United States Department of Agriculture

Forest Service

Pacific Northwest Region

Steelhead Biological Assessment November 2022

Murderers Creek, Fields Peak and Aldrich Allotments

Blue Mountain Ranger District,
Malheur National Forest
Grant County, Oregon

for the greatest good

Cover Photo: Fields Peak Allotment, Murderers Creek Riparian DMA End of Use Monitoring 2016

Steelhead Biological Assessment

Murderers Creek, Fields Peak and Aldrich Allotments

Malheur National Forest
Blue Mountain Ranger District
Grant County, Oregon

November 2022

Prepared for:
United States Department of Agriculture
Forest Service
Malheur National Forest
Blue Mountain Ranger District
Grant County, Oregon

Prepared By:
Hamer Environmental

D. Brady Green, Fisheries Biologist

Reviewed by:
Brandy Langum, Fisheries Biologist
Malheur National Forest Supervisor's Office

Amy Unthank, Natural Resources and Planning Staff Officer
Malheur National Forest Supervisor's Office
January 14, 2018

Updated by:
Lindsay Davies, Natural Resources and Planning Staff Officer
Malheur National Forest Supervisor's Office

November 15, 2022

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

EXECUTIVE SUMMARY

This Biological Assessment (BA) covers three grazing allotments in the Upper John Day River Sub-basin (8 digit Hydrologic Unit Code (HUC) 17070201) on the Blue Mountain Ranger District of the Malheur National Forest: Murderers Creek, Fields Peak, and Aldrich allotments, in response to re-initiation of grazing consultation for Mid-Columbia River (MCR) summer steelhead *(Oncoryhnchus mykiss*) listed as threatened under the Endangered Species Act.

The action area for this consultation is primarily within the Middle South Fork John Day 10 digit HUC (1707020102), the Murderers Creek 10 digit HUC (1707020103), the Fields Creek – John Day River 10 digit HUC (1707020110), and small portions of the Laycock Creek-John Day River 10 digit HUC (1707020109) and the Lower South Fork John Day River 10 digit HUC (1707020109) watersheds. There is a total of approximately 78.53 miles of designated critical habitat (CH) and 33.9 miles of Most Sensitive Riparian Area (MSRA); 52.47 CH miles and 26.28 miles of MSRA in the Murderers Creek allotment, 21.61 CH miles and 7.62 miles of MSRA in the Fields Peak allotment, and 4.45 CH miles and zero miles of MSRA in the Aldrich allotment. The consultation is proposed to cover the next five years 2023-2027 of livestock grazing in these allotments.

The Malheur received a Biological Opinion for the years 2018-2022 on June 1, 2018 (Reference: WCR 2018/9125) for these allotments. The ESA consultation call for this period was " May Affect, Likely to Adversely Affect (LAA). The Malheur National Forest is submitting this updated BA for the 2023-2027 consultation period.

The environmental baseline as defined by the National Marine Fisheries Service (NMFS) Matrix of Pathway Indicators (MPI) (NMFS 1996) for the Upper John Day River sub-basin has zero indicators Properly Functioning. Nine indicators are Functioning at Risk (sediment, nutrients/number of 303(d) listed streams, off-channel habitat, refugia, stream bank condition, floodplain connectivity, change in peak/base flow, disturbance history, and disturbance regime). Ten indicators are rated as Not Properly Functioning (temperature, physical barriers, substrate, large woody debris, pool frequency, pool quality, channel width/depth ratio, increase in drainage network, road density and location, and riparian habitat conservation areas).

The proposed actions are to graze the three allotments with permitted numbers and identified seasons presented in this BA. Project design criteria and adaptive management are common to all proposed actions and are identified in detail in the proposed actions (see ALLOTMENT PROPOSED ACTIONS section). There are only minor changes from the 2018 Biological Assessment. Two pastures from the Fields Peak Allotment were moved to the Murderers Creek Allotment. Two additional pastures were also created in the Murderers Creek Allotment from fencing portions of Dan's Creek and Orange Creek to better control livestock access to critical habitat. These are administrative boundary changes, the overall miles of habitat covered in this Biological Assessment has not changed.

The Murderers Creek allotment is entirely within the Wild Horse Territory Joint Management Area (JMA). Pre-season monitoring of the three Multiple Indicator Monitoring (MIM; Burton 2011) indicators (stubble height, bank alteration, and woody browse) was a requirement in the last consultation. Pre-season monitoring is especially critical within the Murderers Creek allotment because the wild horse appropriate management level (AML) previously identified of 50-140 horses has been exceeded every year since 2005. The Forest Service is currently working on an EA to update and identify management options for the wild horses and is also re-analyzing the AML. The EA should be complete in 2023. If indicators are already at move triggers or

"end of use" levels in the spring from wild horse use, livestock are not to turn out into those pastures (see the wild horse section).

The previous five years of monitoring (2017-2021) identified which end of grazing use indicators were met or were exceeded in critical habitat. In 2018, South Fork Murderers Creek in the Blue Ridge Pasture exceeded stubble and bank alteration standards. A notice of non-compliance was sent. MSRA identified on South Fork Murderers Creek was then fenced in this pasture in 2019 extending the South Fork Murderers Creek Gather pasture. Critical habitat designated on South Fork Murderers and Bark Cabin Creek is still within the Blue Ridge Pasture. In 2021, the Watershed Exclosure had documented excess use that resulted in exceedance of the bank alteration standard on South Fork Deer Creek. A Letter of Warning was sent to the permittee. This is a different permittee that the one that runs on Blue Ridge Pasture. A notice of non-compliance was not sent because the permittee voluntarily accepted maintenance responsibility of the Watershed Exclosure. Prior to this incident, the USFS was responsible for fence maintenance of the exclosure, however regular maintenance had not been occurring. No other exceedances have occurred nor have there been documented occurrences of redd trampling over this consultation period.

Murderers and Deer Creek watersheds are underlain by complex geology that contributes to areas of non-perennial late season stream flows in some areas. Historic impacts too many stream channels from grazing, logging, homesteading, channel clearing, and road building were significant based on review of watershed analyses (MNF 1997, MNF 2000) and historical photos.

Based on analysis of the proposed project actions and the direct or indirect effects on listed MCR steelhead or their critical habitat the effect determinations are as follows:

Murderers Creek Allotment: "May Affect, Likely to Adversely Affect" (LAA)
Fields Peak Allotment: LAA
Aldrich Allotment: LAA

INTRODUCTION

The Blue Mountain Ranger District (BMRD) of the Malheur National Forest (MNF) proposes to authorize livestock grazing for the next five seasons, 2023-2027, on the Murderers Creek, Fields Peak and Aldrich 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 (FS) regarding the effects of implementing the livestock grazing it intends to authorize during that period. The analysis in the BA evaluates the effects on the Middle Columbia River (MCR) steelhead Distinct Population Segment (DPS) listed by the National Marine Fisheries Service (NMFS) as Threatened and designated critical habitat (CH). It is prepared in compliance with the requirements of Forest Service Manual (FSM) 2630.3, FSM 2672.4, and ESA section 7 regulations.

Table 1. Federally-Listed Species that Occurs In or Near the Action Area. (LAA = May Affect, Likely to Adversely Affect)

Common Name	Scientific Name	Jurisdiction Agency	Federal Status	Critical Habitat	ESA Effect Determination Species/CH		
					Murderers Creek	Fields Peak	Aldrich
Middle Coulumbia River Steelhead	*Oncorhynchus mykiss*	NMFS	Threatened	Designated	LAA/LAA	LAA/LAA	LAA/LAA

Table 2. ESA Action Area Hydrologic Unit Code Names and Numbers-Murderers Creek Allotment.

8 Digit Name HUC	10 Digit HUC Number	12 Digit ("6th Field) Name	12 Digit HUC Number
Upper John Day 17070201	Murderers Creek 1707020103	Headwaters Murderers Creek	170702010301
		Upper Murderers Creek	170702010303
		Middle Murderers Creek	170702010304
		Lower Murderers Creek	170702010305
		South Fork Murderers Creek	170702010302
	10 Digit HUC Number	South Fork Murderers Creek	170702010302
	Middle SF John Day River 1707020102	Upper Deer Creek	170702010205
		Lower Deer Creek	170702010206

Table 3 ESA Action Area Hydrologic Unit Code Names and Numbers-Fields Peak Allotment

8 Digit Name HUC	10 Digit Name HUC	12 Digit (6th Field) Name	12 Digit HUC Numbers
Upper John Day 17070201	Murderers Creek 1707020103	Headwaters Murderers Creek	170702010301
	Fields Creek-John Day River 1707020110	Fields Creek	170702011002

Table 4. ESA Action Area Hydrologic Unit Code Names and Numbers-Aldrich Allotment.

8 Digit Name HUC	10 Digit Name HUC Numbers	12 Digit (6th Field) Name	12 Digit HUC Numbers
Upper John Day 17070201	Lower South Fork John Day River 1707020104	Smoky Creek-South Fork J.D.R	170702010405
		Middle Murderers Creek	170702010304
	Fields Creek-John Day River 1707020110	Dry Creek -John Day River	170702011004
		Bridge Creek- John Day River	170702011006

ESA Action Area Subwatersheds and Streams

The ESA Action Area includes all areas to be affected directly or indirectly by the federal grazing actions and as such includes the hydrological watersheds bounding the Murderers Creek, Fields Peak and Aldrich allotments, and within the watersheds includes designated critical habitat, as well as non-critical habitat streams and wetland or riparian areas tributary to the critical habitat (CH).

The Murderers Creek allotment is located within the Upper John Day River subbasin. 8-digit Hydrologic Unit Code (HUC) (17070201); Middle South Fork John Day 10-digit HUC (1707020102); and the Murderers Creek 10-digit HUC (1707020103) watersheds.

The Fields Peak allotment is located within the Upper John Day River subbasin, Fields Creek-John Day River 10-digit HUC (1707020110) and the Murderers Creek 10-digit HUC (1707020103), with a small portion in the Laycock Creek-John Day River 10-digit HUC (1707020109) watershed.

The Aldrich allotment is located within the Upper John Day River subbasin, Fields Creek-John Day River 10-digit HUC (1707020110), and the Lower South Fork John Day River 10-digit HUC (1707020104) watersheds.

The twelve digit Hydrologic Unit Code are provided below for each allotment (Table 5 through Table 8) which are the smaller sub-watersheds that make up the action area. Most Sensitive Riparian Areas (MSRA) are miles identified in the previous consultation as part of the response to grazing litigation and are used to identify stream sections that are most vulnerable to livestock impacts as well as highly valuable for steelhead spawning and have a high risk of interaction between steelhead and livestock.

Table 5. Murderers Creek Allotment 12 Digit HUCs, Streams, River Miles, Critical Habitat, and MSRA Miles located within the Murderers Creek 10 Digit HUC (1707020103).

Subwatershed (12 Digit)	12 Digit (6h Field) HUC	Stream	Action Area (River Mile)	Steelhead Critical Habitat (Miles)	MSRA (Miles)
Murderers Creek Headwaters	170702010301	Murderers Creek	7.94	7.21	7.16
		Tex Creek	.09	.09	.08
		Orange Creek	1.55	.55	0
		Dans Creek	3.01	.81	.80
		Horse Creek	1.68	0	0
		Oregon Mine Creek	2.30	.41	0
		Tennessee Creek	2.23	2.04	0

Subwatershed (12 Digit)	12 Digit (6h Field) HUC	Stream	Action Area (River Mile)	Steelhead Critical Habitat (Miles)	MSRA (Miles)
Upper Murderers Creek	170702010303	Thorn Creek	7.25	6.96	0
		Duncan Creek	6.03	5.21	0
		North Trib. to Duncan Creek	1.08	.51	0
		South Trib. To Duncan Creek	1.32	.46	0
		Dry Duncan Creek	3.66	0	0
Middle Murderers Creek	170702010304	Deer Gulch	.15	0	0
Lower Murderers Creek	170702010305	Corral Gulch	.22	0	0
		East Fork Corral Gulch	.69	0	0
South Fork Murderers Creek	170702010302	S.F. Murderers Creek	7.26	5.32	2.71
		Beaver Dam Creek	2.54	0	0
		Bark Cabin Creek	2.17	.72	0
		Crazy Creek	3.44	1.64	0
		Total miles	**54.61**	**31.93**	**10.75**

Table 6. Murderers Creek Allotment, 12 Digit HUCs, Streams, River Miles, Critical Habitat, and MSRA Miles located within the Middle South Fork John Day River 10 Digit HUC (1707020102).

Subwatershed (12 Digit)	12 Digit (6th Field) HUC	Stream	Action Area (River Mile)	Steelhead Critical Habitat	MSRA
Upper Deer Creek	170702010205	Deer Creek Mainstem	3.46	3.46	3.44
		South Fork Deer Creek	3.2	2.22	1.73
		North Fork Deer Creek	4.62	2.22	.72
		Dead Injun Creek	2.63	0	0
		Thorpe Creek	1.44	0	0
		Corral Creek	4.79	2.51	2.47
		Alder Creek	1.16	0	0
		Trail Creek	1.43	0	0
		Blue Creek	2.72	1.06	.61
Lower Deer Creek	170702010206	Deer Creek Mainstem	5.62	5.62	5.60
		Antelope Creek	1.05	0	0
		Vester Creek	3.06	1.85	0
		Buck Creek	3.68	1.60	.96
		Dewey Creek	2.09	0	0
		Dugout Creek	.79	0	0

Subwatershed (12 Digit)	12 Digit (6th Field) HUC	Stream	Action Area (River Mile)	Steelhead Critical Habitat	MSRA
		Round Creek	1.78	0	0
		Total miles	**44.06**	**20.54**	**15.53**

Table 7. Fields Peak Allotment, 12 Digit HUCs, Streams, River Miles, Critical Habitat, and MSRA Miles located within the Fields Creek- John Day River 10 Digit HUC (1707020110) and the Murderers Creek 10 Digit HUC (1707020103).

Subwatershed (12 Digit)	12 Digit (6th Field) HUC	Stream	Action Area (River Mile)	Steelhead Critical Habitat	MSRA
Fields Creek	170702011102	Fields Creek	6.31	5.11	0.23
		Buck Cabin Creek	2.83	2.30	0
		Wickiup Creek	3.81	0.90	0.11
Headwaters Murderers Creek	170702010103	Murderers Creek	8.02	5.06	4.5
		Tex Creek	7.1	4.22	2.78
		Miner Creek	1.82	0.83	0
		Sugar Creek	2.68	0.67	0
		White Creek	1.58	0.68	0
		Charlie Mack Creek	1.78	0.51	0
		Lemon Creek	2.34	0.85	0
		Basin Creek	1.28	0.48	0
		Total miles	**39.55**	**21.61**	**7.62**

Table 8. Aldrich Allotment, 12 Digit HUCs, Streams, River Miles, Critical Habitat, and MSRA Miles located within the Fields Creek- John Day River 10 Digit HUC (1707020110) and the Lower South Fork-John Day River 10 Digit HUC (1707020104).

Subwatershed (12 Digit)	12 Digit (6th Field) HUC	Stream	Action Area (River Mile)	Steelhead Critical Habitat	MSRA
Dry Creek-JDR	170702011004	Widows Creek	2.25	1.06	0
Bridge Creek-JDR	170702011006	Flat Creek	0.76	.45	0
Smoky Creek-South Fork JDR	170702010405	Smoky Creek	2.06	0.73	0
Middle Murderers Creek	170702010304	Cabin Creek	3.72	1.21	0
		Todd Creek	3.38	1.00	0
		Total miles	**12.17**	**4.45**	**0**

Consultation History

Past and ongoing informal and formal consultations that overlap the ESA action area and the 6th field HUC subwatersheds of Murderers Creek, Fields Peak and Aldrich allotments are described in this section.

Recent and Ongoing Associated ESA Consultations

Blue Mountains Expedited Section 7 Consultation Process

The three Blue Mountain National Forests (Umatilla, Wallowa-Whitman, and the Malheur) and the Vale and Prineville BLM Districts consulted with NMFS and United States Fish and Wildlife Service (USFWS) on the effects of a subset of forest management projects with a set of project design criteria (PDC) as a Programmatic Informal Consultation on listed animal and plant species in the action area called *Blue Mountain Expedited Section 7 Consultation Process* (BM-PDC).

Informal consultation has been concluded by both NMFS and USFWS (collectively the Services) on the categories of MNF actions addressed by the programmatic to listed fish species and designated critical habitat. On May 31, 2007, the MNF received a concurrence letter from NMFS (2007/02970) regarding effects to both listed MCR steelhead and their designated critical habitat. Additionally, informal consultation with USFWS was concluded regarding effects to Columbia River (CR) bull trout and their designated CH on June 04, 2007 (TS Number 07-1661; TAILS: 13420-2007-I-0154) and on July 30, 2010 (TS Number 10-1262; TAILS: 13420-2010-IC-0150), respectively.

Informal consultation was reinitiated in 2013 on the BM-PDC and was concluded by both NMFS and USFWS on the categories of MNF actions addressed by the programmatic process. On November 1, 2013, the MNF received a concurrence letter from NMFS (NWR-2013-10339) regarding effects to both listed MCR steelhead and their designated critical habitat. Additionally, informal consultation with USFWS was concluded regarding effects to CR bull trout and their designated CH on November 1, 2013 (TAILS Number 01EOFW00-2013-I-0173). The BA was amended to fix several small errors and omit the Gray wolf and submitted to the Services on January 29, 2015.

Malheur National Forest Road Maintenance

Currently, the MNF consults on road maintenance specific to actions such as vegetation management projects.

Livestock Grazing Consultations

The Malheur National Forest submitted a BA dated October 14, 2011 to the NMFS for Murderers Creek Allotment with a request for formal consultation. The effect determination was “May Affect, Likely to Adversely Affect” (LAA) steelhead and Critical Habitat for the Murderers Creek allotment. NMFS issued a Biological Opinion (BO) on April 2, 2012 (2011/05362) for the Murderers Creek allotment for 2012-2016. The Aldrich allotment was not included in 2012-2016 consultation. A new BA was submitted on June 6, 2017 to the NMFS, and was edited in January 2018 to include the 2017 monitoring results and the final “Common to All” section with this edition of the final BA. The Malheur then received a BO for the years 2018-2022 on June 1, 2018. The ESA consultation call for this period was “ May Affect, Likely to Adversely Affect (LAA).

Litigation over previous compliance has occurred in the past. The MNF was challenged by Oregon Natural Desert Association (ONDA), the Center for Biological Diversity (CBD), and Western Watersheds Projects in 2007 on the adequacy of the 2007-2011 MCR steelhead Biological Opinions, and the MNF’s compliance

with the Biological Opinion (BO) and Forest Plan Standards (PACFISH) for 13 allotments with ESA listed MCR steelhead. The court ruled in 2010 that the MNF failed to comply with the PACFISH standards, violated the ESA, and failed to reinitiate consultation following violation of the Take Statement. The Biological Opinion, which had also been challenged was upheld. Ten allotments were banned (permanently enjoined) from grazing in December 2010, until the permanent injunction was modified to only apply to two allotments and five pastures in three additional allotments.

The various legal challenges (including one filed in 2008 by permittees over the Biological Opinion) were consolidated as ONDA III, also commonly referred to as the "Tidwell case". Much of the case was lost over the MNF's failure to conduct adequate monitoring in 2007 and 2008, and over the failure to adequately evaluate the standards to determine whether steelhead habitat is recovering at a "near natural rate". The court noted that violation of the Incidental Take Statement was likely due to inadequate monitoring by the MNF. The court also pointed out that the MNF's grazing strategy "passed muster as it sets up an enforcement process that is triggered by certain criteria (i.e. by the exceedance of the bank alteration standard)." The grazing strategy included the allotment specific standards such as stubble height, woody browse use, and streambank alteration, and required the use of monitoring and conservation measures as well as the use of fencing and active herd management. The court understood that the MNF implemented grazing strategies by incorporation into grazing authorizations and the strategy's measures are binding on the permittees, requiring them to move livestock when move triggers are reached, prior to exceeding endpoint indicators. This updated BA for grazing consultation (2023-2027) is part of the requirements for the MNF to meet the intent of the ESA section 7 with respect to conservation and recovery of listed species and preventing violation of section 9 of the ESA (the "take" provision).

Aquatic Restoration Biological Opinion

The FS and BLM concluded a region-wide formal consultation with the NMFS (April 25, 2013, NMFS reference no. NWP-2013-9664) on aquatic restoration activities for administrative units in Oregon and Washington including the MNF. The NMFS aquatic restoration biological opinion II (ARBO II) updates a prior formal consultation on similar activities that expired in 2012. The FWS also issued an ARBO II opinion to the FS and BLM for the same activities on July 1, 2013 (FWS reference no. 01EOFW00-2013-F-0090). ARBO II provides coverage for 20 aquatic restoration program activity types.

The ARBO II has been used to cover consultation on a variety of aquatic restoration activities across the MNF since consultation conclusion. The categories of aquatic restoration from the ARBO II consultation that may be implemented in this action are according to specific project design criteria include: off-channel livestock water facilities, livestock fencing, and instream large wood placement. As part of that consultation, pre- and post- project reporting has occurred annually through reporting databases managed by the FS Region 6 Regional Office.

Wild Horse Gathers

The MNF has consulted with the NMFS on wild horse collection and removal (gathers) in the Murderers Creek Wild Horse Territory. The first consultation on the effects to MCR steelhead and designated CH was concluded with a letter of concurrence dated December 8, 2000 (NMFS reference number OSB2000-0292) for a gather scheduled to occur between January 1 and March 1, 2001. The concurrence letter also stated that NMFS found the effects of the action would be unlikely to adversely affect EFH for Chinook salmon. A second informal consultation for wild horse gathers for the period Spring 2004 through 2008 was concluded with a concurrence letter dated February 18, 2004 (NMFS reference number 2004/00101).

On July 13, 2009, a letter was sent to the BMRD District Ranger from the interagency members of the Malheur Level 1 Team (FS, BLM, NMFS and USFWS). 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 Wild Horse Gather within the Murderers Creek Wild Horse Territory 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 MCR steelhead 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 Essential Fish Habitat (EFH) and fulfilled requirements under the Magnuson Stevens Act (MSA). The letter provided ESA and MSA coverage for wild horse gathers within the Murderers Creek Wild Horse Territory from 2009 to 2014.

Wild Horse Management Plan

The MNF and Prineville BLM District completed consultation with NMFS in January 2013 (NMFS reference NWR-2012-716) on implementation of the 2007 Murderers Creek Wild Horse Territory/Herd Joint Management Plan. The MNF was identified as the lead agency. The non-jeopardy opinion recognized that take was reasonably certain to occur as a result of juvenile steelhead interactions with wild horses and increased fine sediment input to streams. The estimated number of wild horses became the "Take" indicator in this consultation. The extent of take limitation is 140 horses with re-initiation triggered at a horse population size of 141 or more over a continuous 24-month period. The terms and conditions included requirements for wild horse census, not less than once per year, when estimated horse population size is greater than 141, and an annual report from MNF and the Prineville BLM District with; horse use maps, population calculations and survey techniques, horse gather results, and all Murderers Creek allotment data collected prior to livestock turnout in the previous year. The Wild Horse Management Plan is in the process of being updated with a Decision expected in 2023.

Description of the Project Area

The project area consists of the Murderers Creek, Fields Peak and Aldrich allotments. They are located within the Upper John Day River subbasin and comprise a total of 118,026 acres (Murderers Creek 66,730 acres, Fields Peak 30,718 acres, Aldrich 20,578 acres). Approximately 272 acres of private land (Fields Peak allotment) are intermingled with National Forest system lands. Elevations within the allotments range from 3,800 to 7,362 feet at Fields Peak, the highest point in the action area.

The pastures comprising the Murderers Creek allotment lie within the Murderers Creek (HUC 1707020103) and Middle South Fork John Day (HUC 1707020102) ten digit watersheds. The allotment includes approximately 64,649 acres of National Forest System (NFS) lands. Approximately 1,260 acres of private land, 1,432 acres of state land, and 326 acres of Bureau of Land Management lands are intermingled with NFS lands. Approximately 895 acres of private land and 792 acres of state land within the allotment are unfenced and management of these lands has not been waived to the FS.

The Murderers Creek allotment lies entirely within the Murderers Creek Wild Horse Territory Joint Management Area (JMA). Under current management the MNF seeks to maintain a herd of 50 to 140 horses with an average of 100 horses. Since 2007, 317 horses have been removed from the territory. The population estimate from the 2016 survey was 261 adult horses (on both BLM and NFS lands of the terriroty) (Lubow 2016).

Riparian conditions in the Murderers Creek allotment were reviewed by the Forest Service Northeast Area Ecology program (Mellman-Brown 2015) and provide updated information based on qualitative and

quantitative monitoring methods. The previous BA (2012) mentioned upland monitoring and vegetation data that had been collected in multiple different forms including Parker 3-Step, cover frequency, photo point, ocular plots, line-point intercept and gap intercept transects (MNF 2011). The BA however, did not present any of that data or conclusions on upland conditions based on the data. Ecology plots were re-examined as part of Mellman-Brown (2015).

The pastures comprising the Fields Peak allotment lie within the Murderers Creek (HUC 1707020103), Fields Creek-John Day River (HUC 1707020110), and Laycock Creek-John Day River (HUC 1707020109) watersheds. The allotment includes approximately 30,718 acres. Approximately 272 acres of private land are intermingled with NFS lands. The private lands are unfenced and management of these lands has not been waived to the FS.

The pastures comprising the Aldrich allotment lie within the Lower South Fork John Day River (HUC 1707020104), Field's Creek-John Day River (HUC 1707020110) and Murderer's Creek (HUC 1707020103) watersheds. This allotment includes approximately 20,578 acres of NFS land.

Vegetation in all three allotments varies from open juniper grasslands in the lower elevations to open ponderosa pine/Douglas fir stands at mid-elevations and at higher elevations on the south and west facing slopes. Dominant grass species are Idaho fescue, bluebunch wheatgrass, and prairie junegrass, in the open pine stands, elk sedge/pine grass in the forested areas, and mixed riparian grasses and sedges along the riparian areas. Non-native invasive species documented in the action area include cheatgrass, ventenata, bull thistle, houndstongue, and oxeye daisy. At least four sites in the Murderers Creek allotment are now dominated or co-dominated by Kentucky bluegrass, which is typical of heaving grazing, and may now be in an alternate stable state. Nebraska sedge was also noted in high dominance at one site, and was noted as being indicative of moderate to high grazing pressure because it can suppress or eliminate other hydric sedges and tufted hairgrass (Crow and Clausnitzer 1997).

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

Shade in the action area is provided by grass and grass-like species, riparian hardwood species and conifer species along the stream, as well as topography due in part to significantly incised stream channels on several streams within the allotment. Historically, riparian areas were logged by conventional tractor yarding. Mining occurred in portions of Murderers Creek watershed and to a limited extent in Deer Creek watershed. The combination of past logging, livestock grazing, insect epidemic, and valley bottom roads has contributed to reduced shading from riparian species. The watersheds encompassing the allotments support a mix of National Forest System and State and private lands. Activities that have occurred or continue to occur within these watersheds include grazing, timber harvest, limited mining, roads, trails, prescribed and natural fire, noxious weed treatment, and motorized and non-motorized recreation.

Important aquatic species within the action area, in addition to MCR steelhead include: spring Chinook salmon (*Oncoryhnchus tshawytscha*), redband (*Oncoryhnchus mykiss gairdneri*), Pacific lamprey (*Entosphenus tridentatus*), sculpin (*Cottus sp*.), and three species of freshwater mussel; California floater (*Anodonta californiensis*), western ridged mussel (*Gonidea angulate*), and the shortface lanx (*Fisherola nuttali*).

Other Activities in the Project Area

Activities that have occurred or continue to occur within these watersheds include timber harvest, grazing, road and trail use, water diversions, prescribed and natural fire, noxious weed treatment, and recreation (hiking, hunting, off road-vehicle use, driving for pleasure, camping, cross country skiing, and horseback riding). Limited watershed or aquatic restoration has occurred within Murderers Creek and Fields Peak allotments. None have occurred within the Aldrich allotment.

- In 2019, the South Fork Murderers Creek enclosure fence was built, excluding 0.8 miles of SF Murderers Creek within the Blue Ridge and South Fork Murderers Gather pastures.
- In 2019, exclusion fencing in the Tex Creek Gather pasture was built. This excluded all except 150' of CH in this pasture.
- In 2020, two exclosures were built in Dans Creek Pasture around Dan's Creek Critical Habitat and Orange Creek Critical Habitat. All Critical Habitat in Dan's Creek Pasture is now excluded.
- In 2021, wildlife ingress/egress ramps were installed at the Shaw Spring trough within the Oregon Mine pasture (Murders allotment).
- In 2020 and 2021, invasive weeds were treated within the Fields allotment along major Forest Service routes crossing streams.

Forest Plan Direction and Policies Guiding the Action

Forest plan direction and policies provide a management framework that directs and guides development and implementation of grazing actions on the Malheur National Forest. This section of the BA is included to help inform the reader on the various Forest Plan Directions and Policies that have helped guide the development of the proposed actions outlined below (see ALLOTMENT PROPOSED ACTIONS section). This section is not the proposed action.

The original Malheur National Forest Land and Resource Management Plan (LRMP) of 1990 contained Forest Goals, Desired Conditions, and Forest-wide Standards, along with 22 Management Areas (each with different management goals, resource potentials, and limitations, see below). The 1990 plan established General Forest (MA 1) as a common area, along with Rangeland (MA 2) and Anadromous Riparian Areas (MA 3B). Included in those MA 3B areas are Class IV (intermittent streams that are not perennial) streams, upland riparian areas, such as seeps, springs, meadows, and bogs, which have high water table conditions during some parts of the growing season. Class IV channels are to be recognized as important links between the uplands and downslope perennial streams. Per the Land and Resource Management Plan (LRMP) they will be managed to ensure bank and channel stability.

Since 1990 the Forest Plan has been amended many times, most significantly for PACFISH (USDA FS and USDI BLM 1995) and by INFISH (USDA FS 1995b) and Amendment 29 (MNF 1994), which used updated information to establish direction to restore and protect habitat for listed fishes.

Malheur National Forest Land and Resource Management Plan (LRMP)

The MNF LRMP (MNF 1990) contains Forest-wide goals, objectives, and specific Forest Management Area standards that provide direction with respect to fish and wildlife, range management, anadromous riparian areas and other resources.

Goals 15, 16, 17, 18, and 19 on page IV-2 apply to the Fish and Wildlife management:

- 15. Assist in the identification, protection and recovery of threatened, endangered, and sensitive species.

- 16. Coordinate fish and wildlife management activities with other agencies and organizations to achieve mutual resource goals and utilize project cost share opportunities.
- 17. Provide for maintenance and enhancement of big-game habitat so as to sustain elk and deer populations at the state management objective level.
- 18. Provide for improved fish habitat conditions to support increased populations of anadromous and resident fish.
- 19. Provide a diversity of habitat sufficient to maintain viable populations of all species.

Goals 20, 21, and 22 on page IV-2 apply to the Range management:

- 20. Provide a sustained production of palatable forage for grazing by livestock and dependent wildlife species.
- 21. Manage rangelands to meet the needs of other resources and uses at a level which is responsive to site-specific objectives.
- 22. Permit livestock use on suitable range when the permittee managing livestock is using prescribed practices.

The Goal for the MNF LRMP Anadromous Riparian Areas (MA3B) states: "Manage riparian areas to protect and enhance their value for wildlife, anadromous fish habitat, and water quality. Manage timber, grazing, and recreation to give preferential consideration to anadromous fish on that portion of the management area "suitable" for timber management, grazing, or recreation. Design and conduct management in all riparian areas to maintain or improve water quality and beneficial uses".

Important Fish and Wildlife Standards of MA3B are standards 5, 8, and 10 on page IV-63:

- Standard 5 - Provide the necessary habitat to maintain or increase populations of management indicator species with special emphasis on steelhead.
- Standard 8 - Manage the composition and productivity of key riparian vegetation to protect or enhance riparian dependent resources. Emphasis will be on reestablishment of remnant hardwood shrub and tree communities.
- Standard 10 - Improve the rate of recovery in riparian areas that are not in a condition to meet management objectives by eliminating or reducing the impacts of management activities that may slow riparian recovery.

Important Range Standards of MA3B are standards 15-22 on pages IV-64-65:

- 15. Grazing allotments with riparian areas in less than desirable condition will be identified and updated according to the schedule shown in Activity Schedule A-10 (Activity Schedule A-10 is an outdated list in the 1990 Forest Plan and has been replaced with an updated range/National Environmental Policy Act (NEPA) schedule Appendix E).
- 16. Include in allotment management plans (AMPs) a strategy for managing riparian areas for a mix of resource uses. Establish a measurable desired future riparian condition based on existing and potential vegetative conditions. When the current riparian condition is less than that desired, objectives will include a schedule for improvement. AMPs will identify management actions needed to meet riparian objectives within specific timeframes. Measurable objectives will be set for key parameters, such as amount of stream surface shaded, streambank stability, sedimentation, cover provided by trees, shrubs, forbs, and grass/grasslike vegetation. This process is described in "Managing Riparian Ecosystems (Zones) for Fish and Wildlife in Eastern Oregon and Washington" (Oregon-Washington Interagency Wildlife Committee 1979). The AMP will specify the monitoring needed to determine if the desired rate

of improvement is occurring. AMPs currently not consistent with this direction will be developed or revised on a priority bases as shown in Activity Schedule A-10 of the 1990 LRMP (now out dated). Page IV-64.

- 17. Using Activity Schedule A-10 and available funding, prepare Allotment Management Plans for every grazing allotment on the Malheur National Forest as soon as possible. This process will use information gathered through the range allotment analysis activity, including the analysis of the management situation. Prepare an allotment management plan for each allotment that provides the techniques to reach an agreed upon interdisciplinary desired future condition. Establish resource value ratings and the range resource management level needed to reach the desired future condition. Use Table IV-5 to establish utilization levels for grass/grasslikes and shrubs by range resource management level. Inventory existing conditions to determine of the riparian area is satisfactory or unsatisfactory. Page IV-64.
- 18. Establish annual forage utilization requirements for each grazing allotment as a tool to achieve or maintain the desired condition. Use the forage utilization standards as shown in Table IV-4, except where site-specific monitoring information shows that a higher level of utilization will achieve the desired future condition without delaying the rate of improvement. As a minimum, the desired condition must be "satisfactory". Employ all available methods to achieve the desired levels of utilization by permitted livestock and big game. In cooperation with Oregon Department of Fish and Wildlife establish riparian area carrying capacity of big-game. Limit game populations to the level necessary to achieve riparian objectives for all riparian resources. Special emphasis needs to be placed on big game riparian winter range management. Design the methods selected for controlled livestock use to fit the site-specific requirements for improving the riparian area to desirable condition. Any one or a combination of methods may be used to treat less than desirable areas, such as corridor fencing, herding, additional water developments, salting, nonuse for resource protection, early and late season use, short-term grazing rather than season long, reduced livestock numbers, control of degree of use, and/or creating additional pastures through fencing. Pages IV-64-65.
- 19. Manage allotments to protect or enhance riparian-dependent resources. Page IV-65.
- 20. Manage livestock grazing so that water quality meets Oregon State standards and fish populations are maintained at an acceptable condition or in an upward trend. Page IV-65.
- 21. Maintain sufficient streamside vegetation to maintain streambank stability and fish habitat capability. Page IV-65.
- 22. Restrict season long grazing, unless specifically evaluated and approved through the environmental analysis process. Page IV-65.

Following standard 22 the MNF LRMP displays the following table (Table 9) regarding forage utilization in riparian areas.

Table 9. Allowable Utilization of Available Forage in Riparian Areas (% Allowable use of available forage) (page IV-65 LRMP)

	Grass and Grasslikes[1]		**Shrubs[2]**	
Range Resource Management Level	S[3]	U[4]	S	U
Strategy B- Stewardship Management[5]	40	0-30	30	0-25
Strategy C- Extensive Management[6]	45	0-35	40	0-30

1. Utilization based on percent removed by weight.
2. Utilization based on weight and twig length. Example if 2/3 of the available leader length is removed, then browse utilization is 50% (USDA-FS-PNW-RN-472, April 1988).

3. Satisfactory Condition: On suitable range, forage condition is at least fair, with stable trend, and allotment is not classified PC (basic resource damage) or PD (other resource damage).
4. Unsatisfactory Condition: Allotment does not meet criteria for satisfactory condition
5. Management controls livestock numbers so that livestock use is within present grazing capacity. Distribution is achieved through riding, herding and/or salting. Improvements are minimal and constructed only to the extent needed to cost effectively maintain stewardship of the range in presence of grazing.
6. Management seeks full utilization of forage available to livestock. Cost-effective management systems and techniques, including fencing and water development, are designed and applied to obtain relatively uniform livestock distribution and use of forage to maintain plant vigor.

The LRMP direction described above is intended to provide many conservation benefits to ESA-listed MCR steelhead and designated CH by directing standards that must be met during management actions in anadromous riparian areas.

Other components of the forest management framework (MNF LRMP) that guide the development of the proposed action are discussed below under the Forest amendments sections of the BA. The most pertinent amendments to the MNF LRMP for aquatic objectives are PACFISH/INFISH (USDA Forest Service 1995a and 1995 b) and Amendment 29 Both the LRMP and the amendments are still the current direction for guiding grazing management.

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 the 1990 LRMP Standard 5 for Fish and Wildlife which stated "provide the necessary habitat to maintain or increase populations of management indicator species with special emphasis on steelhead" (page IV-63) to include specific numeric desired future conditions (DFCs) to protect water quality, features of riparian vegetation, riparian dependent species, and components of fish habitat. The amended Standard 5 included specific numerical DFCs for Management Area 3A (non-anadromous riparian areas) and Management Area 3B (anadromous riparian areas). The DFCs provided numeric values for the elements and sub-elements of: 1) sediment/substrate, 2) water quality, 3) stream channel morphology, and 4) riparian vegetation.

Amendment 29 states, *"These values are based upon the best information currently available and are considered to be consistent with management area desired future condition. If new information becomes available in the future which indicates changes in the numeric values to achieve the stated desired condition, these values may be inserted as a clarification/correction to the individual standard."*

Amendment 29 did not set specific quantifiable standards for livestock grazing activities. However, grazing activities can directly affect the attainment of Amendment 29 DFCs for: 1) sediment/substrate (cobble embeddedness), 2) water quality (water temperature – Forest wide or by fish species), 3) channel morphology (large woody debris, bank stability, lower bank angle, width to depth ratios, 4) riparian vegetation (ground cover, percentage of stream bank vegetated), and 5) shade/canopy closure (hardwood/meadow complex). DFCs were developed to provide the criteria against which attainment or progress toward attainment of the riparian goals are measured. The MNF was directed to manage according to the more conservative standards applicable to habitat components of anadromous riparian areas as between Amendment 29 DFCs and the Riparian Management Objectives (RMOs) of the PACFISH/INFISH amendment (Table 10). See PACFISH LRMP Amendment and PACFISH/INFISH Riparian Management Objectives sections for PACFISH/INFISH details.

