spring and streambank erosion contribute to turbidity. Problematic eutrophication in the mainstem John Day River is a partial result of irrigation return flow and possibly cattle feedlots (NPCC 2001 from NPCC 2005). Elevated stream temperatures are common to almost all the streams in the Upper John Day watershed. Historical mining has added to water quality problems by removing riparian vegetation, simplifying stream channels and changing stream substrate composition, all of which contribute to increased water temperatures.

### **Blocked or impaired fish passage**

Strawberry Creek has numerous unscreened ditches that may strand fish. Water withdrawals dewater the lower reaches of Pine, Indian, Strawberry, Moon, Laycock, McClellan, Riley, and Field creeks and create passage problems for juvenile fish. Diversions and low flows in Strawberry Creek create passage problems for adults as well. Push-up dams and other irrigation structures throughout the Upper John Day watershed often obstruct or delay fish passage. Culverts on national forest, state, county and private lands also create passage barriers in many areas. EDT results identified obstructions as high priority restoration needs in Beech and Laycock creeks. Panama Ditch crosses Beech Creek approximately one mile above its convergence with the John Day River forming a juvenile passage barrier, and possibly an adult barrier, at certain flows. High water temperatures in numerous tributaries and portions of the mainstem alter or sometimes block juvenile steelhead movements in the summer months.

### **Degraded riparian communities and large wood recruitment**

Riparian conditions are generally degraded in the Upper John Day watershed. Roads along riparian corridors have altered riparian functions; the Malheur National Forest has identified 123.8 miles of roads within RHCAs in the Upper John Day watershed (MNF 2004). Forest practices on private and public lands have altered riparian vegetation and reduced LWD recruitment potential. Grazing activities on the forest and private lands have reduced or eliminated native plant communities, altering soil conditions and infiltration rates (Kauffman 2004).

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

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#### **6.1.2 MALHEUR NATIONAL FOREST ROADS ANALYSIS REPORT**

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

- Total road density (roads in management levels 1-5)
- Road density (roads in management levels 1 and 2)
- Total road density within 200 feet of perennial and intermittent streams

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

Ranges of values for each element were assigned a risk rating of low, moderate, high or extreme (Table 12). 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 12. RANGES OF VALUES BY RISK CATEGORY FOR ELEMENTS USED IN THE WATERSHED RISK ANALYSIS.

Risk Element	Risk Category			
	Low	Moderate	High	Extreme
Total Road Density (miles/mile <sup>2</sup> )	0 - 1	1 - 3	3 - 5	>5
Level 1-2 Road Density (miles/mile <sup>2</sup> )	0 - 1	1 – 2.5	2.5 – 4	>4
Road Density w/in 200 feet of streams (miles/mile <sup>2</sup> )	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 <sup>2</sup> )	0 – 0.2	0.2 – 0.5	0.5 – 0.8	>0.8
Road Stream				

Risk Element	Risk Category			
	Low	Moderate	High	Extreme
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 five 6<sup>th</sup> field HUCs represented in the allotments are shown in Table 13. Three of the sub watersheds were given a “high” watershed risk rating, while one was given a low. The majority of individual risk ratings for the road density, road proximity within 200 feet, and road crossings elements were “high” or “extreme.” This suggests that the legacy road system has negatively impacted riparian and aquatic environmental baseline conditions in these 6<sup>th</sup> field HUCs.

The NMFS MPI values for the Road Density and Location (RDL) indicator are <2, 2-3 miles/mile<sup>2</sup> and >3 miles/mile<sup>2</sup> 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 Upper Canyon Creek, Upper Bear Creek and Middle Bear Creek 6<sup>th</sup> field HUCs are NPF for RDL. The East Fork Canyon 6<sup>th</sup> field HUCs road density risk ratings of “low” would be considered either PF, since the road density elements’ ranges for “low” (<2) encompass the NMFS MPI numeric ranges for the PF categories.

While there are no other roads risk analysis elements that are directly comparable to NMFS MPI indicators, it is logical that the Road Stream Crossing Density (RSCD) watershed risk element would inform an analysis of the NMFS MPI Increase in Drainage Network (IDN) indicator. The “high” risk score for the RSCD risk element for Upper Canyon 6<sup>th</sup> field HUCs support a NMFS MPI classification of NPF for the IDN indicator.

Road crossings at streams are the primary mechanism for rainfall runoff intercepted by roads to enter stream channels. Roads tend to concentrate runoff, resulting in higher peak flows than would occur without roads. Fine sediments from road surfaces also enter stream channels at road crossings, increasing turbidity, substrate embeddedness and substrate composition. The “high” risk ratings for Upper Canyon 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 MCR Steelhead Recovery Plan did not identify fish passage barriers as a limiting factor for these allotments. However, the MNF has tallied road crossing structures that may have fish passage concerns from Level II stream inventory reports. Five culverts with potential fish passage problems on designated critical habitat streams were documented in streams within the Dark Canyon allotment pastures.

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

TABLE 13. SUB-WATERSHED RISK RATINGS FOR SIXTH FIELD HYDROLOGIC UNITS IN THE ESA ACTION AREA (FROM MNF 2004B).

Watershed Risk Element	Hydrologic Unit Code Name and Number			
	Upper Canyon Creek 170702010701	East Fork Canyon Creek 170702010702	Upper Bear Creek 171200020201	Middle Bear Creek 171200020202
Road Density Risk (ML <sup>1</sup> 1-5)	high	low	high	extreme
Road Density Risk (ML 1-2)	high	low	high	extreme
Road 200' Proximity Risk (ML 1-5)	Extreme	low	extreme	extreme

Watershed Risk Element	Hydrologic Unit Code Name and Number			
	Upper Canyon Creek 170702010701	East Fork Canyon Creek 170702010702	Upper Bear Creek 171200020201	Middle Bear Creek 171200020202
Road 200' Proximity Risk (ML 1-2)	high	low	extreme	extreme
Road Crossings Risk	high	low	Moderate	Moderate
Geologic Sensitivity	Low	Low	Low	Low
Soil Erosion Sensitivity	Moderate	Moderate	Low	Low
Overall Watershed Risk	High	low	high	high

<sup>1</sup>ML = Road Maintenance Level (see narrative below)

Road maintenance level (ML) designations are defined as:

Level 1. These are intermittent service roads during the time they are closed to motorized traffic. The closure period must exceed one year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Roads receiving level 1 maintenance may be of any type, class, or construction standard.

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

Level 3. Roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this maintenance level are

typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material.

Level 4. Roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated.

Level 5. Roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated.

### 6.1.3 MALHEUR NATIONAL FOREST LEVEL II STREAM SURVEYS

The most recent level II stream survey data for streams within the Dark Canyon and Fawn Springs allotments are summarized below in Table 14. Most data are from 2006; however, data for Crazy Creek are from 1994. It is unknown whether habitat conditions have changed in the 17 years since the last habitat survey in Crazy Creek. The Crazy Creek stream survey, although dated, represents the best available science used to establish an environmental baseline for this document.