Table 10. Identification of the More Stringent Habitat Indicator Objective (Amendment 29 Desired Future Conditions or PACFISH/INFISH Riparian Management Objective)

Habitat Indicator	Desired Future Condition or Riparian Management Objective		More Stringent Condition or Objective
	Amendment 29	PACFISH/INFISH RMO	
Cobble embeddedness	<20% embedded	NA	Amendment 29
Water temperature	Forest-wide: No increase if < 68°F, reduce to 68°F if >68°F ≤ 55°F Bull Trout spawning and rearing habitat	No measurable increase. Max below 64°F for migration/rearing, max below 60°F for spawning	MCR steelhead: PACFISH RMO CR bull trout: Amendment 29 but MNF INFISH RMO.
Large Woody Debris Stream Densities (pieces per mile in forested systems)	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
Pool frequency (wetted width in feet/Number of pools per mile	Range expected for Rosgen (1996) B&C streams, upper limits adjusted for streams >75 ft. to be consistent w/PACFISH. Provides table w/ranges by bankfull width (BFW)	Table provided shows pools/mile by wetted width. All values fall within ranges by BFW of Amendment 29	Same
Bank stability	90% and no decrease if above 90% (forested streams)	>80% (non-forested streams)	Amendment 29
Lower bank angle (undercut banks) 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 large woody material standard	NA	Amendment 29
Ground cover	90% of site potential	NA	Amendment 29
% streambank vegetated	90% of site potential	NA	Amendment 29
Percent shade/canopy closure	Varies by conifer species forest. Hardwood/meadow complex 80% shaded	NA	Amendment 29 Ponderosa Pine 20-50% Mixed Conifer 50-65% Lodgepole Pine 60-75% Hardwood/Meadow 80%

PACFISH LRMP Amendment

PACFISH applies specifically to the MNF lands within the range of anadromous fish including the allotments in this BA. PACFISH amended Forest Service Land and Resource Management Plans (LRMPs) in 1995 (USDA and USDI 1995). 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 anadromous fish, 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 habitat for anadromous fish would receive special attention and treatment, and also a landscape pattern of protection would be achieved;
- Watershed analyses to provide a basis for evaluating cumulative watershed effects, define watershed restoration needs, goals, and objectives, implement watershed restoration strategies, and monitor the effectiveness of watershed protection measures;
- Targeted watershed restoration identified through watershed analysis;
- A 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 watersheds, 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 contributes to the viability of riparian-dependent communities.

PACFISH/INFISH Riparian Management Objectives

Interim quantitative RMOs for stream channel, riparian and watershed conditions were developed in 1995 to provide criteria against which attainment or progress of the PACFISH and INFISH strategies' riparian goals could be measured. They were first established for PACFISH from stream survey inventory data and used as a description of good anadromous fish habitat (USDA FS and USDI BLM 1995). INFISH (USDA FS 1995a) also adopted RMO's for inland native fish species, which were identical, except for temperature and Large

Woody Debris (LWD) objectives. These objectives are to be evaluated and assessed temporally to reflect the ecological capabilities of specific ecosystems. The attainment of or progress toward some of the objectives is only able to occur over extended periods of time.

The Forest is to manage livestock grazing so as not to prevent or retard attainment of the RMOs (GM-1). The standards and guidelines in the next section are to be used in combination with Forest Plan standards and guidelines (listed above). The intent is that management, including grazing, would not retard the attainment of the RMO's.

- Pool Frequency: varies by channel width (see page C-6 in the PACFISH EA/FONSI and page A-4 in the INFISH EA/FONSI)
- Water Temperature: No measurable 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).
- Large Woody Debris (in forested systems): >20 pieces/mile; >12 inch diameter; 35 foot length.
- Bank Stability: at least 80%
- Lower Bank Angle: >75% of banks with <90 degree angle (i.e. undercut).
- Width-to-Depth Ratio (W:D): W:D <10, mean wetted width divided by mean depth (NMFS PACFISH BO 1998); or Bankfull Width-to-Depth Ratio within 75th percentile of the range for minimally managed or reference watershed conditions (i.e. healthy streams) by stream type (analysis pending from PACFISH/INFISH biological opinions (PIBO) Effectiveness Monitoring Team).

The goal is to achieve a high level of habitat diversity and complexity which would meet the life history requirements of the anadromous fish community within a watershed (USDA FS USDI BLM 1995 Appendix E, p. C-5).

PACFISH/INFISH Riparian Habitat Conservation Areas and Standards

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

- **GM-1** - Modify grazing practices (e.g., accessibility of riparian areas 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/inland native fish. Suspend grazing if adjusting practices is not effective in meeting Riparian Management Objectives and avoiding adverse effects on listed anadromous fish (PACFISH)/inland native fish (INFISH).
- **GM-2** – Locate new livestock handling and/or management facilities outside of Riparian Habitat Conservation Areas. For existing livestock handling facilities inside the Riparian Habitat Conservation Areas, assure that facilities do not prevent attainment of Riparian Management Objectives or adversely affect listed anadromous fish (PACFISH)/native inland fish (INFISH). 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 (PACFISH)/inland native fish (INFISH).

Note that the word "listed" does not accompany the term "inland native fish" in INFISH, as opposed to PACIFISH, which specifies "listed" anadromous fish in the GM standards. Implementing these standards clearly provides a conservation benefit to MCR steelhead and its designated CH.

PACFISH/INFISH Key Watersheds, Watershed Analysis, and Targeted Restoration through Watershed Analysis

These components of PACFISH/INFISH that amended the MNF LRMP in 1995 are being implemented to the present, but the methods or terms identified with the components have been slightly modified or adapted through the past 20 years to national and regional Forest Service policies, direction, and current science.

The intent of designating Key Watersheds is to provide a pattern of protection across the landscape where habitat for anadromous fish would receive special attention and treatment. Priority within these watersheds would be to protect, or restore habitat for listed stocks, stocks of special interest or concern, or salmonid assemblages of critical value for productivity or biodiversity. Criteria considered to designate Key Watersheds are:

- Watersheds with stocks listed pursuant to the ESA, or stocks identified in the 1991 American Fisheries Society report (AFS 1990) as "at risk" or subsequent scientific stock status reviews; or
- Watersheds that contain excellent habitat for mixed salmonid assemblages; or,
- Degraded watersheds with a high restoration potential.

In addition to key watersheds, which were identified following PACFISH and INFISH, (and are now being re-confirmed under the proposed new Malheur Forest Plan), there are also "high priority river basins", "focus watersheds", and "priority watersheds".

High priority river basins originated from Forest Service Pacific NW Regional direction and are 6 digit (large) scale Hydrologic Unit Code (HUC) watersheds. Within the high priority river basins (which is the John Day River on the MNF), each National Forest identified three "focus watersheds" at the 10 digit scale HUC. The NMF's initial focus watersheds were Bridge Creek Middle Fork John Day; Camp Creek Middle Fork John Day; and Canyon Creek.

Priority Watersheds have been identified as part of the Watershed Condition Framework (WCF) which is a national policy for the Forest Service (USDA 2011) that directed each National Forest to rate the condition of their 12 digit HUCs based on a model consistent across the agency. Each National Forest has identified a subset of "priority watersheds" from their WCF work to help target focused restoration, and produced "Watershed Restoration Action Plans" (WRAPs) for those priority watersheds. The MNF's priority watershed is Camp Creek. The regional system of high priority river basins and focus watersheds were initially identified as part of the regional Aquatic Restoration Conservation Strategy (ARCS) prior to the WCF rating and 12 digit HUC priority watershed designation.

The MNF has about 57% of the Forest covered by Watershed Analyses conducted between 1995 and 2002 **(**Table 11**).** This type of focused analysis has not been conducted since 2004. Some of the same components and considerations are evaluated and analyzed during "landscape scale analysis for accelerated restoration" on the MNF, however not all the key questions, analysis and synthesis that was provided by Watershed Analysis occurs during landscape analysis.

Table 11. Watershed Analyses Conducted by the Malheur National Forest. (Bold indicates within the Action Area).

Forest	NHD HUC10	NHD HUC Name	Assessment Name	Year
Malheur (17/17)	1705011601	Headwaters Malheur River	Malheur Headwaters	2000
	1705011602	Wolf Creek	Wolf Cr. (L. Malheur)	1996
	1705011603	Pine Creek	Pine Creek (L. Malheur)	1996
	1705011605	Griffin Creek-Upper Malheur River	Muddy Creek (L. Malheur)	1996
	1705011611	Upper North Fork Malheur River	Upper North Fork Malheur	1995
	1707020101	**Upper South Fork John Day River**	**Upper South Fork John Day River**	**1995**
	1707020102	**Middle South Fork John Day River**	**Deer Creek**	**2000**
	1707020103	**Murderers Creek**	**Murderers Creek**	**1997**
	1707020106	Grub Creek-John Day River	Prairie City/Strawberry	1997
	1707020107	Canyon Creek	Canyon Creek	2004
	1707020301	Bridge Creek-Middle Fork John Day River	Upper Middle Fork John Day	1998
	1707020302	Camp Creek -Middle Fork John Day River	Galena	2002
	1712000203	Upper Silvies River	Upper Silvies	2000
	1712000204	Middle Silvies River	Silvies Canyon	2000
	1712000205	Emigrant Creek	Emigrant	1997
	1712000401	Claw Creek	Wickiup	1998
	1712000402	Upper Silver Creek	Silver Creek	1998

Targeted watershed restoration is an outcome of the various priority, key, and focus watersheds, as well as occurs during landscape scale vegetation NEPA analyses on the MNF. The landscape NEPA analyses include watershed condition issues and proposed actions to restore areas or conditions that have been identified during the landscape NEPA analysis, including range improvements in some cases. In addition, the Watershed Restoration Action Plans (WRAPs) for priority watersheds are an excellent example of targeted restoration. While Watershed Analysis also allowed for the identification of targeted watershed restoration, it was not as explicit in helping a National Forest prioritize where the most beneficial and highest priority work should occur across a National Forest.

PACFISH Enclosure B: Livestock Grazing Guidelines

A revision of PACFISH Enclosure B, the "Recommended Livestock Grazing Guidelines," (USDA 1995c) was sent to the PACFISH Forest Supervisors on August 14, 1995 (USDA Forest Service 1995). 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 and inland 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 Assumptions identified in the Enclosure B revision are:

- Influences of livestock grazing must result in riparian restoration at a minimum of "near natural" rates. We recognize that some environmental effects are inherent with the presence of livestock. However, we believe that "near natural" rates of recovery can be provided if we limit environmental effects to those that do not carry through to the next year, thereby avoiding cumulative, negative effects.

Adverse affect to aquatic habitat associated with livestock grazing can be avoided, and riparian restoration provided by controlling:

- Season of use (tied to plant phenology and soil characteristics rather than calendar dates); and amount of use.
- Providing for the health, form and function of riparian systems should remain the focus of management efforts.
- Stream gradient, inherent stability characteristics, potential vegetative communities, and type of degradation (i.e., vegetation vs. bank/channel characteristics) are important factors in determining restoration potential and guidelines that will lead to restoration.
- Guidelines for developing allotment specific prescriptions can be identified at the programmatic level. However, in general, the prescriptions themselves must be developed to fit "on-the-ground" conditions within the context of those guidelines.
- In some definable cases, avoiding adverse affects can only be accomplished by suspending livestock grazing. These cases include problems related to ecological status.
- Effective monitoring using specific measurement approaches, as well as administration, are essential.
- Maintain or allow for improvement of conditions where criteria for late-seral ecological status are met or exceeded.

PROGRAMMATIC GUIDELINES FOR LIVESTOCK GRAZING

As noted in the assumptions above, the goals, or desired outcomes of management efforts provide the foundation for the recommended programmatic livestock grazing guidelines. The guidelines and resulting site specific prescriptions are of value only to the extent they contribute to meeting these goals. The Environmental Assessment for PACFISH interim direction (USDA 1995a) provides suitable riparian goals for the land management agencies (See PACFISH EA, APPENDIX, pages C-3 and C-4). All management activities implemented, including non-livestock related activities, should contribute to accomplishment of these goals.

Where these goals are met, the following on-the-ground attributes will be evident (See BLM Technical Reference 1737-9, Process for Assessing Proper Functioning Condition):

1. Floodplains are inundated by relatively frequent events (i.e., 1-3 years).
2. Stream sinuosity, width/depth ratio, and pool frequency reflect the capabilities of the setting (i.e., landform, geology, and bioclimatic region).
3. Lateral stream movement is associated with natural sinuosity (i.e., streambank stability reflects the inherent capabilities of the setting).
4. The overall system is vertically stable.
5. Streambank morphology reflects the inherent capabilities of the ecological setting.

6. Upland watershed conditions within the allotment are not contributing to degradation of riparian habitat conservation areas.
7. Riparian vegetation characteristics:

- diverse age structure for woody species (where such species are a part of the natural system);
- plants exhibit high vigor;
- species present indicate maintenance of riparian soil moisture;streambank vegetation protects stream banks and dissipates energy during high flows (i.e.,consider community type composition, rooting characteristics, and plant density); and provide an adequate source of coarse and/or large woody debris (where such debris is a part of the natural system).

MANAGEMENT CONSIDERATIONS

Based on the key assumptions previously outlined in Enclosure B above, the following guidelines are recommended for use in modifying applicable allotment management plans/annual operating plans/project decision documents/instructions to permitees to provide a high degree of assurance that objectives for conservation and restoration of anadromous fish habitat will be met.

These recommendations do not specifically address "priorities" for taking action. Taking action to conserve Columbia River Anadromous Fish **is not optional.** However, we believe priorities can be identified where there are insufficient resources to "do it all." Those priorities are as follows:

8. Maintain or improve conditions, where the criteria for "late seral" ecological status are met or exceeded (i.e., it is easier to protect healthy riparian systems than restore degraded ones). See Key Definitions – Ecological Status.
9. 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 (i.e., making adjustments at this stage is likely to prevent stream bank/channel damage of a lasting nature).
10. Adjustments in management practices, where the criteria for "early seral" ecological status are met, and primarily tied to deteriorated stream bank/channel conditions (especially in cases of severe channel downcutting where channel evolution has not re-created a floodplain), may contribute little to the recovery of the system in the near term.

RECOMMENDATIONS INCLUDED IN ENCLOSURE B

- Continue current grazing prescriptions in pastures/allotments where ecological status is "late seral" (or better) based on either riparian vegetation or stream bank/channel conditions. Ensure residual herbaceous vegetation heights of at least 4 to 6 inches, and that no "condition thresholds" are exceeded. (See Key Definitions - Ecological Status and Residual Herbaceous Vegetation Heights)
- Where ecological status is "mid-seral," limit grazing in pastures/allotments to provide at least 6 inches of residual herbaceous vegetation and to ensure that no "condition thresholds" are exceeded. For moderate and low gradient (i.e., Rosgen "B" and "C" channel types) (Rosgen 1996) channels, with substrates composed of medium to fine easily eroded materials, also limit use to early season grazing to provide for recovery of stream bank/channel characteristics. (See Key Definitions - Early Season Grazing)
- In pastures/allotments where ecological status is "early seral", the following is strongly recommended:

- In moderate and low gradient (i.e., Rosgen "B" and "C" channel types) channels, with substrates composed of medium to fine easily eroded materials, consider rest.
- In all moderate to high gradient stream systems (Rosgen "A" and "B" type channels) with coarse substrate materials that provide inherent stability, whose ecological status rating of early seral is tied entirely to vegetation characteristics, grazing may be permitted if limited to early season use, residual herbaceous vegetation heights of at least 6 inches are met, and no "condition thresholds" are exceeded.

- Where early season grazing, as prescribed above, would result in adverse affects or is impractical, mid- or late-season grazing may be alternatives. However, residual herbaceous vegetation requirements would still have to be met and no "condition thresholds" could be exceeded.
- Appropriate "condition thresholds" will be monitored in all pastures/allotments. Results are to be reported on an annual basis, and appropriate adjustments made to the annual operating plans.

KEY DEFINITIONS

The following definitions from Enclosure B are applicable to this consultation except as noted)

Condition Thresholds: A number of indicators of impending impacts that would carry over to the next year would be monitored during the period of use and act as "triggers" to prevent damage. These should not be exceeded anytime during the grazing season. The recommended triggers and associated threshold values are as indicated below:

New bank alteration (the bank alteration threshold incorporated into the Proposed Action is different than Enclosure B due to more recent research and the development of new protocols for measuring bank alteration): bank instability that becomes evident after livestock grazing is initiated in a pasture/allotment in a given year. This assumes that early season use occurred following peak flows, when most of the additional bank damage can be tied to land use activities. The recommended threshold is 5% of the lineal bank distance (includes both sides of the stream).

Riparian area alteration: two measures of riparian area alteration are proposed. Each keys on areas away from stream banks that are good early indicators of impending riparian damage.

- The first relates to use of "riparian islands" - those portions of riparian areas slightly higher and drier than the rest of the riparian area. These are often dominated by Kentucky bluegrass. The recommended threshold is 25% of the areas with visible trampled soils or a vegetation height of 2 inches, which ever is reached first.
- The second measure relates to livestock use of "riparian sinks" - those portions of riparian areas slightly lower and more moist than the rest of the riparian area. These are often dominated by carex species. The recommended threshold is utilization in excess of a vegetation height of 3 inches.
- Riparian "island" and "sinks" are not significant components of all riparian areas. Generally only one of these features would be used as an indicator of impending riparian damage (i.e., the one that represents a significant component of the riparian area away from the stream side and/or which first shows signs of damage).

Woody Vegetation Utilization (the woody browse threshold incorporated into the Proposed Action is not consistent with Encolsure B): proposed limitations on season and amount of use, suggest that woody vegetation utilization would seldom be of concern. Monitoring of this feature would generally be limited to those circumstances where the prescription calls for mid- or late-season grazing or where there is a

documented problem with woody vegetation utilization. The recommended threshold is 30% of the current year's growth, measured as incidence of use.

Ecological Status: 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. Our definition of "ecological status" adds to Winward's definition, recognizing the importance of stream bank and channel features. Definitions follow for each of the categories:

In those areas where livestock are a significant factor in the streambank rating, use both or either/or the vegetative factor and the streambank factor in determining the seral stage.

- **Early Seral**: Percent similarity of riparian vegetation to the potential natural community/composition < 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 rating of at least "fair".
- **Late Seral**: Percent similarity of riparian vegetation to the potential natural community/composition > 50%; and, stream bank/channel condition rating "good" or better.

If similarity of riparian vegetation information is lacking or cannot be readily obtained, use BLM Technical Reference 1737-9, Process for Assessing Proper Functioning Condition, or other rating systems. In using the previously mentioned technical reference, the following approximate crosswalk may be applied to relate functioning condition and ecological status:

- Proper Functioning Condition - continue current management if monitoring data supports or use recommendations for late seral.
- Functional-At Risk, upward trend - continue current management if monitoring data supports or use recommendations for mid-seral.
- Functional-At Risk, static trend - use recommendations for mid-seral or early seral depending on site specific conditions.
- Functional-At Risk, downward trend; or,
- Non-Functional, use recommendations for early seral.

Greenline: That specific area on or near the waters edge where a more or less continuous cover of perennial vegetation is encountered. Natural plant species forming the greenline are composed primarily of large, hydric species such as beaked sedge, Nebraska sedge, bluejoint reedgrass, or other especially strong rooted species capable of buffering the forces of water at the bankfull discharge level. Disturbance activities, such as overgrazing or trampling by animals or people, result in changes to shallow rooted species such as Kentucky bluegrass, which have a reduced ability to buffer water forces.

Early Season Grazing: Early season grazing is defined in terms of the phenology of the vegetation. Early season grazing is limited to that period where upland vegetation is green but not drying. It typically begins about the second to third leaf stage and ends between boot and flowering of perennial upland bunch grasses. Caution should be used to avoid soil compaction and bank alteration from physical damage that can occur in some settings with early season grazing.

In general, early season, or spring season encompasses the period from the end of supplemental feeding for livestock to seed ripe and includes the time during which soil moisture levels are at their highest due to snoe melt and spring rain. Time frame: Early May to early/mid July (*added to update this BA*).

Late Season Grazing: Late season grazing generally begins after sugar storage in woody vegetation is complete and leaf fall has started. Upland plant seeds have shattered and mean air temperatures begin to cool. Time frame: mid/late September to December (*added to update this BA*).

Mid-season Grazing includes the hotter part of the summer during which upland forage has dried, seed ripening has occurred, and soil moisture content in the riparian areas have declined. Time Frame: early/mid-July to mid/late September (*added to update this BA*).

Near Natural Rate of Recovery: Synonymous with PACFISH requirement not to "retard" or "measurably slow" recovery of degraded riparian features. Further defined in these recommendations within the context of effects that "carry over to the next year." Any effect that carries over to the next year is likely to result in cumulative negative effects, and measurably slow recovery of degraded riparian features.

Residual Herbaceous Vegetation Height: Residual herbaceous vegetation height, measured at the end of the growing or grazing season (which ever occurs latest), is used as an indicator of a system's ability to withstand erosive stream flows, filter sediment and build stream banks. Residual herbaceous vegetation height measurements are to be taken on those hydric species along the greenline with the capability to buffer water forces (See above discussion of "greenline")."). (For the purposes of implementation monitoring of the end point indicators, the MNF proposed to measure within one to two weeks of cessation of grazing.)

Exclosure: An area fenced to keep animals out (Society of Range Management 1974).

Trailing: Controlled directional movement of livestock (Society of Range Management 1974).

MONITORING

The history of range, stream, riparian, and watershed condition monitoring has evolved through time in both the Pacific NW Region of the Forest Service and on the MNF since Columbia River bull trout and MCR steelhead were listed under the ESA in 1998 and 1999 respectively. Prior to the listings, range monitoring of uplands was a primary focus, although sporadically documented or established in time and place from the 1920's to the 1980's. The primary method used for range monitoring was utilization with height-weight curves. In 1998 National Forests under the PACFISH/INFISH decision began to use stubble height to monitor herbaceous vegetation use. A 4 to 6-inch stubble height (4 inch early season use, 6 inch late season use) on key riparian grasses was used to closely approximate the 1990 Forest Plan standard of 35 percent and 45 percent utilization. Some monitoring photo points did document changes in stream and riparian conditions from the 1930's to the 1980's (MNF 2003, Appendix G). In recent times (since listing and ensuing litigation over grazing on the MNF from the early 2000's to the present) continuity and documentation of monitoring has improved, although methods have varied during that time, primarily due to changes in funding and personnel.

The monitoring programs discussed in Appendix C were used to describe the environmental baseline in the ENVIRONMENTAL BASELINE section of this BA. Four of these programs, PACFISH/INFISH Biological Opinion monitoring (PIBO), Multiple Indicator Monitoring (MIM), Level II stream surveys and steelhead spawning surveys are incorporated into the Proposed Action as described in the WINTER MEETINGS WITH PERMITTEES section. Properly Functioning Condition Assessments and channel cross-sections are not incorporated into the Proposed Action, but may provide additional information regarding the effects of the grazing program over time

PACFISH/INFISH (PIBO) Monitoring

When salmon, steelhead, and bull trout were listed under the Endangered Species Act in the Columbia River basin, the National Forests in the basin amended their forest plans with the "PACFISH/INFISH" environmental assessment (EA). In 1995 a Biological Opinion was established for the PACFISH and INFISH EA called the "PIBO" (PACFISH INFISH Biological Opinion USDC NMFS 1998). The monitoring program established for PIBO is intended to evaluate the effectiveness of the amended forest plans that included new or revised standards and guidelines for grazing management. The monitoring is intended to evaluate whether the structure and function of riparian and aquatic systems on lands managed by the BLM and USFS is being maintained or restored.

The objectives of the PIBO Effectiveness Monitoring (EM) program are to:

1. Determine whether a suite of biological and physical attributes, processes, and functions of upland, riparian, and aquatic systems are being degraded, maintained, or restored across the PIBO landscape.
2. Determine the direction and range of change in riparian and aquatic habitats over time as a function of management practices.
3. Determine if specific Designated Monitoring Area (DMA) practices related to livestock grazing are maintaining or restoring riparian vegetation structure and function.

Information on stream habitat features documented in this section includes:

Site type – I is for "Integrator" sites which have been established to evaluate the response of streams to all upstream management activities. They are generally located in low-gradient response reaches as far downstream in a subwatershed on federal land as possible and are sampled once every five-years. In some areas of the Blue Mountains, but not on the MNF, there are "reference" I sites (no permitted grazing within the last 30 years, less than 10% of the watershed undergoing timber harvest, no evidence of mining near riparian areas, and road densities less than 0.5 km/square km). Reference sites allow for comparisons of habitat variables to managed sites. There are 19 reference sites in the Blue Mountain Ecoregion that are used for MNF comparisons.

Site type - K is for "key" sites, which are also called DMA sites that were to be specifically selected with input from district range management specialists in subwatersheds with integrator stream reaches to assess the impacts of livestock on riparian vegetation and stream habitat. DMA sites are evaluated during and after the grazing season every five-years to determine if the pasture was used in compliance with the allotment management plan, and if end-of-season grazing implementation standards have been achieved.

- **Total Index –** The status of integrator reaches is determined through a "habitat index score approach" to compare habitat variables at managed sites to reference sites in the local area (Blue Mountains ecoregion) and to all reference sites in the PIBO study area (the interior Columbia River Basin). The total index is determined on a scale from 0 to 100, with a higher number indicating similarity to reference site values and a lower number indicating the site is less similar to reference site values.
- **Bankful width:depth (W/D**) – High width to depth ratios indicate an overly shallow stream with a wide wetted area. Increases in solar gain (temperature increases) and decreases in quality pool habitat are indicative of wide shallow streams. Different stream types (e.g. higher (and steeper) in a watershed vs. meandering meadow streams have a range of natural width:depth ratios. Healthy meadow systems should be deep and narrow and have a low width:depth number.
- **Mean particle size (D50) in millimeters (mm)** – D50 is the mean particle size of the streambed substrate. Smaller D50's can be an indication of excess fine sediment in a stream system. Particles are measured in both pools and riffles. Median particle size is also measured and has similar attributes.

- **Percent pool (% pool)** – The presence of pool habitat is highly important for trout, steelhead, and salmon. Streams that have been widened through historical impacts from logging and grazing, along with removal of instream large wood, tend to have less pool habitat than levels in reference streams of similar character.
- **Residual pool depth (meters)** – This is a measure of pool depth at low levels of streamflow and is calculated by subtracting maximum pool depth from the depth at pool tail crest (e.g. if you stopped water from entering an overflowing bathtub with a notch at one end, at which point the tub would quit flowing over, how deep is that compared to the deepest measurement of the bathtub - not at the notch – that is the concept of "depth at pool tail crest"). Residual pool depth is an indication of the quality of pool habitat, and sometimes indicates that a pool has filled with fine sediment. The higher the residual depth the higher the pool quality.
- **Percent fines less than two millimeters (<2mm) and less than six millimeters (<6mm)** – This is a measure of the percent of fine material within the tails of pools (areas where trout and salmon spawn and lay eggs). Excess fine material smothers eggs. The higher the number the greater amount of fine material in the streambed in the tail area of pools.
- **Bank stability (percent)** – Stream systems have a small amount of naturally unstable banks, however low bank stability indicates a system that has been recently disturbed and/or is not in equilibrium with the overall functioning of the stream and its watershed. Specific to PIBO stable banks are the percentage of 40+ plots (30 cm. wide) that show no evidence of fractures, slumping, or cracks.
- **Vegetative Bank stability (percent)** – Specific to PIBO vegetatively stable banks are the percentage of 40+ plots (30 cm. wide) that show no evidence of fractures, slumping, or cracks, and that are also covered with >50% perennial vegetation, roots, rocks >15 cm. in diameter or logs >10 cm. in diameter or a combination of those.
- **Bank angle (degree)** – The objective of documenting the bank angle is to determine the frequency of undercut banks in the stream reach. Legacy and ongoing management of streamsides from logging, roads/trails, and grazing have caused a loss of undercut banks on stream systems on the Malheur National Forest.
- **Bank undercut (percent)** – Undercut banks provide cover for fish, refuge, streamside shade, and pockets of cooler water in the summer months, and pockets of thermal refuge in the winter**.**
- **Greenline Wetland Rating** – One equals upland, 25=facultative upland, 50=facultative, 75=facultative wetland, 100=obligate wetland –A low score indicates that upland plant species occupy the interface between the water and the riparian vegetative community, and higher scores indicate a stream connected to wetland plant species that depend on and are receiving an abundance of water (e.g. connection to groundwater or periodic seasonal flooding). Historical grazing has modified many systems from obligate streamside wetland species to upland species such as Kentucky bluegrass. Higher scores indicate a streamside less modified by management impacts.
- **Greenline Woody Cover (GL woody CV)** – This is the sum of the relative cover of woody species out of 200% due to shrub canopy, and is an estimate of the percent of cover provided by woody vegetation adjacent to a stream.
- **Aquatic Macroinvertebrates –** Sampling the macroinvertebrate community provides information regarding habitat condition, productivity, and water quality. PIBO provides data for: 1) richness (total number of unique taxa); 2) community tolerance quotient (an index widely used by the USFS and BLM to compare the aquatic macroinvertebrate community to high quality vs. polluted waters); 3) intolerance (number of intolerant taxa at a site intolerant to poor quality water); and 4) RIVPAC (Hargett et. al 2007)

score (a predictive model that compares expected versus observed number of taxa based on number of taxa in high quality water).

Malheur National Forest Riparian Monitoring Strategy

The MNF Riparian Monitoring Strategy was a forest policy developed in 2006. At that time in order to deal with the many accepted methodologies and analytical tools available to monitor short-term and long-term rangeland and forest health, the MNF documented an overall strategy, methods, and those tools to be used for determining condition and trend of riparian ecosystems as they related to grazing activities. The methods and tools chosen were 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. Currently, the assessments and monitoring methods used are still 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. Moreover, risk analyses and prioritization were to be considered in all areas prior to initiating monitoring in order to determine the level and intensity of quantitative data collection. All of these tools were, and are still intended to help provide the MNF information for many of the RMOs.

Below are the key components of the MNF Riparian Monitoring Strategy that are incorporated into the proposed action. Multiple Indicator Monitoring and spawning surveys are incorporated into the Proposed Action. Proper Functioning Condition assessments, channel cross-sections and Forest Service stream surveys are not specifically incorporated into the Proposed Action but may occur in the Action Area providing additional information regarding the status of CH over time:

1. Information Gathering and Interpretation:

- Proper Functioning Condition (PFC) Assessment –qualitative condition assessment over a stream reach (geomorphic or unit-specific), used to spotlight focus areas for monitoring. Proper functioning condition assessments can serve as the risk analyses/prioritization step. PFC can provide a coarse filter to determine where to conduct more intensive quantitative monitoring, such as MIM or PIBO.
- Multiple Indicator Monitoring (MIM) – quantitative monitoring protocol at MIM Designated Monitoring Areas (DMAs). Stubble height, streambank alteration, and woody browse is to be monitored at the end of grazing use within 1 week from the removal of livestock, to identify current year management issues in all pastures with critical habitat. The timing of the 1 week visit has been considered by the MNF to include a second week in order to meet staffing needs to monitor multiple sites (e.g. monitoring within one week of scheduled end of grazing use by livestock, but no longer than two weeks after cattle have left the pasture). The MNF has previously interpreted the MIM intent to monitor as consistently allowing for monitoring at the end of the growing season, which is used in MIM to monitor "residual vegetation remaining to protect streambanks during high winter or spring flows" vs. the typical collection of short term data for annual indicator status immediately following livestock use. The full 10 indicator MIM, versus the three indicators discussed immediately above, is to be completed at years 3 and 5 intervals prior to livestock turnout in the spring or early summer, to identify long term trends.
- 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 and aquatic habitat condition, with limited information on aquatic species present at the time of the survey, to determine condition of selected stream systems. Survey attributes collected are typically; Flow, elevation, Rosgen channel type, valley type, flow regime, stream order, average width, width-to-

depth, unstable banks, pool frequency and depth, large woody material pieces per mile, shade, substrate (%), riparian vegetation, and future large wood recruits.

- Spawning Surveys – Quantitative assessment to identify presence of spawning activity and/or redds; assessment of vulnerability to livestock, design and implementation of protective measures.

2. **Support determinations of plan compliance** – Provide information on which the Malheur National Forest can assess compliance with the Forest Plan, including PACFISH & INFISH amendments.

- Standards are GM 1-4 in PACFISH & INFISH (GM 1-3 previously stated in the PACFISH/INFISH Riparian Habitat Conservation Areas and Standards section. GM-4 is "Adjust wild horse and burro management to avoid impacts that prevent attainment of Riparian Management Objectives or adversely affect anadromous/inland native fish"); standards 15-22 for Management Areas 3a and 3b in Forest Plan (see Chapter IV of the 1990 LRMP and section PACFISH LRMP Amendment of this BA).
- Management Objectives for stream and riparian areas are described in PACFISH & INFISH amendments (RMO's) (see PACFISH/INFISH Riparian Management Objectives) and in Amendment 29 of Forest Plan for MA3A/B (DFC's).

3. **Recommendations:** Determine the linkage between condition, trend, and past/current management activities by conducting 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. (End of 2006 Riparian Strategy)

The Malheur National Forest Riparian Monitoring Strategy has not been consistently applied since 2006, for instance the last documented PFC analysis was in 2012, and MIM trend monitoring is not often implemented on the MNF. The primary information gathering to determine short and long-term condition of the streams and watersheds is conducted through MIM monitoring of the three indicators (stubble height, bank alteration, and woody browse) at the end of the active grazing use period, Level II stream surveys to be conducted every 10 years, temperature monitoring (in some locations), photos, and spawning surveys. Updated monitoring components described in this Biological Assessment which are part of the Proposed Action are:

- Document monitoring results for both mid-point trigger (photo or MIM) and end of use (three indicator MIM) monitoring at DMA locations.
- Increase documentation of MIM DMA sites with photos, monument/markers, and spatial data. If one or two indicators cannot be measured at the site, document through an IDteam and provide to the Malheur Level 1 representative why a new site has not been established.
- Continue redd surveys in coordination with Oregon Department of Fish and Game (ODFW) and any appropriate tribes.
- Continue with season long, multi-year temperature monitoring at selected sites in relation to high value fish habitat or proposed restoration.
- Institute methods to determine ecological seral status or departure from desired riparian condition with PIBO and 10 indicator MIM data.
- Conduct 10 indicator MIM trend monitoring to augment sites where PIBO data is not collected (three to six sites per year for the next four years with a three year rotation of re-visits).

Most Sensitive Riparian Areas (MSRA) in Relation to ESA-Threatened MCR Steelhead.

In response to previous ESA and National Forest Management Act (NFMA) litigation over range management and prior to the previous consultation of 2012, as part of a court order the MNF identified stream reaches with valuable steelhead spawning habitat and high potential fish production CH that are typically most accessible and sensitive to livestock use. Because of the life-cycle stages of MCR steelhead relevant to streams within Forest livestock allotments, the MNF decided to identify known and likely spawning areas for MCR steelhead as "Most Sensitive Riparian Areas" (MSRA). The same exercise was expanded to include bull trout on the MNF with an objective to help narrow and focus on stream reaches of concern for livestock interactions. MSRA provides an added layer to focus attention, which assists range staff in management. Designated CH is documented on official maps from USFWS and NMFS and continues to be managed for recovery objectives, and covers more linear miles than MSRA. MSRAs are characterized by low gradient (4% mapped or less), unconfined, open meadow reaches of a stream. Typically, Rosgen (1996) C and E channel types that are unconfined stream channels with low gradients. Riparian areas adjacent to potential spawning areas can be more sensitive to impacts for ESA listed fishes 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. The presence of MSRA in a pasture requires different grazing management strategies (e.g. reduced bank alteration thresholds and or other actions).

The MSRA mapping exercise was based on the concept of intrinsic potential (IP) modeling that uses geospatial data such as intrinsic topographic and climatic features to rank stream reaches in terms of their potential to provide habitat that can support high or low potential for fish or other species. Intrinsic Potential analyses are used to inform prioritization of sites for restoration or conservation, recovery planning, and the historic distribution of fish (Sheer et. al. 2008). The MNF used stream channel gradient and valley width topographic features as well as the location of ODFW index spawning reaches to identify the MSRAs.

The decision-making process on model validation and determining whether a stream section is a MSRA was intended to be conducted in an interdisciplinary team approach, integrating range, hydrology, and/or fisheries staff. MSRAs have also been used to narrow the focus of spawning surveys to best utilize time and resources. While the original intent after 2012 was to allow MSRA to be adjusted, expanded or deleted from the maps if model validation failed to detect the presence of cattle preference of these areas. Unfortunately, MSRA adjustments were not well documented. A review of the original MSRA layers by the Forest Fisheries and Watershed Program Managers, the GIS staff, and discussion on the time it would take to refine these layers based on improved modeling and available data, determined that there would not be an update of MSRA prior to completing this consultation and the original MSRA layer will apply to the current (2023-2027) consultation. Until MSRA is refined, MSRA adjustments will be initiated by District ID Teams, followed by review and agreement through the interagency streamlining (Level 1) consultation team for the MNF.

CONSULTATION COMPLIANCE 2018-2022

Compliance with the Terms and Conditions of the 2018 Biological Opinion is summarized in the sections below.

Compliance and Resource Condition Issues in Murderers Creek Allotment

In 2008 all livestock grazing in the Murderers Creek allotment was enjoined by the District Court of Oregon based on bank alteration exceedances. Monitoring to determine the impacts of wild horses revealed concentrated use in the Dans Creek, Deer Creek, and Frenchy Butte pastures. Utilization levels were high enough to limit or preclude cattle grazing on these pastures.

In 2009 only the John Young Meadows and Timber Mountain pastures were grazed. Wild ungulate bank alteration on Blue Ridge Pasture reached 20% before turnout. Cattle grazed the John Young Meadows Pasture for four days. Ninety-seven wild horses were removed from the Territory.

In 2010 the Dayville Grazing Association waived their permit to members Loren and Piper Stout and Chet Hettinga. Pre-season monitoring on Frenchy Butte, Deer Creek, and Blue Ridge pastures showed considerably less wild horse concentration areas than in previous years but a heavier concentration on Vester Creek in the Frenchy Butte pasture and on South Fork Deer Creek in the Deer Creek pasture, requiring electric fencing to exclude wild horses and livestock. Wild horse use sites in the Blue Creek drainage and Bark Cabin Creek required the permittee to keep cattle out of these areas. No suitable locations for MIM monitoring have been identified in the Timber Mountain or Blue Ridge pastures, by the BMRD ID Team, however there are two PIBO sites in Timber Mountain pasture (an I site and a K site) that are read every five years. The 2012 BA stated that Bark Cabin Creek in Blue Ridge Pasture is heavily protected by shrubs that limit access to crossings. It also stated that the Deer Creek DMA is dominated by thick stands of alder, although the PIBO site photos show areas that would not limit livestock, wild horse, and or wildlife access to water.

In 2011 grazing on the Murderers Creek allotment for the season was again enjoined by the District Court on December 30, 2010. On March 16, 2011, the District Court modified its injunction allowing grazing to occur on the Frenchy Butte, Deer Creek, and John Young Meadows pastures; however the permittee elected to not graze and grazing was not authorized on the entire Murderers Creek allotment. As part of the 2013 settlement agreement to resolve Stout vs. Forest Service, the MNF agreed to document estimated wild horse population levels, especially when over AML.

In 2020, wild horse use was high in the Dan’s Creek Pasture, which prevented turnout of livestock in that pasture for the year.

Issues and Compliance with Endpoint Indicators 2018-2022

Through annual allotment grazing strategies, allotment operating instructions (AOIs) and/or grazing authorization letters, the MNF had been applying terms and conditions to pastures during the grazing seasons to address streambank alteration, woody browse, and stubble height exceedances, which was also to trigger implementation of annual adaptive management strategy’s by the MNF.

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

Specific compliance or resource issues by allotment are as follows:

Murderers Creek Allotment

Blue Ridge Pasture: In 2018, Blue Ridge Pasture (S.Fork Murderers Creek) had both stubble and bank alteration exceedances. Bank Alteration was measured at 22% and Stubble Height was 5.8" A notice of non-compliance was sent. Critical Habitat was then fenced in this pasture in 2019. Because all Critical Habitat in this pasture is now excluded from livestock, end of use monitoring no longer occurs here.

Watershed Exclosure: Watershed exclosure was scheduled to be rested from 2018-2022. In 2018, 2019, and 2021 excess use occurred. In 2018 and 2019 there is no documentation of follow-up monitoring, however in 2021 follow-up monitoring did occur. In 2021, the excess use resulted in exceedance of the bank alteration standard on S.Fork Deer Creek. Bank alteration was measured at 23%, which exceeded the standard. Stubble height was 10" and woody browse was 10%. The standard was not exceeded for those indicators. See photo in Allotment Photos section. A Letter of Warning was sent to the permittee (this is a different permittee that the one is authorized to use the Blue Ridge Pasture). It was decided by the Line Officer that a Letter of Warning was sufficient to resolve the issue. A notice of non-compliance was not sent because the permittee voluntarily accepted maintenance responsibility of the Watershed Exclosure. Prior to this incident, the USFS was responsible for fence maintenance of the exclosure, however regular maintenance had not been occurring. In 2022, the fence was maintained by the permittee prior to turnout and no excess use has occurred.

Excess use also occurred intermittently in other rested pastures over the past five years, but in cases were resolved promptly and did not result in standards exceedance in Critical Habitat. In 2019, signs of excess use were noted in the South Fork Murderer's Creek Gather Pasture, outside of Critical Habitat. Critical Habitat was fenced in this pasture in 2019. Excess use was again noted in 2020 in this pasture. The permittee removed cattle promptly. Dans Creek Pasture also had excess use in 2020 (three cows).

Field's Peak Allotment: There have been no documented exceedances in the Fields Peak allotment during the last consultation period. Excess use in rested pastures occurred in 2020 in North Murderers Creek Pasture. Permittees responded to excess use in a timely manner and standards were not exceeded.

Monitoring has not always been in compliance with the BIOP. Miners Creek Pasture, although used from 9/20-10/5 in 2020, the Miners Creek DMA was not monitored. The site is fairly brushy, which likely limits livestock access. Photos taken the following year indicate there were no carryover effects from the use that occurred in 2020 (See Allotment Photos Section).

In the **Aldrich Allotment**, end of season photo monitoring on Critical Habitat was only conducted on the DMA in Cabin Todd Pasture in 2018, 2021, and 2022. Access to the DMA difficult and only accessible by via a five-mile hike. In 2019 and 2020 this precluded monitoring with staffing constraints in those years. Upland monitoring occurred from 2017-2021. Photo monitoring occurred that did occur shows the site to be very brushy, with no visible livestock use(see Allotment Photos Section)

The updated compliance strategy for the 2023-2027 consultation period is in the Proposed Action: Common to all MNF Allotments section.

End of Year Reporting

The monitoring presented in the Year End Grazing (EOY) report and the compilation of the report for the regulatory agencies is a term and condition from the previous consultation (2018-2022). The reports for the last five years contain use data by allotment and pasture, on/off dates, AUM's, grazing strategies, spawning survey summaries, monitoring information and data from mid-season checks and end of use monitoring. Also required in the report are recommendations for management changes for the next grazing season, descriptions of grazing exceedances, administrative actions, unauthorized use, fence/gate maintenance or condition issues, and any permit compliance issues. The information collected as part of those reports has been utilized in this consultation., and much of it is summarized in allotment specific sections of this BA. Listed fish distribution and spawning survey data were also to be reported. These reports were submitted to the Services, although we generally did not meet the specified timeframes for report submission.

Redd Survey Protection and Reporting

Under Reasonable and Prudent Measures in the 2018 Biological Opinion (which are nondiscretionary measures to minimize the amount of incidental take), the MNF shall:

- Minimize incidental take caused by livestock grazing along streams resulting in trampling of MCR steelhead redds and disturbing incubating/rearing juveniles by performing spawning surveys and protecting redds.

Under the 2018 Biological Opinion, critical habitat within each pasture of Murderer's Creek and Field Peak Allotment was surveyed or was surveyed to the upper extent of suitable spawning habitat (presence of gravels/cobbles, access) where grazing occurred prior to July 1. Similarly, spawning surveys also occurred in Aldrich Allotment as well. However, in 2020 in Aldrich Allotment, there was an internal miscommunication over required surveys and no surveys were conducted, although cattle had grazed prior to July 1 in the Cabin Todd Pasture.

Across the forest and these allotments, protection has been successfully implemented and documented when redds have been encountered. Redd protection primarily consisted of constructing fenced exclosures or delaying grazing until after July 1.

See ENVIRONMENTAL BASELINE section for specific details on survey results by Allotment and Pasture.

Best Management Practices

Watershed Best Management Practices (BMPs) are identified at the National, Regional, and Forest level of the Forest Service as part of demonstrating and achieving compliance with the Clean Water Act (CWA). They also provide methods to address and improve impaired water bodies (303d) listed by the states through their implementation of the CWA. There are three nationally identified BMPs for rangeland management activities (USDA Forest Service 2012): 1) Rangeland Management Planning; 2) Rangeland Permit Administration; and 3) Rangeland Improvements. The various practices identified under each BMP include many actions applicable to reducing impacts and helping recover ESA listed species. Many of them are already incorporated into the MNF's grazing program (e.g. "Adjust livestock numbers, season of use, and distribution when monitoring and periodic assessments indicated consistent noncompliance with permit provisions" and "Establish management requirements such as the season of use, number, kind, class of livestock, and the grazing system").

Across the Malheur National Forest there have been nine Range Management BMP Evaluations completed between 2013-2021. Preliminary results indicate that BMPs were rated as fully or mostly implemented on

44% of the monitoring evaluations. BMPs were marginally implemented, or not implemented on 33% of the sampled sites, and no BMPs were prescribed on 22% of evaluations. BMPs were rated as effective or mostly effective on 33% of evaluations completed across the Forest, and were marginally effective, or not effective on 67%. BMP monitoring is conducted by random sampling across the MNF. As a result of BMP monitoring these range issues have been highlighted:

- A lack of recent Allotment Management Plans
- Fence maintenance that has not been adequately addressed,
- Lenience and lack of consistency in enforcement of non-compliance issues.
- A need to identify long term indicators for stream/riparian desired conditions
- Some examples of corrective actions/adaptive management strategies identified in the BMP evaluations include.
- A day rider is required in the decision document to move the cattle until the riparian exclosures are complete.
- Salting away from water sources to encourage better distribution and lessen impacts to riparian areas (at least 1/4 mile away from water sources and visuals i.e. major roads).
- Improve the rotation of the pastures and ensure proper clean-out of pastures
- Complete recommended exclosures
- Harden water gaps/crossings on critical stream reaches
- Salt blocks need to be rotated around & moved further away from the stream; suggest adjusting to a 2–3-week grazing period
- Consider felling trees into cattle trail to discourage livestock trailing in section that is allowing sediment to enter stream channel
- Recommend reducing time and numbers permitted on allotment. Development of range improvements are also recommended
- There is a need for site specific information/assessment and updated NEPA/AMP for grazing allotment
- Consider adjusting season of use in this pasture from July-August to June-July
- Potential incorporation of these types of measures can aid in minimizing indirect effects to steelhead and bull trout and designated critical habitat to ensure that agency actions are discountable.

Ecological Condition of Riparian Areas

The intent in 2018 -2022 was to move forward with identification of current and potential ecological condition of riparian areas. In 2018, with the exception of sites with more than three PIBO data collections (e.g. a site collection every five years over the 15 years since the PIBO program inception), long term trend indicators were lacking on the MNF.

Additional variables from the “full MIM” monitoring were identified in the 2018 consultation as necessary to help identify the ecological baseline condition of riparian areas. That information is important when assessing how departed the riparian condition may be from ecological potential or from a desired condition. The information also further complements and explains the conditions captured by photo monitoring. In the 2018 consultation, part of the proposed action was to conduct the ten indicator MIM effectiveness monitoring at locations not represented by PIBO beginning in the spring of 2018 with three to six full MIMs

conducted each year, and revisiting one site beginning in the fourth year (e.g. 2021). The intent was to have a total of 18 to 36 MIM trend sites monitored across the forest between 2018-2022, with sites chosen by the MNF and agreed to as high priority by the Level 1 team. A total of 14 Full MIMs were conducted across the forest from 2018-2021 with some issues over data collection methods in 2020.

The Malheur National Forest also intended to work with the USFS National Stream and Aquatic Ecology Center to develop an ecological classification system of the Forest's stream and riparian areas to provide a framework for improved descriptions of existing vs. desired conditions for a variety of valley types and vegetation communities that comprise the riparian areas on the MNF. This work was to rely on existing information such as the Mid-Montane Wetland Plant Associations of the Malheur, Umatilla, and Wallowa-Whitman National Forests (Crowe and Clausnitzer 1997), and additional information such as stream valley classifications. The goal was to have an improved riparian ecological classification system to assist in resource management, including grazing, by 2019, but no later than 2020. This effort was started but not completed due to changes in personnel.

The Malheur National Forest collected greenline plant composition data on 49 range monitoring DMA's across the forest in 2018 in addition to short-term indicators (key species stubble height, shrub browse and streambank alterations). This greenline data was not previously collected and in the 2018 Biological Opinion the collection of greenline data was a term and condition. Most monitoring trips (42 of 49; 86%) were conducted after the end of livestock grazing with 7 (14%) conducted on ungrazed (rested) pastures. Only 13 of 49 (26%) site visits were conducted during the growing season before September 1st, when plants are most identifiable.

In 2019 44 DMAs were surveyed using a MIM protocol that assessed only the short-term indicators listed above and for streambank stability/cover. No other long-term indicators were assessed, except at the three full MIM sites (Table 9). Nearly all (38 of 44; 86%) were conducted after the livestock grazing and only 12 of 44 (27%) before September 1st.

In 2020 37 DMAs were surveyed with a MIM protocol that assessed the short-term indicators listed above as well as streambank stability/cover. Greenline plant composition was also assessed. However, it must be noted that the greenline composition data was not collected correctly.

In 2021 a total of 60 post-season MIMs focused on short-term indicators were conducted.

In early summer of 2021, a Forest IDT selected two new DMAs for full MIM along critical habitat within the Upper Camp Creek watershed. Both are within the Long Creek allotment; the first in the Camp Riparian (Charlie) pasture on upper Camp Creek and the second in the Coxie Exclosure pasture on Coxie Creek. These new DMA were sited in two pastures that had not been grazed for many years with the intention that they would serve as reference DMAs for other routinely grazed pastures nearby

Some long-term indicators were not consistently assessed between 2018 and 2021 (woody species height class, woody species age class, greenline-to-greenline width, substrate, and residual pool depth/frequency). To remedy this, in 2022 a permanent technician was hired and assigned to MIM monitoring who can provide consistent oversight.

While long term monitoring efforts have been initiated in many places, the data has not yet been evaluated in a riparian condition assessment. A full evaluation of this data is needed in order to assess riparian condition in the context of the current stream setting against historic disturbances, and current management practices. We anticipate a full analysis of the data to be completed as part of any allotment managing planning and prior to any changes in the "Common to All" section of the Proposed Action in future consultation.

ENVIRONMENTAL BASELINE

The Environmental Baseline includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in progress. An environmental baseline that does not meet the biological requirements of a listed species may increase the likelihood that adverse effects of the proposed action will result in jeopardy to a listed species or in destruction or adverse modification of a designated critical habitat.

General History

Human use started over 8,000 years ago in the action area. At the time of historical contact with the first whites, Northern Paiutes were a primary user of the area. Several other tribes used the area periodically (now members of the Umatilla, Warm Springs, and Nez Perce reservations). Beaver trappers arrived in the 1820's. When cattle markets declined in the late 1800's, the large herds of horses that had been used to drive them to the railroads were in less demand. Taxes were also imposed on horses leading many ranchers to turn their horses loose and by 1900 there were many horses roaming the John Day Valley, which may have been a factor in the origin of the Murderers Creek horse herd. By the early 1900's the area had thousands of sheep in addition to horses and cattle.

The Blue Mountain Reserve was created in 1906 and the MNF was proclaimed in 1908. Industrial logging by the Hines Lumber Company began in 1939 and cinnabar ore mining began in the 1940's (in the Deer Creek watershed). Also in the 1940's and 1950's horses were gathered from the Murderers Creek watershed for private, rodeo, and fox food use. In 1959 it was noted that one of the cattle permittees had up to 1,200 cattle in the action area while only permitted for 650. The Forest Service began to enforce grazing permit numbers, and also began to collect basic information on the horses in order to begin horse management. In 1971, a Murderers Creek Resource Development Plan was started in a coordinated manner with many agencies and private landowners (MNF 1972).

The State of Oregon has scattered parcels in the Murderers Creek watershed within the boundaries of the MNF, and also has more extensive land holdings in lower Murderers Creek (along with the BLM and private lands) that were designated as a state wildlife refuge from 1929-1933. At that time a large mule deer population and heavy cattle grazing had highly degraded the range conditions (ODFW 2006). Management of the area (including on MNF lands) for mule deer and elk continues to be an important objective of the Murderers Creek management unit. The presence of cattle and wild horses, along with big game management objectives create a complex situation in the Murderers Creek watershed.

The primary activities that currently occur in the action area are cattle grazing, big-game hunting, mushroom gathering, fishing, camping, hiking, snowmobiling, firewood cutting, and general motorized travel (automobile and ATV's).

Existing Condition

A densely developed road system covers a majority of the landscape, however there are also significant designated semi-primitive non-motorized areas: Aldrich Mountain (8,609 acres); McClellan Mountain (18,717 acres); Dry Cabin (14,629); and Shaketable (8,997 acres) that occur in portions of Murderers, Aldrich and Fields allotments and consist largely of roadless acres.

Historical grazing caused gullying in headwater areas of streams such as Chickenhouse Gulch, Cabin Creek, and Todd Creek. Some areas that were once mountain meadows are now considered gullied scabs (MNF 1997). Many of the headwater systems (e.g. Thorn, Duncan, Todd, and Cabin creeks) are fed by numerous springs, which provide Murderers Creek with cold, clear perennial flow. John Young Meadows, which is a 240 acre area near the headwaters of South Fork Murderers Creek is a wet meadow that releases cold, clear water throughout the year. South Fork Murderers Creek in the meadow is one of the few low-gradient, meandering stream systems in the action area that is not entrenched (MNF 1997). In the middle zone of the Murderers Creek watershed, little groundwater recharge occurs due to the geology (e.g. a serpentine formation) and summer flows are discontinuous when the streams loose water to deeper groundwater storage. Beavers played an important role historically in stabilizing and maintaining flow in these stream and riparian systems.

Between 1880 and 1920 major valley erosion occurred in the action area due to the activities of the early settlers. Log skidding in intermittent and ephemeral draws are also legacy activities that occurred later and caused erosion in the watershed. Wildfire has also occurred in the action area frequently, with historic low to moderate intensity fire that may have occurred as frequently as every ten years. Historically those fires averaged 500 acres and ranged from 1,000-2,000 acres (Johnson 1993).

The action area is important to the state of Oregon for elk and deer. Elk were scarce from over utilization by the early 1900's, but increased in the Murderers Creek unit from 220 in 1935 to 2,500 in 1994. Current numbers are 1800-1900. Mule deer numbers also expanded after lows in the early 1900's to very high numbers in the 1960's, and have since declined to present numbers estimated at 6,244 in the Murderers Creek Unit (#46).

The condition of forest stands is generally much denser than historically, especially in areas that were historically single story pine. Timber harvest and pre-commercial thinning changed many of those stands to earlier seral stages with increased amounts of grand fir. Grazing also greatly increased conifer establishment and survival throughout the action area by reducing competition from grass. In portions of the watershed the reduction in wildfire intensity, frequency, and size from grazing is believed to have allowed juniper to encroach into grass and shrublands.

Aspen and cottonwood were more common historically in the action area (MNF 1997). Both species now exist in small stands and patches and require fire, beaver, or other appropriate disturbance to regenerate. They were also impacted by valley bottom road building, historic grazing, and can be impacted by current grazing where not protected.

The road system and grazing, along with the background geology, are the cause of dominant erosion processes in portions of the action area. Fields Creek 12 digit sub watershed (Field Peak allotment) was rated in the 2004 MNF roads analysis as "extreme watershed and high aquatic risk" due in part to the "high" road density, and "extreme" ratings for the amount of road within 200' proximity to streams. Other 12 digit sub watersheds with "extreme" ratings for the amount of road in proximity to streams include Bark-Cabin, lower Deer Creek, and Corral Creek (Murderers Creek Allotment). For Fields Peak allotment the 12 digit sub watersheds with "extreme" or "high" ratings for road proximity to streams are Tex Creek and Fields Creek. Much of the Aldrich allotment overlaps with the 8600-acre Aldrich Mountain Roadless Area and the 14,600 acre Dry-Cabin Roadless Area, which also includes a portion of the Murderers Creek allotment. The Shake-Table Natural Area also is within the Murderers Creek allotment. Those areas will remain under similar objectives in the new proposed Forest Plan.

The existing condition of specific stream and riparian areas is presented below specific to each allotment.

Murderers Creek Allotment

The Murderers Creek allotment is located within the Upper John Day River (8 digit 17070201) sub basin. The pastures comprising the Murderer's Creek allotment lie within Murderer's Creek (10 digit 1707020103) and Middle South Fork John Day (10 digit 1707020102) watersheds. The allotment is located mostly within T 14 S, 15 S and 16 S, R 27 E and 28 E. The allotment includes approximately 66,730 acres. Elevations within the allotment range from approximately 3,700 feet at the western boundary to 6,500 feet at the south-eastern boundary of the allotment.

In the 2012 BA the allotment was divided into 14 pastures. This allotment is now divided into 27 pastures: Red Rocks, Martin Corrals, Oregon Mine, Timber Mountain, Blue Ridge, Horse Mountain, Dan's Creek, John Young Cow Camp, John Young Meadow, Deer Creek, Frenchy Butte and Antelope Spring are pastures included in rotations. The remaining pastures are exclosures, pastures which are not typically grazed or are gather/trailing pastures. These pastures are: Tex Creek Gather, Murderer's Creek Gather, Oregon Mine Campground, South Fork exclosure, Bark Cabin, Horse Mountain Riparian exclosure, Vester Creek exclosure, Watershed pasture, Dan's Creek Riparian, Orange Creek Riparian, Blue Creek exclosure, South Fork Murderer's Creek Gather, South Fork Murderer's Creek Gather Exclosure, Deer Creek Guard Station and Deer Creek Horse Pasture (see Appendix A, map). In 2019, all Critical Habitat in Tex Creek Gather Pasture was fenced, except for a 150' watergap. In the 2018 BA, there was a proposal to build fence around the Critical Habitat on Murderers Creek in the Oregon Mine Pasture. This fence has not yet been constructed; however, it is still proposed but still subject to NEPA review and funding.

The Murderer's Creek allotment contains several pastures which contain State and BLM land. The Frenchy Butte pasture contains 650 acres of State land and 324 acres of BLM land, both of which are managed by ODFW and permitted to a Murderer's Creek allotment permittee. Timber Mountain contains a 640-acre section of fenced State land which is managed by ODFW and permitted to a Murderer's Creek allotment permittee. John Young Meadow contains 135 acres of State land, managed by ODFW. John Young Cow Camp contains 118 acres of State land, managed by ODFW. Oregon Mine contains 57 acres of State land, managed by ODFW.

The Murderer's Creek allotment contains 52.47 miles of MCR steelhead Critical Habitat (CH) and 26.28 miles of stream reaches identified as Most Sensitive Riparian Area (MSRA) (Table 5 and Table 6 and Appendix A, map). MSRA is designated in the Martin Corrals, Oregon Mine, Blue Ridge, Horse Mountain, South Fork Murderer's Creek Gather, Dan's Creek, John Young Meadow, Deer Creek, Frenchy Butte, Watershed Pasture, South Fork exclosure and Horse Mountain Riparian exclosure.

The following table (Table 12) summaries the grazing management for the allotment from 2017-2021.

Table 12. Murderer's Creek Pasture Information 2017-2021.

Pasture and Authorized Number	Total Acres	Proposed season of use 2017	Actual Use Dates 2017	Proposed season of use 2018	Actual Use Dates 2018	Proposed season of use 2019	Actual Use Dates 2019	Proposed season of Use 2020	Actual Use Dates 2020	Proposed season of Use 2021	Actual Use Dates 2021	DMA (Y/N)
Red Rocks (175c/c)	3,123	7/1-9/25	7/7-8/28 8/28-10/11	5/15-9/25	6/1-9/20	5/15-7/25	6/13-9/20	7/09-10/15	7/06-10/10	7/10-10/15	7/05-10/15	No
Martin Corrals (175c/c)	4,330	7/1-9/25	7/7-8/28 8/28-10/11	5/15-9/25	6/1-9/20	5/15-7/25	6/13-9/20	7/09-10/15	7/06-10/10	7/10-10/15	7/05-10/15	No
Oregon Mine (175 c/c)	10,300	7/1-9/25	7/7-8/28 8/28-10/11	5/15-9/25	6/1-9/20	5/15-7/25	6/13-9/20	7/09-10/15	7/06-10/10	7/10-10/15	7/05-10/15	Yes
Timber Mountain (100c/c)	5,182	7/1-8/30	Rested	6/1-8/30	7/1-8/15	7/01-8/30	7/01-8/15	7/01-8/30	6/25-8/30	6/1-6/30	6/1-6/30	No
Blue Ridge (300c/c)	7,750	8/15-10/15	Rested	7/1-8/30	8/16-10/15	7/01-8/30	8/16-10/15	7/01-9/30	7/01-9/30	7/1-10/1	7/1-8/15	No
Horse Mountain (300c/c)	4,085	7/1-8/15	Rested	9/6-10/15	8/16-10/15	9/01-10/15	8/16-10/15	9/1-10/15	9/01-10/15	7/25-10/1	7/1-8/15	No CH
South Fork MC Gather (300c/c)	61	Rested	Rested	9/1-9/5	Rested	Rested	Rested*	Rested	Rested*	9/6-9/11 gather	Rested	Yes
Dan's Creek (175c/c)	3,704	9/26-10/10	8/29-9/15	10/1-10/15	Rested	10/01-1015	9/20-10/14	Rested	Rested*	5/17-6/30	6/5-7/5	Yes
John Young Cow Camp (300c/c)	286	Gather 8/15-9/15	Rested	10/7-10/15	10/3-10/4	10/7-10/15	10/3-10/4	10/7-10/15	10/3-10/4	9/7-9/15	9/7-9/15	No
John Young Meadow (400c/c)	707	9/15-10/2	9/15-10/2	10/1-10/15	9/17-10/4	10/01-10/15	9/25-10/14	10/01-10/15	9/24-10/14	9/1-9/15	8/30-9/17	Yes
Deer Creek (400c/c)	13,855	8/2-9/15	8/2-9/15	8/15-9/30	8/2-9/17	8/16-9/30	8/10-9/25	8/16-9/30	8/16-9/30	5/17-6/30	7/21-9/1	Yes
Frenchy Butte (400c/c)	13,057	7/7-8/1	7/12-8/15	7/1-8/15	7/7-8/2	7/01-8/15	7/13-8/10	7/6-8/20	7/17-8/08	7/1-7/30	7/12-8/09	Yes
Watershed Pasture (400c/c)	23	Rested	Rested	Rested	Rested*	Rested	Rested*	Rested	Rested	Rested	Rested*	No
Oregon Mine Campground (175c/c)	38	7/1-7/15 9/15-10/5	8/28-8/28 9/14-9/14	5/15-5/25 9/20-9/30	9/27-9/30	Rested	Rested*	Rested	Rested*	Rested	Rested*	No

Pasture and Authorized Number	Total Acres	Proposed season of use 2017	Actual Use Dates 2017	Proposed season of use 2018	Actual Use Dates 2018	Proposed season of use 2019	Actual Use Dates 2019	Proposed season of Use 2020	Actual Use Dates 2020	Proposed season of Use 2021	Actual Use Dates 2021	DMA (Y/N)
Tex Creek Gather (150' CH)	68	N/A	N/A	N/A	N/A	N/A	N/A	Gather 10/01-10/15	10/01-10/20	Gather 6/15-10/15	Gather 10/01-10/20	No
Murderers Creek Gather	158	N/A	N/A	N/A	N/A	N/A	N/A	Gather 10/01-10/15	10/01-10/20	Gather 6/15-10/15	Gather 10/01-10/20	Yes

*Excess or unauthorized use documented in scheduled Rested pasture during this season.

Pre-Season Monitoring

Since 2012 all pastures within the allotment and JMA are monitored prior to livestock turnout (pre-season monitoring for wild horse use) and if endpoint indicators were nearing or were at end of grazing use levels, livestock would not be allowed to turnout (NMFS 2013, NWR-2012-716). Pre-season monitoring entails MIM – short term indicator monitoring (stubble height, woody browse, bank alteration) and needs to occur prior to permitted turnout (at MIM DMAs), which varies from 5/15 to 7/1. See proposed action for pasture turnout dates for this allotment.

Pre-season monitoring occurred in all years. Monitoring results are summarized in Table 13 below. With the exception of Dan's Creek Pasture in 2020, pre-season monitoring in all years did not indicate that endpoint indicators were close to end-use levels, therefore livestock were allowed to turn out accordingly.

Dans Creek Pasture was rested by livestock in 2020 because pre-season monitoring found that Bank alteration move triggers were already met.

Table 13. 2018-2022 Pre-Season Monitoring

Pasture	Monitoring Date	Result
Blue Ridge	6/21/2018	Stubble height 21", bank alteration 2%, browse use 10%
Blue Ridge	7/8/2019	Stubble height 16", woody Browse 10%, bank alteration 2%
Blue Ridge	6/24/2020	Stubble height 25", streambank alteration 3%, woody browse 10%
Dan's Creek	9/16/2020	Stubble height 14", bank alteration 12%, woody browse 18%
Deer Creek	8/1/2018	Stubble height 16", bank alteration 1%, browse use 11%
Deer Creek	7/23/2019	Stubble height 16", woody browse 10%, bank alteration 4%
Deer Creek	7/29/2020	Stubble height 13", bank alteration 5%, woody browse 10%
Deer Creek	7/28/2021	Stubble height 14", bank alteration 2%, woody browse 10%
Deer Creek	8/8/2022	Stubble height 9", bank alteration 6%, woody browse 10%
Frenchy Butte	6/21/2018	Stubble height 15", bank alteration 0%, browse use 10%
Frenchy Butte	6/19/2019	Stubble height 11", woody browse 10%, bank alteration 0%
Frenchy Butte	6/24/2020	Stubble height 15", bank alteration 2%, woody browse 10%
Frenchy Butte	6/24/2021	Stubble height 11", bank alteration 1%, woody browse 10%

Pasture	Monitoring Date	Result
Frenchy Butte	6/30/2022	Stubble height 16”, bank alteration 2%, woody browse 10%
John Young Meadow	8/2/2018	Stubble height 16”, bank alteration 3%, browse use 13%
John Young Meadow	7/8/2019	Stubble height 17", woody browse 10%, bank alteration 2%
John Young Meadow	8/12/2021	Stubble height 16”, bank alteration 5%, woody browse 10%
John Young Meadow	9/15/2022	Stubble height 18”, bank alteration 4%, woody browse 20%
Murderers Creek Gather	5/30/2018	Stubble height 11”, bank alteration 1%, browse use 11%
Murderers Creek Gather	6/7/2022	Stubble height 12”, bank alteration 2%, woody browse 10%
North Fork Deer Creek	8/1/2018	Stubble height 21”, bank alteration 0%, browse use 12%
Oregon Mine	6/26/2019	Stubble height 18", woody browse 10%, bank alteration 2%
Oregon Mine	5/21/2020	Stubble height 9”, bank alteration 1%, woody browse 10%
Oregon Mine	5/12/2021	Stubble height 8”, bank alteration 2%, woody browse 10%
Oregon Mine	6/30/2022	Stubble height 16”, bank alteration 1%, woody browse 10%
Oregon Mine Campground	5/30/2018	Stubble height 8”, bank alteration 0%, browse use 11%
Oregon Mine Campground	5/7/2020	Stubble height 7”, bank alteration 0%, woody browse 10%
Oregon Mine Campground	5/12/2021	Stubble height 7”, bank alteration 2%, woody browse 2%
Oregon Mine Campground	5/11/2022	Stubble height 7”, bank alteration 1%, woody browse 10%
South Fork Murderers Creek Gather	6/21/2018	Stubble height 21”, bank alteration 0%, browse use 11%
Timber Mountain	5/14/2020	Photo monitoring conducted.
Timber Mountain	5/26/2021	Woody browse 10%
Timber Mountain	5/25/2022	Woody browse 10%

PIBO DATA OVERVIEW

The following provides a summary of data collected by the PIBO Effectiveness Monitoring Program (EMP) for monitoring locations on stream reaches within the Murderers Creek allotment. Sites included within the summary are: 1) Integrator PIBO Designated Monitoring Area (DMA) sites (I sites) chosen within randomly selected sub-watersheds 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%) and 2) PIBO (DMA) (K sites) located within each randomly selected sub-watershed where livestock grazing occurs within the riparian area; locations are selected by Ranger Districts and used for annual implementation monitoring. One objective is to develop a link between implementation and effectiveness monitoring as part of adaptive management feedback process.

There are eight PIBO DMA (K) sites in the Murderers Creek allotment, representing seven pastures with CH. These sites are located on Crazy Creek (Timber Mountain pasture, monitoring occurred in 2003, 2008, and 2013), Deer Creek (Frenchy Butte pasture, monitoring occurred in 2008 and 2013), North Fork Deer Creek (Deer Creek pasture monitoring occurred in 2013 and 2018), Lower Deer Creek (Deer Creek pasture, monitoring occurred in 2013 and 2018), Middle Murderers Creek (Murderers Creek Gather, monitoring occurred in 2013 and 2018), Lower Murderers Creek (Oregon Mine pasture, monitoring occurred in 2013 and 2018), South Fork Murderers Creek (Timber Mountain pasture, monitoring occurred in 2013 and 2018) and Thorn Creek (Martin Corrals pasture, monitoring occurred in 2003, 2008, 2013, and 2018).

PIBO DMA (K) Site Results

North Fork Deer Creek, South Fork Murderers Creek, and Thorn Creek had the lowest total index scores, which indicates conditions are worse than expected based on an index score evaluation of the physical data (Archer and Ojala 2017). The other K sites scored between 19 and 41, which is below the approximate reference values of 50 for the ecoregion (Blue Mountains) and 50 for all PIBO program reference sites.

Bankfull w/d ratios for six of eight K sites from 2003 and 2008 (2013 was collected with another methodology) were below the PIBO managed mean and reference values, except for Crazy Creek, which had a higher value (less desired) in the 2008 sample year, and South Fork Murderers Creek, which had very high values in 2003 (71.2) and 2008 (40.3). The higher w/d PIBO values may be reflected in the 2009 Level II stream survey of Reach 2 South Fork Murderers Creek, which also had a high w/d (20). Otherwise the Level II survey indicated w/d meeting Forest Plan standards, or being very close, on six of seven additional stream survey reaches of South Fork Murderers Creek. Deer Creek, Middle Murderers Creek and Murderers Creek (both in Murderers Creek Gather Pasture), and South Fork Murderers Creek in John Young Meadow all had bank angles at or just below the PIBO reference value. Most other sites had bank angles between 110 and 140, which is indicative of the poor bank angle scores at many sites across the MNF. Percent undercut banks was lowest on Crazy Creek and Thorn Creek, with the other six K sites ranging between 25 and 50, and three of the sites above the PIBO reference value of 32.7, including the South Fork Murderers K site (33.3) in John Young Meadow, Deer Creek in Frenchy Butte Pasture (45.2), and Murderers Creek in Murderers Creek Gather Pasture (50.0).

All K sites, except Crazy Creek, which is dominated by cobble/boulder/gravel substrate, and lower Murderers Creek, had high fine sediment (% fines for <6mm) levels that exceeded PIBO managed and reference mean values. All K sites had bank stability ratings near 100%, well above the PIBO managed and reference means for this attribute. Only two K sites (North Fork Deer Creek and South Fork Murderers Creek) had mean particle sizes (D50) that were lower than the PIBO reference mean value. The D50 for all sample sites on the MNF is relatively close to the reference values of both the Blue Mountain province and at all PIBO sites. Streams that have high fines and relatively small D50's tend to be outliers on the MNF.

Three of eight K sites (Deer Creek, Lower Deer Creek, and Middle Murderers Creek), exceeded PIBO reference mean values for % pools, while Crazy Creek and North Fork Deer Creek had the lowest % pool values. Residual pool depths were very close to the PIBO reference mean values at five of seven K sites.

It is difficult to pick up a consistent pattern in the K site PIBO data, except that streams of most concern appear to be South Fork Murderers, Crazy Creek, and based on some indicators Thorn Creek and North Fork Deer Creek. Crazy Creek did not have one of the lower PIBO index scores, but the other three creeks did.

Integrator (I) Site Results

There are three Integrator Sites (I) in the Murderers Creek allotment; Murderers Creek (Murderers Creek Gather pasture), South Fork Murderers Creek (Timber Mountain Pasture) and Thorn Creek (Martin Corrals pasture).

Thorn Creek and South Fork Murderers Creek had very low total index scores (<10), which indicates conditions are worse than expected based on an index score evaluation of the physical data (Archer and Ojala 2017). However, photo trend in South Fork Murderers Creek appears to be upward. The Murderers Creek Gather pasture site had slightly higher scores (14-27)that saw a decrease in 2018

All Murderers Creek Allotment I sites had high levels of fine sediments (% fines for <6mm) in pool tail crests, which is of concern for successful spawning and incubation rates. All three I sites exceeded PIBO reference mean values (had high amounts of fine sediment) for this indicator, with South Fork Murderers Creek site at 30.7% being the lowest of the exceedances (compared to the reference value of 18%). Thorn Creek significantly exceeded sediment levels all three years surveyed.

Murderers Creek I site exceeded the PIBO reference mean value for % pools in all sample years, while Thorn Creek exceeded the reference value in three of the four sample years. South Fork Murderers Creek % pools values were significantly below PIBO managed and reference mean values. Murderers Creek residual pool depths exceeded the reference values in all three sample years, while South Fork Murderers Creek and Thorn Creek were below both managed and reference values for residual pool depths.

Bank stability ratings for all I sites consistently exceeded PIBO managed and reference mean values, all being at or very near 100%. Murderers Creek consistently exceeded the PIBO managed and reference mean values, for percent undercut banks. Thorn Creek exceeded PIBO managed and reference means in 2018. South Fork Murderers Creek was significantly below PIBO managed and reference mean values in all years. The same pattern held true for bank angle, with Murderers Creek being at or below reference values, South Fork Murderers Creek having the worst values indicating laid back banks that are outside the desired values for this attribute, with Thorn Creek also consistently exceeding PIBO managed and reference mean values, but with values less departed from reference.

Murderers Creek and Thorn Creek I site had lower w/d values than reference, while South Fork Murderers started high (undesirable), improved over the last two years of consistent data methodology.

In summary, South Fork Murderers Creek I site reflects less than desired conditions, while Murderers Creek reflects better condition for many indicators (except for % fines). Thorn Creek had a mix of good and bad indicator conditions. For all the PIBO data combined South Fork Murderers Creek and Thorn Creek appear to have habitat indicators that are most often departed from reference conditions. The Shaketable Complex Fire (aka Thorn Fire, 2006) may explain some of the condition of Thorn Creek. The PIBO I site for South Fork Murderers Creek is in the Timber Mountain Pasture, which is downstream of Blue Ridge, Horse Mountain, John Young Cow Camp, and John Young Meadow pastures. However, photo

Figure 1 Thorn Creek PIBO – K site, Martin Corrals pasture, 6/8/2003

Figure 2 Thorn Creek PIBO – K site, Martin Corrals pasture, 6/15/2008

Figure 3 Thorn Creek PIBO – K site, Martin Corrals pasture, 7/5/2013

Figure 4 Lower Deer Creek PIBO - K Site, Deer Creek pasture 6/23/2013

Figure 5 Lower Deer Creek PIBO – K Site, Deer Creek pasture 6/13/2008

Table 14. PIBO data for I and K sites in the Murderers Creek allotment

Stream Site Type and Rosgen Channel Type (if known)	Pasture	Year	Total Index	Bankfull W/D	Mean Part. Size (D50) (mm)	Pool (%)	Res. Pool depth (m)	%Fines <2mm (%)	%Fines <6mm (%)	Bank Stab. (%)	Veg Stab (%)	Bank Angle (°)	Under-cut Banks (%)	GL Wet Rat	GL Woody CV
Crazy Creek 156-05-K B 3/4	Timber Mountain	2003	-	-	-	-	-	-	-	100	83	140	14.3	57	85
		2008	-	32.9	-	31.7	0.2	-	-	97.6	88	136	7.3	60	70
		2013	34.2	14.9	320	18.3	0.2	9.9	11.2	100	80	128	21.4	59	90
Deer Creek 156-08-K C4	Frenchy Butte	2008	-	17.6	-	62.1	0.4	-	-	92.9	88	119	21.4	59	18
		2013	37.3	8.3	100	81.7	0.3	58.0	61.1	100.0	86	95	45.2	66	70
NF Deer Creek 528-10-K	Deer Creek	2013	8.8	6.3	2	21.4	0.2	91.9	93.1	97.7	96	111	31.8	82	09
		2018	23.6	4.0	2	41.99	.15	10.2	10.2	91.7	87	103	29.2	--	--
Lower Deer Creek 528-05-K	Deer Creek	2013	31.8	12.7	18	66.3	0.3	31.0	33.0	93.2	82	119	25.0	66	69
		2018	27.5	13.3	18	65.6	0.3	10.9	23.4	95.45	50	128	18.6	--	--
Mid Murderers Creek 528-09-K	Murderers Creek Gather	2013	19.4	8.8	6	71.9	0.3	37.8	52.8	97.7	96	99	50.0	76	21
		2018	12.7	10.1	2	79.2	0.4	40.6	53.6	95.8	92	107	29.2	--	--
Lower Murderers Creek 528-07-K	Oregon Mine	2013	27.3	17.6	31	45.1	0.3	11.8	13.2	90.5	76	115	26.2	67	63
		2018	--	21.6	2	82.4	0.7	--	--	100	88	124	11.9	--	--
Murderers Creek 156-06-I C4	Murderers Creek Gather	2003	24.1	14.5	6	78.7	0.4	40.5	59.8	86.4	73	100	39.5	70	45
		2008	20.5	14.1	7	43.5	0.5	37.7	61.3	100.0	93	96	43.2	67	36
		2013	27.5	9.9	8	75.7	0.4	69.8	74.5	97.9	94	96	46.8	72	65
		2018	14.6	10.7	2	58.0	0.4	40.9	63.4	100	100	95	48	--	--
SF Murderers Creek 156-05-I F4	Timber Mountain	2003	-	71.2	17	11.4	0.2	20.2	31.6	90.0	45	143	2.9	24	23
		2008	3.5	40.3	43	13.1	0.2	16.2	23.3	97.6	95	153	2.4	31	17
		2013	7.8	24.8	48	10.3	0.2	30.0	30.7	100.0	100	135	17.5	37	33
		2018	0.0	28.4	32	33.5	.12	23.3	26.9	95.2	57	142	7.1	--	--

Stream/Rosgen Channel Type	Pasture	Site Type	Year	Total Index	Bankfull W/D	Mean Part. Size (D50) (mm)	Pool (%)	Res. Pool depth (m)	%Fines <2mm (%)	%Fines <6mm (%)	Bank Stab. (%)	Veg Stab (%)	Bank Angle (°)	Under-cut Banks (%)	GL Wet Rat	GL Woody CV
SF Murderers Creek 528-06-K	John Young Meadow	K (528-06)	2013	0.0	7.9	2	43.4	0.3	92.6	93.3	100.0	100	99	33.3	78	16
			2018	0.0	5.65	2	47.1	0.3	86.0	95.7	79.5	77	103	11.4	--	--
Thorn Creek 156-04-I C4	Martin Corrals	I (156-04)	2003	7.8	19.7	12	68.5	0.2	49.7	86.7	95.5	59	119	13.6	54	58
			2008	0.0	20.6	10	28.0	0.2	71.4	88.2	89.1	59	110	17.4	60	63
			2013	3.6	10.6	10	46.3	0.2	64.8	68.2	97.7	77	114	22.7	68	61
			2018	0.0	11.04	2	43.9	0.2	69.5	77.6	97.8	76	109	35.6	--	--
Thorn Creek 156-04-K B 3/4	Martin Corrals	K (156-04)	2003	-	-	-	-	-	-	-	97.6	60	138	7.3	56	82
			2008	-	20.8	-	29.1	0.2	-	-	97.6	93	132	4.9	50	73
			2013	40.9	11	230	26.8	0.2	40.9	43.2	100.0	76	128	19.1	63	79
**PIBO Managed Mean		-	-	-	23.9	43.0	40.9	0.26	-	26.7	74.6		108	26.4	-	-
PIBO Reference Mean		-	-	-	22.6	58.0	43.3	0.31	-	18.0	79.9		99.3	32.7	-	-
RMSE		-	-	-	4.0	13.8	12.9	.027	-	4.9			6.5		-	-
FLMP standard		-	-	-	-	-	-	-	<20	<20	>90		75 < 90	50-75%	-	-

Stream is the stream name. **Site ID** is the PIBO site identification number. **Site Type** is the PIBO sample type where I = instream habitat, S= annual sentinel sites, P=Prairie Sites, K=Designated monitoring Area. R is a random site with no plans for repeat observation. **Year** is year of last sampling. **Total Index** is the index of physical habitat where numeric score 0 (worst) - 100 (best) that ranks the habitat integrity of a reach [Index score calculated by summing values of 6 metrics (residual pool depth, % pools, D50, % pool tail fines <6mm, large wood frequency, average bank angle) and scaling 0 - 100. Index was developed using data from reference reaches as a basis of comparison to managed sites. There is some uncertainty about scores denoted with *, because they have landscape information outside of the range used to develop the index]. **Bankfull W/D** is the bankfull width-to-depth ratio. **Mean Part. Size (D50)** is the diameter of the mean 50th percentile streambed particle. **Pool %** is the percent of pools within the reach. **Res. Pool depth** is the average of the residual depth of pools in the sample reach. **%Fines <2mm** is the percent of pool tail fines less than 2mm. **%Fines <6mm** is the percent of pool tail fines less than 6mm. **Bank stab** is percent of stable banks over the sample reach. **Veg Stab** is the number of covered stable and false bank measurements. **Bank angle** is the average of bank angles across the sample reach. **Undercut** is the percent of angles < 90 degrees. **GL Wet Rat** is the greenline wetland rating where 1=upland, 25= facultative upland, 50=facultative, 75=facultative wet, 100=obligate wetland). **GL Woody CV** is the greenline woody cover (the sum of the relative cover of woody species out of 200% due to shrub canopy). *RSME = Root Mean Square Error. Useful in quantifying site-specific estimates of temporal variability – typically used with multiple linear regression. The RMSE is the square root of the variance of the residuals. It indicates the absolute fit of the model to the data–how close the observed data points are to the model's predicted values.*

PIBO DATA OVERVIEW CONTINUED

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 50-72, indicating a moderate to majority presence of wetland species along the streambank. An outlier was the South Fork Murderers Creek K site, which had values of 24 in 2003, 31 in 2008, and 37 in 2013. This suggests that the site has predominately upland vegetation along the streambank. Overall, there were no major changes in GWR rating between years at the other sites. Greenline wetland data was not collected after 2013 on these sites.