Measured parameters that did not meet resource management objectives (RMOs) are displayed in bold text on the tables. Most RMOs were not met on these streams except for streambank stability that was met for every stream. RMOs are presented in section 4.2.4. and Appendix J.

TABLE 14. LEVEL II STREAM SURVEY DATA FOR DARK CANYON ALLOTMENT

ALLOTMENT	Dark Canyon	Dark Canyon	Dark Canyon
	<b>R6 Level II Stream Survey Data</b>	<b>R6 Level II Stream Survey Data</b>	<b>R6 Level II Stream Survey Data</b>
<i>R6 Survey Protocol (Italics)</i>			
Stream Name	<b>Middle Fork Canyon Creek Reach 01-0.00</b>	<b>Middle Fork Canyon Creek Reach 02-5.833</b>	<b>Crazy Creek Reach 01-01</b>
<i>Percent of Stream within Pasture (i.e x, y) corresponding</i>	100%	85%	100%
<i>Length of Reach inside Pasture (feet)</i>	19,140.00	11,121.26	11,093.28
Pasture Name	Canyon Creek	Canyon Creek	Canyon Creek
Survey Date	8/10/2006	8/10/2006	8/4/1994
6 <sup>th</sup> Field HUC	Upper Canyon Creek	Upper Canyon Creek	Upper Canyon Creek
Ave Wetted Width (feet)	11.98	12.27	3.29
Ave Bankfull Width (feet)	20.6	17.25	4
<b>Ave BKFL W/D</b>	<b>26.8929</b>	<b>16.7936</b>	8.7562
Ave Gradient (%)	ND	ND	6

Ave Residual Pool Depth (feet)	1.256	1.507	0.614
<b>Pool Quantity (#/mi)</b>	<b>6.68</b>	<b>56</b>	<b>55.13</b>
Pool Quality (#/mi)	ND	2	ND
Percent Pools	3.36	ND	16.04
D50 (mm), or Dominant Substrate	18.5	155.5	ND
Embeddedness	ND	ND	ND
Pct Fines <2 mm in Riffles (R) or Pool Tails (P)	4.96/0	1.12 /0	P&R-25%,P-48%
<b>Percent Stable Banks (CS &amp; FB)</b>	98.6	98.5	ND
<b>Large Wood Frequency (#/mi)</b>	<b>2.06</b>	38	41.07
<i>Percent Shade/Canopy Closure</i>	ND	ND	Ave. Habitat Shade: 2
<i>Dominant Overstory(MC/PP/LPP)</i>	MC	MC	MC
<i>Off-channel Habitat &amp; Refugia</i>	Side channels on 4.2% of reach	Side channels on part of reach	Side channels on 1.81% of reach
<b>ALLOTMENT</b>	<b>Dark Canyon</b>	<b>Dark Canyon</b>	<b>Dark Canyon</b>
	<b>R6 Level II Stream Survey Data</b>	<b>R6 Level II Stream Survey Data</b>	<b>R6 Level II Stream Survey Data</b>
<i>R6 Survey Protocol (Italics)</i>			
Stream Name	<b>Canyon Creek Reach 01-29.791</b>	<b>Canyon Creek Reach 01-29.791</b>	<b>Canyon Creek Reach 02-34.896</b>
<i>Percent of Stream within Pasture (i.e x, y) corresponding</i>	58%	38%	100%
<i>Length of Reach inside Pasture (feet)</i>	9,717.00	7,449.76	12,624.48
Pasture Name	15 Road	Canyon Creek	Canyon Creek
Survey Date	8/10/2006	8/10/2006	7/24/2006
6 <sup>th</sup> Field HUC	Upper Canyon Creek	Upper Canyon Creek	Upper Canyon Creek
Ave Wetted Width (feet)	12.58	12.58	10.99
Ave Bankfull Width (feet)	21.25	21.25	12.83
<b>Ave BKFL W/D</b>	<b>24.2383</b>	<b>24.2383</b>	<b>14.0144</b>
Ave Gradient (%)	1.55	1.55	3.76

Ave Residual Pool Depth (feet)	1.547	1.547	1.36
<b>Pool Quantity (#/mi)</b>	<b>13.44</b>	<b>13.44</b>	<b>12.55</b>
Pool Quality (#/mi)	2	2	1
Percent Pools	8.45	8.45	5.23
D50 (mm), or Dominant Substrate	ND	ND	133
Embeddedness	ND	ND	ND
Pct Fines <2 mm in Riffles (R) or Pool Tails (P)	0	0	0/0/0
<b>Percent Stable Banks (CS &amp; FB)</b>	97.75	97.75	ND
<b>Large Wood Frequency (#/mi)</b>	<b>2.19</b>	<b>2.19</b>	<b>9.41</b>
<i>Percent Shade/Canopy Closure</i>	ND	ND	ND
<i>Dominant Overstory(MC/PP/LPP)</i>	MC	MC	LPP/MC
<i>Off-channel Habitat &amp; Refugia</i>	Side channels on 3.28% of reach	Side channels on 3.28% of reach	Side channels on 3.41% of reach
<b>ALLOTMENT</b>	<b>Fawn Springs</b>		
	<b>R6 Level II Stream Survey Data</b>	<b>R6 Level II Stream Survey Data</b>	
<i>R6 Survey Protocol (Italics)</i>			
Stream Name	<b>EF Canyon Creek Reach 01-2.072</b>	<b>Canyon Creek Reach 01-29.791</b>	
<i>Percent of Stream Reach within Pasture (i.e x, y) corresponding</i>	36%	4%	
<i>Length of Reach inside Pasture (feet)</i>	5708.1	2656.9	
Pasture Name	Lake	Lake	
Survey Date	8/14/2006	8/10/2006	
6 <sup>th</sup> Field HUC	East Fork Canyon Creek	Upper Canyon Creek	
Ave Wetted Width (feet)	13.23 ft	12.58	
Ave Bankfull Width (feet)	20.08	21.25	
<b>Ave BKFL W/D</b>	<b>16.9</b>	<b>24.2383</b>	
Ave Gradient (%)	3	ND	
Ave Residual Pool Depth (feet)	1.517	1.547	
<b>Pool Quantity (#/mi)</b>	<b>16.9</b>	<b>13.44</b>	
Pool Quality (#/mi)	1	2	

Percent Pools	14.39	8.45
D50 (mm), or Dominant Substrate	169.5	ND
Embeddedness	no data	ND
Pct Fines <2 mm in Riffles (R) or Pool Tails (P)	0/0	0
<b>Percent Stable Banks (CS &amp; FB)</b>	98	97.75
<b>Large Wood Frequency (#/mi)</b>	<b>12.33</b>	<b>2.19</b>
<i>Percent Shade/Canopy Closure</i>	no data	ND
<i>Dominant Overstory(MC/PP/LPP)</i>	MC	MC
<i>Off-channel Habitat &amp; Refugia</i>	Side channels on 1.58% of reach	Side channels on 3.28% of reach

ND = no data

##/# = multiple entries for this field

#### 6.1.4 MALHEUR NATIONAL FOREST WATER TEMPERATURE MONITORING

Appendix I presents water temperature monitoring information for the Dark Canyon and Fawn Springs allotments. Four streams; Middle Fork Canyon Creek, East Fork Canyon Creek, Canyon Creek and Wickiup Creek exceed the 7 day mean maximum of 64 degrees. All streams are designated critical habitat except Wickiup Creek. Wall Creek is a designated critical habitat stream, but does not have temperature data. Canyon Creek and East Fork Canyon Creek are on the State of Oregon 303d list for water temperature.