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 17.4 to 84.9 percent. The sites with the least woody cover were the South Fork Murderers Creek I site and the Deer Creek K site. The lowest GWC taking over all years (2003-2013) was NF Deer Creek K site (Figure 6). The sites with the greatest amount of woody cover were the Crazy Creek K site and Thorn Creek K site. Estimates for GWC were lower in 2008 than 2003 at four of five sites. By 2013, all sites except for Thorn Creek had increased in their GWC rating. Greenline woody cover data was not collected again after 2013 for these sites.

Figure 6 North Fork Deer Creek, Deer Creek pasture PIBO K site 6/23/2013

Figure 7 Crazy Creek PIBO K site 7/6/2013

Multiple Indicator Monitoring (MIM) Short-Term

Short-term MIM data has been collected in the Murderers Creek allotment over the course of the last consultation period. This data is summarized in the 2021 EOY Report (Appendix F) As described in Section Issues and Compliance with Endpoint Indicators 2018-2022, Blue Ridge Pasture (S.Fork Murderers Creek) had both stubble and bank alteration exceedances in 2018 and South Fork Deer Creek in the Watershed Pasture exceeded bank alteration standards in 2021

Spawning Surveys

Under the 2018 Biological Opinion, all critical habitat within each pasture was surveyed or was surveyed to the upper extent of suitable spawning habitat (presence of gravels/cobbles, access). Protection has been successfully implemented and documented when redds have been encountered. The table below provides a summary of redds found per year within each pasture. Photos and site-specific data taken during the surveys are on file and available upon request.

Table 15. MCR 2018-2022 Steelhead Spawning Surveys Murderers Creek Allotment

Pasture	Stream	# Redds Observed 2018	# Redds Observed 2019	# Redds Observed 2020	# Redds Observed 2021	# Redds Observed 2022
Dans	Dans Creek	No Survey	No Survey	0	No Survey	No Survey
Dans	Orange Cr.	No Survey	No Survey	0	No Survey	No Survey
Martin Corrals	Murderers Cr.	18*	1	11*	4*	No Survey
Martin Corrals	Thorn Creek	No Survey	0	0	0	No Survey
Oregon Mine	Duncan Cr.	No Survey	0	0	**No Survey**	No Survey
Oregon Mine	East Trib to Duncan Cr.	No Survey	**No Survey**	0	**No Survey**	No Survey

Pasture	Stream	# Redds Observed 2018	# Redds Observed 2019	# Redds Observed 2020	# Redds Observed 2021	# Redds Observed 2022
Oregon Mine	Murderers Cr.	10*	9*	22*	6*	3*
Oregon Mine	Oregon Mine Cr.	0	0	0	0	No Survey
Oregon Mine	Tennessee Cr.	0	0	0	0	No Survey
Oregon Mine	Thorn Cr.	0	0	0	**No Survey**	No Survey
Oregon Mine	West Trib to Duncan Cr.	No Survey	**No Survey**	0	**No Survey**	No Survey
Red Rocks	Duncan Cr.	0	0	0	1*	No Survey
Red Rocks	East Trib to Duncan	No Survey	**No Survey**	0	**No Survey**	No Survey
Timber Mountain	Crazy Creek	0	No Survey	1*	No Survey	0

Bold indicates that an adult steelhead migration barrier was identified downstream of the pasture.

No Survey indicates pasture was not grazed prior to July 1st and did not require a survey

* Indicates surveys were completed but a change in pasture timing occurred after surveys were conducted in order to protect redds.

Note that if an abundance of redds were found in Murderers Creek by ODFW and as a result, pasture use was delayed until after 7/1 (*), other CH surveys within those pastures were not surveyed. ODFW does not survey other CH streams within the Murderers Creek allotment, but does survey Murderers Creek, typically prior to FS surveys. If pasture rotations are changed to delay use until after 7/1, other Critical Habitat streams in that pasture were no longer needed,

Region 6 Level II Stream Surveys

Fifteen streams, located in eight pastures, were surveyed in the Murderers Creek allotment during the 2015 summer/fall field season using the R6 Level II Aquatic Inventory survey methodology (Table 16). In 2018 and 2019, eight additional surveys were completed within the Murderers Creek allotment (Table 17).

Table 16. 2018-2019 R-6 Level II Stream Surveys in Murderers Creek Allotment (SF Murderers Creek, Lower and upper Deer Creek)

12 Digit HUC Subwatershed	Survey Start Date	Stream	Miles Surveyed*	Pasture
South Fork Murderers	7/29/2019	Beaverdam Creek	2.064	John Young Meadow Horse Mountain Dans Creek
	9/23/2019	Crazy Creek	3.732	South Fork Excl.** Timber Mountain
	7/10/2018	South Fork Murderers Creek	8.104	Timber Mountain Blue Ridge Horse Mountain John Young Cow Camp John Young Meadow
Upper & Lower Deer Creek	7/25/2018	Deer Creek	12.327	Frenchy Butte Deer Creek
Lower Deer Creek	6/26/2019	Dewey Creek	2.225	Frenchy Butte
Upper Deer Creek	9/5/2018	Dead Injun Creek	3.472	Deer Creek
	6/24/2019	North Fork Deer Creek	4.135	
	6/26/2019	South Fork Deer Creek	3.678	

Table 17. 2015 R-6 Level II Stream Surveys in Murderers Creek Allotment (Murderers Creek and Middle SF John Day River Ten Digit HUCs)

12 Digit HUC Subwatershed	Stream	Pasture	Miles Surveyed*
Headwaters Murderers Creek	Murderers Creek	Martin Corrals Oregon Mine Dans Creek	18.55
	Tennessee Creek	Oregon Mine	1.81
	Oregon Mine Creek	Oregon Mine	0.43
	Dans Creek	Dans Creek	2.98
	Orange Creek	Dans Creek	2.11
Upper Murderers Creek	Thorn Creek	Martin Corrals	8.44
	Duncan Creek	Red Rocks	6.8
	Duncan Creek Trib. # 1	Oregon Mine	.56
	Duncan Creek Trib. # 2	Oregon Mine	.60
South Fork. Murderers Creek	Bark Cabin Creek	Blue Ridge	2.29
Upper Deer Creek	Corral Creek	Deer Creek	4.12
	Alder Creek	Deer Creek	1.23
	Blue Creek	Blue Ridge-Frenchy Butte	2.42
Upper Deer Creek	Vester Creek	Frenchy Butte	2.75
	Buck Creek	Frenchy Butte	3.29

* From stream survey data summary table. Measured length (miles) for each stream

Murderers Creek

The mainstem Murderers Creek was surveyed from the ODFW land upstream to the headwaters, beyond Basin Creek, a distance of approximately 18.55 miles (13 reaches). The lower five reaches of Murderers Creek (approximately 9 miles) up to Orange Creek, are within the Murderers Creek allotment. The upper eight reaches of Murderers Creek, upstream from Orange Creek (approximately 9 miles), are located within the Fields Peak Allotment, and are discussed in the Fields Peak allotment stream survey section (Region 6 Level II Stream Surveys).

The survey reported that most of the upper reaches of Murderers Creek had serious livestock damage to stream banks and a high water temperature of 24° C, was recorded, exceeding the maximum State Water Quality Standard of 20 °C. This is an increase in high water temperature for Murderers Creek compared to a 1992 survey that reported temperatures ranging from 8-20 °C, while the 2015 survey ranged from 7-24 °C. Also, the 1992 survey described Murderers Creek as being “well vegetated with stable banks.”

All reaches surveyed in middle and lower Murderers Creek, within the Murderers Creek allotment, met Forest Standards for percent unstable banks and percent large wood key pieces. However, all reaches in the Martin Corrals, Oregon Mine and Dan’s Creek pastures failed to meet Forest Standards for wetted width to depth ratio, pools per mile, large wood per mile, percent fines, and most also did not meet Forest Standards for shade.

Based on the 2015 survey results, compared to the 1992 survey, the habitat condition trend in the middle and lower reaches of Murderers Creek, within the Martin Corrals, Oregon Mine and Dan’s Creek pastures of the Murderers Creek allotment, appears to be declining, as it continues to not meet many of the Forest Standards.

Tennessee Creek

The two reaches surveyed in Tennessee Creek met Forest Standards for % unstable banks, shade, and % fines. However, both reaches failed to meet Forest Standards for wetted width to depth ratio, pools per mile, and large wood per mile. The state water quality standard for maximum water temperatures in Tennessee Creek was met in the 1994 and 2015 surveys. Based on this survey the trend in habitat conditions in Tennessee Creek, which is within the Oregon Mine pasture, appears to be static.

Oregon Mine Creek

The reach surveyed in Oregon Mine Creek met Forest Standards only for percent unstable banks and shade. However, the reach failed to meet Forest Standards for wetted width to depth ratio, pools per mile, large wood per mile, and percent fines. Based on this survey and compared to a 1994 survey, the trend in habitat conditions in Oregon Mine Creek, which is within the Oregon Mine pasture, appears to not be improving and is static.

Dan's Creek

The two reaches surveyed in Dan's Creek met Forest Standards only for percent unstable banks and shade. The standard for wetted width/depth ratio was met in the uppermost reach, while not being met in the lower reach. All reaches failed to meet Forest Standards for pools per mile, large wood per mile, and percent fines. State water quality standards for maximum water temperatures in Dan's Creek were met in 1992 and 2015 surveys, with recorded high water temperatures being well below the state maximum.

Based on this survey, and comparisons with the 1992 survey, the trend in habitat conditions in Dan's Creek, which is within the Dan's Creek pasture, appears to not be improving but is static.

Orange Creek

The two reaches surveyed in Orange Creek met Forest Standards only for percent unstable banks and shade. The standard for wetted width/depth ratio was met in the lower reach, while not being met in the uppermost reach. All reaches failed to meet Forest Standards for pools per mile, large wood per mile, and percent fines. State water quality standards for maximum water temperatures in Orange Creek were met in 1992 and 2015 surveys, with recorded high water temperatures being well below the state maximum.

Based on this survey, the trend in habitat conditions in Orange Creek, which is within the Dan's Creek Pasture, appears to not be improving but is static.

Thorn Creek

The four reaches surveyed in Thorn Creek met Forest Standards only for % unstable banks. Two out of the four reaches surveyed met the standard for shade. All reaches failed the standards for pools per mile and two out of the four reaches, failed to meet Forest Standards for wetted width to depth ratio, large wood per mile, and % fines. The 1992 survey had an average water temperature of 9.12°C in Thorn Creek, however, the 2015 survey recorded water temperatures between 8-21°C, with the 21°C exceeding state water quality standards for maximum water temperature. The lower two reaches still showed the effects of a fire that occurred in 2006. In addition, the upper reach, which is about 2.82 miles long, had 9 culverts, two of which were deemed potential barriers to juvenile salmonids.

Based on the 2015 survey results, and compared to the 1992 survey, the habitat condition trend in Thorn Creek, within the Martin Corrals Pasture, appears to be declining, as it continues to not meet many of the Forest Standards.

Duncan Creek

The three reaches surveyed in Duncan Creek met Forest Standards for % unstable banks and % fines, and two of the three reaches met the standard for shade. All reaches failed the standard for wetted width to depth ratio and pools per mile, while the standard for large wood per mile was not met in two out of the three reaches.

A 1992 survey measured a water temperature range similar to that found in 2015, of 9°C (48.2°F) to 13°C (55.4 °F) in Duncan Creek, meeting state water quality standards for maximum water temperature. However, the 2015 survey reported two of the reaches being impacted by recent fires that created unstable banks and higher amounts of silt and fine sediments, although the survey indicated otherwise. The survey also reported heavy use by elk and deer in the riparian area of the upper reach.

Based on the 2015 survey results, and compared to the 1992 survey, the habitat condition trend in Duncan Creek, within the Red Rocks Pasture, appears to be static, although it continues to not meet many of the Forest Standards, but may show improvement as conditions improve in the two reaches that were impacted by recent fires. A big unknown is the future impact of elk and deer on the riparian habitat along Duncan Creek.

Duncan Creek Tributary # 1

The survey showed that the reach surveyed in Duncan Creek Trib. # 1, met Forest Standards for % unstable banks and shade. However, it failed to meet the standards for wetted width to depth ratio, pools per mile, large wood per mile, and % fines. No water temperature information or past survey data was available. Based on this survey, the trend in habitat conditions in Duncan Creek Trib. # 1, which is within the Oregon Mine Pasture, appears to not be improving and is static.

Duncan Creek Tributary # 2

The reach surveyed in Duncan Creek Trib. # 1, met Forest Standards for % unstable banks and shade. However, the stream failed to meet Forest Standards for wetted width to depth ratio, pools per mile, large wood per mile and % fines. No water temperature information, or past survey data, was available. Based on this survey, the trend in habitat conditions in Duncan Creek Trib. # 2, which is within the Oregon Mine Pasture, appears to not be improving and is static.

Bark Cabin Creek

The four reaches surveyed in Bark Cabin Creek met Forest Standards for % unstable banks and shade. All reaches failed to meet the Forest Standards for wetted width to depth ratio (except one out of four reaches), pools per mile, large wood per mile, and % fines. A 1992 survey in Bark Cabin Creek measured water temperatures ranging from 10°C -13°C, similar to those measured in 2015 (9 °C to 14°C), and meeting state water quality standards for maximum water temperature. Based on this survey, the trend in habitat conditions Bark Cabin Creek, which is within the Blue Ridge Pasture, appears to not be improving and is static.

Corral Creek

The three reaches surveyed in Corral Creek met Forest Standards for % unstable banks and shade. All reaches failed to meet the Forest Standards for wetted width to depth ratio, pools per mile, large wood per mile, and % fines. Heavy trampling (livestock, horses or elk?) was observed in multiple places for lengths greater than 100 feet in reach 3. No water temperature information, or past survey data was, available.

Based on the 2015 survey results and reports of heavy trampling, in multiple places within the Deer Creek Pasture, the habitat condition trend in Corral Creek appears to be declining, as it continues to not meet many of the Forest Standards.

Alder Creek

The reach surveyed in Alder Creek met Forest Standards for wetted width to depth ratio, % unstable banks, and shade. However, the survey also reported that cattle heavily damaged banks making wetted width to depth ratio and % fine measurements, very difficult to conduct. All reaches failed to meet the Forest Standards for pools per mile, large wood per mile, and % fines. A 1995 survey reported an average water temperature of 52°F, similar to that found in 2015 (44.6 °F to 55.4°F) in Alder Creek, meeting state water quality standards for maximum water temperature. The survey also noted that the Rosgen Channel Type had changed from a reported B5 (V-shaped valley), 4% gradient in 1995, to a Type A (flat meadow) and 7% gradient in 2015.

Based on the 2015 survey results, reports of heavily damaged banks by cattle, and comparing these to the 1992 survey (Rogen Type B5 to A), the habitat condition trend in Alder Creek, within the Deer Creek Pasture, appears to be declining, as it continues to not meet many of the Forest Standards.

Blue Creek

The three reaches surveyed in Blue Creek met Forest Standards for % unstable banks and % fines, and two out of the three reaches met the standard for shade. All reaches failed meet Forest Standards for pools per mile, wetted width to depth ratio, and large wood per mile.

A 1995 survey reported an average water temperature of 57 °F in Blue Creek, while the 2015 survey recorded water temperatures between 9-19 °C (48.2-66.2°F), just under the state water quality standard for maximum water temperature.

Heavy impacts from cattle, and horse grazing, were reported in both the 1995 (throughout the three reaches) and 2015 (from wild horses) surveys, noting decreased shrub cover and undercut banks, particularly in the upper reach (Reach 3). This indicates that habitat conditions have not improved in 20 years in the Blue Ridge Pasture. The 2015 survey also reported that four fenced riparian areas in Reach 2 were collecting debris that was blocking gravel transport to downstream areas.

Based on the 2015 survey results, reports of heavy impacts from cattle and horse grazing, and comparing them to the 1995 survey, the habitat condition trend in Blue Creek, within the Blue Ridge and Frenchy Butte pastures, does not meet many of the Forest Standards, and continues to decline after 20 years.

Vester Creek

The three reaches surveyed in Vester Creek met Forest Standards for percent unstable banks in all reaches, and met the standard for shade, in two out of the three reaches surveyed. All reaches failed to meet Forest Standards for pools per mile, wetted width to depth ratio, large wood per mile, and % fines.

The 1995 survey measured an average water temperature of 59°F (15°C) in Vester Creek, while the 2015 survey recorded water temperatures between 6-9 °C, well under the state water quality standard for maximum water temperature. The 2015 survey stated that Vester Creek's "sedimentation was a potential concern with inadequate riparian ground cover and poor bank stability." The survey reported that the stream had changed from V-shaped to U-shaped valley. The Rosgen classification changed from A5 to G5. The 2015 crew also classified the stream as Rosgen Class A to B. [There is some confusion here about the context of

the Rosgen channel types presented in the stream survey narrative]. The survey also reported that there were "heavy signs of trampling, as well as horse sign" in the uppermost reach.

Based on the 2015 survey results, reports of heavy impacts from cattle and horse grazing, compared them to the 1995 survey, and the change from a V-shaped to U-shaped valley between 1995 and 2015, the habitat condition trend in Vester Creek, within the Frenchy Butte Pasture, does not meet many of the Forest Standards, and appears to be declining over the 20-year period.

Buck Creek

The two reaches surveyed in Buck Creek met Forest Standards for percent unstable banks and shade, but failed the standards for wetted width to depth ratio, pools per mile, large wood per mile, and % fines.

The 1995 survey measured an average water temperature of 55°F (12.51°C) in Vester Creek, while the 2015 survey recorded water temperatures between 5-8 °C, well under the state water quality standard for maximum water temperature.

The 2015 survey listed Buck Creek concerns for sedimentation, low riparian ground cover and poor bank stability and noted that Buck Creek had changed from a B5 (U-shaped valley) to A4 (V-shaped valley) between 1995 and 2015.

Based on the 2015 survey results, concerns for sedimentation, low riparian ground cover and poor bank stability, and the reported changes (although there is some confusion in the survey narrative) from a B5 (U-shaped valley) to A4 (V-shaped valley) between 1995 and 2015, the habitat condition trend in Buck Creek, within the Frenchy Butte Pasture, does not meet many of the Forest Standards, and appears to be declining over a 20 year period

Table 18 on the next page shows the stream surveyed from 1993 to 2015 and compares attributes measured (pool frequency, large woody debris/mile, fine sediment/embeddedness, width to depth ratio, percent bank stability and percent shade) compared with PACFISH RMOs, Forest Plan Amendment 29, and NMFS MPI standards.

Table 18. Stream Surveys for the Murderers Creek Allotment. Attributes measured compared with RMOs, Amendment 29 and NMFS MPI standards. Key below table

Stream name	Survey year	Pool frequency (pools/mi)	Large woody debris (pieces/mile)	Fine sediment/ embeddedness -No R.M.O. standard	Width-to-depth (W:D) ratio	Bank stability %	Shade % (with solar pathfinder, Ave July/Aug) -No R.M.O. standard -No NMFS standard
Alder Creek R1	2015	2.44 (NPF)	2.44 (NPF)	100% <2mm (NPF)	19.5897 (NPF)	**100 (PF)**	**66.5**
Bark Cabin Cr. R1	2015	8.47 (NPF)	30.5 (PF)	74.96% <2mm (NPF)	12.7012 (NPF)	**99.01 (PF)**	**88.2**
Bark Cabin Cr. R2	2015	11.48 (NPF)	8.2 (NPF)	60.41% <2mm (NPF)	11.8812 (AR)	**95.78 (PF)**	**62.25**
Bark Cabin Cr. R3	2015	6.9 (NPF)	6.9 (NPF)	78.00% <2mm (NPF)	21.2553 (NPF)	**98.54 (PF)**	**92.5**
Bark Cabin Cr. R4	2015	-	4.4 (NPF)	74.11% <2mm (NPF)	14.958 (NPF)	**97.68 (PF)**	**80**
Beaverdam Cr - R1	2009	34.04 (NPF)	2.12 (NPF)	60.00% <2mm (NPF)	**3.5463 (PF)**	**100 (PF)**	
Beaverdam Cr - R2	2009	12.14 (NPF)	10.71 (NPF)	88.15% <2mm (NPF)	**7.0833 (PF)**	**100 (PF)**	
Beaverdam Cr - R1	2019	26.7 (NPF)	5.82 (NPF)	69.4% <2mm (NPF)	**3.59 (PF)**	**100 (PF)**	38.1
Blue Cr. R1	2015	46.51 (NPF)	0 (NPF)	**2.39% <2mm (PF)**	**4.5866 (PF)**	**98.14 (PF)**	**62.5**
Blue Cr. R2	2015	12.77 (NPF)	0 (NPF)	**4.21% <2mm (PF)**	**7.9147 (PF)**	**99.07 (PF)**	**42.25**
Blue Cr. R3	2015	2.25 (NPF)	8.99 (NPF)	**2.82% <2mm (PF)**	**8.3832 (PF)**	**98.3 (PF)**	**59**
Buck Cr. R1	2015	4.41 (NPF)	5.28 (NPF)	68.7% <2mm (NPF)	14.1473 (NPF)	**98.34 (PF)**	**63.5**
Buck Cr. R2	2015		15.54 (NPF)	90.20% <2mm (NPF)	19.2128 (NPF)	**99.65 (PF)**	**83.5**
Corral Cr. R1	2015	4.39 (NPF)	18.05 (NPF)	37% <2mm (NPF)	14.4691 (NPF)	**96.07 (PF)**	**67**
Corral Cr. R2	2015	2.86 (NPF)	11.42 (NPF)	100% <2mm (NPF)	10.6024 (AR)	**99.4 (PF)**	**81.5**
Corral Cr. R3	2015	14.07 (NPF)	14.81 (NPF)	57.31% <2mm (NPF)	11.261 (AR)	**95.54 (PF)**	**90**
Crazy Creek - R1	2009	**75 (PF)**	8.59 (NPF)	27.95% <2mm (NPF)	13.6098 (NPF)	**99.25 (PF)**	
Cazy Creek - R1	2019	72 (NPF)	13.82 (NPF)	6.4% <2mm (PF)	**8.8 (PF)**	**98.86 (PF)**	**69.2**

Stream name	Survey year	Pool frequency (pools/mi)	Large woody debris (pieces/mile)	Fine sediment/ embeddedness -No R.M.O. standard	Width-to-depth (W:D) ratio	Bank stability %	Shade % (with solar pathfinder, Ave July/Aug) -No R.M.O. standard -No NMFS standard
Cazy Creek - R2	2019	20.5 (NPF)	20.54 (NPF)	9.8% <2mm (PF)	**7.4 (PF)**	**98.7 (PF)**	**70.6**
Dans CK. Reach 1	2015	14.36 (NPF)	10.26 (NPF)	63.97% <2mm (NPF)	13.4749 (NPF)	**99.76 (PF)**	**67.92**
Dans Creek Reach 2	2015	3.2 (NPF)	1.6 (NPF)	91.87% <2mm (NPF)	15.671 (NPF)	**100 (PF)**	**76**
Dead Injun Creek Reach 1	1993	52.54 (NPF)	72.88 (PF)	-	**6.0093 (PF)**	**100 (PF)**	**-**
Dead Injun Creek Reach 1	2018	5.76 (NPF)	9.5 (NPF)	62.45% <2mm (NPF)	**5.85 (PF)**	63.07 (NPF)	**71.11**
Deer Creek Reach 1	2007	15.22 (NPF)	1.63 (NPF)	**5.08% <2mm (PF)**	15.2223 (NPF)	**97.62 (PF)**	**57**
Deer Creek Reach 2	2007	25.95 (NPF)	2.53 (NPF)	**4.78% <2mm (PF)**	15.9993 (NPF)	**98.07 (PF)**	**51**
Deer Creek Reach 3	2007	31.69 (NPF)	2.06 (NPF)	**2.33% <2mm (PF)**	13.3771 (NPF)	**97.78 (PF)**	**47**
Deer Creek Reach 2	2018	45.66 (NPF)	10.9 (NPF)	41% <2mm (NPF)	20.18 (NPF)	**96.84 (PF)**	**67.47**
Deer Creek Reach 3	2018	22.92 (NPF)	18.61 (NPF)	36.95% <2mm (NPF)	21.52 (NPF)	86.65 (NPF)	**77.71**
Deer Creek Reach 4	2018	22.74 (NPF)	12.37 (NPF)	70.5% <2mm (NPF)	21.11 (NPF)	56.44 (NPF)	63.915
Deer Creek Reach 4	2007	32.08 (NPF)	3.07 (NPF)	**0% <2mm (PF)**	18.1552 (NPF)	**99.595 (PF)**	**40**
Deer Creek Reach 5	2007	26.28 (NPF)	3.41 (NPF)	**6.82% <2mm (PF)**	12.7424 (NPF)	**97.19 (PF)**	**44**
Dewey Creek Reach 1	1995	13.04 (NPF)	26.09 (PF)	-	**8.7564 (PF)**	-	**-**
Dewey Creek Reach 1	2019	44.14 (NPF)	22.07 (NPF)	76.25% <2mm (NPF)	**4.93 (PF)**	**97.62 (PF)**	**64.47**
Duncan Cr. R2	2015	17.07 (NPF)	12.19 (NPF)	**14.92% <2mm (AR)**	13.4809 (NPF)	**98.08 (PF)**	**62.92**
Duncan Cr. R3	2015	5.51 (NPF)	23.53 (PF)	**15.69% <2mm (AR)**	10.696 (AR)	**99.07 (PF)**	**70.63**
Duncan Cr. Trib 2 R1	2015	14.29 (NPF)	20.63 (PF)	34.48% <2mm (NPF)	10.1354 (AR)	**99.95 (PF)**	**85.25**
Duncan Trib 1 R1	2015	29.09 (NPF)	14.55 (NPF)	45.44% <2mm (NPF)	**9.3007 (PF)**	**99.97 (PF)**	**96.5**
Murderer's Cr. R2	2015	22.95 (NPF)	18.03 (NPF)	29.46% <2mm (NPF)	31.6563 (NPF)	**99.3 (PF)**	**56.5**

Stream name	Survey year	Pool frequency (pools/mi)	Large woody debris (pieces/mile)	Fine sediment/ embeddedness -No R.M.O. standard	Width-to-depth (W:D) ratio	Bank stability %	Shade % (with solar pathfinder, Ave July/Aug) -No R.M.O. standard -No NMFS standard
Murderer's Cr. R4	2015	**39.51 (PF)**	14.2 (NPF)	33.13% <2mm (NPF)	32.5673 (NPF)	**98.76 (PF)**	**61**
Murderer's Cr. R5	2015	**40 (PF)**	6 (NPF)	43.66% <2mm (NPF)	35.4068 (NPF)	**99.41 (PF)**	**50.5**
Murderer's Cr. R6	2015	25 (NPF)	10.94 (NPF)	25.05% <2mm (NPF)	33.3413 (NPF)	**99.16 (PF)**	-
Murderer's Cr. R8	2015	18.32 (NPF)	3.05 (NPF)	59.86% <2mm (NPF)	17.6035 (NPF)	**97.75 (PF)**	36
Murderer's Cr. R9[1]	2015	14.08 (NPF)	11.27 (NPF)	36.04% <2mm (NPF)	18.8914 (NPF)	**98.79 (PF)**	**60**
North Fork Deer Creek Reach 2	2007	8.25 (NPF)	9.28 (NPF)	81.37% <2mm (NPF)	**9.1068 (PF)**	**100 (PF)**	**68**
North Fork Deer Creek Reach 1	2007	18.13 (NPF)	0.63 (NPF)	52.18% <2mm (NPF)	**9.3746 (PF)**	**99.605 (PF)**	**43**
North Fork Deer Creek Reach 3	2007	-	0 (NPF)	**0% <2mm (PF)**	-	**100 (PF)**	24
North Fork Deer Creek Reach 2	2019	**129 (PF)**	7 (NPF)	50.8% <2mm (NPF)	**8.18 (PF)**	**97.89 (PF)**	**67.14**
North Fork Deer Creek Reach 1	2019	**93 (PF)**	2 (NPF)	49.6% <2mm (NPF)	**6.17 (PF)**	**99.74 (PF)**	**75.21**
North Fork Deer Creek Reach 3	2019	56 (NPF)	4 (NPF)	65.8% <2mm (NPF)	**3.92 (PF)**	**100 (PF)**	41.40
Orange CR. Reach 1	2015	36.51 (NPF)	12.7 (NPF)	35% <2mm (NPF)	**5.0188 (PF)**	**100 (PF)**	**85.5**
Orange CR. Reach 2	2015	5.26 (NPF)	10.53 (NPF)	94% <2mm (NPF)	**6.5385 (PF)**	**100 (PF)**	**80.5**
Oregon Mine Cr. R1	2015	26.92 (NPF)	1.92 (NPF)	48.11% <2mm (NPF)	11.5227 (AR)	**100 (PF)**	**53.42**
SF Murderers Cr - R2	2009	22.03 (NPF)	1.69 (NPF)	28.17% <2mm (NPF)	20 (NPF)	**98.87 (PF)**	-
SF Murderers Cr - R3	2009	59.78 (NPF)	4.35 (NPF)	**15.48% <2mm (AR)**	10.1368 (AR)	**100 (PF)**	-
SF Murderers Cr - R4	2009	**103.39 (PF)**	22.03 (PF)	39.86% <2mm (NPF)	10.3514 (AR)	**98.07 (PF)**	-
SF Murderers Cr - R5	2009	39.01 (NPF)	3.55 (NPF)	50.45% <2mm (NPF)	10.7803 (AR)	**95.94 (PF)**	-
SF Murderers Cr - R6	2009	9.72 (NPF)	2.77 (NPF)	100% <2mm (NPF)	**6.7425 (PF)**	**97.7 (PF)**	-
SF Murderers Cr - R7	2009	6.83 (NPF)	1.95 (NPF)	58.36% <2mm (NPF)	15.5926 (NPF)	**98.69 (PF)**	-

Stream name	Survey year	Pool frequency (pools/mi)	Large woody debris (pieces/mile)	Fine sediment/ embeddedness -No R.M.O. standard	Width-to-depth (W:D) ratio	Bank stability %	Shade % (with solar pathfinder, Ave July/Aug) -No R.M.O. standard -No NMFS standard
SF Murderers Cr - R8	2009	1.74 (NPF)	1.74 (NPF)	82.76% <2mm (NPF)	**7.5 (PF)**	**100 (PF)**	-
SF Murderers Cr - R9	2009	1.22 (NPF)	-	100% <2mm (NPF)	**6.3312 (PF)**	**97.69 (PF)**	-
SF Murderers Cr - R2	2019	55.92 (NPF)	7.24 (NPF)	**7.3 <2mm (PF)**	**7.52 (PF)**	**98.99 (PF)**	33.15
SF Murderers Cr - R3	2019	**83.81** (NPF)	9.36 (NPF)	42.1% <2mm (NPF)	**5.7 (PF)**	**98.68 (PF)**	32.89
SF Murderers Cr - R5	2019	25 (NPF)	2.55 (NPF)	51.45% <2mm (NPF)	**5.59 (PF)**	**98.21 (PF)**	38.45
SF Murderers Cr - R7	2019	20 (NPF)	0.54 (NPF)	**10 <2mm (PF)**	**2.51 (PF)**	**99.95 (PF)**	**61.70**
South Fork Deer Creek Reach 1	2007	8.7 (NPF)	3.38 (NPF)	59.52% <2mm (NPF)	11.2119 (AR)	**100 (PF)**	**49**
South Fork Deer Creek Reach 2	2007	0.74 (NPF)	8.15 (NPF)	70.39% <2mm (NPF)	-	**100 (PF)**	**-**
South Fork Deer Creek Reach 1	2019	67.5 (NPF)	8.75 (NPF)	49% <2mm (NPF)	**5.92 (PF)**	**91.6 (PF)**	41
South Fork Deer Creek Reach 2	2019	45.8 (NPF)	20.32 (NPF)	57% <2mm (NPF)	**7.8 (PF)**	**97.4 (PF)**	40
Tennessee Cr R2	2015	23.66 (NPF)	10.75 (NPF)	**10.89% <2mm (PF)**	10.91 (AR)	**99.37 (PF)**	**76.17**
Tennessee Cr. R1	2015	55.17 (NPF)	**20.69 (PF)**	**12.14% <2mm (AR)**	**7.0437 (PF)**	**100 (PF)**	**83.88**
Tex CK. R2[1]	2015	54.86 (NPF)	4.86 (NPF)	**9.95% <2mm (PF)**	24.8176 (NPF)	**99.49 (PF)**	**57.55**
Thorn Cr. R2	2015	29.3 (NPF)	5.5 (NPF)	61.74% <2mm (NPF)	19.1517 (NPF)	**97.7 (PF)**	**28.5**
Thorn Cr. R3	2015	21.51 (NPF)	1.8 (NPF)	**9.64% <2mm (PF)**	20.1303 (NPF)	**97.63 (PF)**	**63.7**
Thorn Cr. R4	2015	14.08 (NPF)	2.16 (NPF)	39.33% <2mm (NPF)	15.1919 (NPF)	**100 (PF)**	**91.1**
Vester Crk. R1	2015	3.57 (NPF)	20 (PF)	48.61% <2mm (NPF)	**7.6108 (PF)**	**100 (PF)**	**93**
Vester Crk. R2	2015	11.27 (NPF)	18.31 (NPF)	**0.0% <2mm (PF)**	**7.5864 (PF)**	**99.87 (PF)**	**55.75**
Vester Crk. R4	2015	-	-	**0.0% <2mm (PF)**	-	**100 (PF)**	23.5

Table 19. Degree to Which Stream Inventory Data Meets Numeric Standards or Classifications Described In RMOs, Amendment 29 or the NMFS MPI. Refer to Table 7

RMOs (Riparian Management Objectives from PACFISH – see PACFISH/INFISH Riparian Management Objectives section)	<u>Underline</u> indicates standards met		
Amendment 29 (From the MNF LRMP as amended see LRMP Amendment 29 Desired Future Conditions)	**Bold** indicates standards met		
NMFS MPI (See Aldrich Allotment Section)	PF: Properly Functioning	AR: At Risk	NPF: Not properly Functioning

See Appendix D for stream surveys completed in this allotment. Water Temperature Monitoring

Water Temperature Monitoring

Within the allotment there are 16 stream temperature monitoring sites located on six streams in the Murderers Creek allotment (Appendix A). PIBO 2016 summary of water temperature data sets vary from single years to multiple years in the time frame from 2003 to 2013. PIBO stream temperature attributes include various parameters like average temperature between July 15th-August 31st , maximum daily, maximum weekly, etc., but do not include enough data to graph showing full average 7 day maximums. The only streams in the Murderers Creek Allotment that had water temperatures included in the PIBO 2016 summary are Thorn Creek and Murderers Creek for 2003, 2008 and 2013.

The 2015 R-6 Level II stream surveys collected water temperatures for 13 out of 16 streams.

A data logger was placed in Murderers Creek in Reach 4 (Oregon Mine Pasture), located just upstream from the private land (near Stewart Cabin?). This data log shows stream temperature data only at 30 minute intervals collected from 1995 to 2010 (excluding 1998, 2006, 2008). This data is available from the MNF from Ryan Monzulla.

Currently there are three streams, and three stream segments, listed by ODEQ as 303(d), Category 5, Water Quality Limited streams in the Murderers Creek Allotment (EPA addition to 303(d) list September 14, 2012). These include:

- Murderers Creek (RM 0-24.7) for Sedimentation
- North Fork Deer Creek (0-4.2) for Biological Criteria
- South Fork John Day River (0-57.3) for Biological Criteria.

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

Allotment Photos

Figure 8. South Fork Murderers Creek PIBO site 156-05-1 from 2013 (left) to 2018 (right). Apparent upward trend in deep rooted riparian vegetation can be seen in the PIBO photos at this site.

Figure 9 Murderers Creek Allotment: South Fork Deer Creek, Watershed Exclosure, facing upstream. 9/15/2021. Excess use in this exclosure in 2021 resulted in 23% bank alteration, 10" stubble height, and 10% woody browse on the greenline. Photos taken after livestock were removed from the exclosure.

Fields Peak Allotment

The Fields Peak allotment is located within the Upper John Day River (HUC 17070201) subbasin. The pastures comprising the Fields Peak allotment lie within the Murderers Creek (HUC 1707020103), Fields Creek-John Day River (HUC 1707020109) and a small portion of the Laycock Creek-John Day River (HUC 1707020103) watersheds. This allotment is located mostly within T 14 and 15 S and R 28, 29, and 30 E. The allotment includes approximately 30,818 acres. Approximately 272 acres of private land are intermingled with NFS lands. The private lands are unfenced and management of these lands has not been waived to the Forest Service. Elevations within the allotment range from approximately 3,200 to 7,300.

In the previous consultation, this allotment contained two additional gather pastures. In 2020, Murderers Creek Gather Pasture and Tex Creek Gather Pasture, which were originally part of Fields Peak Allotment, were administratively moved into the Murderers Creek Allotment. This allotment is now divided into five larger pastures (Tex Creek, Murderers Creek, North Murderers Creek, Fields Peak, Miners pastures), and four exclosures (Tex Creek Livestock exclosure, Tex Creek Wildlife exclosure, Murderers Creek Guard Station, and Lemon exclosure (newly built in 2016).

The Tex Creek Wildlife exclosure was built approximately 20 years ago. It is 1.2 acres and contains 330 ft of CH and MSRA on Tex Creek. This is an exclosure and has not been grazed by cattle since it was built and will not be grazed by cattle for the next five years.

The Tex Creek Livestock exclosure was also built approximately 20 years ago. It is 3.6 acres and contains 1,000 ft of CH and 300 ft of MSRA on Tex Creek. The exclosure is divided into two sections by a road that is used as a water gap for Tex Creek. The exclosure has not been grazed by cattle since it was built and will not be grazed by cattle for the next five years.

The Lemon exclosure was built in 2016. It is approximately 14 acres and contains all of the CH on Lemon Creek: 0.9 miles. This pasture was built to exclude cattle from the stream and will not be grazed for the next five years.

The Murderers Creek Guard Station is within this allotment. The Guard Station is fenced into a 10 acre pasture with 0.15 miles of CH and 0.15 miles of MSRA. Livestock have been and will continue to be excluded from this area.

The Tex Creek Riparian, Murderers Creek Riparian, Lemon Creek Riparian, and Miners Creek Riparian pastures were created in 2016. Specific grazing management for the allotment over the past five years is displayed in table 20 below.

The Field’s Peak allotment contains 21.61 miles of MCR steelhead CH and 7.62 miles MSRA. MSRA is designated in Miner’s Creek, Tex Creek, and Murderer’s Creek pastures.

Table 20. Field's Peak Allotment Pasture Information 2017-2021.

*150 feet water gap is only CH in pasture.

Pasture and Authorized Number	Total Acres	Proposed season of use 2017	Actual Use Dates 2017	Proposed season of use 2018	Actual Use Dates 2018	Proposed season of use 2019	Actual Use Dates 2019	Proposed season of Use 2020	Actual Use Dates 2020	Proposed season of Use 2021	Actual Use Dates 2021	DMA (Y/N)
Fields Peak (197c/c)	12,079	7/5-9/2	7/21-10/15 9/4-10/1	6/15-8/08	6/15-8/8	8/17-10/01	8/02-10/01	5/15-9/15	5/15-10/1 9/18-10/5	5/25-8/15 6/15-7/15 7/15-8/3	5/15-8/13 6/15-7/25 7/15-8/3	Y
Miner's Creek (197c/c)	6,151	9/3-9/25	Rested	8/08-9/02	8/08-9/02	9/16/20-10/10/20	9/20/-10/5	9/16-10/10	9/20-10/5	8/3-10/15	9/27-10/14 8/15-10/14	Y
Tex Creek (197c/c)	3,316	6/15-7/4	6/15-7/21 10/1-10/15	9/02-9/25	9/02-9/25	8/02-8/16 10/02-10/15	10/02-10/13	8/2-8/15 9/16-10/10	8/21-9/17 10/5-10/13	7/15-8/15 8/3-10/15	7/25-9/1 8/15-10/14	Y
North Murderer's Creek (40c/c, 2 Horses)	5,231	7/1-8/30	Rested	6/15-7/30	7/03-7/24	6/15-7/01	7/03-8/29	7/01-7/15	Rested*	7/15-9/15	7/15-9/15	Y
Murderer's Creek (197c/c)	3,609	10/1-10/15	Rested	9/26-10/15	Rested	6/15-8/01	6/21-8/01	6/15-8/01	6/15-8/17	10/1-10/15	9/25-10/13	Y
Tex Creek Gather**	58	7/1-7/15 9/12-9/26 10/1-10/15	10/2-10/6 10/9-10/13	6/1-6/16 9/11-9/25 10/1-10/15	6/1-6/15 9/26-10/11	Gather	6/7-6/21 9/26-10/11	Gather	10/13-10/14	N/A	N/A	N
Murderers Creek Gather**		10/1-10/15	10/7 10/14	N/A	N/A	Gather	8/22 10/13-10/15	10/11-10/15	8/17-8/20 10/14-10/15	N/A	N/A	Y

*Excess use documented within scheduled Rested pastures during the season.

** Tex Creek gather, and Murderers Creek gather were added to Murderers Creek Allotment in 2020.

PIBO Effectiveness Monitoring Data Summary for the Fields Peak Allotment

The following provides a summary of data collected by the PIBO Effectiveness Monitoring Program (EMP) for stream and reach monitoring locations within the Fields Peak allotment (Table 21). There are three PIBO K sites, and one I site (map I Appendix A) within the allotment. Monitoring occurred at two K sites (Fields Creek and Murderers Creek) and the Fields Creek I site, up to four times, between 2003 and 2013.

PIBO DMA (K) Site Results

Of the three PIBO K sites, two sites (Upper Murderers Creek in Murderers Riparian pasture, and Murderers Creek in North Murderers pasture) had very low total index scores. The third site, Field Peak, had a moderate score of 56.3.

Upper Murderers Creek and Murderers Creek had significantly high levels of fine sediments (% fines for <6mm) that exceeded PIBO reference and managed mean values. All K sites had near 100% bank stability ratings. Bankfull w/d ratios were below the reference and managed mean values for all three K sites.

For pool indicators, only the Murderers Creek site was above the reference and mean values for percent pools. All three K sites were at or above the reference and mean for residual pool depths.

None of the three sites were at or below the reference bank angle mean value. This indicates less desirable laid-back banks. The Upper Murderers Creek and Murderers Creek sites met, or exceeded, the PIBO managed mean values for undercut banks, and while Fields Creek failed to meet them in all three sample years.

Overall, data shows that trends for many attributes were relatively static, with more improvement at Fields Creek.

Integrator (I) Site Results

The Fields Creek I site had moderate total index scores (60-43), with an improvement since 2013.

The Fields Creek I site had a fine sediment (% fines for <6mm) level in 2003 that exceeded PIBO reference and managed mean values, improved over time, and by 2018 was below the PIBO reference and managed mean values .

Bankfull width-to-depth ratio improved each year from 2003 to 2008 to 2013 on Fields Creek, and in 2018 was slighter higher, but was still below the reference mean value.

The % pools value for the Fields Creek I site was below PIBO reference and managed mean values in all years, although has improved over time. Bank stability ratings for this I site consistently exceeded PIBO reference and managed mean values, in 2018 bank stability had improved to 100%. . Each year the Fields Creek I site was approximately at the PIBO reference mean values for residual pool depth, but decreased in 2018 so that it was no longer at the reference mean.

This I site had lower percent undercut banks than the PIBO reference mean values, and showed a continued decrease (not in the desirable direction) from 2003 to 2013, but improved from 2013 to 2018. The Fields Creek I site was above the PIBO reference and managed mean value for bank angle each year, indicating not meeting a desired condition.

The information from the Fields Creek K and I sites indicate improving channel morphology with decreasing width to depth ratios, but the state or increasing bank angle and decreasing vegetative bank stability (and

static or decreasing overall bank stability) indicate some processes at work that are not moving in the desired direction for overall condition. The increasing total index score at the I site since 2013 is an indicator of conditions are again moving in the desired direction. Percent fines, however, did decrease at both sites withmore than one year of data. The greenline wetland rating and the greenline woody cover rating were relatively unchanging over the three sample years on Fields Creek. Trends on the two Murderers Creek sites are harder to identify given the few overall data points.

Table 21. PIBO Monitoring Results 2003-2013 for I and K sites within the Fields Peak Allotment

*Stream and Site Type	Pasture	Year	Total Index	Bankfull W/D	Mean Particle Size (D50) (mm)	Pool (%)	Res. Pool depth (m)	%Fines <2mm (%)	%Fines <6mm (%)	Bank Stab. (%)	Veg Stab (%)	Bank Angle (°)	Under-cut Banks (%)	GL Wet Rat	GL Woody CV
Fields Creek K (156-03)	Fields Peak	2003	-	-	-	-	-	-	-	97.5	85	125	5.3	51	96
		2008	-	21	-	20.2	0.3	-	-	97.2	81	130	8.3	62	78
		2013	56.3	14	38.5	38.9	0.3	15.7	17.9	97.4	63	125	19.4	57	96
Fields Creek I (156-03)	Fields Peak	2003	57.2	30	52	33.2	0.3	23.6	31.5	95.2	76	111	29	42	98
		2008	60.5	23	32	32.1	0.3	6.2	13.2	94.7	58	118	26.3	30	74
		2013	43.1	17	39.5	33.4	0.3	17.6	18.9	87.5	55	128	20.5	40	91
		2018	50.8	21	61	37.4	0.2	10.2	16.0	100	56	122	22.2	--	--
Upper Murderers Creek K (528-08)	Murderers Riparian	2013	0	10	2	35.4	0.3	79.7	76.2	97.6	93	105	33.3	74	20
		2018	0	10.3	2	27.1	0.2	66.4	75.9	100	95	115	27.3	--	--
Murderers Creek K (156-06)	North Murderers Creek	2003	-	-	-	-	-	-	-	95	90	112	32.5	81	9
		2008	-	18	-	49.4	0.5	-	-	85.4	76	103	34.2	71	8
		2013	11	10	80	60.3	0.3	43.5	56.2	100	98	115	31.8	87	3
**PIBO Managed Mean		-	-	23.9	43	40.9	0.26	-	26.7	74.6		108	26.4	-	-
PIBO Reference Mean		-	-	22.6	58	43.3	0.31	-	18	79.9		99.3	32.7	-	-
RMSE		-	-	4	13.8	12.9	0.027	-	4.9			6.5		-	-
FLMP standard		-	-	-	-	-	-	<20	<20	>90		75 < 90	50-75%	-	-

***Stream** is the stream name. **Site ID** is the PIBO site identification number. **Site Type** is the PIBO sample type where I = instream habitat, S= annual sentinel sites, P=Prairie Sites, K=Designated monitoring Area. R is a random site with no plans for repeat observation. **Year** is year of last sampling. **Total Index** is the index of physical habitat where numeric score 0 (worst) - 100 (best) that ranks the habitat integrity of a reach [Index score calculated by summing values of 6 metrics (residual pool depth, % pools, D50, % pool tail fines <6mm, large wood frequency, average bank angle) and scaling 0 - 100. Index was developed using data from reference reaches as a basis of comparison to managed sites. There is some

uncertainty about scores denoted with *, because they have landscape information outside of the range used to develop the index]. **Bankfull W/D** is the bankfull width-to-depth ratio. **Mean Part. Size (D50)** is the diameter of the mean 50th percentile streambed particle. **Pool %** is the percent of pools within the reach. **Res. Pool depth** is the average of the residual depth of pools in the sample reach. **%Fines <2mm** is the percent of pool tail fines less than 2mm. **%Fines <6mm** is the percent of pool tail fines less than 6mm. **Bank stab** is percent of stable banks over the sample reach, **.Veg Stab** is the number of covered stable and false bank measurements **Bank angle** is the average of bank angles across the sample reach. **Undercut** is the percent of angles < 90 degrees. **GL Wet Rat** is the greenline wetland rating where 1=upland, 25= facultative upland, 50=facultative, 75=facultative wet, 100=obligate wetland). **GL Woody CV** is the greenline woody cover (the sum of the relative cover of woody species out of 200% due to shrub canopy). *RSME = Root Mean Square Error. Useful in quantifying site-specific estimates of temporal variability – typically used with multiple linear regression. The RMSE is the square root of the variance of the residuals. It indicates the absolute fit of the model to the data–how close the observed data points are to the model's predicted values.*

Multiple Indicator Monitoring (MIM) Short-Term Fields Peak Allotment

Short-term MIM data has been collected in the Fields Peak Allotment over the course of the last consultation period. This data is summarized in the 2021 EOY Report on page 66 (Appendix F). Standards have not been exceeded over the course of the last consultation period.

Spawning Surveys

Under the 2018 Biological Opinion, all critical habitat within each pasture was surveyed or was surveyed to the upper extent of suitable spawning habitat (presence of gravels/cobbles, access). Protection has been successfully implemented and documented when redds have been encountered. The table below provides a summary of redds found per year within each pasture. Photos and site specific data taken during the surveys are on file and available upon request

Table 22. 2018-2022 MCR steelhead spawning surveys for the Fields Peak Allotment. In 2019 and 2022, surveys were not required because pastures were not grazed prior to July 1st.

Pasture	Stream	# Redds Observed 2018	# Redds Observed 2019	# Redds Observed 2020	# Redds Observed 2021	# Redds Observed 2022
Fields Peak	Fields Creek	2	No Survey	3	6	No Survey
Fields Peak	Buck Cabin Creek	0	No Survey	1	2	No Survey
Fields Peak	Wickiup Creek	0	No Survey	0	0	No Survey
Fields Peak	Murderers Creek Gather	0	0	No Survey	No Survey	0

Region 6 Level II Stream Surveys

In 2018 and 2019, six surveys were completed in the Fields allotment following the R6 Level II Aquatic Inventory (stream survey) protocol which are summarized in Table 23 by sub-watershed and pasture location. See Appendix D for stream survey reports and Table 25 for survey data from 1992-2019.

Table 23. 2018-2019 R-6 Level II Stream Surveys in Fields Creek Allotment

12 Digit HUC Subwatershed	Survey Start Date	Stream	Miles Surveyed*	Pasture
Headwaters Murderers Cr.	7/18/2018	Basin Creek	1.434	North Murderers Cr.
	8/27/2018	Charlie Mack Cr.	1.914	
	7/17/2018	White Creek	0.961	
	7/8/2019	Miner Creek	1.913	Miners Cr.
	7/19/2018	Sugar Creek	3.056	
South Fork Murderers Cr.	8/28/2018	Lemon Creek	2.298	Lemon Cr. Exclosure Murderers Cr.

Table 24. Level 2 Stream Survey Data for Fields Peak Allotment, Attributes measured compared to RMOs, Amendment 29 and NMFS MPI. Key below table.

Stream name	Survey year	Pool frequency (pools/mi)	Large woody debris (pieces/mile)	Fine sediment/ embeddedness -No R.M.O. standard	Width-to-depth (W:D) ratio	Bank stability %	Shade % (with solar pathfinder, Ave July/August) -No R.M.O. or NMFS standard
Basin Creek Reach 1	1992	42.86 (NPF)	**607.74 (PF)**	-	**7.7678 (PF)**	**99.9 (PF)**	**-**
Basin Creek Reach 1	2018	4.9 (NPF)	23.07 (NPF)	100% <2mm (NPF)	**4.55 (PF)**	**99.34 (PF)**	49.84
Charlie Mack Creek Reach 1	2018	(dry)	20 (NPF)	65.3% <2mm (NPF)	(dry)	**99.22 (PF)**	**94.5**
Fields Creek Reach 1	1992	**85.42 (PF)**	**75 (PF)**	-	14.6424 (NPF)	-	**-**
Fields Creek Reach 2	1992	**78.82 (PF)**	**83.53 (PF)**	-	13.759 (NPF)	**99.9 (PF)**	**-**
Fields Creek Reach 3	1992	**94.96 (PF)**	**76.47 (PF)**	-	10.4805 (AR)	-	**-**
Fields Creek Reach 4	1992	**89.66 (PF)**	**94.83 (PF)**	-	11.2978 (AR)	**99.9 (PF)**	**-**
Fields Creek Reach 5	1992	**165.31 (PF)**	**142.86 (PF)**	-	**8.1424 (PF)**	-	**-**
Fields Creek Reach 6	1992	**110.19 (PF)**	**156.48 (PF)**	-	**7.4321 (PF)**	-	**-**
Fields Creek Reach 7	1992	**100 (PF)**	**96.23 (PF)**	-	**6.316 (PF)**	-	**-**
Lemon Creek Reach 1	1992	60.54 (NPF)	**104.08 (PF)**	-	**8.0963 (PF)**	**99.9 (PF)**	**-**
Lemon Creek Reach 1	2018	35.65 (NPF)	14.35 (NPF)	84.8% <2mm (NPF)	**8.73 (PF)**	99 **(PF)**	78.58
Miner Creek Reach 1	1995	17.37 (NPF)	**57.89 (PF)**	-	10.6365 (AR)	-	**-**
Miner Creek Reach 1	2019	**85 (PF)**	41 (NPF)	47.2% (NPF)	10.12 (NPF)	89.88 (NPF)	82
Miner Creek Reach 2	2019	14 (NPF)	14 (NPF)	33.1% (NPF)	**9.41 (PF)**	**90.59 (PF)**	80.5
Murderer's Cr. R9[1]	2015	14.08 (NPF)	11.27 (NPF)	36.04% <2mm (NPF)	18.8914 (NPF)	**98.79 (PF)**	**60**
Murderer's Cr. R10	2015	10.53 (NPF)	14.03 (NPF)	-	-	**97.97 (PF)**	9.5
Murderer's Cr. R11	2015	10.11 (NPF)	12.92 (NPF)	-	-	**96.48 (PF)**	29.5
Murderer's Cr. R12	2015	9.33 (NPF)	15.11 (NPF)	-	-	**98.66 (PF)**	46
Murderer's Cr. R13	2015	11.32 (NPF)	15.1 (NPF)	68.89% <2mm (NPF)	13.8 (NPF)	**99.4 (PF)**	**42.5**

Stream name	Survey year	Pool frequency (pools/mi)	Large woody debris (pieces/mile)	Fine sediment/ embeddedness -No R.M.O. standard	Width-to-depth (W:D) ratio	Bank stability %	Shade % (with solar pathfinder, Ave July/August) -No R.M.O. or NMFS standard
Murderer's Cr. R14	2015	10.74 (NPF)	14.76 (NPF)	-	-	**99 (PF)**	**88**
Murderer's Cr. R15	2015	4 (NPF)	22 (PF)	66.97% <2mm (NPF)	**6.2691 (PF)**	**98.78 (PF)**	39
Murderer's Cr. R16	2015	4.92 (NPF)	16.39 (NPF)	-	-	**99.48 (PF)**	**75.5**
Orange CR. Reach 1[1]	2015	36.51 (NPF)	12.7 (NPF)	35.27% <2mm (NPF)	**5.0188 (PF)**	**100 (PF)**	**85.5**
Sugar Creek Reach 1	1995	60.27 (NPF)	73.97 (PF)	-	**8.969 (PF)**	-	**-**
Sugar Creek Reach 1	2018	4.9 (NPF)	26.14 (NPF)	63.15% <2mm (NPF)	**6.72 (PF)**	**99.79 (PF)**	**87.4**
Tex CK. R2[1]	2015	54.86 (NPF)	4.86 (NPF)	**9.95% <2mm (PF)**	24.8176 (NPF)	**99.49 (PF)**	**57.54**
Tex CK. R3	2015	59.05 (NPF)	10.47 (NPF)	24.05% <2mm (NPF)	14.909 (NPF)	**100 (PF)**	**77.5**
Tex CK. R4	2015	35.71 (NPF)	3.58 (NPF)	**13.82% <2mm (AR)**	21.1918 (NPF)	**100 (PF)**	**63.13**
Tex CK. R5	2015	51.59 (NPF)	8.28 (NPF)	23.61% <2mm (NPF)	21.6574 (NPF)	**100 (PF)**	**58.12**
Tex CK. R6	2015	59.26 (NPF)	14.81 (NPF)	40.60% <2mm (NPF)	11.1614 (AR)	**100 (PF)**	**53.00**
White Creek Reach 1	1992	71.55 (NPF)	12.07 (NPF)	-	**5.7605 (PF)**	-	**-**
White Creek Reach 1	2018	14.58 (NPF)	16.67 (NPF)	100% <2mm (NPF)	**4.69 (PF)**	**100 (PF)**	44.1
Wickiup Creek Reach 1	1992	**144.35 (PF)**	**170.44 (PF)**	-	**8.0513 (PF)**	-	**-**
Wickiup Creek Reach 2	1992	**119.64 (PF)**	**91.07 (PF)**	-	**6.3206 (PF)**	-	**-**

Table 25. Key to above Table 24

RMOs (Riparian Management Objectives from PACFISH – see PACFISH/INFISH Riparian Management Objectives)	Underline indicates standards met		
Amendment 29 (From the MNF LRMP as amended see LRMP Amendment 29 Desired Future Conditions)	Bold indicates standards met		
NMFS MPI (See Aldrich Allotment)	PF: Properly Functioning	AR: At Risk	NPF: Not properly Functioning

See Appendix D for stream surveys reports completed in this allotment.

Water Temperature Monitoring

There are two years of PIBO water temperature monitoring at the Fields Peak pasture I site 156-03 on Fields Creek. In both years the data was collected from 7/15 to 8/31. In 2003 the average weekly maximum temperature was 17.8C (64F) and in 2013 it was 16C (60.8F). Other temperature sites shown on the allotment map (Appendix A) were from data collected in the 1990s which has not been located. On Fields Creek, in the Fields Peak pasture, there are three water temperature monitoring sites shown.

A PIBO site (Murderers Creek I site 156-06) at the downstream end of this allotment had temperatures of 20.7C (69F) in 2003; 16.3C (61F) in 2008; and 15.7C (60F) in 2013. The data was also collected between 7/15 and 8/31 in all three sample years.

Allotment Photos

Figure 10 Fields Peak Allotment, Miners Creek Pasture: end of season monitoring 8/29/2019.

Figure 11. Fields Peak Allotment, Miners Creek Pasture. 2021 End of Season photo monitoring at top and bottom of DMA, 10/20/2021.

Figure 12. Fields Creek in Fields Peak Allotment, Fields Peak Pasture at DMA. Photo is taken at the bottom of the reach, facing upstream. 8/23/2021.

Figure 13. Fields Creek in Fields Peak Allotment, Fields Peak Pasture at DMA. Photo is taken at the top of the reach, facing downstream. 8/23/2021.

Figure 14 Tex Creek, June 4, 2015

Aldrich Allotment

The Aldrich allotment is located within the Upper John Day River (HUC 17070201) sub basin. The pastures comprising the Aldrich allotment lie within the Lower South Fork John Day River (HUC 1707020104), Field's Creek-John Day River (HUC 1707020110) and Murderer's Creek (HUC 1707020103) sub-watersheds. The allotment is located mostly within T 14 S, R 27 E and R 28 E. This allotment includes approximately 20,578 acres. This allotment has two fenced pastures: Widow's Creek Burn and Cabbage Patch Camp. The remaining pastures do not have fences separating them from other pastures and rely on the topography of the allotment to separate cattle into different use areas in the allotment. There are two permittees authorized to graze on Aldrich Allotment. One permittee is authorized to use the Widow's Creek Burn, the other permittee is authorized on Widow's Creek Basin, Smoky-Oliver, Cabin-Todd, Aldrich Ridge, and Cabbage Patch Use Areas.

The unfenced areas in the allotment are divided into four geographic use areas; Widow's Creek Basin, Smoky-Oliver, Aldrich Ridge, and Cabin-Todd. The Widows Creek Basin, Smoky-Oliver, Aldrich Ridge and Cabin–Todd areas are managed collectively as one pasture. However, permittees actively push cattle into the different use areas throughout the season. Generally, cattle begin grazing in Cabin -Todd Pasture, then move to Aldrich Ridge and Smoky-Oliver, and finally end the grazing season in Widows Creek Basin. Widows Creek burn is permitted from July-August. The specific grazing management for the allotment over the past five years can be found in Table 26 below.

Most of the Widow Creek Burn Pasture (No CH) was terraced to slow erosion as a result of a 1939 stand replacing fire, which was noted in the 2002 BA as continuing to provide ideal trails for cattle and wildlife as they crisscrossed that pasture. This allotment had many years of non-use (except for the Widows Creek Burn pasture) from 1987-2001. The permittee in the 1980's did not maintain developments in the more remote pastures and that was one reason those pastures were waived back to the government in 1997. Riding and salting were described as necessary to keep cattle in the uplands in this allotment in the 2002 BA. The Aldrich allotment was not consulted on in 2004, 2007, or 2011.

The Aldrich allotment contains 4.45 miles of MCR steelhead CH and 0 miles of stream reaches identified as MSRA (Appendix A).

Table 26. Aldrich Pasture Information 2017-2021.

Pasture and Authorized Number	Total Acres	Proposed season of use 2017	Actual Use Dates 2017	Proposed season of use 2018	Actual Use Dates 2018	Proposed season of use 2019	Actual Use Dates 2019	Proposed season of Use 2020	Actual Use Dates 2020	Proposed season of Use 2021	Actual Use Dates 2021	DMA (Y/N)
Cabbage Patch Camp (250c/c) No CH	42	Rested	Rested	Gather	Gather	Gather	9/1-9/15	Gather	Gather	Gather	Gather	Y
Widow's Creek Basin (250c/c)	4,659	Rested	Rested	9/16-10/15	9/16-10/15	9/16-10/15	9/15-10/15	9/16-10/15	9/16-10/12	9/16-10/15	9/16-10/15	Y
Smoky-Oliver (250c/c)	3,587	Rested	Rested	5/15-7/1	5/15-7/1	8/2-9/15	8/2-9/15	8/2-9/15	8/2-9/15	8/2-9/15	8/1-9/15	Y
Widow's Creek Burn (100c/c) No CH	1,412	07/20-08/30	07/01-7/31	7/20-8/30	08/01-/8/30	7/24-8/24	7/20-8/20	7/20-8/30	7/20-8/30	7/20-8/15	7/20-8/20	No CH
Cabin-Todd (250c/c)	10,878	Rested	Rested	7/2-8/1	7/2-8/1	5/15-6/14	5/15-6/14	5/15-6/14	5/15-6/14	5/15-6/14	5/15-6/15	Y

PIBO Effectiveness Monitoring Data Summary for the Aldrich Allotment

There are no PIBO Monitoring sites located in streams within the Aldrich allotment.

Multiple Indicator Monitoring (MIM) Short-Term

No short or long term MIM monitoring has been completed in the streams within the Aldrich allotment. End of season photo monitoring occurred on Cabin Creek in the Cabin Todd Pasture (Use Area) in 2021 and 2022. End of Season photos showed streambanks heavily covered by vegetation with little to no use by livestock in both years.

Spawning Surveys

Under the 2018 Biological Opinion, all critical habitat within each pasture was surveyed or was surveyed to the upper extent of suitable spawning habitat (presence of gravels/cobbles, access). Protection has been successfully implemented and documented when redds have been encountered. There have been no redds observed over the past 5 years during spawning surveys (Table 27). In 2020, there was an internal miscommunication over required surveys and no surveys were conducted, although cattle had grazed prior to July 1 in the Cabin Todd Pasture. Photos and site-specific data taken during the surveys are on file and available upon request.

Table 27. Spawning Survey Results 2018-2022.

Pasture	Stream	# Redds Observed 2018	# Redds Observed 2019	# Redds Observed 2020	# Redds Observed 2021	# Redds Observed 2022
Cabin-Todd	Todd Creek	0	0	*No Survey	0	0
Cabin -Todd	Cabin Creek	0	0	*No Survey	0	0

Region 6 Level II Stream Surveys

No stream surveys have been completed within the Aldrich allotment.

Water Temperature Monitoring

No water temperature monitoring has been conducted in the streams within the Aldrich allotment.

Allotment Photos

Figure 15. End of Season Use monitoring photo on Cabin Creek in Cabin Todd Pasture (Use Area). Photo was taken on 6/22/2021 at the DMA looking upstream. Additional photos are available upon request.

Matrix of Pathways and Indicators (MPI) at the 8 Digit Hydrologic Unit Code (HUC)

A NMFS process paper titled "Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale" (National Marine Fisheries Service 1996) is used to describe the environmental baseline for steelhead. It is commonly known as the NMFS Matrix of Pathways and Indicators, hereafter referenced as the "NMFS MPI." The NMFS MPI identifies indicators to analyze for the following pathways: 1) Water quality; 2) Habitat access; 3) Habitat elements; 4) Channel condition and dynamics; 5) Flow/hydrology; and, 6) Watershed condition. The condition of each indicator is described as either "Properly Functioning" (PF), "At Risk (AR)," or "Not Properly Functioning (NPF)" based upon specific numeric or qualitative criteria. Table 28 presents the current status of the environmental baseline for the Murderers Creek, Fields Peak and Aldrich allotments 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 physical or biological features (PBFs) of designated CH for MCR steelhead. The relationship between NMFS MPI and the PBFs of CH is discussed in the Analysis of Effects to designated CH.

Table 28. Analysis of Effects to Matrix Pathway Indicators (MPI) for MCR steelhead in the Upper John Day River sub-basin.

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-dayavg.)**
	Sediment	< 12% fines (<0.85mm) in gravel	**12 – 20% fines; one CWA 303d designated reach (Murderers Cr.)**	> 20% fines
	Chemical Contaminants or Nutrients	Low levels of chemical contamination from agricultural, industrial, and other sources; no excess nutrients; no CWA 303d designated reaches	**Moderate levels of chemical contamination from agricultural, industrial, and other sources; some excess nutrients; two CWA 303d designated reaches - NF Deer Cr., SFK JDR**	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	**Any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows**
Habitat Element	Substrate	Dominant substrate is gravel or cobble (interstitial spaces clear), or embeddedness <20%	Gravel and cobble is subdominant, or if dominant, embeddedness 20 – 30%	**Bedrock, sand, silt, or small gravel dominant, or if gravel and cobble dominant, embeddedness >30%**

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
	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	**Does not meet standards for Properly Functioning and lacks potential large woody debris recruitment**
	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	**Does not meet pool frequency standards**
Habitat Element	Pool Quality	Pools > 1 meter deep (holding pools) with good cover and cool water; minor reduction of pool volume by fine sediment	Few deeper pools (> 1 meter) present or inadequate cover/ temperature; moderate reduction of pool volume by fine sediment	**No deep pools (> 1 meter) and inadequate cover/temperature; major reduction of pool volume by fine sediment**
	Off Channel Habitat	Backwaters with cover, and low energy off-channel areas (ponds, oxbows, etc.)	**Some backwaters and high energy side channels**	Few or no backwaters; no off-channel ponds
	Refugia	Habitat refugia exist and are adequately buffered (e.g., by intact riparian reserves); existing refugia are sufficient in size, number, and connectivity to maintain viable populations or subpopulations (all life stages and forms)	**Habitat refugia exist but are not adequately buffered (e.g., by intact riparian reserves); existing refugia are insufficient in size, number, and connectivity to maintain viable populations or subpopulations (all life stages and forms)**	Adequate habitat refugia do not exist
Channel Condition & Dynamics	Width/Depth Ratio	< 10	10 – 12	**> 12**
	Stream Bank Condition	> 80% of any stream reach has > 90% stability	**50 – 80% of any stream reach has > 90% stability**	< 50% of any stream reach has > 90% stability
	Floodplain 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**	Severe reduction in hydrologic connectivity between off-channel, wetland, floodplain, and riparian areas; wetland extent drastically reduced, and riparian vegetation/success altered significantly

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
Flow/Hydrology	Change in Peak/Base Flows	Watershed hydrograph indicates peak flow, base flow, and flow timing characteristics comparable to an undisturbed watershed of similar size, geology, and geography.	**Some evidence of altered peak flow, base flow, and/or flow timing relative to an undisturbed watershed of similar size, geology, and geography**	Pronounced changes in peak flow, base flow, and/or timing relative to an undisturbed watershed of similar size, geology, and geography
	Increase in Drainage Networks	Zero or minimum increases in drainage network density due to roads.	Moderate increases in drainage network density due to roads (e.g., 5%)	**Significant increases in drainage network density due to roads (e.g., 20 – 25%)**
Watershed Condition	Road Density and Location	< 2 mi/mi^2; no valley bottom roads.	2 – 3 mi/mi^2; some valley bottom roads	**> 3 mi/mi^2; many valley bottom roads**
	Disturbance History	< 15% ECA (entire watershed) with no concentration of disturbance in unstable or potentially unstable areas, and/or refugia, and/or riparian areas	**< 15% ECA (entire watershed) but disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian areas**	> 15% ECA (entire watershed) and disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian areas
	Riparian Habitat Conservation Areas	The riparian reserve system provides adequate shade, large woody debris recruitment, and habitat protection and connectivity in all subwatersheds, and buffers or includes known refugia for sensitive aquatic species (>80% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/ composition > 50%	Moderate loss of connectivity or function (shade, LWD recruitment, etc.) of riparian reserve system, or incomplete protection of habitats and refugia for sensitive aquatic species (~ 70 – 80% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/ composition 25 – 50% or better	**Riparian reserve system is fragmented, poorly connected, or provides inadequate protection of habitats and refugia for sensitive aquatic species (< 70% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/ composition < 25%**

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

John Day River Basin Water Quality Restoration Plan

The Federal Clean Water Act requires that water quality standards be developed to protect beneficial uses and a list be developed of water quality impaired streams (303d list). Water quality standards are based on life stages of fish and the most restrictive need sets the standard.

The Forest Service's responsibilities under the Clean Water Act are described in a 2014 Memorandum of Understanding (MOU) between the Oregon Department of Environmental Quality and the Pacific Northwest Region of the USDA Forest Service. The MOU directs that the "Forest Service manage water-quality-limited water bodies on US Forest Service- administered lands to protect and restore water quality. Management will involve development and implementation of strategies such as BMPs to protect and restore water quality conditions when US Forest Service actions affect or have the potential to affect the 303(d) listed waters" (US Forest Service, 2014). The MOU also directs the US Forest Service to develop a Water Quality Restoration Plan (WQRP) for the John Day Basin Total Maximum Daily Loads (TMDLs) and conduct BMP effectiveness and implementation monitoring. The WQRP was completed in 2014 (USDA 2014) and addresses how grazing actions can remain consistent with the Clean Water Act (CWA), as they are designed to protect and restore water quality as addressed in the WQRP.

In 2010 the following streams in the action area (Table 27) were added to Oregon's 303(d) list as Category 5 Water Quality Limited (TMDL Needed):

- Murderers Creek (RM 0 to 24.7) for "Sedimentation."
- North Fork Deer Creek (RM 0 to 4.2) for "Biological Criteria."
- South Fork John Day River (RM 0 to 57.3) for "Biological Criteria." (portions of the river are in the action area, but downstream of the allotments).

STATUS OF THE MCR STEELHEAD AND DESIGNATED CRITICAL HABITAT

Determining Presence of Species or Habitats

The following sources of information have been reviewed to determine if Threatened, Endangered, or Sensitive species and their associated habitats may or may not occur within the project planning area. In the few places where there was discrepancy, the greater distribution was used:

1. USFS Regional Fish Distribution database (MNF fish distribution information was updated in 2017 in cooperation with data from Oregon Department of Fish and Wildlife)
2. Regional Forester's (R6) special status species list (7/2015)
3. Oregon Department of Fish and Wildlife (ODFW) stream/fish survey reports
4. Forest Service stream survey reports, Blue Mountain Ranger District, John Day, OR

MCR steelhead and designated CH are documented to occur within the Murderers Creek, Fields Peak and Aldrich allotments in all streams listed in the INTRODUCTION Section, Table 2 to Table 3.

Middle Columbia River Steelhead Recovery Plan

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

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

The MCR steelhead ESA Recovery Plan (NMFS 2009) identified population limiting factors. Tributary limiting factors for the Upper Fork John Day population include degraded channel structure and complexity (habitat quantity and diversity), degraded riparian areas and large woody debris recruitment, altered sediment routing, water temperatures and altered hydrology.

For the Upper John Day River (UJDR) and South Fork John Day River (SFJDR) populations the primary tributary limiting factors are degraded floodplain and channel structure (habitat quantity/diversity), altered sediment routing, altered hydrology and water temperature. Habitat limiting factors identified in NMFS (2009) for the Major and Minor Spawning Areas (MaSA and MiSA) of the UJDR are displayed in Table 29. Major spawning areas have enough habitat to support 500 spawning adults.

The action area is associated with the SFJDR population that contains three Major Spawning Areas: Upper SFJDR; Murderers Creek; and Lower SFJDR. The Recovery Plan describes limiting habitat conditions in the South Fork John Day Basin (Table 29). The ODFW considers Murderers Creek downstream from Cabin Creek as not properly functioning for floodplain connectivity and function. The MNF (1997) reported that land use practices had accelerated water runoff and instream velocities in the South Fork John Day River system, which led to increased channel and bank erosion and incised and unstable channels. However, recent stream bank surveys indicated that the lower 14.6 miles of Murderers Creek protected by riparian fences, had banks that ranged from 98 to 100 percent stable. Lack of large woody debris (LWD) in lower Murderers Creek is a concern, although it is expected to improve as riparian vegetation recovers in the fenced areas. Murderers Creek lacks braided channels and side channels, and those present are dewatered as flows drop in the summer. NMFS (2009) cites Unterwegner (2005) when stating that pool numbers are closer to ODFW bench mark values in the South Fork than in the tributaries. It is likely due to increased beaver activity.

Impacts from the legacy road system on Forest Service System lands in the SFJDR have affected baseline conditions for several MPI indicators: sediment; substrate; road density and location; floodplain connectivity; increase in drainage network and physical barriers. Each has received an MPI rating of NPF. The Recovery Plan (NMFS 2009) cites the MNF (1997) when stating that roads might be the single most important threat causing increases in stream sedimentation because of density, location, and maintenance. The Recovery Plan describes areas with high road densities and stream reaches contributing excessive sediment to stream channels:

"Road densities on Forest Service lands in various HUC5s of the South Fork drainage are; 2.75 miles/mile2 in Murderers Creek; 4.14 miles/mile2 in Deer Creek; 4.25 miles/mile2 in Middle South Fork; and 3.27 miles/mile2 in Upper South Fork. The most heavily roaded areas are coincident with sedimentary soils in the upper watershed (MNF 1997). Surveys from 1992 to 1997 identified a number of reaches in the Murderers Creek watershed that were contributing excessive sediment to stream channels including, Beaver and North Fork Beaver, Miner, Grapefruit, Orange, Charley Mack, South Fork Murderers, Bark Cabin, Murderers (reach between Stewart's Cabin and Murderers Creek Guard Station), Oregon Mine, and Tennessee creeks."

Altered sediment routing is a concern in the SFJDR. Greater than 50% embeddedness of substrate particles was reported in 21 of 26 summaries for streams in the South Fork watershed (MNF 2004a). Substrate embeddedness greater than 30 percent results in a "NPF" classification under the NMFS MPI.

The Recovery Plan states that high summer water temperatures are considered a major limiting factor. Dan's Creek, Deer Creek, North Fork Deer Creek, Murderers Creek, South Fork John Day River and Tex Creek are on the ODEQ 303(d) list for water temperature (ODEQ 2010a). Data from a stream gage near the mouth of Murderers Creek showed that water temperatures exceeded 64ºF, 54% of the time between July 1 and September 30, averaged over a 5-year period (ODFW 2005).

The MCR Steelhead Recovery Plan (NMFS 2009) presented viability ratings for the MCR Steelhead MPG (1From Table 8-30 of Recovery Plan

Figure 16). 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.

Table 29. Habitat limiting factors identified in NMFS (2009) for the Upper South Fork John Day River and streams within the ESA action area.

Limiting Factor	Upper/Middle/S.Fk Murderer's Creek[1]	Lower Murderer's Creek[1]	Deer Creek[1]	Upper South Fork John Day[1]
Degraded floodplain connectivity and function	X	X	X	X
Degraded channel structure and complexity	X	X		
Altered hydrology	X			
Altered sediment routing	X	X	X	X
Water temperature		X	X	X
Degraded riparian communities	X	X	X	X
Man-made block to migration				X
Impaired fish passage				X

[1]From Table 8-30 of Recovery Plan

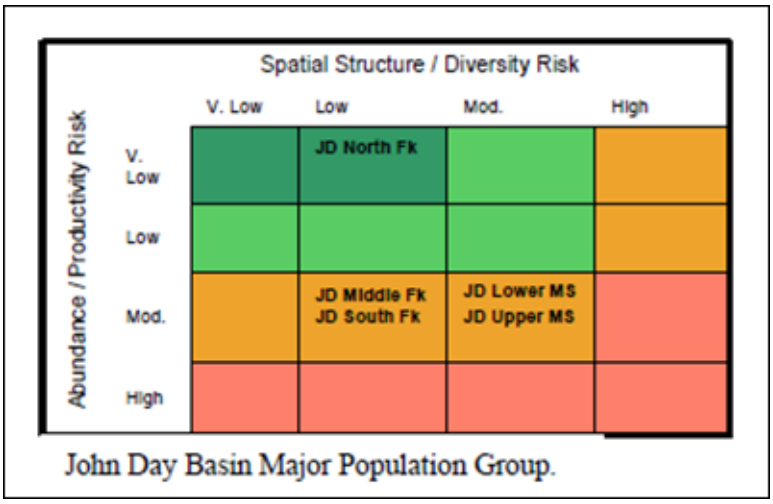

Figure 16 Viability ratings for the MVR Steelhead MPG (NMFS 2009). Shades of green indicate lower risk of extinction and shades of red indicate higher risk.