#### 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

The following provides a summary of data collected by the PIBO Effectiveness Monitoring Program (EMP) for monitoring locations within the Dark Canyon and Fawn Springs Allotments. Sites included within the summary are both integrator<sup>7</sup> reaches within randomly selected watersheds as well as Designated Monitoring Area (DMA)<sup>8</sup> reaches that lie within pastures contained by the randomly selected watersheds. Although 3 monitoring sites are found within these allotments, there has been only 1 reach evaluation (sites evaluated two or more times)

<sup>7</sup> 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%)

<sup>8</sup> 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

which occurred between 2001 and 2006 on Fawn Springs Allotment. Within this monitored reach the data suggests that most stream attributes are improving, while others are remaining relatively static, or missing data does not allow a comparison between years (see Tables 17 & 18 below).

Table 15 displays pool characteristics. Percent pool estimates ranged from 30.8 to 57.6 percent. Values exceeding 50 percent pool area included Canyon Creek I/DMA site in 2006. There was a significant increase in percent pool area between 2001 and 2006 at the Canyon Creek Integrator/DMA site. Mean residual pool depth did not exceed 0.53 meters for any site. Raw data are not available to evaluate the NMFS MPI criterion for pool quality (presence of pools greater than one meter in depth).

TABLE 15. POOL CHARACTERISTICS AT PIBO MONITORING SITES WITHIN THE DARK CANYON (DC) AND FAWN SPRINGS (FS) ALLOTMENTS.

Stream	Allot	Site Type	Year	Rosgen Channel Type	Bankfull Width (M)	Pools per km	Percent Pools	Residual pool depth (m)
Middle Fk. Canyon Cr.	DC	I	2006	B4c/C4	5.0	34.7	28.9	.23
Middle Fk. Canyon Cr.	DC	DMA	2006	B4c	7.3	ND	ND	ND
Canyon Cr.	FS	I/DMA	2001	B4c	7.2	30.8	30.8	.30
Canyon Cr.	FS	I/DMA	2006	C4	8.8	57.6	57.6	.32

Table 16 presents stream channel and bank characteristics. No bankfull width to depth ratio calculations met the NMFS MPI criteria for PF or AR of less than 10 or 10-12, respectively. The NMFS MPI utilizes 90 percent stability for the stream bank condition indicator. Data at each site exceeded the 90 percent threshold in 2006 and at Canyon Creek between 2001 and 2006 improved from 80 to 98 percent. The 2006 data is encouraging, however range monitoring data from 2009 measured 34% bank stability at the DMA on Canyon Creek and 40% covered banks. Percent undercut bank decreased slightly at Canyon Creek.

TABLE 16. STREAM CHANNEL AND BANK CHARACTERISTICS AT PIBO MONITORING SITES WITHIN THE ALLOTMENTS.

Stream	Allot	Site Type	Year	Rosgen Channel Type	Bankfull Width/Depth Ratio	Percent Stable Bank	Percent Undercut Bank
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Stream		Site Type	Year	Rosgen Channel Type	Bankfull Width/Depth Ratio	Percent Stable Bank	Percent Under-cut Bank
Middle Fk. Canyon Cr.	DC	I	2006	B4c/C4	23.6	100	25.0
Middle Fk. Canyon Cr.	DC	DMA	2006	B4c	-	83	33.3
Canyon Cr.	FS	I/DMA	2001	B4c	39.6	80	13.3
Canyon Cr.	FS	I/DMA	2006	C4	28.4	98	11.9

Table 17 presents substrate characteristics at the PIBO Integrator monitoring sites. Substrate measurements are missing for Canyon Creek 2001 and Middle Fork Canyon Creek 2006. Substrate data is also missing from all stream survey data. Using the data that is available indicates the D50 (median particle size) of the substrate ranged from 52 to 30 mm. Amendment 29 of the LRMP sets a desired condition of <20% embeddedness for substrate. Data for percent fine sediment smaller than 2 mm in diameter at pool tail-outs ranged from 5.2 to 8.9 percent. The PIBO data for the 2 mm size class is conservative in contrast to the NMFS MPI criterion of fines in gravel <0.85 mm. Both sites met the criteria. A trend for Canyon Creek cannot be determined due to missing data.

TABLE 17. SUBSTRATE CHARACTERISTICS AT PIBO MONITORING SITES WITHIN THE ALLOTMENTS.

Stream		Site Type	Year	Rosgen Channel Type	Median Particle Size (D50) (mm)	Percent Pool Tail Fines <2 mm/<6mm
Middle Fk. Canyon Cr.	DC	I	2006	B4c/C4	52	5.2/ 6.5
Middle Fk. Canyon Cr.	DC	DMA	2006	B4c	-	-
Canyon Cr.	FS	I/DMA	2001	B4c	34	-
Canyon Cr.	FS	I/DMA	2006	C4	30	8.9/ 20.8

Table 18 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 majority of the sites had GWR values ranging from 54-63, indicating a moderate to majority presence of wetland species along the streambank. There were no major changes in GWR rating between years at each site.

Greenline woody cover (GWC) is the sum of the percent cover of woody species along the greenline. These could be any woody species, such as willows, pines, or currants. Greenline woody cover can be up to 200 percent because cover estimates are a combination of two layers. Estimates ranged from 6 to 37 percent. The sites with the least woody cover were the Canyon Creek Integrator/DMA site and the Middle Fork Canyon Creek DMA. The sites with the greatest amount of woody cover were the Middle Fork Canyon Creek integrator site. Additional data are needed to determine if these incremental changes indicate a trend.

TABLE 18. RESULTS FOR TWO PIBO VEGETATIVE COVER ESTIMATES FOR SITES WITHIN THE ALLOTMENTS.

Stream	Allot	Site Type	Year	Greenline Wetland Rating	Greenline Woody Cover
Middle Fk. Canyon Cr.	DC	I	2006	63	37
Middle Fk. Canyon Cr.	DC	DMA	2006	54	6
Canyon Cr.	FS	I/DMA	2001	ND	ND
Canyon Cr.	FS	I/DMA	2006	57	8

In reviewing the data, it appears that the monitoring site on Canyon Creek has shown improvement for most attributes where data is available for a comparison. Overall, bankfull width-to-depth ratios, pool %, and bank stability have shown improvements while the remaining evaluated attributes, those considered to be potentially affected by livestock grazing – bank angle, undercut banks, D50, residual pool depth, percent fines <6mm, greenline wetland rating, and greenline woody cover – remained relatively unchanged (some attributes lacked data for an evaluation). There are too few reference sites within the John Day Basin to determine whether similar changes are occurring in unmanaged watersheds. Although only bankfull width-to-depth ratios, pool %, and bank stability showed improvement, this is actually a promising indicator given that both Bengeyfield (2006) and Rosgen (1996) indicated that the relationship between a stream's width and depth is perhaps the most revealing of all stream channel indicators as to whether the stream is in a condition to perform the various tasks that lead to a healthy riparian area.

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

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Identifying the existing condition of streams within a particular watershed or management area is an important step in evaluating how land management may be affecting the quality of stream habitats. To help assess these conditions, we are utilizing recent information from the PIBO EMP to represent mean habitat conditions for both managed and reference conditions (see Table 19). 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 19 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 19. 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 19. PIBO MANAGED AND REFERENCE MEAN VALUES FOR SELECTED RIPARIAN, CHANNEL MORPHOLOGY, AND HABITAT ATTRIBUTES.

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

<sup>1</sup>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 Dark Canyon and Fawn Springs Allotments, half of the monitoring sites presently show bankfull width-depth ratios within PIBO managed mean values, all sites currently

exhibit bank stability and percent fines <6mm within managed mean values, while only one of the three monitoring sites exhibit managed mean values for the remaining five stream attributes: D50, % undercut banks, pool %, residual pool depth, and bank angle. Thus, a cursory examination of the Dark Canyon and Fawn Springs Allotments reveals that three of the eight stream attributes considered to be potentially affected by livestock grazing – bankfull width-depth ratios, bank stability, and percent fines <6mm – are found to be within PIBO managed mean values, whereas the other five, D50, % undercut banks, pool %, residual pool depth and bank angle, are less than 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. Meeting 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 S&Gs.

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## 6.2.2 IMPLEMENTATION MONITORING

An interdisciplinary group using the Multiple Indicator Monitoring (MIM) method acquired monitoring data for one site in each of the Fawn Springs and Dark Canyon allotments. Data were collected from 2008 to 2010, although not all allotments, pastures, and end-point indicators were monitored in each year. Data are presented in Table 20. Data from the G4 pasture in the Fawn Springs allotment are not presented as this was an upland monitoring site. Data for each allotment are summarized below.

The NMFS MPI criteria for a stream reach is PF if > 80% of any stream reach has > 90% stability, AR if 50 – 80% of any stream reach has > 90% stability and NPF if <50% of any stream reach has >90% stability. Percent stable streambank for both pastures ranged from 84-92 percent. While the monitoring sites are intended to be representative of grazed sites in a pasture, the estimate does not determine the percent stable bank of the *entire* stream length within the pasture, so it is not directly comparable to the NMFS MPI criteria.

Bank stability estimates ranged from 32-40 percent between allotments and covered banks ranged between 40 and 47 percent (Table 20). For the Dark Canyon and Fawn Springs allotments, data were collected on bank alteration, stubble height, and woody browse (Table 20). Data from the Dark Canyon allotment did not reveal a downward trend over this 3-year timeframe and adaptive management was used to rest the pasture in 2010 (Table 20).

TABLE 20. DARK CANYON AND FAWN SPRINGS ALLOTMENT MIM MONITORING RESULTS.

<i>Dark Canyon Allotment</i>
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Dark Canyon Allotment at Canyon Creek	2008	2009	2010 (non-use)
<b>Streambank Alteration (%)</b>	8	16	8
<b>Utilization of woody shrubs</b>	None	Slight to Light	None to Slight
<b>Greenline Stubble Height</b>	5	4	11
<b>Bank Stability (%)</b>	NM <sup>1</sup>	32	NM
<b>Covered Banks (%)</b>	NM	40	NM
<i>Fawn Springs Allotment</i>			
<b>PIBO Monitoring Sites</b>			
Fawn Springs Allotment at Lake Pasture	2009	2010	
<b>Streambank Alteration (%)</b>	6	NM <sup>1</sup>	
<b>Utilization of woody shrubs</b>	Moderate	Slight to Light	
<b>Greenline Stubble Height</b>	12	NM	
<b>Bank Stability (%)</b>	40	NM	
<b>Covered Banks (%)</b>	47	NM	

<sup>1</sup>Not monitored

Implementation monitoring for livestock grazing also provides insight on the effects of other wildlife grazing on implementation monitoring indicators. A summary of the monitoring results is presented in Table 21 and 24. The end-of-year reports indicate that while only 37 percent of the grazing use end-points were measured in the Dark Canyon and Fawn Springs allotments, data available suggest that grazing use end-points were met with few exceptions.

TABLE 21. SUMMARY OF IMPLEMENTATION MONITORING RESULTS FOR 2008-2010 FOR THE FAWN SPRINGS ALLOTMENT.

Year	Summary
<b>2008</b>	Monitoring information was reported for four pastures. The utilization of grass and non-hydrophytic species (UGNHS) standard of 45% use was met. No other grazing use end-points were measured.
<b>2009</b>	Monitoring information was reported for four pastures. The utilization of herbaceous hydrophytic species (UHHS) and Streambank Alteration (SA) standards were met for the

	one pasture measured. <b>The utilization of riparian woody shrubs (URWS) standards were exceeded in the Lake Pasture, and was not measured in the other pastures.</b> Unauthorized livestock use was reported on the allotment after the off date on numerous occasions.
<b>2010</b>	Monitoring information was reported for four pastures. The UHHS was not measured. The URWS standard was met in the two pastures where measured. The UGNHS standard of 45% was met in the four pastures measured. The 20% standard for SA was not measured. Unauthorized livestock use was reported early in the season.

TABLE 22. SUMMARY OF IMPLEMENTATION MONITORING RESULTS FOR 2008-2010 FOR THE DARK CANYON ALLOTMENT.

Year	Summary
<b>2008</b>	Monitoring information was reported for three pastures. The UHHS standard was met in the two pastures measured. The URWS standard was measured in two pastures, however there were no woody shrubs within the measured transects. <b>The UGNHS standard of 45% use was exceeded at 72% in the Dark Canyon Pasture at the Bear Creek DMA #2 site.</b> The UGNHS standard was met for the other two pastures measured. The 20% SA standard was exceeded at 30% in the Dark Canyon Pasture at the Bear Creek DMA #2 site, however this measurement was noted as Not Applicable in the end-of-year report. The SA standard was met in the one other pasture where measured. Unauthorized livestock use was reported on the allotment after the off date on numerous occasions.
<b>2009</b>	Monitoring information was reported for four pastures. The UHHS and URWS standards were met for the one pasture measured. <b>The UGNHS standard of 45% was exceeded in the CH pasture, and met in the other three pastures measured.</b> The SA standard of 20% was met for the one pasture measured. Unauthorized livestock use was reported after the off date.
<b>2010</b>	Cattle did not graze the Canyon Creek and Wickiup pastures in 2010. However, unauthorized and excess use did occur in both pastures from cattle off the Fawn Springs Allotment, and cattle from the Dark Canyon Pasture of the Sugarloaf Allotment. Monitoring information was reported for two pastures, Canyon Creek and Dark Canyon. The UHHS, URWS, and SA standards were met for the two pastures measured. The UGNHS standard was also met for the one pasture where measured.