Population Status

MCR steelhead runs in the John Day River Basin are composed entirely of native stocks. However, hatchery fish do stray into the John Day Basin from the Columbia River (NMFS 2009). The MFJDR Subbasin contributes approximately 22% of the total run for the basin. Redd counts have displayed wide variability since 1964 (ODFW 2007). Redds per mile have been below ODFW management objectives (5.8 redds per

mile) for 10 of the past 15 years, but have met objectives for three of the past five years (ODFW 2014). Steelhead occupy approximately 410 miles of habitat on the MNF of which 81.5 miles are within the action area.

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 30. 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.

Table 30. 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[P1]	Size Category and Run Timing	10-year Geomean abundance	Abundance Range	10-yr Hatchery Fraction[P2]	Productivity[3] And Productivity Standard Error		A&P and SSD Risk Rating[P4]	
Lower Mainstem John Day	2250	Very Large/ Summer	1800	563-6257	0.1	2.99	0.24	M	M
North Fork John Day	1500	Large/ Summer	1740	369-10,235	0.08	2.41	0.22	VL	L
Upper Mainstem John Day	1000	Intermediate/ Summer	524	185-5169	0.08	2.14	0.33	M	M
Middle Fork John Day	1000	Intermediate/ Summer	756	195-3538	0.08	2.45	0.16	M	M
South Fork John Day	500	Basic/ Summer	259	76-2729	0.08	2.06	0.27	M	M

1 Abundance threshold for viability based on habitat intrinsic potential

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

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

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

Distribution and Habitat

MCR steelhead are widely distributed in the UJDR Subbasin. Spawning and rearing takes place in all major tributaries of the Upper John Day River and steelhead utilize the river for migration, as well as spawning and juvenile rearing habitat during years when water conditions are favorable.

Murderers Creek Allotment Area

Spawning and juvenile rearing habitat are present in many streams in Murderers Creek (headwaters, upper and South Fork), Deer Creek and the Middle South Fork John Day River, and their tributaries (Appendix A). Included are: Bark Cabin Creek, Blue Creek, Buck Creek, Corral Creek, Crazy Creek, Dans Creek, Duncan Creek (and East & West tributaries), North Fork Deer Creek, Orange Creek, Oregon Mine Creek, South Fork

Deer Creek, South Fork Murderers Creek, Tennessee Creek, Tex Creek (lower portion), Thorn Creek, and Vester Creek.

Fields Peak Allotment Area

Spawning and juvenile rearing habitat are also present in many streams in the Fields Peak allotment (Appendix A). Included are: Fields Creek, Wickiup Creek, Buck Cabin Creek, Tex Creek (upper portion), White Creek, Charlie Mack Creek, Basin Creek, Miners Creek, Sugar Creek, Murderers Creek (upper portion), and Lemon Creek.

Aldrich Allotment Area

Spawning and juvenile rearing habitat are also present in many streams in the Aldrich allotment (Appendix A). Included are: Cabin Creek, Todd Creek, Smoky Creek, Flat Creek and Widows Creek.

Five Year Status Review

In 2022, the National Marine Fisheries Services conducted a 5 year review for Middle Columbia River Steelhead. This review stated that John Day River MPG, of which this allotment is a part of, is still not viable. The 2022 review states “The John Day River MPG does not meet the viability criteria of the Lower Mainstem John Day River, North Fork John Day River, and either the Middle Fork John Day River or Upper Mainstem John Day populations achieving viable status (low risk), with one highly viable (very low risk) population since both the John Day Lower Mainstem and the John Day Upper Mainstem populations remain at a ‘maintained’ status (low risk).”

Key habitat concerns listed in the review related to grazing management include high stream temperatures, degraded floodplain connectivity and function, degraded channel structure and complexity, and degraded riparian communities. A number of protective measures to address these issues have been implemented by land managers since the last review. These include riparian grazing fencing, riparian planting, large wood addition projects, channel restoration, beaver dam analogs, and side channel creation. See the 2022 Species Status Review for a complete description of these projects.

The 2022 review recommends continuing efforts to reduce summer temperature, increase summer baseflow connectivity, throughout the John Day basin. The plan also specifically mentions reducing the effects of grazing in the Middle Fork John Day basin to improve floodplain and riparian function, and channel structure.

Critical Habitat

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.

The physical or biological features (PBFs) that are essential for the conservation of listed DPSs on the MNF are those sites and habitat components that support one or more life stages. For MCR steelhead these include:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;
2. Freshwater rearing sites with:
    a. Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
    b. Water quality and forage supporting juvenile development; and
    c. 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.

ODFW Redd Survey Data

The number of steelhead redds counted during 2018-2022 within the project area subbasin is displayed in Figure 30. Oregon Department of Fish and Wildlife (ODFW): Research Division conducts annual spawning ground surveys within BLM and ODFW Phillip W. Schneider Wildlife Area land downstream of the Malheur National Forest boundary. ODFW surveys Murderers Creek from its confluence (with the South Fork John Day River) through BLM and ODFW land and also through the Murderers Creek allotment. Surveys on Deer Creek and South Fork John Day River do not occur on forest lands. Note that flows were particularly high during 2022 spring surveys, so data may not reflect all redds present, though steelhead redd numbers were low in 2022 overall across the forest.

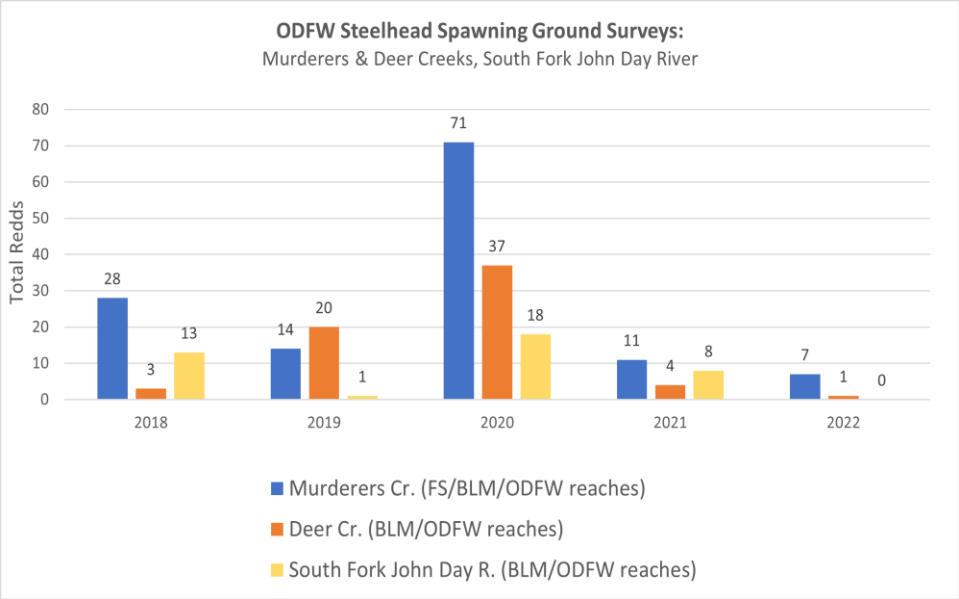

Figure 17. ODFW steelhead spawning ground surveys from 2018-2022.

ALLOTMENT PROPOSED ACTIONS

Proposed Action: Common to all MNF Allotments

BACKGROUND

This section of the 2023-2027 Biological Assessments submitted for the final grazing Biological Assessments (BAs) on the Malheur National Forest (MNF) is intended to be a concise summary for permittees, National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (FWS) – (collectively "the Services"), and MNF personnel which documents the expectations of administering the grazing program to be in compliance with United States Department of Agriculture policy and regulation, and with the Endangered Species Act (ESA). The basis of the content is Forest Service Handbook and Manual direction, and experience acquired from the previous consultation of 2012-2016 and 2018-2022. This addendum provides expectations for necessary and required communications and is the basis for a common understanding of commitments that are required as part of completing ESA consultation for the next period of grazing 2023-2027.

Livestock pasture rotations are provided in each Biological Assessment under the allotment specific proposed action. The number of livestock and season of use are based on permitted numbers and designated season of use. Numbers, kind (e.g. cattle vs. sheep), class of livestock (e.g. cow/calf vs. yearling), and the period of use are stated on the permit. The numbers permitted, the period of use, or both can be modified by the line officer for resource conditions or emergency action. When the numbers or period of use are reduced for resource conditions, the permittee shall get as much notice as possible, but not less than six months (FSH2209.13). Any modifications to increase numbers, lengthen season of use, or change class of livestock will require meeting the Endangered Species Act, which could trigger re-initiation of consultation. Reports or other pertinent records on range conditions will be made available for review by the permittees, so they are fully informed prior to making any adjustments or having a permit modified.

The MNF uses three types of grazing systems, deferred rotation, season long, and rotation, with most systems falling under deferred rotation or rotation. A few allotments have season long grazing (Lower Middle Fork Allotment, two herds in Fox Allotment, and one herd in the Mt. Vernon Allotment). Rest rotation, with rest of pastures that are not small riparian pastures, is implemented for the Ott Allotment on Prairie City Ranger District (PCRD). On Blue Mountain Ranger District (BMRD) the North Middle Fork Allotment has a rest rotation of Mosquito Riparian and the C pastures every other year (out of 21 pastures total), a rest rotation of four Camp Creek riparian pastures every other year (out of 16 pastures total) on the Long Creek Allotment, a rest rotation of three riparian pastures every other year (out of nine pastures total) on Slide Creek Allotment, and rest for two of five years on the Lower Butte pasture (once created) in the South Middle Fork Allotment.

1. Deferred grazing – The deferment of grazing in a nonsystematic rotation with other land units (SRM 1998).
2. Deferred rotation grazing – Any grazing system which provides for a systematic rotation of the deferment among pastures (SRM 1998). A deferred grazing system provides a systematic rotation of pastures in which grazing is delayed or discontinued to provide for plant reproduction, establishment or restoration of existing plants.
3. Season long grazing –Grazing continuously for the period allowed on the permit such as mid-June to end of October.

4. Rotation – As used on the MNF this is a grazing system where animals are moved from one grazing unit to another in the same order each year. Move times vary if move and/or end triggers have been reached.
5. Rest rotation – A grazing management scheme in which rest periods for individual pastures, paddocks, or grazing units, generally for the full growing season, are incorporated into a grazing rotation (SRM 1998).

In some instances the BMRD/PCRD graze a pasture twice in the same growing season (i.e. the pasture is grazed both first and last during a single grazing season). This method is used in holding, trailing, and/or gathering pastures, where the pasture holds livestock for a short duration at the start of the season and also holds livestock in that same pasture for a short duration at the end of the season. The proposed action in each BA describes how each pasture is to be used.

All allotments subject to this consultation, except for Long Creek and Slide Creek, which are managed under a grazing agreement according to the laws of the State of Oregon, and Blue Mountain Allotment, are permitted by "Term Grazing" permits. The Blue Mountain Allotment is currently not under permit and could be used with a temporary (one year) grazing permit for existing permittees who are taking non-use for resource protection or to provide forage in the case of wildfire on their allotments. Some permits are Term Permits with On/Off provisions, such as York and Beech Creek allotments. On/Off occurs when a minor portion of the carrying capacity, usually less than 1/3, of a logical grazing area is composed of National Forest System (NFS) lands. The intent with on/off pastures is to promote efficient use of intermingled ownership, while at the same time achieving desired conditions on NFS lands.

Livestock are moved throughout the allotments and pastures based on monitoring of forage use in both uplands and riparian areas. ESA consultation is based on move trigger monitoring that is used to start the movement of livestock prior to exceedances and on end of grazing use monitoring in riparian areas that measures: stubble height, woody browse, and bank alteration using the Multiple Indicator Monitoring (MIM) protocol (MIM TR 2011) at Designated Monitoring Areas (DMA).

All DMAs will be consistently documented as spatial data with GPS, photos, and monuments or markers. Move trigger monitoring will occur at the established DMA areas where the three ESA end-of grazing use indicators (stubble height, bank alteration, and woody browse utilization) are also measured. In documented cases there may be only one or two indicators at a DMA that are suitable for monitoring due to stream or riparian condition. The DMAs are established in the areas most sensitive to management influences in each grazed pasture containing critical habitat, which are accessible by livestock. DMA's are not to be temporarily or seasonally fenced, as monitoring the DMAs is intended to be representative of livestock use in riparian areas and critical habitat.

In the 2012-2016 consultation (NMFS 2012), measurement of the three MIM indicators was required on any pasture where it appeared that riparian conditions were approaching one or more of the move triggers. The MNF will continue to document the date of move trigger observation, but proposes to put continued focus on measurement and documentation of data for any move-triggers approaching their threshold, along with at least four site photos. The MIM data sheets with photos will be electronically filed to the range file and provided to the Ranger District Aquatics (hydrology and fisheries) departments.

The MNF measures end-point indicators within DMAs to assure: 1) Potential adverse effects to listed fish species and their designated critical habitat (CH) are avoided or minimized, 2) Riparian Habitat Conservation Areas (RHCAs) are recovering at a near natural rate to meet Malheur National Forest Land and Resource Management Plan (LRMP) Standards and Guidelines, which include consistency with Middle Columbia River (MCR) steelhead recovery and/or Columbia River (CR) bull trout recovery objectives. In cases where end-point indicators are not met, the line officer will implement adaptive management strategies or actions (Table 33) for the following year to protect and recover MCR steelhead and/or CR bull trout and their CH.

Adaptive management actions are necessary to ensure riparian conditions not only meet Forest Plan Standards, but also meet PACFISH/INFISH (USDA FS and USDI BLM 1995/USDA FS 1995a) direction to not retard the attainment of Riparian Management Objectives (RMOs).

Proper pasture and allotment management begins in the spring. If grazing is started too early plant vigor is reduced, total forage production is lowered, ecological conditions are potentially degraded, and RHCAs could receive excessive damage due to livestock use during wet spring conditions. **Range readiness** is the methodology of assessing springtime conditions before livestock turnout. Readiness is primarily based on the development stage of the most common or key plant species in that pasture, moisture of the soils in RHCAs and associated floodplains. A range readiness form (R6-2210-2) is provided as Appendix H of the Biological Assessments, and is to be used if readiness is not determined with ocular inspections. If ocular inspection is used it will be documented on an Allotment Inspection Report form to the permit file. Range readiness forms will also be placed in the allotment permit files. The completed forms are not required on every allotment, but will be used for all pastures where grazing starts prior to June 1 or where conditions may not be ready for grazing, such as determining if allotments or pastures are ready to graze after fires, floods, or severe drought.

WINTER MEETINGS WITH PERMITTEES

For cases where non-compliance with the terms of the grazing permit was documented and follow-up is necessary, a meeting with the permittee will occur between November and January each year. Potential changes will be discussed to help the MNF and the permittees document agreed upon remedies. The remedies will be documented for review and discussion at the spring meetings and included in Annual Operating Instructions (AOIs). Changes of management activities for purposes of addressing non-compliance and/or resource protection concerns will be conveyed to the Services through Level 1 Team discussions (USDA FS, USDC NMFS, USDI BLM, and USDI FWS 1999).

SPRING MEETINGS WITH PERMITTEES AND ANNUAL CHECKLIST

After the completion of the Final End of Year (EOY) report to the Services on April 15 each year, meetings with permittees will occur between the end of February and end of April to review the previous grazing year and to establish the information needed for documenting the Annual Operating Instructions. An annual check list will be used and documented in the range administration file to review the appropriate topics. Key topics to be reviewed and discussed with documented notes include:

- Confirmation of prior year's actual use (to be reported to and documented by the Range Specialist by November 15 prior to spring meetings for all pastures in allotments with listed fish)
- Evaluate the effectiveness and results of the previous year's pasture use timing and rotation
- Discussion and identification of a proposed rotation by date and livestock numbers by pasture
- Assess the previous year water development conditions and maintenance
- Review and identify water developments proposed for maintenance in the upcoming year
- Evaluate and document other maintenance needed, including fences, results of fence inspections and identified maintenance completed the previous year(s)
- Assess exclosures within the allotment and identify who is responsible for them (MNF or permittee)
- Review and document new project proposals from the permittee
- Review any proposed MNF activities such as prescribed fire, stream restoration, or vegetation treatments proposed to improve or restore habitat in riparian areas in pastures with CH in order to minimize

conflicts between prescribed fire, stream restoration, vegetation treatment, and grazing activities. Concentrated cattle use in restoration areas is to be avoided for one to three years after project implementation. Evaluation of the cattle use will be documented with photos for at least two site specific visits in the same year as the project, and up to two succeeding years. If the project area includes a DMA, then mid-season and end of grazing use MIM will be implemented and documented. If any impacts to riparian habitat are identified the cause of the impact (e.g. heavy equipment, fire, or cattle or elk) will be identified. Cattle use must be adjusted where additional impacts from grazing would retard attainment of the RMOs.

- Review and evaluate compliance monitoring results from the past grazing season, including success and problem areas/issues in riparian and sensitive wetland areas or exclosures
- Document any adjustments from the prior year agreed to for upcoming implementation
- If drought conditions exist or are likely, review the Drought Plan and potential modifications to the current year grazing's plan.

See below for an updated checklist.

Annual Spring Permittee Meeting Checklist

Allotment/Permit Information

Allotment Name:_____ Permit Number:_____

Permittee Name:_____ Date:_____

Name of meeting participants:
_____ RMS:_____

_____ AMP? (Y/N) _____

Actual Use - Due 11/15

☐ Attach Tally Record (actual use from previous grazing season)
☐ Previous year's grazing system (what worked, what didn't work, exceedances/violations)
☐ Monitoring results:

1. Permittee involvement
2. ESA compliance
3. Forest Plan Standard/PACFISH/INFISH/Amendment 29 compliance

Range Improvements

☐ Improvement

1. Water developments maintained
2. Water developments proposed for maintenance (water development maintenance plan)
3. Fence issues (fence maintenance plan
4. Dirt tanks/pond maintenance
5. Other projects requiring maintenance
6. New proposed projects (with timeline/plan)

Does Permittee have a map of all assigned range improvements

☐

Does Permittee have a map of all assigned exclosures

☐

TERMS AND CONDITIONS

☐ Grazing permit/Biological Opinion (BO)

1. End of grazing use standards
2. Move Triggers

Proposed Grazing System (Planning)

☐ Proposed grazing system/rotation by pasture and dates

☐ Proposed Forest Service land management activities within the allotment (Rx fires, thinning, stream restoration)

☐ Proper placement of salt and supplements

General

☐ Any changes to permitted base property?

☐ Brand certificates up to date?

☐ Brand certificates match Term Grazing Permit Application?

☐ Ear tag colors used

Other

☐ Other

1. Noxious weeds
2. Drought plan review (if needed)
3. Wildland fire activity (impacts or readiness documentation) review (if needed)
4. Any unauthorized use or excess use on allotment, if yes explain

Signatures

_____ Date _____

Grazing Permittee(s)

_____Date _____

Rangeland Management Specialist

Date _____

District Ranger

MONITORING – PROPOSED ACTION COMMON TO ALL ALLOTMENTS

Intensive monitoring at the allotment or local scale is critical to determine if desired conditions are being achieved and adverse effects to ESA listed fish and CH are avoided or minimized. A successful grazing program requires implementation monitoring (e.g. are the actions described in the AOIs, the ESA consultation, and the permit being implemented) and effectiveness monitoring (are management actions effective at achieving the desired conditions).

Effectiveness monitoring specific to the MNF's grazing of riparian communities is limited. The MNF has a total of 204 PACFISH/INFISH Biological Opinion (PIBO) sites, of which 72 are Integrator sites (located lower in a watershed to reflect all upstream management), 67 are DMA sites (occur within grazed watersheds), and 65 are Contract sites (requested specifically by the MNF and monitored for grazing management, wild and scenic river management, and compliance with water quality standards). While the PIBO program has helped provide status and trend data for larger scale analysis areas, such as the Upper John Day or Middle Fork John Day 8 digit Hydrologic Unit Code (HUC) "subbasin", there must be a sufficient number of sites on the landscape with repeat visits to evaluate trends at smaller scales such as allotments. Allotments are often comprised of one to seven smaller 12 digit HUC "sub-watersheds". The PIBO program sites are monitored every five years, unless they are coincident with a grazing DMA established for ESA monitoring which occurs every year. The location of the PIBO sites have gaps in coverage for many MNF sub-watersheds, and together with the five year repeat visit cycle, precludes assessment of trend in most allotments. Presently condition and trend data are lacking to adequately address effectiveness of allotment management on the longer term ecological conditions of the MNF riparian communities. Effectiveness monitoring is further addressed below.

The MNF proposes as part of the 2023-2027 consultation to improve implementation monitoring and begin collecting data to assess the effectiveness of grazing management to address allotments subject to ESA consultation. The intent is to move forward with quantification of current and potential ecological condition of riparian areas during this consultation. Except for sites with more than three PIBO data collections (e.g. a site collection every five years over the 15 years since the PIBO program inception), long term trend indicators are lacking on the MNF. This has caused continued focus on the three short term annual ESA end point indicators (browse, stubble height, and streambank alteration). The three indicators are used as move triggers during the grazing period and as end of grazing use metrics. They are assigned to each pasture with CH and continue to be the core of implementation compliance for ESA consultation. The overall monitoring program and the objectives of each monitoring type are displayed in the table below.

Table 31 Proposed Monitoring by Pasture with Critical Habitat 2023-2027.

Time of Year	Monitoring Type	Time of Monitoring	Objective	Alternative A Outcome	Alternative B Outcome
Pre-Season (in pastures with sensitive riparian areas that are grazed in May or early June) OR for allotments with wild horses.	Range readiness documented on FS form as an inspection for the file. Evaluation of end point indicators for pastures that overlap the Wild Horse Joint Management Area prior to livestock turnout.	Prior to turnout of livestock.	To determine plant developmental stage and soil condition for grazing use. To determine horse and/or wildlife use in the Wild Horse JMA pastures with unfenced Critical Habitat.	A pasture or allotment is not ready for use and livestock turnout will be delayed. If horse or wildlife use has exceeded endpoint indicators cattle	Livestock can turnout

Time of Year	Monitoring Type	Time of Monitoring	Objective	Alternative A Outcome	Alternative B Outcome
				will not turn out.	
Mid-Season	Photo documentation and MIM for the three indicators where one or more triggers appear close.	Middle of period for livestock grazing for that pasture or when triggers appear close.	To initiate livestock movement or pasture rotation if needed to avoid exceeding End of Use standards.	If move triggers are close or met start move to next pasture in rotation.	Remain in pasture or more time is allowed based on permit and AOI and riparian/range condition
End of Use	MIM - Endpoint indicators and photo documentation (with possible expansion of indicators).	1-2 weeks after livestock leave the pasture. Within 1 week is optimal.	To ensure meeting Forest Plan standards, guidelines, and ESA Terms and Conditions to minimize take on listed species.	If indicators are exceeded see the Compliance Strategy section and the FS Range Handbook.	Indicators are met and documented, along with actual use. Actual use reporting due November 15.
Trend Monitoring	MIM – 10 indicators and/or PIBO (where available) and photo documentation.	Every 3-5 years following a MNF schedule.	To establish a trend in riparian and aquatic habitat conditions. The first reading provides a baseline to compare to desired conditions.	Downward (or static in some cases) trend due to grazing results in livestock management adjustments.	Upward trend meets Forest Plan standards and objectives and is compatible with grazing.
Spawning	Redd surveys for summer steelhead (April into June) and bull trout (September into October). Increased attention to variable time of monitoring based on previous years numbers and current year hydrograph	Prior to grazing a pasture during spawning season period or in coordination with ODFW or tribes to gain additional knowledge on importance of a stream for spawning. .	To document the presence of redds and potential for livestock interaction (which could result in take) and avoid exceedance of take or the need to re-initiate consultation.	Redds are documented, permittees are notified and provided a location map. Redd protection measures are required.	No redds are documented. A decision is made if grazing will be delayed or occur.

The Move Trigger and Endpoint Indicator table below describes the indicators for this consultation. All riparian areas, regardless of grazing period use, require a six inch stubble height. When pastures contain Most Sensitive Riparian Areas (MSRA), the streambank alteration move trigger and end of grazing use indicator is adjusted, as in the previous consultation period. In MSRA-designated pastures, the streambank alteration **move trigger is 10% and the endpoint indicator is 15%.**

Table 32. Move triggers and endpoint indicators assigned to each pasture.

Grazing Use Period	Browse Trigger* (%)	Browse Endpoint* (%)	Greenline Stubble Trigger (in)	Greenline Stubble Endpoint (in)	Streambank Alteration Trigger (%) MSRA	Streambank Alteration Endpoint (%) MSRA	Streambank Alteration Trigger (%) NO MSRA	Streambank Alteration Endpoint (%) NO MSRA
Early Season	40	50	7	6	10%	15%	15%	20%
Mid to late Season	30	40	7	6	10%	15%	15%	20%

* A 21-40% use, with a 30% midpoint, is classed as "light" use. A 41-60% use, with a midpoint of 50% is classed as "moderate."

In general ***early season*****,** or spring season encompasses the period from the end of supplemental feeding for livestock to seed ripe and includes the time during which soil moisture levels are at their highest due to snow melt and spring rain. Time frame: Early May to early/mid-July

Mid-season includes the hotter part of the summer during which upland forage has dried, seed ripening has occurred, and soil moisture content in the riparian areas have declined. Time Frame: early/mid-July to mid/late September.

Late season grazing is defined as grazing that generally begins after sugar storage in woody vegetation is complete, leaf fall has started, upland plant seeds have shattered and mean air temperatures begin to cool. Time frame: mid/late September to November.

The exact dates which these periods encompass depend on geography, topography, weather and range conditions. Plant phenology and soil moisture are the dominant criteria.

Move Triggers and Endpoint Indicators

Move triggers and corresponding end-point indicators are implemented in consideration of allotment and pasture conditions and are based on season of use and/or site-specific condition of the resource. **Livestock are to be moved as soon as any one of the move triggers is reached or if condition of the indicator (even if not yet at the move trigger) indicates a trajectory of conditions that may exceed the endpoint standards based on specific experience and local knowledge of the permittee or the rangeland management specialist.**

Pastures containing MCR steelhead CH and/or Columbia River bull trout CH will be checked near the mid-point of the grazing period in that pasture, conducting and documenting a MIM for move triggers as a trigger is approached or there is an appearance of exceedance. As part of the overall grazing administration, MNF staff may also visually inspect riparian areas for livestock use above CH where there is the potential for downstream effects to CH. **Move triggers are designed to ensure that endpoint indicators are not exceeded.** The relationship between move triggers, end of grazing use indicators, and the protection of MCR steelhead or CR bull trout and their CH is based on timely monitoring, knowledge of the site (e.g. Rosgen (1996) channel type, seral status or ecological condition of riparian plant communities, seasonal conditions, and water year), and current best available science. Appropriately moving cattle based on move trigger assessment to not exceed the end of grazing use indicators is intended to maintain desired riparian and aquatic habitat conditions or result in an upward trend toward the desired conditions. The trend in riparian and aquatic habitat conditions will be determined by the photo points and effectiveness monitoring described below. Where the habitat conditions are not at the desired condition, an upward trend in condition will be assumed to be consistent with allowing for a "near natural" rate of recovery.

Permittees are responsible for moving all cattle out of a pasture prior to exceedance of end point indicators and are responsible for ensuring that end-point indicators are not exceeded. As stated in the previous consultation, *move triggers are to be monitored by permittees and MNF staff. The Forest Service is responsible for visual inspections of riparian livestock use in each pasture with steelhead (or bull trout critical) habitat near the mid-point of the grazing rotation for that pasture. The MNF will conduct applicable MIM on any such pasture if it appears that riparian conditions are approaching one or more move triggers or end-point indicators*. Permittees are invited to conduct as well as participate in inspections and other monitoring efforts.

Under this strategy two implementation monitoring components will be implemented on each pasture with CH to evaluate annual livestock grazing management: 1) Move trigger monitoring, and 2) End of use endpoint indicators. A third component of the monitoring is effectiveness (also referred to as "trend") monitoring at selected PIBO and MIM DMA sites. The schedule for the trend monitoring is based on a 3-5 year rotation of individual sites as was established to assess PACFISH/INFISH implementation over the long-term. All three components allow for the evaluation of livestock grazing management. Monitoring will be conducted by a MNF ID Team or a separate monitoring team when available. The PIBO sites on the MNF are monitored by the national PIBO team on a five year rotation schedule, which incorporates the 65 contract sites added by the MNF to the original PIBO site locations.

DMAs have been established in most pastures containing MCR steelhead CH or CR bull trout CH in the last five years (see appendices). The DMAs are located in the areas most sensitive to management influences in each grazed pasture containing critical habitat, which are accessible by livestock. The DMA sites are to be monitored by the Ranger District IDT or Forest monitoring team with all personnel trained specifically in MIM techniques and familiar with the requirements for ESA compliance data collection. DMAs represent the impacts of grazing and are intended to be accessible by cows and are not intended to be fenced out. If they are fenced out, alternate actively grazed sensitive sites will be monitored and the spatial location documented along with photo points. Where riparian fencing excludes Critical Habitat, DMA's may not be required.

Monitoring guidelines and general procedures from the MIM Technical Reference will be followed when conducting MIM monitoring, for example: *"If the site does not have the potential for woody species with appropriate management, do not include the woody species age class and use data as part of the monitoring of the site"* (MIM TR, 2011). An exception to the MIM protocol will occur when the sample reach is too short, but the indicators and grazing use otherwise meet ESA monitoring needs.

The DMA sites are required in each pasture accessed by livestock, including in pastures where the MNF maintains that topography or vegetation preclude cattle use of the riparian are, unless there is physical evidence such as collected by game cameras for an entire season with no cattle observations. The DMAs are established in the areas most sensitive to management influences in each grazed pasture containing critical habitat. Monitoring is the existing tool that helps determine annual cause and effect of grazing on ESA listed fishes and habitat. Implementation monitoring of the three ESA move triggers and end-point indicators described below will be completed each grazing season in pastures with CH. The end point indicators will be monitored when livestock move off the pasture (one-two weeks following livestock use). By conducting monitoring during this time it helps determine the cause-and-effect relationships between livestock grazing and stream-riparian conditions and whether livestock grazing management changes may be needed the following year.

Stubble height. Stubble height is a measure of the residual height of key herbaceous vegetation species remaining after grazing. (MIM TR 2011, pp. 23 - 27).

Streambank alteration. Streambank alteration helps determine if grazing intensity is excessive. (MIM TR 2011, pp. 27 - 34).

Woody browse use. Important for determining the success of a grazing management prescription and may help establish the relationship between the level of grazing use by cattle, elk, and other large herbivores. (MIM TR 2011, pp. 34-39)

Effectiveness Monitoring

Effectiveness monitoring to identify longer term trends in condition will be conducted at 3-to-5 year intervals. Trend monitoring consists of the MIM protocol which includes 10 indicators, seven of those specific to long-term trend monitoring, in addition to the three short-term "implementation" indicators (browse use, stubble height, streambank alteration). These additional indicators are also useful for monitoring stream condition changes that occur as a result of management activities in addition to livestock grazing.

Ecological Condition of Riparian Areas

The Malheur National Forest would like to develop an ecological classification system of the Forest's stream and riparian areas. It is anticipated that this will provide a framework to better describe existing versus desired conditions for a variety of valley types and vegetation communities that comprise MNF riparian areas. The goal is to have an improved riparian ecological classification system that better assists resource management including grazing management. This framework will rely on existing information such as the Mid-Montane Wetland Plant Associations of the Malheur, Umatilla, and Wallowa-Whitman National Forests (Crowe and Clausnitzer 1997) and additional information such as stream valley classifications. The Malheur National Forest will collect vegetation data over the next five years to determine riparian condition and seral status which will inform the development of an ecological classification system as resources allow.

Additional monitoring variables will continue to be incorporated at the agreement of the Level 1 and Level 2 team members. These additional variables will help identify the ecological baseline condition of riparian areas, which is important when assessing how departed the riparian condition may be from ecological potential or from a desired condition. They will also further explain the conditions captured by photo monitoring. Of high priority to supplement the analysis of grazing's impacts on aquatic/riparian systems are these indicators which would be measured on a 3-5 year rotation:

Woody species age class. The procedure is designed to provide decision makers with information concerning the recruitment of woody species along streams. For systems with the potential to produce woody vegetation the procedure helps provide an understanding of whether the woody species are increasing, decreasing, or maintaining numbers and age classes. (MIM TR 2011, pp. 51-54)

Greenline composition. The composition of vegetation along the greenline directly effects the condition of streambanks and the overall stream condition. The major plant species along the greenline are helpful for analyzing the effects of livestock grazing along a stream. Streambanks dominated by deep rooted vegetation result in stable streambanks, narrow channel widths, shading, habitat diversity, and terrestrial insect production. (MIM TR 2011, pp. 39-44)

Greenline to greenline width. Many stream channels become overwidened as a result of vegetative changes and physical disturbance to streambanks from improper livestock grazing (i.e., streambank trampling and shearing) or other physical disturbances to the streambanks. As streams recover they become narrower. (MIM TR 2011, pp. 54-57)

The information collected during the MIM trend monitoring, and the work the MNF hydrologist is coordinating with the PIBO program to develop an analysis of greenline ecological vegetation conditions will allow the MNF to evaluate and track the current conditions in relation to desired vegetation conditions.

The ecological seral status recommendations in the "Enclosure B" (USDA FS 1995b) guidelines for each National Forest covered by PACFISH were intended to help adjust grazing prescriptions in a more informed manner and to determine progress toward meeting and maintaining long term desired trends and recovering riparian and aquatic habitat. Long Term trend monitoring will continue to be conducted by a MNF ID Team (defined as at least one fisheries biologist or hydrologist with a rangeland specialist or botanist, with preference for both a fisheries biologist and a hydrologist). A qualified technician from either program may be substituted on the team. An independent (and appropriately trained) monitoring team may also conduct the effectiveness monitoring, if available.

The additional seven indicators are (including the three above that may be collected during ecological condition monitoring):

Greenline composition (adopted from Winward 2000 and USDI, BLM 1996a). The "greenline as defined by Winward (2000) is the "first perennial vegetation that forms a lineal grouping of community types on or near the water's edge. (MIM Technical Reference (TR) 2011, pp. 13-19).

Woody species height class (Kershner et al, 2004). Woody species regeneration occurs within a six-foot wide belt adjacent to the greenline on both streambanks (MIM TR 2011, pp. 44-47).

Streambank stability and cover (Kershner et al, 2004). (MIM TR 2011, pp. 47-51).

Woody species age class (Winward 2000). (MIM TR 2011, pp 51-54).

Greenline-to-greenline width (GGW) (Burton et al. 2008). GGW is the nonvegetated distance between the greenlines on each side of the stream. It provides an indication of the width of the channel, reflecting the disturbance of the streambank and vegetation (MIM TR 2011 pp.54-58).

Substrate (Bunte and Abt 2001). Sampling of bed material is used to determine the effects of channel disturbance (MIM TR 2011 pp. 58-63).

Residual pool depth and pool frequency (Lisle 1987). Residual depth is the average of all differences between riffle crest depth and the pool max depth in the survey. Pool frequency is a count of all pools encountered divided by the thalweg (max) length of the DMA (MIM TR 2011, pp 64-47).

Spawning Surveys

MCR steelhead spawning surveys must occur within all pastures containing CH where turnout is expected prior to July 1 or where the stream is not permanently fenced off from livestock use. **Bull trout spawning surveys** must occur within all pasture containing CH where grazing will occur after August 15. Where there is risk of redd trampling, **the MNF staff and permittees** will utilize a number of tools or management options to protect redds and avoid trampling. These include but are not limited to: alternative rotation, rest, exclusion fence, temporary electric fences, and additional riding. Avoidance in time and location of the spawning area by livestock, or exclusion fencing, are most effective, with additional riding and temporary electric fencing often being less than 100% effective.

When redds have been documented to occur within a pasture, MNF staff will communicate the location of the redds to the permittee within 24 hours and provide a location map no later than 72 hours. If grazing is not already occurring yet planned prior to July 1 (MCR steelhead) or after August 15 (CR bull trout), direction to the permittee to eliminate interaction between livestock use and redds in that pasture will be documented within 72 hours. Redd protection measures can be decided upon through discussion and communication with the permittees, but must involve the Ranger District Fisheries Biologist, the Forest Fish Biologist, or the

Forest Consultation Biologist. Implementation of the redd protection measures, whether fencing, movement of livestock off the pasture, or other effective and agreed upon method, including a combination of methods, will be reviewed in the field and communicated to the services within 24 hours after notifying the permittee that redds have been located in a pasture with grazing. Because the effectiveness of redd protection measures varies, the MNF will annually review the measures taken for the purposes of eliminating those (on a pasture basis). Failure in one year will trigger adaptive management the following year in that specific pasture to avoid interaction with redds. Specific permanent exclusion fencing that is part of the 2023-2027 proposed actions to protect stream reaches with redds are described in detail in the allotment and pasture descriptions where it is occurring.

ADAPTIVE MANAGEMENT

As noted above, monitoring is a key aspect of adaptive management. Move trigger monitoring needs to be conducted in addition to end of actual use monitoring. End of use monitoring occurs promptly following livestock pasture off dates to observe if the current grazing management is meeting standards or if any of the listed adaptive management strategies need to be implemented. Monitoring is the responsibility of the MNF, with participation from the permittees encouraged.

An adaptive management strategy is appropriate in dynamic situations, such as livestock grazing. Adaptive management is designed to provide the MNF the ability to make annual livestock grazing management decisions based on new information, changing ground conditions, or the result of any of the monitoring discussed above. Adaptive management is intended to ensure: 1) Forest Plan standards and guidelines are being met, 2) sites not at desired conditions have an upward trend, toward attainment of RMO's, and 3) ESA consultation direction with the Services are met.

When mid-season trigger data and/or annual end of grazing use data is collected and shows a need for change in livestock management, the MNF will implement management adjustments (e.g. livestock numbers, timing, duration of grazing, and/or rest). Making adjustments to ensure that end of grazing use indicators are not exceeded is intended to result in positive effects to habitat indicators and therefore to CH in the long-term. Such adjustments should also have beneficial effects to the species, as many adaptive management adjustments will reduce the time that livestock are in or adjacent to streams and RHCA's.

Under the proposed action, the MNF and permittees will jointly implement needed adaptive management options for the management of livestock grazing on an allotment (Table 33). The goal of implementing the management strategy components will be to achieve and maintain sustainable grazing systems on the allotment, while allowing riparian conditions to move in the direction of meeting desired conditions and RMO's at a **near natural rate of recovery**. The objective is to have grazing management more proactive, generating long-term solutions to recurrent problems rather than reactive responses to immediate crises. Success will be gauged in the short term as meeting annual use indicators and in the long term to allow for sites not in a desired condition to have an upward trend and to meet requirements for aquatic resources directed by the MNF LRMP.

Table 33. Adaptive Management Options

	Possible Grazing Management Actions
A	Implement a different grazing system within grazing permit dates, and/or change number of pastures. As example, options include deferred rotation in 2, 3, 4, or more pastures, rest-rotation, or short-duration spring grazing to meet resource objectives on the allotment (may include use of permittees private land in the rotation).
B*	Modify annual grazing use indicators or add other indicators as needed to facilitate achievement of objectives and desired conditions.

Possible Grazing Management Actions	
C*	Construct new permanent water development to influence livestock distribution (wells and pipelines, and use of solar pumps).
D	Remove existing water development to influence livestock distribution.
E	Construct fence to exclude livestock from areas of concern (springs, seeps, riparian, ESA critical habitat, Region 6 sensitive species sites, species of local concern, hardwoods, heritage site, or other).
F	Implement specific dates of use or nonuse to protect areas of concern.
G*	Construct permanent fence to influence livestock distribution.
H	Use temporary electric fence for short-term control of livestock distribution.
I*	Remove (permanent or temporary) fence to influence livestock distribution.
J	Use of range rider (herding) to control livestock movement (distribution).
K	Change class of livestock (i.e., cow/calf to yearling)—do not exceed permitted animal unit months or stocking rate.
L	Rest from livestock grazing for one or more seasons.
M	Change the permitted livestock number, permitted animal unit months and/or season of use until monitoring or inventory data shows endpoint indicators can be met. .
N	Do not allow livestock grazing in a pasture or allotment.
O*	Change allotment or pasture boundaries.
P	Use salt or other supplements to draw livestock toward or away from specific areas.
Q	Move existing water developments, if feasible, away from streams and springs.
R*	Fell and jackstraw trees to reduce livestock impacts to areas of concern.
S	Harden water gaps or stream crossings, and/or stock pond berms.
T	Restrict access and/or use until after June 30 avoid MCR Steelhead spawning or after August 15 to avoid bull trout spawning and to reduce impacts to Critical Habitat.
U	Expand monitoring for spawning and rearing to better document use of stream reaches, whether designated critical habitat or not.