## 7 EFFECTS OF THE PROPOSED ACTION

The direct and indirect effects of implementing the action, including interrelated and interdependent actions, on the listed species and designated CH are evaluated in this section. In addition, the probability of directly affecting juveniles, spawning adults, and incubating embryos in redds, will be assessed. The environmental impacts of implementing the project elements

(PE) will be evaluated by use of NMFS MPI indicators to determine effects to ESA-listed MCR Steelhead and designated CH.

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

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## 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.

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### 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.

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### 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.

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### 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 PEs remaining for analysis are:

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

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#### 7.1.3.1 PE1: LIVESTOCK USE OF ALLOTMENT/PASTURES

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

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#### 7.1.3.2 PE2: PERMITTEE MANAGEMENT OF LIVESTOCK AND INFRASTRUCTURE MAINTENANCE

This PE includes the move-in and move-out of livestock using highway and off-road vehicles, and herding by range riders. While vehicles are also used to access sites for monitoring purposes (PE 5), the effects of vehicle use to CH and to the species will only be assessed for this PE to reduce redundancy in the analysis. Project Design Criteria for vehicle use are provided by the PDCs described earlier in the proposed action section.

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

### 7.1.3.3 PE5: MONITORING

A variety of implementation and effectiveness monitoring techniques are employed to determine if desired conditions are being met. The MNF Riparian Monitoring Strategy is discussed in detail in the Monitoring section (Section 4.1.4). 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

The three PEs will be analyzed first for their effects to designated CH, then for effects to the species. The freshwater primary constituent elements (PCE) of MCR Steelhead CH applicable to the action area are presented in Table 23.

TABLE 23. 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.

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 24 presents the analysis for effects of the action to the PCEs of MCR Steelhead designated CH. Table 25 presents a summary of effects to the indicators associated with each PCE of MCR Steelhead CH. Measurable effects to several habitat indicators of PCEs were concluded.

TABLE 24. ANALYSIS OF EFFECTS TO MPI INDICATORS CORRESPONDING TO PCEs OF DESIGNATED CRITICAL HABITAT FOR MCR STEELHEAD WITHIN THE DARK CANYON AND FAWN SPRINGS ALLOTMENTS.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;	Water Quantity	Flow/ Hydrology	Changes in Peak/Base Flows	<p>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 <i>et al.</i> (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.</p> <p>Indirect effects of historic livestock grazing in the ESA action area (including trailing and watering), on channel and bank features such as bank stability, undercut banks and width to depth ratio, as well as impacts to shrub recruitment and green line plant vigor, have likely affected peak and base flows on some streams. It is anticipated that PE 1 (livestock use) will have negative effects to this indicator, but they will be too small to be meaningfully measured, particularly to flows at the time of year when spawning, incubation and larval development occur. The use of BMPs, end point indicators, and adaptive management should minimize effects. If hydrophytic vegetation, bank stability, width-depth ratio, and undercut banks show a static and/or downward trend and the Forest is not meeting RMOs, grazing practices will be modified (See Adaptive Management Section VI). PE 2 (permittee mgt. and mtce.) includes off-road vehicle use. This has the potential to increase soil compaction, but it will be minimized by use of PDCs. Little to no riparian vegetation is affected by vehicle use, range riding or maintenance activities. PE 2 overall will have slight negative effects to the indicator that are too small to be meaningfully measured. PE5 (monitoring) will not increase compaction or remove vegetation, and therefore does not have</p>

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
	Water Quality	Flow/ Hydrology		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.
			Temperature	<p>The majority of the temperature monitoring data for the allotments indicate that State water quality standards are not being met. Such streams would be considered “NPF” using NMFS MPI criteria. The exception to this is Crazy Creek.</p> <p>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).</p> <p>Livestock use (PE 1) is likely to result in measurable water temperature increases for certain stream reaches. These impacts are expected to be localized and infrequent, and 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 mgt. and mtce.) and PE 5 (monitoring) activities will not remove vegetation that provides shade nor affect channel-forming processes that might widen stream channels. Consequently, there is no mechanism for PEs 2 and 3 to affect water temperature and the effect of the PE for the indicator is neutral.</p> <p>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</p>

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				<p>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.</p>
			Sediment/ Turbidity	<p>The monitoring results presented above indicate that livestock use (PE 1), as well as use by wildlife, results in trampled and grazed riparian vegetation, and altered stream banks to some degree. Livestock also use trails to access streams for water. Livestock occasionally will concentrate their use in certain areas, potentially creating patches of relatively bare soil. Some of these areas may be adjacent to stream sections used by MCR Steelhead for spawning, incubation and larval development. Bare soil is prone to erosion and can result in fine sediment entering stream channels and resultant increases in turbidity. Habitat impacts are likely to include areas of exposed streambank up to a few feet wide where livestock access streams to drink or cross, and areas of bank disturbance where livestock graze in riparian areas. Exposed areas and other bank disturbances that occur are likely to result in a slight increase in turbidity for a short distance downstream during rainstorms or runoff events. However, given background levels of turbidity during runoff events it will be difficult to distinguish between turbidity resulting from these minor 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.</p> <p>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.</p> <p>However, livestock grazing will increase the amount of sediment entering streams by the mechanisms described above. These impacts are expected to be localized and short-term.</p>

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				<p>Consequently, the effect to this indicator by PE1 (livestock use) is negative and expected to be measurable.</p> <p>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, although they are currently allowed to cross streams. 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.</p> <p>Monitoring (PE 3) activities such as pebble counts and measuring cross-sections involve wading in stream channels. Other monitoring activities involve walking or riding horses in riparian areas. The timing of these activities is typically after spawning, incubation and larval development of MCR Steelhead, although there may be some overlap in timing. Spawning surveys also involve wading. Wading may result in very small increases in turbidity downstream for a short distance (a few feet) that will quickly dissipate. Walking and riding horses in riparian areas should not result in fine sediment delivery to stream channels. However, there may be very small and transient increases in turbidity when a stream is being crossed. The monitoring PE effect to the indicator is negative, but not meaningfully measured.</p>

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Chemical Contamination/ Nutrients	<p>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.</p> <p>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.</p> <p>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.</p>
	Suitable Substrate	Habitat Elements	Substrate Embeddedness	<p>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.</p>

PCE	PCE Habitat Feature	Matrix Pathway	Matrix 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;	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.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
<p>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</p>	<p>Floodplain Connectivity</p>	<p>Channel Condition and Dynamics</p>	<p>Floodplain Connectivity</p>	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Width/Depth Ratio	<p>Half the streams within these allotments are exhibiting over-widened channels (see PIBO data, Section 6.2). However, data from one PIBO site indicates an improvement in this indicator from 2001 to 2006. Legacy effects of livestock management in these 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 and adaptive management. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect W/D ratio. PDC for off-road use will prevent bank damage and effects to W/D ratio. Range riding with horses will occasionally cross a stream but effects to streambanks and beds will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect W/D ratio. The overall effect of PE 2 is a neutral affect to the indicator. PE 5 (monitoring) does not remove vegetation or destabilize stream banks. There is no potential for it to increase W/D ratio. The monitoring PE will have a neutral effect to the indicator.</p>
	Forage	Habitat Elements	Substrate Embeddedness	<p>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. Percent fines monitored in PIBO are found to be within PIBO managed mean values. 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.</p>

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Large Woody Debris	<p>Livestock grazing does not affect this indicator in conifer-dominated riparian forests. Livestock use can negatively affect this indicator when grazing occurs within hardwood stands such as aspen, alder, birch, and cottonwoods that could contribute larger pieces of wood to small streams. In sites in the action area that would be naturally dominated by cottonwood gallery riparian forests, livestock use (PE 1) will likely result in altering the level of cottonwood stocking and future large tree (and subsequent large woody debris) recruitment (Kaufmann et al. 1983, Case and Kaufmann 1997, Beschta and Ripple 2005). Therefore it is anticipated that livestock will graze young cottonwoods at levels meaningfully measured with respect to the future production of large woody debris. The effect to this indicator by livestock use (PE 1) is negative and meaningfully measured. Using BMPs, end point indicators, and adaptive management will result in discouraging browse on existing hardwoods and willows but may not promote regeneration of new cottonwoods. PE 2 and PE 5 do not affect trees and associated LWD in any way. Therefore there is no mechanism for an effect and the effect is neutral to the indicator for both PEs</p>

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Pool Frequency	<p>Pool frequency at the PIBO monitoring sites and stream survey reaches within these allotments are not currently meeting the DFC as described within Amendment 29 of the MNF LRMP and would be considered to be NPF using NMFS MPI criteria. See PIBO and stream survey results.</p> <p>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.</p> <p>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.</p> <p>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.</p>

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Pool Quality	<p>PIBO and stream survey data within these allotments indicates that undercut banks are at less than the desired condition. Residual pool depth is generally low with very few to no pools greater than 1 meter deep. Although Width/Depth ratios at one PIBO site is improving other streams are still considered to be too wide. See 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.</p> <p>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 quality that is negative and not meaningfully measured.</p> <p>PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect pool quality. PDC for off-road use will prevent bank damage and effects to pool quality. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect pool frequency. The overall effect of PE 2 is a neutral affect to the indicator.</p> <p>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.</p>

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Off-Channel Habitat	<p>There is very little off-channel habitat within tributaries of these allotments. Stream survey data is showing an overall degradation of this indicator between the early 1990's and the mid/late 2000's, with off-channel habitat decreasing on Canyon Creek where data is comparable between 1993 and 2006 in Canyon Creek pasture. 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 off-channel habitat that is negative and not meaningfully measured.</p> <p>PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect pool frequency. PDC for off-road use will prevent bank damage and effects to off-channel habitat. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect pool frequency. The overall effect of PE 2 is a neutral affect to the indicator.</p> <p>PE 5 (monitoring) does not have any mechanisms to affect off-channel habitat. The monitoring PE has a neutral effect to the indicator.</p>

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Refugia	<p>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.</p> <p>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.</p> <p>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.</p>

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
		Watershed Condition	Riparian Reserves	<p>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.</p> <p>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.</p> <p>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.</p>

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
	Natural Cover	Habitat Elements	Substrate	<p>This indicator focuses on the composition of streambed substrate rather than its embeddedness, which was evaluated earlier. PIBO and stream survey D50 data indicates that substrates are less than managed means. See PIBO and stream survey data. Based on the stream survey data the Substrate indicator would be classified as “NPF” using NMFS MPI criteria.</p> <p>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, and adaptive management, should further minimize the magnitude of potential negative effects by PE 1.</p> <p>The analysis of effects to the sediment/turbidity indicator for PCE 1, above, determined that the effect of PE 2 (permittee management and infrastructure maintenance) was “negative and not meaningfully measured.” This level of effects is not expect to measurably change the composition of existing substrate with regard to its function as cover for juvenile or adult MCRS Steelhead. Therefore, the effect to this indicator by PE 1 (livestock use) is negative and not meaningfully measurable.</p> <p>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.</p>
			Large Woody Debris	See Above.

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

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
(3) Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival;	Migration Corridors Free of Obstruction	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 25. SUMMARY OF EFFECTS OF THE PROPOSED ACTION BY THE PROJECT ELEMENTS OF LIVESTOCK GRAZING IN THE ALLOTMENTS TO THE INDICATORS ASSOCIATED WITH HABITAT FEATURES OF EACH PRIMARY CONSTITUENT ELEMENT OF MCR STEELHEAD CRITICAL HABITAT.

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

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

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

<sup>1</sup>NNMM = Negative, not meaningfully measured

<sup>2</sup>NMM = Negative, meaningfully measured

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## 7.3 ANALYSIS OF EFFECTS TO LISTED SPECIES

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### 7.3.1 GENERAL EFFECTS

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

Grazing can have a number of detrimental effects on riparian and aquatic habitat (Platts 1991). When riparian habitat is adversely 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 (Bjornn and Reiser 1991). Spawning salmonids appear to prefer spawning in areas in close proximity of overhead cover (Bjornn 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 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.

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### 7.3.2 DIRECT EFFECTS TO SPECIES

The Fawn Springs and Dark Canyon allotments contain 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. 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 forced into open water are likely to be at increased risk of predation. Livestock may 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 E). 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 3 and 4).

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 unless planks are used. 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 MCRS steelhead being disturbed and moving out of the area, resulting in direct impacts to the species.

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### 7.3.3 DIRECT AND INDIRECT EFFECTS TO AQUATIC AND RIPARIAN HABITAT

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

The analysis in the "Effects to Critical Habitat" section (Section 6.3) evaluated specific NMFS MPI indicators that correspond to the PCEs of CH. The PCEs are used to describe "those physical or biological features that are essential to the conservation of the listed species." The same sub-set of NMFS MPI indicators evaluated for effects to PCEs also apply to the analysis of effects to the species. To eliminate redundancy, only those indicator/PE combinations for which a conclusion of effect to a component of a PCE was "negative and meaningfully measured" will be brought forward for further evaluation in this section, as they have the potential to adversely affect listed MCR Steelhead. This conclusion was only found for PE 1 (livestock use) and not for PE 2 (permittee management and infrastructure maintenance) or PE 5 (monitoring). The indicators for which "negative and meaningfully measured" effects were concluded are:

- Water Temperature
- Sediment/turbidity
- Substrate embeddedness
- Large woody debris

- Refugia

### 7.3.3.1 EFFECTS ON WATER TEMPERATURE

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Water temperature is an important factor affecting distribution and abundance of salmonids within the action area. Water temperatures influence water chemistry, as well as every phase of salmonid life history. Optimal temperatures for steelhead are 50° to 61° F (10° to 16° C), and the lethal temperature is approximately 77° F (25° C). Stream temperatures are of particular concern within the John Day Subbasin. This is highlighted in the John Day Subbasin Plan (NPCC 2005) as well as the MCR Steelhead recovery plan (NMFS 2009). Degraded water quality, which includes elevated water temperatures, is identified as a Limiting Factor in both plans. Analysis of monitoring data for streams in the allotments indicate that most streams exceed standards for water temperature. MNF monitoring indicates that Crazy Creek met standards. 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. Criteria for anadromous salmonid freshwater temperatures are found in the NMFS MPI presented earlier.