*If these are used, may require new NEPA decision or re-initiation of Section 7 Consultation.

If adaptive management changes are needed those changes must be documented in the AOIs for that permit, shared with the Level 1 team, and reported in the Annual End of Year report. Changes may involve any of the items listed above in Table 33. Changes that are outside of permit terms and conditions may require a documented agreement or permit modification and concurrence by the line officer. Needs for other structural or non-structural range improvements or for site-rehabilitation efforts may be identified and will require an IDT review and District Ranger decision or may require additional NEPA review and/or ESA consultation.

FENCE MAINTENANCE

As part of the grazing permit and associated ESA proposed action, Livestock Grazing Permittees are responsible for maintenance of perimeter allotment fences, interior pasture fences, and for all exclosure fences which are primarily intended to protect critical habitat, springs, and riparian areas from grazing and are related to grazing management. The MNF will be responsible for maintenance of exclosure fences established for aspen, recreation, wildlife or other uses not related to livestock grazing management. All fences are to be assessed, and repairs made where necessary before turnout (including fences that are the responsibility of the Forest Service).

Documentation of existing fences and maintenance responsibilities are identified in the grazing permit Part 3. As new livestock management fences are constructed, Term Grazing Permit modifications will assign maintenance responsibility to Livestock Grazing Permittee(s). Existing fences, if not already assigned maintenance responsibility, will be assigned to the appropriate permittee(s) within two years through Term Grazing Permit modifications. All Term Grazing Permit modifications will follow Forest Service Handbook Direction, and be tracked and updated electronically (e.g. the digital grazing map and corporate database), along with hard copies as appropriate in the range file.

Permittees shall notify District Range Staff of completed pre-season and in-season fence inspections and maintenance. Notifications to District Range Staff may be made by documented phone calls, emails, texts, notes, or other forms of documentation. Completed maintenance will be documented by range staff in allotment files along with any MNF inspection results. All fences must be maintained to established specification(s) prior to turn-out in a pasture/allotment and for each subsequent pasture used throughout the

grazing season. In the event that a neighboring allotment and/or pasture is grazed prior to turn-out of a permittee, the permittee who has maintenance responsibilities of the boundary fences is required to make necessary repairs prior to the neighbor's turn-out.

Where maintenance issues occur during the grazing season and are outside the control of the Permittees (for example wildlife damage or wildfire), District Range Staff shall be notified. A cooperative plan of action to remedy the maintenance issue will be mutually agreed upon by the Permittee, District Range staff, and other staff as needed (e.g. fisheries, wildlife or recreation), approved by the District Ranger, and shall then be remedied as soon as possible. The remedy action will be documented to the range file. If there is minor wildlife damage the fence will be repaired by MNF range staff or by the permittee as soon as identified and not require a plan. If the maintenance issue is caused by wildfire, then it may not be remedied until the next year or a later year prior to grazing resuming on the allotment or pasture.

Fences near the end of their useful life will be discussed routinely at spring permittee meetings and put on a schedule for re-construction. New construction and re-construction are to be documented in the corporate database for range activities (currently INFRA) in the same year as completed and documented in the AOIs. Maps showing newly constructed fences will be provided by the MNF to the Level 1 Team.

Failure to comply with the above conditions shall constitute Fence Maintenance Non-Compliance. A Fence Maintenance Non-Compliance letter will be prepared and sent to the Permittee and to the Services at the time of issue, as well as copied in the Year End Report. Corrective action to remedy the Fence Maintenance Non-Compliance shall be completed as soon as possible, but in no more than seven (7) days (unless a longer time period has been agreed upon and documented between the permittee, the rangeland management specialist, and the line officer). Shorter critical sections of fence protecting an actively grazed pasture must be fixed within 72 hours or less.

If the Fence Maintenance Non-Compliance is not remedied within that timeframe, livestock would be required to be removed from the pasture, or no livestock grazing will be authorized to start grazing in the pasture where non-compliance exists. If the fence maintenance is for a substantial portion of fence that requires more than 7 days to comply or if livestock are already in the pasture/allotment where the Fence Maintenance Non-Compliance exists; they will be promptly gathered and rotated to the next pasture with properly maintained fences in the grazing rotation. If the pasture/allotment where the Fence Maintenance Non-Compliance exists is the last pasture in the grazing rotation, livestock will be promptly removed from the allotment. Failure to remedy Fence Maintenance Non-Compliance within the seven (7) day timeline (unless as stated above a longer time period has been agreed upon and documented between the permittee, the rangeland management specialist, and the line officer) may have additional impacts to other Terms and Conditions for grazing use within the allotment.

If Fence Maintenance Non-Compliance occurs in more than two grazing seasons during the five year consultation period (years do not need to be concurrent), the pasture/allotment where the non-compliance occurred may be rested and re-initiation of consultation with the Services will be completed prior authorizing grazing. The Services, Permittees, District Ranger and Range/Aquatics staff will be included in the discussion of how the non-compliance shall be remedied. All permit violations and non-compliance issues will follow the guidance in the Grazing Permit Administration Handbook (FSH 2209.13).

COMPLIANCE STRATEGY FOR THE STREAMBANK ALTERATION ENDPOINT INDICATOR 2023-2027

As stated above an ESA monitoring (MIM) DMA will be established by a District ID Team prior to the 2018 grazing season in any pastures containing MCR steelhead or bull trout CH that currently do not have a DMA

established, using the MIM Technical Reference 1737-23 (2011) for 'how to establish a DMA'. A photo of the DMA and identifying landscape features (e.g. local hill slope profile, major trees, or boulders) with an upstream and downstream view will be taken each year from a consistent GPS point or a fixed monument.

Bank alteration move triggers are established and used to indicate the need to move livestock to avoid exceedances of the indicator. Livestock will begin moving to the next pasture (or off the allotment when they are in the last pasture in the rotation) when the move trigger for bank alteration or stubble height is reached. For each pasture where the level of streambank alteration exceeds the standards as stated below, the line officer and ID Teams shall identify, incorporate, and document adaptive management strategies into the following season's grazing strategy which may include: adjustments to: livestock numbers, timing of grazing, duration of grazing, or rest.

1. Measured bank alteration up to 6% over the endpoint indicator (at end of use) of 15% for CH with MSRA, 20% for CH only (16 - 21% for CH/MSRA and 20 - 26% for CH): The permittee will be contacted within 24 hours or sooner via phone or in person to notify them of the monitoring results. A letter of non-compliance will be sent to the permittee requiring a remedy of the situation within the following year. The letter will include the corrective action to demonstrate compliance (e.g. to what standard), the timeframe of remedial action, and consequences for failure to comply (FSH 2209.13). A copy of the non-compliance letter will also be sent to the Services (NMFS and USFWS) and be included as an appendix in the annual EOY report.

   a. If the above occurs a second time during the life of the BO (does not have to be consecutive years), the District Ranger may initiate suspension or cancellation of part of the permit, including a reduction in the days of use for the allotment the next year, or the number of livestock permitted and/or complete rest of the specific pasture for one year, or a combination of those options. The previous letter of non-compliance shall be the basis of action remedies to repeated incidences of non-compliance. The suspension or cancellation remedy shall be documented in a letter that will also be sent to the Services and included as an appendix in the annual EOY report.

2. When streambank alteration is measured in excess of 6% over the endpoint indicator (at end of use) of 15% for CH with MSRA, 20% for CH only (21% for CH/MSRA and 26% for CH): The permittee will be contacted within 24 hours or sooner via phone or in person to notify them of the monitoring results. A letter of non-compliance will be sent to the permittee and will include the corrective action to demonstrate compliance (e.g. to what standard), the timeframe of remedial action, and consequences for failure to comply (FSH 2209.13). A copy of the non-compliance letter will also be sent to the Services (NMFS and USFWS) as well as be included in the annual EOY report. Corrective action may include one or more of the following: 1) a reduction in the days of use for the allotment the next year, 2) reduction of the number of livestock permitted or 3) complete rest of the specific pasture for at least one year. The AUM/HMs will be reduced from the total numbers authorized in the year the exceedance occurred, and implemented the following grazing year.

   a. If exceedance (non-compliance) from number 2 above occurs two (2) years of five in any pasture within an allotment (does not have to be consecutive years) or if the exceedance occurs in multiple pastures in one year on an allotment, the District Ranger may initiate suspension or cancellation that includes a three year reduction in the days of use for the allotment, or the number of livestock permitted and/or complete rest of the specific pasture(s), or a combination of those options. The three year time frame will be applied regardless of what year in the Biological Opinion (BO) these non-compliances occur. If non-use occurs towards the end of the current 2023-2027 BO, the pasture rest and allotment Animal Unit Month (AUM) reduction will continue into the new consultation. The original letter of non-compliance regarding alteration in excess of 6% over the endpoint indicator shall be the basis of corrective action for repeated incidences of similar non-compliance. The

suspension or cancellation remedy shall be documented in a letter that will also be sent to the Services and included as an appendix in the annual EOY report.

3. If there are multiple exceedances in an allotment in any given year, depending on the severity of 1-6% or over 6%, see number one or two above. If violations persist, partial to total cancellation is appropriate (FSH 2209.13).

COMPLIANCE STRATEGY FOR THE STUBBLE HEIGHT ENDPOINT INDICATOR 2023-2027

Stubble height move triggers are established and used to indicate the need to move livestock to avoid exceedances of the indicator. Livestock will begin moving to the next pasture (or off the allotment when they are in the last pasture in the rotation) when the move trigger for stubble height or bank alteration is reached. For each level of stubble height exceedance in the 2023-2027 consultation, the line officer and Interdisciplinary (ID) Teams shall identify, incorporate, and document adaptive management strategies into the following season's grazing strategy which may include: adjustments to: livestock numbers, timing of grazing, duration of grazing, or rest.

1. Measured stubble height under the endpoint indicator (end of use) of six inches at one or more monitoring locations on an allotment in one year: The permittee will be promptly contacted via phone or in person to notify them of the monitoring results. A letter of non-compliance will be sent to the permittee with one year to remedy the situation and will include the corrective action to demonstrate compliance to six inches, the timeframe of remedial action, and consequences for failure to comply (FSH 2209.13). A copy of the non-compliance letter will be sent to the Services and included as an appendix in the annual EOY report.

b. If the above occurs a second time in a location previously exceeded in an allotment during the life of the BO (does not have to be consecutive years), the District Ranger may initiate suspension or cancellation of part of the permit, including a reduction in the days of use for the allotment the next year, or the number of livestock permitted and/or complete rest of the specific pasture for one year, or a combination of those options. At a minimum the corrective action will include less numbers and a reduction in days of use for the allotment. The AUM/HMs will be reduced from the total numbers authorized in the year the exceedance occurred. The previous letter of non-compliance shall be the basis of action remedies to repeated incidences of non-compliance. The suspension or cancellation remedy shall be documented in a letter that will also be sent to the Services and included as an appendix in the annual EOY report. A copy of the letter will be sent to the Services at the same time as the permittee and included as an appendix in the annual EOY report.

2. If exceedance (non-compliance) from number 1 above occurs two or more years (does not have to be consecutive) on an allotment, the District Ranger may initiate suspension or cancellation, in whole or in part, of the permit, including a reduction in the days of use for the allotment the next three years regardless of what year in the BO this occurs. The corrective action will include a reduction in the number of livestock permitted and/or complete rest of specific pastures for three years, or a combination of those options. At a minimum the corrective action will include less numbers and a reduction in days of use for the allotment. The AUM/HMs will be reduced from the total numbers authorized in the most recent year the exceedance(s) occurred. If, non-use occurs towards the end of the current BO, the pasture rest and allotment AUM reduction will continue into the new consultation.

If a combination of stubble height, bank alteration indicator exceedances, or lack of fence maintenance occurs in an allotment, the permit violations are not considered minor. A letter of non-compliance will be issued with the specific actions required of the permittee to remedy the non-compliance, the timeframe for the action, and the consequences of the failure to comply. Recurring non-compliance of more than one indicator in time (more than one in five years) or space (multiple pastures in one allotment) or

continued documented lack of fence maintenance shall lead to suspension or cancellation in part or whole of the Term Grazing Permit. Permit action involving the suspension or cancelation of grazing permits would be carried out as per direction outlined in FSH 2209.13 and 36 CFR 222.4.

EXCESS USE

Excess Use is defined as any livestock owned by the holder of a National Forest System grazing permit, but grazing on National Forest System lands in greater numbers, at times, or in places other than permitted in Part 1 of the grazing permit or authorized on the annual Bill for Collection, including any modifications made by the authorized officer. Failure to remove livestock at the end of the authorized grazing season or when instructed by the authorized officer is also defined as excess use.

If excess grazing use occurs within any exclosure, pasture, or allotment containing critical habitat, the Permittee will be promptly notified and given 72 hours to remedy the situation. While 72 hours is the Forest Service Handbook guideline for the Notice of Non-Compliance and Opportunity to Remedy excess use (FSH 2209.13 Chapter 10 Section 16.2e). A second occurrence of excess use may result in a 25% or more suspension of permitted numbers or seasons for a period of at least two years.

For any case of excess use the District Ranger or their representative will be notified. District Range and Fishery staff will then conduct a field inspection to document the excess grazing use through ocular observations, photos and if warranted MIM endpoint indicators. The excess grazing use will be resolved if field inspections show no exceedances of any ESA required MIM indicators (stubble height, woody browse, stream bank alteration), and the Permittee remedies the situation within 72 hours. Documentation of the excess grazing use and the inspection report would then be placed in the Range Allotment File and included in the End of Year report.

If field inspections show the potential for exceedance of any one of the three ESA required indicators (stubble height, woody browse, and stream bank alteration) the three indicators will be measured according to the MIM Technical Reference. Additional MIM indicators may also be collected (e.g. woody species age class). The results of the indicator monitoring, photos, and documented Permittee communication will be sent to the Services within 72 hours. All inspection reports should be provided to the Permittee in a timely manner (FSH 2009.13, Section 19.4). Documentation will also be included in the End of Year report.

If the excess grazing use is not resolved by the Permittee within 72 hours, or if the issue is a repeated or cumulative offense; formal administrative action will be taken following FS Handbook direction. Formal action includes providing the permittee with clear, documented explanation in a Notice of Non-Compliance (NONC) letter. The NONC letter shall specify the action required to remedy the non-compliance, the timeframe to comply, and the consequences for failure to comply. The permittee will have an opportunity to correct the situation and bring their permit back into compliance in the same year. If the original non-compliance occurs a second time, or if the non-compliance has not been remedied as specified, the Permittee will receive a notice of permit action for non-compliance. Formal action could include suspension of a portion of permitted numbers or a reduction in the grazing season for a minimum of one year. The MNF will document when compliance has been achieved (see FSH 2209.13). Documentation would be put into the Range Allotment File and included in the End of the Year report.

Severe cases may result in following the Forest Service Handbook guidelines at Section 16.2d, which expressly states that an exception to written notice of non-compliance and opportunity for remedy may be reasonable based on violations of permit terms and conditions that adversely impact species listed under the ESA or their critical habitat.

KEY COMMUNICATION BETWEEN THE MNF AND THE PERMITTEES

The Forest Service Handbook 2209.13 Chapter 10, section 19 directs General Administration of Grazing Permits. Documentation of allotment inspections and monitoring shall be done electronically using the format in the Forest Service corporate database. Permittees must be notified in person or by telephone of any items needing immediate attention. The inspection notes are filed in the official 2230 permit folder with copies sent to the permittees. The documentation serves as a basis for discussions with permittees regarding corrective actions to ensure compliance, completion of annual reporting, development of AOIs for the next grazing season, and documenting permittees contributions to management success.

The direction states that Forest Plan standards, including those pertaining to livestock grazing and fisheries or riparian habitat, will be the basis of monitoring and administering Part 3 of the grazing permit. Permittees are responsible for meeting the terms and conditions of the grazing permit and moving livestock to ensure compliance with management guidelines. Agency personnel are responsible for ensuring permittees comply with grazing permit terms and conditions and performing monitoring to determine if objectives are being met. Compliance determinations should be documented electronically on appropriate inspections forms and in letters to the permittee. Where Forest Plan standards were not met, the authorized officer should identify corrective actions that will result in improved management in the next grazing season. A determination of compliance will not be made if an allotment did not receive a physical inspection by a technically qualified agency employee during or after the grazing season.

After almost twenty years of ESA consultation for livestock grazing's effects on steelhead and bull trout on the MNF, each period of renewed ESA consultation has built upon previous experience of both agency staff and permittees, including a Situation Assessment by the National Riparian Service Team in 2009 and many years of litigation over grazing impacts. The results of administration of the previous six years (2012-2017), together with review of the Biological Assessments submitted to the NMFS and the U.S. FWS, are placing a renewed emphasis on prompt and clear lines of communication for certain actions and information sharing and documentation.

The emphasis includes documenting the context for actions related to grazing management as appropriate, for example when did the action occur (date), where did it occur (Ranger District, allotment, pasture, and stream), why did it occur, what will be done as a result of the action (remedy, corrective action, or path forward), and how is the occurrence and remedy documented. The actions of concern are in regards to pastures with critical habitat or the documented presence (seasonal or otherwise) by listed fishes, and specifically include:

- **Cows in pastures past off dates** (see Excess Use section above)
- **Infrastructure maintenance and updates (GPS, maps, additions)** – the annual list produced at the spring grazing meetings with the permittees will serve as the documentation of annual infrastructure maintenance and updates. The Forest's Range Specialist is responsible for keeping records of the location of range improvements in the permittees file, and is responsible for updating information into the INFRA database as pertains to infrastructure updates, such as fences. When poorly maintained infrastructure is documented by non-range personnel the information will be documented in an e-mail provided to the range specialist.
- **Unauthorized grazing** are those animals not authorized by a permit (e.g. private land cows that have wandered onto Forest land and the owner is not a permittee). If cows are not promptly identified and removed by the owner, then unauthorized grazing is most commonly addressed as a law enforcement issue.
- **Move triggers monitored** – monitoring results will be documented within five working days and available in internally shared electronic file folders. Where move trigger or mid-season monitoring

indicates that move triggers are hit or are being exceeded, the permittee is notified in person or by phone within 24 hours. The follow up documentation of the communication is on an Allotment Inspection form and scanned or electronically filled out and filed in the allotment file and shared with the permittee.

- **Overgrazing and exceedances outside of CH/MSRA/or PIBO/MIM DMAs –** exceedances in either uplands or outside of critical habitat which are severe could be considered as failure to follow management instructions and would follow the 72 hours of notice to notify the permittee of non-compliance. Exceedances would be documented by the district range staff, although initial notes, photos, or locations may be documented by non-range staff in an e-mail to the range staff. It is the responsibility of the range staff to determine if Forest Plan standards are not being implemented and to work with permittees either informally or formally, depending on the violation and corrective actions identified for follow up.
- Concentrated use resulting in adverse impacts to riparian restoration projects, including cattle use where riparian regrowth or hardwood re-establishment is occurring – annual meetings with the permittees will review any restoration implementation that will occur within an allotment in the upcoming year including prescribed fire, stream or floodplain restoration, riparian plantings, or riparian thinning to establish hardwoods. The discussion will be documented and the remedy to avoid impacts to restoration investments will be identified in the meeting notes and the annual AOI letter. Remedies may include temporary (1-3 years) exclusion by fencing, rest of a pasture for a season, modification of timing of grazing, or other solutions proposed by the permittee or the Ranger District ID team.
- **Vandalism on pasture infrastructure (gates open, fences removed, salt blocks moved, hunters' salt areas)** – Reoccurring problems or unauthorized actions which result in resource impacts will be documented by either the permittee, the Forest's range staff, or other MNF personnel (who will report the problem to the range staff). MNF personnel must document the issue to the range staff or District Ranger with a photo and a description of the location within 48 hours of finding a problem. Both the project or action and the remedy will be documented by the range staff for notification of the permittee and inclusion in the EOY report.
- **Redd locations and protection** – If there is no grazing in a pasture with CH and spawning activity, then redd surveys are not necessary. The critical applicable dates are avoiding grazing before June 30th for steelhead spawning streams and after August 15th for bull trout spawning streams. If grazing is planned, then redd surveys in CH will occur and will be documented before grazing occurs in that pasture. Permittees will be notified with a phone call or e-mail, and a map within 48 hours of documenting redds. The protection strategy for the redds will be agreed upon and documented by the Ranger District fisheries staff in cooperation with the rangeland management specialist, and the documentation will be provided to the permittee and to the MNF ESA Consultation Biologist or Forest Fisheries Biologist within a week of documenting the redds. The information will be included in the EOY report provided to NMFS and USFWS. If redd protection measures are observed to be ineffective see Redd trampling below.
- **Redd trampling** – Redd trampling will be documented by photos, a location description by GPS. The permittee will be notified promptly, no more than 24 hours after locating the redds. If the redds are trampled, NMFS and/or USFWS will be notified within 24 hours of the trampling being identified. Cattle will be removed from the pasture immediately, but not to exceed 24 hours after redd trampling documentation. This action will cause re-initiation of consultation for that allotment in order to document where it occurred, the extent (number of redds), photographic evidence of cattle use in the immediate area, and when action was taken to remove the cattle. The letter and attachments documenting the trampling and the response will be provided to NMFS and/or USFWS within 72 hours of the trampling being discovered. Copies of re-initiation correspondence will also be sent to the Livestock Grazing Permittee and added to the range permit file. .

- **Monitoring crew (schedule, reports, outcome that create letters to permittees)** Monitoring schedules will be shared with permittees starting in June. Adjustments to the monitoring schedules are likely to occur and the monitoring team leader or Ranger District ID Team is responsible for keeping an updated schedule which will be shared with permittees prior to monitoring. Data that indicates whether permit terms and conditions are being met or exceeded will be shared with permittees within 7 working days. If livestock are still in the pasture beyond the authorized date and exceedances exist, the notification for removal will be prompt (no more than 24 hours). The monitoring results and all information in the EOY report will be made available upon request to permittees. PIBO data reports will also be available to permittees upon request and as the PIBO reports become updated or available.
- **Providing ranchers an opportunity for instruction or review of monitoring techniques and objectives-** The MNF must provide opportunities for clear understanding by permittees and agency personnel of how Forest Plan compliance is monitored, including specifics that are part of ESA consultation. At least one structured group field day per year focused on monitoring will be offered to permittees with attendance by MNF interdisciplinary staff (fisheries biologists, hydrologists, technical fisheries or watershed personnel, range specialists, and botanists or ecologists). NMFS and USFWS Level 1 team members will also be invited. Permittees will continue to be notified of routine monitoring inspections to their allotments so that they can participate as time permits.

KEY COMMUNICATION BETWEEN THE MNF AND THE SERVICES

The MNF and the Services use the ESA Level 1 team and the interagency consultation streamlining process for communication around ESA listed species and their designated critical habitat. The Level 1 team is an interagency group of field staff with a variety of expertise and agency responsibility. There are monthly Level 1 office meetings with additional field visits in the summer and early fall. The team can meet on an ad hoc basis if needed for urgent or unforeseen high priority actions, in addition to the reviewing action plans, BAs, and draft BOs. The goal of this process is to produce adequate BAs that will facilitate and expedite issuance of a BO or concurrence letter (1999 Interagency Streamlined Consultation Procedures). However, in October of 2022 National Marine Fisheries Service informed the USFS that streamlining expedited timelines would not apply to this (2023-2027) consultation.

Upon review of the grazing Biological Assessments submitted to the National Marine Fisheries Service and the U.S. Fish and Wildlife Service in June of 2017, and as a result of Level 1 and Level 2 field reviews in 2017, a renewed emphasis on prompt and clear lines of internal and external agency communication, interdisciplinary accountability, and livestock grazing program record keeping was requested. The context for addressing some of the actions includes (as appropriate); what is the identified concern/issue, when did it occur, where did it occur, why did it occur, and what will be done as a result of the action (remedy or path forward), and how will it be documented. The actions of concern for the Services speak to pastures with critical habitat or the documented presence (seasonal or otherwise) by listed fishes. Specific concerns include:

- **Field trips –** As part of the late spring, summer, and early fall Level 1 Team meetings, field trips will allow for visits to allotments and pastures. These visits allow for communication across agencies and increased understanding of range issues, range condition, and the exchange of information. In general Level 1 Team meetings are not considered an open meeting to the general public. Forest Service line officers will be notified of any field trips on their units and may accompany the Level 1 Team. The Level 1 team may also request other specialists to participate, based on their expertise, including rangeland specialists, ecologists, soil scientists, wildlife biologists, or botanists. Permittees may be invited, but are not always expected to participate in the Level 1 field meeting visits.
- **Cows in pastures past off dates** (see Excess Use grazing section above)

- **Infrastructure maintenance** and updates (GPS, maps, additions) – the annual list produced at the spring grazing meetings with the permittees will serve as the documentation of annual infrastructure maintenance and updates. The Forest Service Range Specialist is responsible for keeping records of the location of range improvements in the permittees file, and is responsible for updating information into the INFRA database as pertains to infrastructure updates. All assigned infrastructure maintenance responsibilities must be located in the permit file and should be located in the range corporate database.
- **Unauthorized grazing** are those animals not authorized by a permit (e.g. private land cows that have wandered onto Forest land and the owner is not a permittee). If cows are not promptly identified and removed by the owner, then unauthorized grazing is most commonly addressed as a law enforcement issue.
- **Move triggers monitored** to determine if endpoint indicators are on target to be met or if cattle should start moving. All move trigger and endpoint indicator monitoring results will be documented within five working days and available in internally shared electronic file folders. Results will be shared with the services in the Year End Report, and prior to that at Level 1 meetings.
- **Overgrazing and exceedances outside of CH/MSRA/or PIBO/MIM DMAs** - these would be documented by the district range staff, although initial notes, photos, or locations may be documented by non-range staff in an e-mail to the range staff. It is the responsibility of the range staff to determine if Forest Plan standards are not being implemented and to work with permittees either informally or formally, depending on the violation on corrective actions for follow up. If the overgrazing or exceedances outside of CH may effect listed fish or critical habitat the information will be shared with the Services at the next Level 1 meeting.
- Vandalism on pasture infrastructure (gates open, fences removed, salt blocks moved) – see above
- **Redd locations and protection –** If there is no grazing in a pasture with CH and spawning activity, then redd surveys are not necessary. The critical applicable dates are avoiding grazing before June 30th for steelhead spawning streams and after August 15th for bull trout spawning streams. If grazing is planned, then redd surveys in CH will occur and will be documented before grazing occurs in that pasture. Permittees will be notified with a phone call or e-mail, and a map within 48 hours of documenting redds. The protection strategy for the redds will be agreed upon and documented by the Ranger District fisheries staff in cooperation with the rangeland management specialist, and the documentation will be provided to the permittee and to the MNF ESA Consultation Biologist or Forest Fisheries Biologist within a week of documenting the redds. The information will be included in the End Year report provided to NMFS and USFWS. If redd protection measures are observed to be ineffective see Redd trampling below.
- **Redd trampling** – Redd trampling will be documented by photos, a location description by GPS. The permittee will be notified promptly, no more than 24 hours after locating the redds. If the redds are trampled, NMFS and/or USFWS will be notified within 24 hours of the trampling being identified. Cattle will be removed from the pasture immediately, but not to exceed 24 hours after redd trampling documentation. This action will cause re-initiation of consultation for that allotment in order to document where it occurred, the extent (number of redds), photographic evidence of cattle use in the immediate area, and when action was taken to remove the cattle. The letter and attachments documenting the trampling and the response will be provided to NMFS and/or USFWS within 72 hours of the trampling being discovered. Copies of re-initiation correspondence will also be sent to the Livestock Grazing Permittee and added to the range permit file.
- Coordination of forest projects (including proposed vegetation treatments, prescribed fire) with grazing activities in areas that overlap – the purpose is to understand project components that may affect grazing activities and how planning considers both range and vegetation or fire components. Under this item

review of the impact that fires, floods, or other major disturbances have on grazing is also appropriate. Meetings and information exchanged would be documented as Level 1 activities.

- **Monitoring crew (schedule, reports, outcome that create letters to permittees) –** Monitoring schedules for redd surveys and ESA DMA locations will be available to the Services starting in April for the redd surveys and in June for the DMAs. Adjustments to the monitoring schedules are likely to occur and the monitoring team leader or Ranger District ID Team is responsible for keeping an updated schedule, which will be available upon request. Data that indicates whether permit terms and conditions are being met or exceeded will be shared with the Services at monthly Level 1 meetings (or if for redd trampling see timing above). The monitoring results will be compiled in the EOY report. PIBO data reports will also be available to the Services upon request and as the PIBO reports become updated or available.

Project Design Criteria (PDCs):

The following PDCs in Table 34 will be used to minimize or eliminate adverse effects of grazing on MCR steelhead, and designated CH. These PDCs are integral components of the proposed action and it's expected that all proposed grazing activities will be completed consistent with these measures.

Table 34. Grazing Livestock Project Design Criteria

#	PROJECT DESIGN CRITERIA (PDCs)
1	Permittees must maintain all assigned perimeter and interior fences (including exclosure fences related to livestock management) prior to turn-out each year. Existing exclosure fences (including those the Forest Service is responsible for) and any future riparian exclosure fences, shall be inspected and maintained each year prior to turnout of livestock. The results of fence inspections shall be reported to the Responsible Official prior to approval of yearly grazing authorization.
2	Herding and trailing of livestock will be at historically used roads or road crossing where available. Areas with saturated soils such as; springs, seep, or meadows shall be avoided.
3	Trailing will be controlled herding of livestock, where permittees actively push livestock to the next pasture.
4	Spawning surveys will occur within all pastures containing critical habitat or documented spawning streams where turnout is expected to occur prior to June 30 for steelhead and after August 15 for bull trout.
5	When redds are located permittees will be notified by the MNF range staff. Maps with redd locations will be provided by the MNF fisheries biologist or range staff prior to livestock turnout on that pasture.
6	When redds are located permittees will be notified by the MNF range staff. Maps with redd locations will be provided by the MNF fisheries biologist or range staff prior to livestock turnout on that pasture. To minimize risk of redd trampling the Forest and permittees will utilize a number of tools to protect redds, which include but are not limited to these options: deferred rotation, rest, exclusion (if water gaps are present their location and size must be reviewed and documented by the District Fish Biologist), temporary electric fences, additional riding, or no grazing in pastures till after July 1 for MCR steelhead and after Aug 15 for bull trout.
7	Complete all required monitoring (implementation and effectiveness) at MIM DMAs. The monitoring will be accomplished by an interdisciplinary team. Photos can augment but not replace MIM DMA monitoring.
8	MNF will complete and document mid-season monitoring and checks of RHCAs for livestock use in each pasture that contains MCR steelhead CH and CR bull trout.
9	Annual end of grazing use indicators will be used along with pastures off dates, spawning seasons, to dictate when livestock are to be moved from pastures.
10	The MNF Range and Aquatic staff will provide NMFS and USFWS with an End of Year Report by February 15 of each year, for the previous grazing season.
11	All existing troughs, springs and ponds to be maintained will be prioritized at spring meetings with permittees. Maintenance is required as part of the term grazing permit. The proper function of these developments is critical for livestock distribution and helps to reduce impacts to stream riparian areas.
12	Use of roads and off-road travel by permittees and Forest Service staff will follow these PDCs:

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

Murderers Creek Allotment Proposed Action

The Murderer's Creek is managed under two permittees with three separate herds making a deferred rotation difficult. The North herd always starts to the east because they are very dry pastures and the vegetation senesces early. The Middle herd also starts to the east with a smaller group to take advantage of early vegetation. The South herd begins in the east pasture both for vegetation needs and due to being managed in conjunction with the adjacent BLM and State land.

The MNF proposes to authorize livestock grazing on the Murderer's Creek allotment for the next five years, 2023-2027. The Murderer's Creek allotment is operated by two permittees, grazing three separate herds. The North herd consists of 175 cow/calf pairs with permitted use dates of 5/15-10/15, the Middle herd consists of 200 cow/calf pairs with permitted use dates of 6/1-6/30 and 300 cow/calf pairs with permitted use dates of 7/1-10/15 and the South herd consists of 400 cow/calf pairs with permitted use dates of 7/1-10/15 (. Two new riparian pastures were created, by fencing the MSRA and CH on Dans Creek and Orange Creek in the Dans Creek pasture, in 2020 and the pastures are called Dans Creek Riparian and Orange Creek Riparian pasture. A new riparian pasture was constructed in 2019 in Blue Ridge pasture excluding MSRA, in addition all MSRA was fenced in the South Fork Murderers Creek Pasture. Table 35). Pasture use dates, livestock rotations and livestock numbers are presented in the Pasture Use Table (Table 37).

These pastures do not get used more than once per year, with the exception of these gather and holding pastures: South Fork Murderer's Creek Gather, Murderers Creek Gather, Tex Creek Gather John Young Cow Camp.

> **North Herd** (175 cow/calf pairs) grazes Red Rocks, Martin Corrals, Oregon Mine, Oregon Mine Campground, Murderer's Creek Gather, Tex Creek Gather, and Dan's Creek pastures.
>
> **Middle Herd** (300 cow/calf pairs) grazes Timber Mountain, Blue Ridge, Horse Mountain, South Fork Murderer's Creek Gather, Antelope exclosure, and Antelope Spring, pastures.
>
> **South Herd** (400 cow/calf pairs) grazes John Young Meadow, John Young Cow Camp, Deer Creek, and Frenchy Butte.

This allotment includes both trailing and gather pastures. These pastures are small in size and are used as overnight or short term stays when livestock are trailed into or out of the allotment, as well as to facilitate moves within the allotment. Pasture dates and rotations are approximations and will be readdressed on a yearly basis to ensure proper use. . Two new riparian pastures were created, by fencing the MSRA and CH on Dans Creek and Orange Creek in the Dans Creek pasture, in 2020 and the pastures are called Dans Creek Riparian and Orange Creek Riparian pasture. A new riparian pasture was constructed in 2019 in Blue Ridge pasture excluding MSRA, in addition all MSRA was fenced in the South Fork Murderers Creek Pasture. Table 35 Murderer's Creek Allotment Permit and Permit Information.

Permit #	Permit Exp. Date	Total Acres	Permitted Number of Livestock C/C/AUMs/HMs[1]	Permit Season Begin and End Dates
0604010064	12/31/31	21,727	175/1162/886	5/15-10/15
0604010050	12/31/2028	13,093	200/260/197	6/1-6/30
		13,093	300/929/1055	7/1-10/15

[1] An AUM is calculated as the number of days the cattle are grazing a pasture multiplied by the number of cow/calf (1.32), then divided by 30.4167 (which is the average number of days in a month over a year), and rounded up to the whole AUM). A headmonth (HM) is one cow/calf pair for one month. Because the HM is the official unit of measurement for permitting on USFS lands, this BA is including both AUM and HM numbers. The AUMs and HMs as presented are interchangeable, meaning there is no increase or decrease in the permitted number of livestock on the allotments.

0604010064	12/31/31	27,941	400/1857/1407	5/15-10/15
		27,941	4/26/22	5/15-10/30

Proposed Pasture Use 2023-2024

North Herd (175 cow/calf pairs)

Red Rocks, Martin Corrals and Oregon Mine pastures *17,753 acres*- Contains approximately 21.36 miles of MCR steelhead CH and 6 miles of MSRA (Martin Corrals and Oregon Mine pastures). Fences were burned in this allotment in 2004 and due to non-use were never rebuilt. Consequently, they are now managed as one pasture. 175 c/c pairs will enter the pastures as early as 5/15 and remain for 115 to 130 days. There is a MIM DMA located in the Oregon Mine pasture along Murderer's Creek which is the only MSRA stream in these pastures (Appendix A). An additional MIM DMA is in the Oregon Mine pasture along Thorn Creek within CH. In 2018, it was proposed to fence and exclude Murderers Creek in this allotment. This fence is still proposed, but is subject to NEPA review and funding.

Oregon Mine Campground pasture *38 acres*- Contains approximately 0.35 miles of MCR steelhead CH and 0.35 miles of MSRA. This pasture contains a maintained campground In an effort to keep cattle out of this campground, this pasture will typically only be used for trailing to facilitate movement of cattle to and from these pastures along the road.175 c/c will trail through this pasture twice. This will occur between 5/15-6/1. At the end of the season of use for these pastures, these cattle will trail back through this pasture between 9/15-10/15.

Dan's Creek pasture *3,686 acres*- Does not contain any MCR steelhead CH or MSRA. 175 c/c enter the pasture and stay for approximately 35 days. There was a MIM DMA along Dan's Creek that has been excluded from livestock use when the Dan's Creek Riparian Pasture was built in 2020.

Dan's Creek Riparian pasture *11 acres* – contains approximately 0.75 miles of MCR steelhead CH and 0.75 miles of MSRA. There is a MIM DMA along Dan's Creek in this pasture. This pasture is now rested and not authorized to be grazed to protect MSRA reaches

Orange Creek Riparian pasture *7 acres* **-**contains approximately 0.55 miles of MCR steelhead CH and 0 miles of MSRA. This pasture is rested and not authorized to be grazed.

Murderer's Creek Gather pasture 74 acres- Contains approximately 0.82 miles of MCR steelhead CH and 0.83 miles of MSRA. This is a gather pasture and is utilized for short durations while cattle are being moved on and off the allotment. This pasture also contains a set of corrals which are pivotal to management. It is used for approximately 14-day days during each turn on and turn off between the dates of 5/15 and 10/15. This pasture was administratively moved into the Murderers Creek Allotment from Fields Peak Allotment in 2020. There is a MIM DMA located on Murderer's Creek.

Tex Creek Gather pasture 158 acres- Contains approximately 0.03 (150ft) of MCR steelhead CH and 0.03 (150ft) miles of MSRA. This pasture contains approximately 90 acres of land owned by the State including all the critical habitat streams, except for a 150ft water gap on Murderers Creek. The FS land in this pasture is all upland, with the exception of the water gap. The State-owned land within this pasture is managed by the state and is used in conjunction with this allotment for short durations while cattle are being moved between pastures. This pasture is used for approximately 14-day periods for pasture moves between the dates of 6/15 and 10/15. This pasture was administratively moved into the Murderers Creek Allotment from Fields Peak Allotment.

Middle Herd (300 cow/calf pairs)

Timber Mountain pasture *5,028 acres*- Contains approximately 1.61 miles of MCR steelhead CH and 0 miles of MSRA. It is typically the first pasture in the rotation, 200 c/c pairs enter the pasture and remain for approximately 30 days. There is a Photo Point located at a DMA on Crazy Creek within the pasture.

South Fork Exclosure *154 acres*- contains approximately 0.79 miles of MCR steelhead CH and 0.77 miles of MSRA. This is an exclosure and will not be authorized for grazing.

Horse Mountain pasture *4,085 acres*- contains 0 miles of MCR steelhead CH and 0 miles of MSRA Cattle can no longer access the CH and MSRA along South Fork Murderer's Creek except for two water gaps due to a riparian pasture that was built in 2011. 300 c/c pairs enter this pasture and remain for approximately 45 days.

Horse Mountain Exclosure *57 acres*- contains approximately 1.82 miles of MCR steelhead CH and 1.82 miles of MSRA that was formerly counted in Horse Mountain pasture. This is an exclosure and will not be authorized for grazing.

Blue Ridge and Antelope Springs pasture *7,981 acres*- Contains approximately 2.66 miles of MCR steelhead CH and 0.50 miles of MSRA and are managed as one pasture. 300 c/c pairs will enter the pasture and remain for approximately 45 days. All MSRA was fenced within this pasture in 2019.