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 Weathered 1984) (Figure 5). 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 5P3F9P)

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<sup>9</sup> 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.

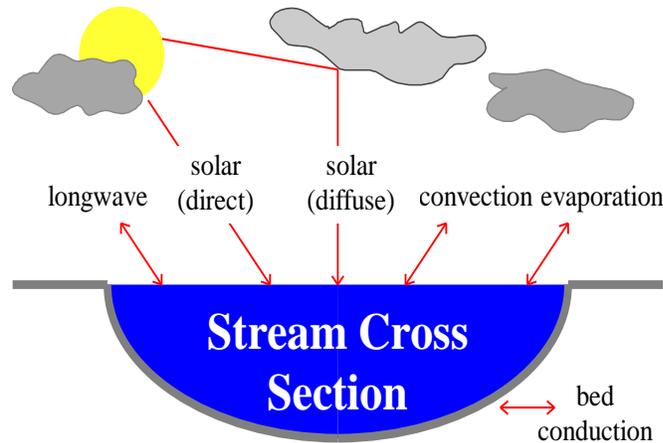


FIGURE 5. HEAT EXCHANGE BETWEEN A STREAM AND ITS ENVIRONMENT.

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:

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

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

Figure 6 and Table 26 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 26 are based on the shadow cast by vegetation at a distance of 1 foot and farther from the edge of the channel.

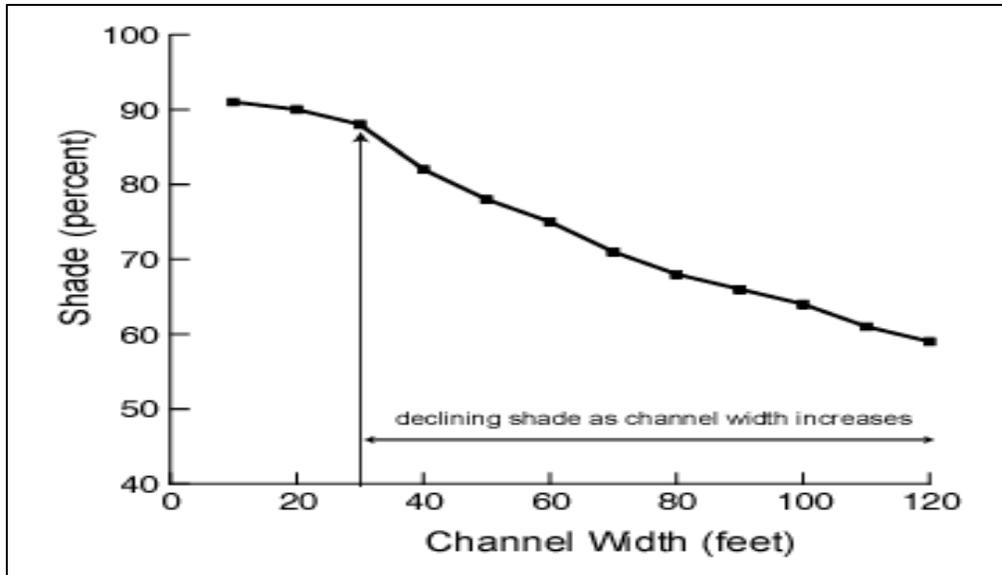


FIGURE 6. SHADE PROVIDED BY 150-FOOT TALL CONIFERS (PLATTS ET AL 1987), (PARK, 1993).

TABLE 26. EFFECTIVE SHADE PROVIDED BY THREE HEIGHTS OF GREENLINE VEGETATION AT VARYING ACTIVE STREAM CHANNEL WIDTHS.<sup>1</sup>

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

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<sup>1</sup>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 6, Table 26 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 2-3 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 26 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 26 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 logical 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 1<sup>st</sup> and 2<sup>nd</sup> order streams in the MFJD River drainage. These are likely to have similar dimensions to streams of the same orders in the UMJD River drainage. The mean wetted width was 2.0 meters with a standard error of 0.5 meter (6.6 feet with a standard error of 1.6 feet). There is 90% confidence that the true mean wetted width is within 6.6 +/- 3.4 feet (3.2 to 10.0 feet). The greatest probability of measurable temperature increases as a result of livestock grazing is therefore likely to occur in channels less than 10 feet wide.

Figure 6 and Table 26 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 26 for the Floodplain Connectivity habitat feature of PCE 2 (rearing critical habitat) concluded that the livestock use PE is anticipated to have a negative, but not meaningfully measured effect to the indicator. The potential for increases in width-depth ratio is mitigated 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 increasing 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. 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. It should be noted some impacts from past management activities will persist over the life of this consultation and likely much longer in some cases.

#### 7.3.3.2 EFFECTS ON SEDIMENT/TURBIDITY, SUBSTRATE AND SUBSTRATE EMBEDDEDNESS

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

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

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

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

There are no streams in the proposed action area that have been identified on the 303(d) list for sedimentation. Fine sediment levels vary across streams in these allotments. Amendment 29 of the LMRP sets a desired condition of <20% embedded. Currently the PIBO information within the allotments show percent fines in the pool tail-outs as meeting the criteria.

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

These effects to the Sediment/Turbidity and Substrate Embeddedness indicators will be minimized by use of endpoint indicators and PDC. 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. It should be noted some impacts from past management activities will persist over the life of this consultation and likely much longer in some cases.

### 7.3.3.3 EFFECTS ON REFUGIA

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The concept of “Refugia” is not described in detail in the NMFS MPI (NMFS 1996) (see Table 11 earlier in this document). The definition provided therein is: “important remnant habitat for sensitive aquatic species.” The availability of various types of habitat refugia are described as limiting factors in the recovery plan for the Oregon steelhead populations of the MCR Steelhead DPS (e.g., loss of side-channels that provided high flow refugia; cold water refugia provided by Columbia River tributary streams such as the Deschutes River (NMFS 2009)).

The analysis of effects to PCEs of CH provided in Table 24, and summarized in Table 25, indicate that the livestock use PE will have negative and meaningfully measured effects to several of the MPI indicators that correlate to components of PCEs. Specifically, they are “Water Temperature,” “Sediment/Turbidity,” “Substrate Embeddedness,” and “Large Woody Debris”. 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

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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 provides 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 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. When cattle were removed from a riparian pastures, but wild ungulates were not excluded, the number of black cottonwoods 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 for cottonwood abundance and stand structure and found very little cottonwood seedling/ sapling regeneration or recruitment into large trees and described wild and domestic ungulate browsing as the primary causal factor.

The analysis of effects to PCEs of CH provided in Table 24, and summarized in Table 25, 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 seedlings/saplings, 2) retarding cottonwood succession and large tree recruitment; and, 3) reduction in future levels of instream large wood. These mechanisms will negatively and measurably affect the large woody debris NMFS MPI indicator. Negative impacts to the large woody debris indicator will be minimized by use of the endpoint indicators and PDC.

## 8 ESA EFFECT DETERMINATIONS

ESA effect determinations are presented in Table 2. The determinations are “May Affect, Likely to Adversely Affect” for MCR Steelhead and its designated CH within the Dark Canyon and Fawn Springs allotments. There are no bull trout or its designated critical habitat in the action area. Consequently, the effect determinations for bull trout are “No Effect” For the Dark Canyon and Fawn Springs Allotments.

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### 8.1 RATIONALE

The PCEs are the physical or biological features of critical habitat essential to the conservation of the species. For PCE 1 (Freshwater spawning sites), the analysis determined that there were

**negative and measurable effects** to the *temperature* and *sediment* indicators corresponding to the *water quality* feature of the PCE, and the *substrate embeddedness* indicator corresponding to the *suitable substrate* feature of the PCE, as diagrammed below:

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

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

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

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

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

In addition, there are likely to be direct effects to individual MCR steelhead from the livestock use PE, because livestock will have access to streams during the spawning, incubation, and rearing periods of the MCR steelhead life cycle. Direct impacts are likely to occur if livestock wade into a stream and disturb rearing juveniles or spawning adults, and/or step on redds. Juveniles in close proximity to stream crossings or watering sites are likely to move out of an area when livestock enter or approach the stream. Juveniles forced into open water could have

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 G), which incorporates PDC 5 and 6 (Section 4.1.2). Additionally, MNF staff (range and aquatic specialists) will take extra effort to monitor these sites when they are in the field. If active redds are located, mitigation actions consistent with PDC 6 (Section 4.1.2) will be taken to eliminate or significantly minimize the potential for redd trampling.

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

## 9 ESA CUMULATIVE EFFECTS

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

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### 9.1 ODFW STATE LANDS

There are no inholdings of state or private land in watersheds that contain listed species. There is private land along most of Canyon Creek and its tributaries between Fawn Springs, and Hunter Cabin allotments. There are a variety of land uses that effect habitat for Chinook and steelhead including documented livestock grazing, culvert barriers, recreation, small dams, and water diversions. The effects of livestock grazing are similar to those described in the effects to MCR steelhead CH section by the proposed action: (1) increased sediment in stream channels resulting in increased turbidity, substrate embeddedness, a reduction in macroinvertebrate production, and reduced quality of spawning gravel; (2) increase in water temperature as a result of shade loss along stream channels from grazing/browsing of riparian vegetation.

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### 9.2 ODFW ELK AND DEER MANAGEMENT

Big game management on the Malheur National Forest is a cooperative effort between the Forest Service and ODFW where the Forest Service manages habitat while ODFW manages populations. The action area is located entirely within the state of Oregon’s Murderers Creek Wildlife Management Unit (WMU).

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

ungulates displacing smaller ungulates. They found that the presence of livestock displaced smaller ungulates including mule deer and elk, and that livestock chose resources such as forage before smaller ungulates.

Table 27 presents Rocky Mountain elk and mule deer management objectives (MO) and population estimates from 2004-2010 for the three allotments. The mule deer population MO was obtained from ODFW (2003), available online at: [http://www.dfw.state.or.us/wildlife/management\\_plans/docs/MuleDeerPlanFinal.PDF](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).

Since 2005, the elk population has exceeded the MO for six consecutive years. The mule deer population MO did not meet the MO during the same time period. It is not known what effect elk or mule deer populations are having on PCEs of CH for MCR Steelhead. But due to their larger territories and the fact that they are hunted, they generally spend less time in riparian areas than livestock.

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

TABLE 27. ROCKY MOUNTAIN ELK AND MULE DEER MANAGEMENT OBJECTIVES AND WINTER POPULATION ESTIMATES FROM 2004-2010 FOR THE MURDERERS CREEK WILDLIFE MANAGEMENT UNITS IN OREGON.

Year	Murderers Creek Wildlife Management Unit	
	Elk Mgmt. Objective = 1,700	Deer Mgmt. Objective = 9,000
2004	1,700	6,695
2005	1,800	6,968
2006	1,800	6,820
2007	2,273	5,207
2008	1,900	6,820
2009	1,900	6,968
2010	1,900	6,695

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### 9.3 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.

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### 9.4 ACTIONS ON PRIVATE PROPERTY

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

## 10 ESSENTIAL FISH HABITAT FOR CHINOOK SALMON

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

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

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

The Magnuson-Stevens Act (MSA) also established an EFH consultation process. Federal agencies are required to consult with NMFS on all actions that may adversely affect EFH. The NMFS interprets the scope of these consultations to include actions by Federal agencies that occur outside designated EFH, such as upstream or upslope, but which nonetheless may have an adverse effect on habitat conditions necessary for the long-term survival of the species within EFH. NMFS must provide conservation recommendations for any Federal or State activity that may adversely affect EFH. Within 30 days of receiving EFH conservation recommendations from NMFS, Federal agencies must conclude EFH consultation by responding to NMFS with a written description of conservation measures the agency will use to avoid, mitigate or offset the

impact of its action on EFH. If the Federal agency selects conservation measures, which are inconsistent with the conservation recommendations of NMFS, the Federal agency must explain in writing its reasons for not following NMFS recommendations.

The MNF searched for information to determine if the action under EFH consultation includes areas currently or historically accessible to Spring Chinook salmon. The MNF could not find any references that Chinook salmon historically utilized streams in these allotments.

The analysis of effects to designated CH for MCR Steelhead concluded that there were measurable negative effects to several PCEs. These effects are a proxy for effects to Chinook salmon EFH as they have similar habitat requirements. However, there is no information to support that Chinook salmon historically or currently use streams on these allotments. The nearest Chinook salmon EFH is about 800 feet away in Canyon Creek. According the ODFW website (maps accessible at: [http://nrimp.dfw.state.or.us/nrimp/default.aspx?pn=chs\\_dist](http://nrimp.dfw.state.or.us/nrimp/default.aspx?pn=chs_dist)).

Chinook salmon habitat extends up Canyon Creek about ¼ mi past East Fork Canyon Creek. There is no documentation of Chinook salmon using the tributaries to Canyon Creek. There is no likelihood that the effects to designated CH for MCR steelhead (as a proxy for effects to EFH for Spring Chinook salmon) will be detectable at those distances in the UJDR, where historic and current use by Chinook salmon is documented. Consequently, the MNF concludes that the proposed action will not adversely affect EFH for MSA-managed Chinook salmon (Table 2).

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