South Fork Murderer's Creek gather pasture *61 acres*- contains approximately 0.45 miles of MCR steelhead CH and 16 feet of MSRA in a water gap, remaining MSRA is not accessible to cattle due to exclusion fencing. This is a gather pasture and is utilized for short durations while cattle are being moved from pasture to pasture. .

Bark Cabin Exclosure *9 acres*- Contains approximately 0.11 miles of MCR steelhead CH and no MSRA. This is an exclosure and will not be authorized for grazing.

Blue Creek Unit Exclosures *12 acres*- Contains approximately 0.73 miles of MCR steelhead CH and 0.61 miles of MSRA. There are 4 small pastures combined as one unit. This unit is exclosures and will not be authorized for grazing.

Antelope exclosure pasture *2 acres* - Contains 0 miles of MCR steelhead CH and 0 miles of MSRA. This pasture will not be grazed and is not included in the rotation.

South Herd (400 cow/calf pairs)

John Young Meadow pasture *707 acres*- Contains approximately 0.09 miles of MCR steelhead CH and 0.08 miles of MSRA. 400 c/c pairs will enter the pasture and remain for approximately 14-21 days in rotation with the other pastures. There is a MIM DMA located on South Fork Murderer's Creek (Appendix A).

John Young Cow Camp pasture *286 acres*- contains no MCR steelhead CH and no MSRA. The CH along South Fork Murderer's Creek has been excluded from livestock use with the exception of a water-gap. Approximately half of this pasture is comprised of State lands, including CH which is unfenced. This pasture is used both as a mid-season gather pasture as well as an end of season holding pasture as a set of corrals are located here. 400 c/c pairs use this pasture for seven days at the end of the season.

Frenchy Butte pasture *13,047 acres*- Contains approximately 9.98 miles of MCR steelhead CH and 7.52 miles of MSRA. This pasture is used approximately 45 days. There is a MIM DMA located on Deer Creek within MSRA (Appendix A).

Deer Creek pasture *13,855 acres*- Contains approximately 8.95 miles of MCR steelhead CH and 6.91 miles of MSRA. This pasture is used for approximately 45 days. There is a PIBO – K site and MIM DMA located on Deer Creek within MSRA (Appendix A).

Watershed pasture *23 acres*- Contains approximately 0.48 miles of MCR steelhead CH and 0.48 miles of MSRA. This pasture will be rested and not authorized for grazing for the life of this consultation (2023-2027)

Deer Creek Guard Station pasture *12 acres*- Contains no MCR steelhead CH or MSRA. This pasture will be rested and not authorized for grazing for the life of this consultation (2023-2027)

Deer Creek Horse Pasture *7 acres*- Contains no MCR steelhead CH or MSRA. This is a horse pasture not typically grazed; not included in rotation, used recreationally with the Guard Station.

Vester Creek (exclosure) *4 acres*- Contains 0.40 miles of MCR steelhead CH and no MSRA. This pasture will be rested and not authorized for grazing for the life of this consultation (2023-2027).

Table 36 MCR steelhead, miles of critical habitat by pasture in the Murderers Creek Allotment within the Endangered Species Act Action Area

Pasture Name	Stream Name	Steelhead Critical Habitat (Miles)	MSRA (miles)
Timber Mountain	Crazy Creek	1.61	0
South Fork Exclosure	South Fork Murderer's Creek	0.80	0.77
Horse Mountain Exclosure	South Fork Murderer's Creek	1.82	1.82
South Fork Murderer's Creek Gather	South Fork Murderer's Creek	0.45	16 feet
Bark Cabin Exclosure	Bark Cabin Creek	0.11	0
Blue Creek Unit Exclosure	Blue Creek	0.73	0.61
Blue Ridge	Bark Cabin Creek	0.61	0
Blue Ridge	South Fork Murderer's Creek	2.05	0.3
Red Rocks	Duncan Creek	1.89	0
Red Rocks	East Trib. to Duncan Creek	0.35	0
Martin Corrals	Thorn Creek	3.83	0
Martin Corrals	Duncan Creek	1.33	0
Martin Corrals	Murderer's Creek	2.08	2.07
Oregon Mine	Duncan Creek	0.44	0
Oregon Mine	East Trib. to Duncan Creek	0.48	0
Oregon Mine	West Trib. to Duncan Creek	0.13	0
Oregon Mine	Tennessee Creek	2.04	0
Oregon Mine	Thorn Creek	3.13	0
Oregon Mine	Murderer's Creek	3.95	3.93
Oregon Mine Campground	Murderer's Creek	0.35	0.35
Orange Creek Riparian	Orange Creek	0.55	0
Dan's Creek Riparian	Dan's Creek	0.75	0.75
John Young Meadow	South Fork Murderer's Creek	0.09	0.08

Pasture Name	Stream Name	Steelhead Critical Habitat (Miles)	MSRA (miles)
Deer Creek	Deer Creek	2.47	2.47
Deer Creek	Corral Creek	2.51	2.47
Deer Creek	South Fork Deer Creek	1.75	1.25
Deer Creek	North Fork Deer Creek	2.22	0.72
Watershed Pasture	South Fork Deer Creek	0.48	0.48
Frenchy Butte	Deer Creek	6.61	6.56
Frenchy Butte	Buck Creek	1.60	0.96
Frenchy Butte	Vester Creek	1.45	0
Frenchy Butte	Blue Creek	0.33	0
Vester Creek Exclosure	Vester Creek	0.40	0
Murderers Creek Gather	Murderers Creek	0.76	0.78
Tex Creek Gather	Murderers Creek	0.03	0.03
Overall Total Miles		**52.47**	**26.28**

Table 37. Proposed Pasture Rotation for the Murderer's Creek Allotment 2023-2027-.

Pasture Name Livestock Numbers	2023	2024	2025	2026	2027	MIM DMA/PIBO PHOTO
North Herd						
Red Rocks Martin Corrals* Oregon Mine *175 c/c	5/15-9/25	5/15-9/25	5/15-9/25	5/15-9/25	5/15-9/25	DMA on Murderers Creek PIBO I and MIM DMA site on Thorn Creek
Oregon Mine Campground* 175 c/c	5/15-5/25 9/20-9/30 Trailing	Trailing 5/15-5/25 9/20-9/30	5/15-5/25 9/20-9/30 Trailing	5/15-5/25 9/20-9/30 Trailing	5/15-5/25 9/20-9/30 Trailing	DMA and PIBO K site on Murderers Creek
Dan's Creek 175 c/c (CH Fenced)	9/25-10/15	9/25-10/15	9/25-10/15	9/25-10/15	9/25-10/15	NO CH
Dan's Creek Riparian Pasture	Rest	Rest	Rest	Rest	Rest	DMA on Dan's Creek
Orange Creek Riparian	Rest	Rest	Rest	Rest	Rest	DMA needs to be established if grazed
Murderers Creek Gather	Gather 5/15-10/15	Gather 5/15-10/15	Gather 5/15-10/15	Gather 5/15-10/15	Gather 5/15-10/15	MIM DMA on Murderers Creek
Tex Creek Gather	Gather 5/15-10/15	Gather 5/15-10/15	Gather 5/15-10/15	Gather 5/15-10/15	Gather 5/15-10/15	
Middle Herd **** In 2024 and 2026, on July 1st 100 c/c pairs will be added into the grazing rotation.**						

Pasture Name Livestock Numbers	2023	2024	2025	2026	2027	MIM DMA/PIBO PHOTO
Timber Mountain* 200 c/c	6/1-6/30	6/1-6/30	6/1-6/30	6/1-6/30	6/1-6/30	MIM DMA (For browse) only Photo Point
Horse Mountain 300 c/c (CH fenced)	7/1-8/15	9/1-10/15	7/1-8/15	9/1-10/15	7/1-8/15	NO CH
Blue Ridge and Antelope Springs 300 c/c (CH Fenced)	8/16-10/15	7/1 – 8/30	8/16-10/15	7/1 – 8/30	8/16-10/15	DMA will be identified prior to turn out
South Fork Exclosure	Rest	Rest	Rest	Rest	Rest	**PIBO**
South Fork Murderer's Creek Gather 300 c/c (CH Fenced)	Rest	Gather 9/1 – 9/5 11 AUM's	Rest	Gather 9/1 – 9/5 11 AUM's	Rest	H20 Gap
South Herd						
Frenchy Butte 400 c/c	7/1-8/15	7/1-8/15	7/1-8/15	7/1-8/15	7/1-8/15	DMA on Deer CR. PIBO K site on Deer CR.
Deer Creek 400 c/c	8/15-9/30	8/15-9/30	8/15-9/30	8/15-9/30	8/15-9/30	DMA and PIBO K site on Deer CR. PIBO K site on NF Deer CR.
John Young Meadow 400 c/c	10/1-10/15	10/1-10/15	10/1-10/15	10/1-10/15	10/1-10/15	MIM DMA and PIBO K Site on SF Murderers CR.
John Young Cow Camp (No CH) 400 c/c	Gather 10/7-10/15	Gather 10/7-10/15	Gather 10/7-10/15	Gather 10/7-10/15	Gather 10/7-10/15	H20 Gap

* Turn out prior to July 1 will trigger actions outlined in 6.1.6 Spawning Surveys.

Table 38. Move Triggers and Endpoint Indicators for the Murderer's Creek Allotment Pastures.

Pasture DMA Site Stream Name	Monitoring Attribute	Key Species	Move Trigger	Endpoint Indicator
All pastures within the Murderers Creek Allotment	Browse Use		30-40%	40-50%
	Greenline Stubble Height in all RHCA's	Deep rooted hydric spp. (sedges)	7 inches	6 inches
	Streambank Alteration on CH/MSRA		10%	15%
	Streambank Alteration on CH outside MSRA		15%	20%

Fields Peak Allotment Proposed Action

The Fields Peak allotment is located within the Upper John Day River (HUC #17070201) sub basin. The pastures comprising the Fields Peak Allotment lie within the Murderers Creek (HUC #1707020103), Fields Creek-John Day River (HUC # 1707020109) and Laycock Creek-John Day River (HUC # 1707020103) watersheds. This allotment is located mostly within T 14 and 15 S and R 28, 29, and 30 E. The Allotment includes approximately 30,818 acres. Approximately 272 acres of private land are intermingled with NFS lands. The private lands are unfenced and management of these lands has not been waived to the Forest Service. Elevations within the allotment range from approximately 3,200 to 7,300. This allotment is divided into 8 pastures: Tex Creek Riparian, Murderers Creek Riparian, Murderers Creek, Fields Peak, Tex Creek Livestock Exclosure, Tex Creek Wildlife Exclosure, North Murderers Creek, Tex Creek, Miners Creek, Lemon Creek Exclosure. There will be 11 pastures once Miners Creek Riparian is constructed. The former Horseshoe pasture will no longer be a separate pasture within the allotment and the acreage will be added to the Field's Peak pasture.

Commented [AH1]: Per BIOP "The former Horseshoe pasture will no longer be a separate pasture within the allotment and the acreage will be added to the Field's Peak pasture."

The Tex Creek Wildlife exclosure was built approximately 15 years ago. It is approximately 1.16 acres and contains 330ft of CH and 330ft of MSRA on Tex Creek. This pasture has not been grazed by cattle since it was built and is not planned to be grazed by cattle for the next 5 years.

The Tex Creek Livestock exclosure was built approximately 15 years ago. It is approximately 3.63 acres, and contains 1,000ft of CH and 300ft of MSRA on Tex Creek. The exclosure is divided into two sections by a road that is used as a water gap for Tex Creek. The exclosure has not been grazed by cattle since being built and is not planned to be grazed by cattle for the next 5 years.

In 2015, the permittee proposed fencing Tex Creek into a 60-acre pasture called Tex Creek Riparian. This project was completed. This pasture includes 3 water gaps and 2.19 miles of CH and 1.63 miles of MSRA. For the duration of the consultation this pasture will be rested.

In 2015, the permittee proposed fencing Murderers Creek into a 163-acre pasture called Murderers Creek Riparian. This project was completed, and this pasture contains 4.51 miles of CH and 4.17 miles of MSRA. There are 2 water gaps that cross Murderer's Creek. For the duration of the consultation this pasture will be rested.

The Lemon Creek Exclosure was built in 2016. It is approximately 14 acres and contains all CH on Lemon Creek: 0.85 miles. This pasture was built to exclude cattle from the stream. The pasture will not be grazed for the next 5 years.

Critical Habitat surrounding White Creek in the North Murderers Creek Pasture has been electric fenced for the duration of the 2018-2022 consultation period. It is scheduled to be permanently fenced by the South Fork Watershed Council in early summer 2023 once site access opens. The Murderers Creek Guard Station is within this allotment. The Guard Station is fenced into a 10-acre pasture that contains 0.15 miles of CH and 0.15 miles of MSRA. Livestock are excluded from this area. The pasture will not be grazed for the next 5 years.

The MNF proposes to authorize livestock grazing on the Field's Peak allotment for the next five years 2023-2027. The Field's Peak allotment is operated by two permittees, grazing two separate herds. Herd one consists of 197 cow/calf pairs with authorized use dates of 5/15-10/15. Herd two consists of 40 cow/calf pairs and two horses with permitted use dates of 6/15-10/15 (Table 39). Pasture use dates, livestock rotation and livestock numbers are presented in the Pasture Use Table (Table 41).

- These pastures are not used more than once per year **Herd 1** (197 cow/calf pairs) grazes the Field's Creek, Miner's Creek, Miners Creek Riparian (once constructed), Tex Creek, Tex Creek Riparian, Murderer's Creek, Murderers Creek Riparian, and
- **Herd 2** (40 cow/calf pairs, 2 horses) grazes the North Murderer's Creek pasture.

Pasture dates and rotations are approximations and will be readdressed on a yearly basis to ensure proper use.

The critical habitat on Miners Creek, Sugar Creek, and Tex Creek contains a heavy shrub component that limits livestock access to the stream. All of the critical habitat in the Miners Creek pasture was approved to be fenced, however due to the heavy shrub component and steep terrain, it was determined that an extensive amount of thinning would need to be completed for a fence to be able to be installed; there is no current timeline of when the fence will be constructed.

Authorization to graze on this allotment is based on the conditions on the ground being ready to be grazed. Range readiness will be completed annually prior to grazing this allotment.

Table 39. Field's Peak Allotment Permit and Permit Information.

Permit #	Permit Exp. Date	Total Acres	Permitted number of livestock c/c pair/horses/AUMs/HMs	Permit season begin and end dates
0604010057	12/31/2030	5,321	40 c/c Pair / 214 AUM / 162 HMs	6/15-10/15
			2 Horses / 12 AUM/ 9 HM	6/1-10/15
0604010016	12/31/2024	25,213	197/0/797	6/15 to 10/15

The Field's Peak Allotment contains 21.61 miles of MCR steelhead Critical Habitat (CH) and 7.62 miles of stream reaches identified as Most Sensitive Riparian Area (MSRA) (Appendix A). MSRA is designated in Miner's Creek, Tex Creek, and Murderer's Creek pastures. Move triggers and endpoint indicators are summarized in Table 43.

Proposed Pasture Use –2023-2027

Herd 1 (197 cow/calf pairs)

Field's Creek pasture 12,150 acres - Contains approximately 8.31 miles of MCR steelhead CH and 0.34 miles of MSRA. 197 c/c pairs enter the pasture and remain for approximately 90 days. There is a Photo Point with Browse Monitoring located in this pasture on Field's Creek. The 2018 BIOP on page 54 stated that an ID team concluded that Field's Creek is not capable of supporting sedge/rush community. The stream has very little access to livestock, shrubs are the dominate vegetation and trailing along the stream is highly unlikely. The ID Team determined that monitoring of stubble height, and bank alteration was unnecessary due to the stream type and that photo point monitoring would be sufficient, with woody browse monitoring.

Miner's Creek pasture 6,152acres contains approximately 3.53 miles of MCR steelhead CH and 1.15 miles of MSRA. This is typically the second pasture in the rotation; 197 c/c pair are moved into this pasture for approximately 25 days. There is a MIM DMA located in this pasture on Miners Creek (Appendix A).

Tex Creek pasture 3,255 acres- contains no MCR steelhead CH and no MSRA due to exclusion fencing. 197 c/c pairs are moved into this pasture for approximately 23 days.

Tex Creek Riparian: 61 acres: contains 2.19 miles of CH and 1.63 miles of MSRA. There is a MIM DMA located in this pasture on Tex Creek (Appendix A). Three water gaps cross Tex Creek and the pasture is used

to facilitate livestock movement between pastures in the allotment. This pasture is used only for a short duration and with a limited number of cattle no more than 50 c/c pair at a time. It will not be grazed for the life of the consultation 2023-2027.

Murderer's Creek Riparian: Built in 2015, 163 acres- Contains approximately 4.51 miles of CH and 4.17 miles of MSRA. There are 2 water gaps that cross Murderer's Creek. This is a small pasture that will not typically be grazed; not included in the rotation. Use will be addressed on an annual basis. When used, there will be 100 c/c pairs for no longer than a week. If this pasture is used, the Photo Point DMA located on Murderer's Creek will be used. An ID Team will determine if MIM is necessary. There is a 14-acre exclosure at the upper end of Murderer's Creek, above critical habitat that will not be authorized for grazing.

Tex Creek Wildlife Exclosure is approximately 1.16 acres, and contains 330ft of CH and 330ft of MSRA on Tex Creek. It will not be grazed for the life of the consultation 2023-2027.

Tex Creek Livestock Exclosure is approximately 3.63 acres, and contains 1,000ft of CH and 300ft of MSRA on Tex Creek. The exclosure is divided into two sections by a road that is used as a water gap for Tex Creek. It will not be grazed for the life of the consultation 2023-2027.

Miner's Creek Riparian: 75 acres- Contains approximately 3.53 miles of CH and 1.15 miles of MSRA. This pasture was proposed for construction in 2018, but has not yet been completed. This pasture will be used in conjunction with Miner's Creek Pasture until the fence is completed. Due to the heavy shrub component and steep terrain, extensive amounts of thinning need to be completed for this fence to be completed. Following completion of this fence. Use will be addressed on an annual basis. When used, this pasture would be used to facilitate livestock movement to other pastures of the allotment. No more than 50 c/c pairs of cattle would be permittee for no longer than a week. If this pasture is used, the MIM DMA located on Miner's Creek will be used.

Murderer's Creek pasture 3,609 acres- contains no MCR steelhead CH and no MSRA due to exclusion fencing. 197 c/c pairs are moved into this pasture for approximately 20 days. There are two 15-feet wide water gaps on Murderers Creek within this pasture.

Lemon Creek Exclosure 15 acres- contains approximately 0.85 miles of MCR steelhead CH and 0 miles of MSRA. Grazing will not be authorized for the life of this consultation (2023-2027).

Herd 2 (40 cow/calf pairs)

North Murderers Creek 5,321 acres- Contains approximately 1.64 miles of MCR steelhead CH and 0 miles of MSRA. 40 c/c pairs will enter the pasture and remain for approximately 123 days. 2 horses will also enter the pasture and remain for approximately 137 days. There is a MIM DMA located in this pasture on White Creek. Critical habitat below the DMA is scheduled to be in 2023. This will account for most of the accessible critical habitat in this pasture.

Table 40. MCR steelhead, miles of critical habitat by pasture for the Fields Peak Allotment within the Endangered Species Act Action Area

Pasture Name	Stream Name	Steelhead Critical Habitat	MSRA (miles)
Fields Creek	Fields Creek	5.11	0.23
Fields Creek	Wickiup Creek	0.9	0.11
Fields Creek	Buck Cabin Creek	2.3	0

Pasture Name	Stream Name	Steelhead Critical Habitat	MSRA (miles)
North Murderers Creek	White Creek	0.66	0
North Murderers Creek	Charlie Mack Creek	0.47	0
North Murderers Creek	Basin Creek	0.46	0
Miners Creek / Miners Creek Riparian	Miners Creek	0.83	0
Miners Creek / Miners Creek Riparian	Tex Creek	2.03	1.15
Miners Creek / Miners Creek Riparian	Sugar Creek	0.67	0
Tex Creek Riparian	Tex Creek	2.19	1.63
North Murderers Creek	Murderers Creek	0.09	0.09
Murderers Creek Riparian	Murderers Creek	4.44	4.17
Lemon Creek Exclosure	Lemon Creek	0.85	0
Overall Total Miles		**21.61**	**7.62**

Table 41. Pasture Rotation for the Fields Peak Allotment 2023-2027.

Pasture Name Livestock numbers	**2023**	**2024**	**2025**	**2026**	**2027**	**MIM DMA PIBO/Photo Point**
Herd 1						
Fields Peak* 197 c/c pair	5/15-8/15	7/5-9/2	5/15-8/15	7/5-9/2	5/15-8/15	Photo Pt with browse use Monitored on Fields CR. PIBO K and I site on Fields CR.**
Miners Creek 197 c/c pair	8/08-9/02	9/3-9/25	8/08-9/02	9/3-9/25	8/08-9/02	MIM DMA on Miners Creek
Tex Creek 197 c/c pair (25 c/c at one time) (CH excluded)	9/02-9/25	6/15-7/4	9/02-9/25	6/15-7/4	9/02-9/25	DMA WITHIN CH, excluded on Tex CR
Murderers Creek 197 c/c pairs (CH excluded)	9/26-10/15	5/15-6/15	9/26-10/15	5/15-6/15	9/26-10/15	No CH
Tex Creek Riparian	Rest	Rest	Rest	Rest	Rest	DMA on Tex Creek
Murderer's Creek Riparian	Rest	Rest	Rest	Rest	Rest	DMA on Murderers Creek
Miner's Creek Riparian	Rest	Rest	Rest	Rest	Rest	DMA on Miners Creek
Herd 2						

Pasture Name Livestock numbers	2023	2024	2025	2026	2027	MIM DMA PIBO/Photo Point
North Murderers Creek 40 c/c 2 Horses	6/15 – 10/15 6/01-10/15	6/15 – 10/156/01-10/15	6/15 – 10/156/01-10/15	6/15 – 10/156/01-10/15	6/15 – 10/156/01-10/15	Photo Point DMA on White Creek

* Turn out prior to July 1 will trigger actions outlined in 6.1.6 Spawning Surveys.

** Evaluate DMA location with ID team to determine if photo point with browse is appropriate. Review results with Level 1 Team by 2024.

Table 42. Move Triggers and Endpoint Indicators for the Fields Peak Allotment Pastures

Pasture DMA Site Stream Name	Monitoring Attribute	Key Species	Move Trigger	Endpoint Indicator
All pastures within the Fields Peak Allotment	Browse Use		30-40%	40-50%
	Greenline Stubble Height in all RHCA's	Deep rooted hydric spp. (sedges)	7 inches	6 inches
	Streambank Alteration on CH/MSRA		10%	15%
	Streambank Alteration on CH outside MSRA		15%	20%

Aldrich Allotment - Proposed Action

The Malheur National Forest (MNF) proposes to authorize livestock grazing on the Aldrich allotment for the next five years, 2023-2027. This allotment is operated by two permittees, grazing two separate herds. One herd of 100 cow/calf pairs with permitted dates of 7/20- 8/30 and another herd of 250 cow/calf pairs with permitted use dates of 5/15-10/15. Pasture use dates, livestock rotation and livestock numbers are presented in the Pasture Use Table (Table 45). This allotment includes one holding/gather pasture: Cabbage Patch Camp. This pasture is small in size and is used for overnight or short term stays when livestock are moved through the allotment. Pasture dates and rotations are approximations and will be readdressed on a yearly basis to ensure proper use.

These pastures are not used more than once per year, with the exception of a holding/gather pasture (Cabbage Patch Camp).

Table 43. Aldrich Allotment Permit and Permit Information

Permit #	Permit Exp. Date	Total Acres	Permitted Number of Livestock C/C/AUMs/Headmonths	Permit Season Begin and End Dates
0604010039	12/31/2024	1,412	100/182/138	7/20-8/30
0604010016	12/31/2024	19,165	250/1671/1266	5/15-10/15

Proposed Pasture Use 2023-2027

Herd 1 (100 cow/calf pairs)

Widow's Creek Burn *1,412 acres*- Contains no MCR steelhead CH or MSRA. This is the only pasture for Herd 1 and is used for 40 days.

Herd 2 (250 cow/calf pairs)

Widow's Creek Basin, Cabin-Todd, Aldrich Ridge, and Smoky-Oliver pastures *19,124 acres*- Contains approximately 4.4 miles of MCR steelhead CH and no MSRA. Aldrich Ridge Pasture does not contain any critical habitat. Due to the steep topography of these pastures and the lack of fences, they are managed as one pasture. Livestock are herded to different use areas in this pasture according to natural barriers; which are steep ridgetops that form rough pasture boundaries that are marginally effective at containing livestock. Therefore, only one Photo point DMA has been established, located on Cabin Creek.

Cabbage Patch Camp pasture *41 acres*- Contains no MCR steelhead CH or MSRA. This is a holding pasture used for two weeks with less than 100 c/c, while cattle are being moved from pasture to pasture.

Table 44. MCR steelhead, miles of critical habitat by allotment within the Endangered Species Act Action Area.

Pasture Name	Stream Name	Steelhead Critical Habitat	MSRA
Cabin-Todd	Cabin Creek	1.21	0.00
Cabin-Todd	Todd Creek	1.00	0.00
Smoky-Oliver	Smoky Creek	0.73	0.00
Widows Creek Basin	Flat Creek	0.40	0.00
Widows Creek Basin	Widows Creek	1.06	0.00
	Overall Total Miles	**4.40**	**0.00**

This allotment previously required riding and salting to keep cattle in the uplands. The intent with this consultation is to rotate the herd through the pastures by riding as well. This will also allow varied time on the range and keep cattle moving given the absence of fences.

Table 45 Pasture Rotation for the Aldrich Allotment 2023-2027.

Pasture Name Livestock Numbers	2023	2024	2025	2026	2027	MIM DMA PIBO/ PHOTO
Herd 1						
Widow Creek Burn (no CH) 100 c/c pair	7/20-8/30	7/20-8/30	7/20-8/30	7/20-8/30	7/20-8/30	
Herd 2						
Widow's Basin and Smoky-Oliver 250 c/c pair	7/1-10/15	7/1-10/15	7/1-10/15	7/1-10/15	7/1-10/15	
	7/1-10/15	7/1-10/15	7/1/-10/15	7/1-10/15	7/1-10/15	

Pasture Name Livestock Numbers	2023	2024	2025	2026	2027	MIM DMA PIBO/ PHOTO
Aldrich Ridge 250 c/c pairs (no CH)	6/15/-10/15	6/15/-10/15	6/15/-10/15	6/15/-10/15	6/15/-10/15	Photo Point DMA on Cabin Creek
Cabin Todd* 250 c/c pairs	5/15-6/15	5/15-6/15	5/15-6/15	5/15-6/15	5/15-6/15	
Cabbage Patch Camp 100 c/c pair (no CH)	Gather	Gather	Gather	Gather	Gather	

* Turn out prior to July 1 will trigger actions outlined in 6.1.6 Spawning Surveys.

In the Cabbage Patch Camp pasture only 100 c/c will be gathered prior to moving. The remaining 150 c/c will be moved to the next pasture in the grazing rotation without using this gather pasture.

Table 46. Move Triggers and Endpoint Indicators for the Aldrich Allotment Pastures.

Pasture DMA Site Stream Name	Monitoring Attribute	Key Species	Move Trigger	Endpoint Indicator
All pastures within the Aldrich Allotment	Browse Use		30-40%	40-50%
	Greenline Stubble Height in all RHCA's	Deep rooted hydric spp. (sedges)	7 inches	6 inches
	Streambank Alteration on CH/MSRA		10%	15%
	Streambank Alteration on CH outside MSRA		15%	20%

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

The proposed actions are expected to allow previously degraded riparian areas/habitat indicators to continue a trajectory of slow recovery, especially with a six-inch stubble height applied to all riparian areas, not just in MSRA and critical habitat. It is anticipated that some of the indicators at the 12-digit HUC or action area scale could improve in status over the five years of this consultation based on implementation of the proposed actions. Active restoration and in some cases, additional information may be needed to identify changes in grazing management that will improve some indicators, such as water temperature and fine sediment.

GRAZING USE INDICATORS AND SUBPORTING RATIONAL

The three annual end of grazing season use indicators 1) stubble height along the greenline, 2) browse use of current year leaders of woody species along streambanks, and 3) streambank alteration have been used on the

MNF since 2004 and are the result of several factors, including the interim guidelines of PACFISH (USDA FS and USDI BLM 1995) and on analysis and review of scientific information. The three indicators have been slightly modified since their initial use in 2004. When the multiple indicator monitoring (MIM) protocol was published in 2004, the FS and BLM agreed that the indicators would adequately provide range data that reflected effects to listed fishes and riparian habitat. There is no change to the proposed grazing use indicators for this consultation period from the 2018-2022 period.

Stubble Height –Herbivore grazing and browsing may impact stream and streamside conditions directly through mechanical alteration to streambanks and/or indirectly through altering riparian vegetation (University of Idaho 2004). Stubble height can be used as an annual indicator of livestock grazing use and impacts to riparian areas. The use of stubble height standards should be restricted to "sites near the stream edge, that is, areas that can be described as streamside, or near-stream areas of hydrophilic or potentially hydrophilic vegetation" (Clary and Leininger 2000). At this interface between vegetation and water (the greenline), riparian and stream habitats are most sensitive and dynamic. This is where moist vegetation communities are mostly likely to occur, and where erosive energy of the stream plays a major role. Because hydrophilic vegetation is often rhizomatous, heavy-rooted and tends toward complete continuity of bank cover along the channel margins, it can be very resistant to stream erosion. This resistance lends itself to channel stability and helps to create stream habitat structure and complexity favorable to aquatic organisms. It is here where stubble heights must be measured to reflect the potential effect of grazing on hydrophilic plant vigor and therefore to relate stubble height to channel stability. Because stubble height applies only to herbaceous vegetation, its use applies only where herbaceous vegetation currently controls bank stability.

Goss (2013) found a significant positive relationship between stubble height and streambank stability, the latter being one of the RMO indicators for grazing management under PACFISH and INFISH. Protecting stubble height helps protect streambank stability. A similar result between stubble height and streambank stability was found by Clary (1999) in that grazing to stubble height over a stated level (10 cm at end of late spring grazing season) resulted in no significant change in streambank stability even though there were differences in cattle caused bank alteration.

More specifically, stubble height has been shown to be related to two areas of concern: 1) the effect of grazing on the physiological health of the individual plant, and 2) the ability of the vegetation to provide streambank protection and to filter out and trap sediment from overbank flows. A summary of the literature (Clary and Leininger 2000) also shows how stubble heights can reflect streambank trampling and shrub (willow) browsing on the greenline. Based on limited research, Clary and Leininger (2000) proposed a 10 cm (4 in) residual stubble height as a "starting point for improved riparian grazing management." However, they acknowledged that, in some instances, 7 cm (2.75 in) may provide adequate riparian protection and that in other instances 15 to 20 cm (6 to 8 in) may be required to limit streambank trampling or to reduce willow browsing. Thus, the stubble height criteria varies depending upon local environmental variables and the timing, duration and intensity of livestock use. The linkages between stubble height and riparian functions have not been extensively researched nor documented through long-term monitoring. Stubble height as an annual indicator of grazing use in riparian areas should only be used where existing science suggests that it is an appropriate indicator and in combination with long-term monitoring of vegetation and channel parameters.

In aquatic systems, above and below ground biomass as well as stem densities of the riparian vegetative community are a good proxy for channel processes and fish populations (Chadwick 2002, Bayley and Li 2008, Saunders and Fausch 2007, Goss 2013).

In using stubble height as a measure of grazing impacts on streams and riparian areas it is important to understand the processes altered by cattle grazing. If stubble height is used as a surrogate of plant vigor,

clipping studies have shown that leaving from 1 cm (Clary 1995, Clary and Kinney 2002) to 10 cm (Clary 1995, Boyd and Svejcar 2012) can reduce future year's aboveground biomass production with the loss of future growth varying across environmental gradients (e.g. elevation and moisture). Clary (1995) found 10 cm or greater stubble height was necessary to maintain future year's growth in a high elevation (1950 m) sedge community while a lower elevation (927 m) redtop community could maintain future growth characteristics at 5 cm stubble height.

Previous studies have been used to set riparian standards to retain 10 cm (4 inches) of stubble height along cattle grazed streams. The four-inch standard was set for the early season grazing in the 2012-2016 consultation. Because of listed fish and the goal to protect and recover their habitat, six (15.24 cm) inches is the proposed action end of grazing use indicator height in all riparian areas for the 2018-2022 and remains so for the 2023-2027 consultation.

In a study which sought to integrate multiple factors that could be important to fish, early season grazing (late June) that left 10.5 cm of stubble was shown to maintain most stream habitat conditions, but 14.1 cm (5.5 inches) was needed to protect all measured stream attributes (Clary 1999). These values represent measurements taken as cattle were removed from the riparian pasture; values for these same pastures recorded at the end of the growing season were 12.9 cm (5.1 inches) and 16.4 cm (6.5 inches) respectively (Clary 1999). In each case over 2 cm of growth occurred between when cattle were removed and when vegetative growth had senesced in the fall. While Clary (1999) focused on the 10.5 cm value, stubble height at the end of the growing season (12.9 cm) better represents conditions that protect stream and riparian attributes from high stream flows that occur during the winter and spring.

A stubble height objective based on a goal to maintain or restore floodplain sediment routing processes requires taller plant heights (≈ 20 cm) to maintain sediment deposits on the streambank (Abt et al. 1994). Clary et al. (1996) found short statured plants (< 2 cm) can settle out stream sediment but that the deposits are not necessarily maintained, which is needed to help recover many of the cobble dominated stream banks on the MNF, which have lost floodplain function over time from various historic impacts.

Few other studies have elucidated the relationship between the end of growing season stubble heights and stream conditions. Goss (2013) found a linear relationship between increasing stubble height and decreasing streambank angle (good for trout) and increasing residual pool depth (good for trout), streambank stability and percent undercut banks (good for trout). This suggests that across stream and riparian conditions evaluated within the Interior Columbia River Basin, the higher the stubble height the greater the likelihood stream conditions favored by trout would be present (Goss 2013). Similar conclusions from a much smaller scale study were presented by Chadwick (2002) for riparian health and width-to-depth ratios.

An underappreciated value of stubble height, especially in small streams, is its function as overhead cover. Saunders and Fausch (2007) found that while shrubs accounted for most of the overhead cover, certain cattle grazing management strategies (high intensity short duration) could foster conditions where graminoids and forbs provided considerable overhead cover in small streams. The presence of overhead cover can reduce stream temperatures (Li et al. 1994. Bayley and Li. 2008, Nusslé et al. 2015) and increase trout growth during late summer (Saunders and Fausch 2007, Saunders and Fausch 2012). Streamside cover is also important for terrestrial invertebrate inputs for trout forage. Ungrazed areas with greater vegetative cover fostered greater density of cold-water fish (rainbow trout) and lower densities of warm water fish than nearby grazed areas in northeastern Oregon (Bayley and Li. 2008).

Stubble heights that are too short alter cattle behavior. Cattle generally switch to consuming more woody material when stubble height is 10 and 15 cm high (Kovalichik and Elmore 1992) with reported values ranging from as 7.5 cm (Hall and Bryant 1995) to 20 cm (Pelster el al. 2004). Pelster et al. (2004) found that during summer and fall grazing, greater than 40% of cattle diets were willow when stubble heights were less

than 20 cm. Secondarily, as stubble height drops below 10 cm cattle become less efficient feeders (Ungar et al. 1991), so must move more to consume the same amount of forage. This additional cattle movement could increase streambank alteration. This suggests if the goal of a stubble height objective is to protect woody material and reduce streambank disturbance during late summer, stubble heights of 15 cm measured at the end of the grazing season are likely necessary to minimize potential changes in cattle foraging and movement behaviors.

Browse use on non-forested **r**iparian ecosystems has two important areas of concern: (1) loss of woody vegetation that provides shade, cover, and streambank protection; and (2) streambanks themselves, often called "the green line," with their protective herbaceous vegetation. Cattle can affect each of these in different ways. Direct browsing of shrubs reduces the cover and shade they provide over the stream and could prevent their regeneration. (Clary and Medin 1990, Clary and Webster 1989, Elmore 1992, Platts 1989).

Because riparian areas differ in terms of their hydrologic and soil characteristics, their vegetation potential differs. For instance, some riparian areas do not support woody vegetation such as cottonwoods and willows, but instead may be dominated by sedges, rushes, and grasses. Other riparian systems support or may have the potential to support woody vegetation.

Stubble height and greenness factors are critical elements in palatability and cause shifts in cattle forage preference, such as changing from grasses and sedges to shrubs or from moist-site grasses and sedges to wet-site course sedges (Clary and Webster 1989, Gillen et al. 1985, Hanson 1993, Kauffman et al. 1983a). Cattle preference will change as herbaceous vegetation dries (Clary and Webster 1989, Gillen et al. 1985, Hanson 1993, Kauffman et al. 1983a).

Unacceptable impacts from livestock grazing can be avoided in riparian areas by recognizing that a shift in cattle preference can occur as the 3-inch stubble height is approached. Assume undesirable shrub use will occur at any time as stubble height changes from 3 inches to 3/4 of an inch as a result of major shifts in livestock preference (Clary and Webster 1989). Drying of herbaceous forage, particularly Kentucky bluegrass, also will cause a shift in preference to woody shrubs that may adversely impact riparian ecosystems.

Streambank alteration: Streambank erosion is a fundamental driver of stream channel form and maintenance in unmanaged systems. Streambank stability is generally characterized by evaluating bank failure rates along a distance of streams and will rarely be 100% stable in any situation. In many managed areas, bank failure rates have natural and anthropogenic components that vary with stream size and slope. Natural stability varies for riparian areas with vegetation ranging from grass to trees (Lyons et al. 2000). Streambank stability of forested systems are often primarily related to the amount of shade, large tree and tree root structures and the size of the substrate on the streambed. In contrast the stability of non-forested zones will have a much stronger relationship with the near stream above and below ground biomass of herbaceous and shrub vegetation. Given this, the expected stability of a stream will depend upon the environmental condition of the existing herbaceous and shrub vegetation.

Compared to natural rates livestock grazing in managed systems can increase stream bank erosion rates and cause negative effects. These effects include increased width to depth ratios, stream incision, loss of undercut banks, loss of pools, loss of effective stream shade, and increased streambed sediment loads. The magnitude of streambank erosion often increases in the areas most sensitive to trampling.

Results from past management activities created stream networks on the MNF where conditions lack instream large wood and greenline late seral herbaceous and woody species. These conditions make it challenging for stream systems to re-establish undercut banks; sediment is flushed through the simplified

system, and can embed spawning gravels in lower gradient reaches. These conditions are reflected in over widened dished out streams that limit floodplain interaction and have lowered the ground water tables. PIBO and stream survey data indicate that while conditions in some streams have improved, the current conditions are significantly departed from desired conditions for functioning riparian systems.

Today, many of the MNF most sensitive greenlines are composed of simplified grass communities or non-protective forbs as evidenced by the number of DMA's where stubble height can't be used as an indicator or greenline sample numbers for key species are extremely low. Use of streambanks by livestock within many of these systems on the MNF may cause direct physical damage through the breakdown of the bank and the overuse of the available herbaceous vegetation. This could continue to prohibit a change in vegetation to protective sedges from existing non-protective forbs. Prolonged or concentrated use also fosters streambank erosion and reduces the filtering action of dense sedges, which tends to reduce sediment loading (Clary and Medin 1985, Clary and Webster 1989, Elmore 1992, Platts 1989). In this event, riparian conditions are kept at a static state or move in a downward trend.

Given historic impacts and the current MNF baseline it may take intense management where streamside livestock grazing occurs, to create and maintain a balance where these areas can be grazed and riparian conditions can move in the direction of desired conditions.

Project Elements

The six project elements below are the component parts of the action that the MNF is consulting on. Project elements are assessed in this section (EFFECTS OF THE PROPOSED ACTION) of the BA for all three allotments. Some of the project elements involve the use of vehicles on and off roads to access sites, such as four wheel drive trucks and/or OHV's.

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 for each pasture (ALLOTMENT PROPOSED ACTIONS section) 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, pasture boundary fences, 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 minimize 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, see Proposed Action: Common to all MNF Allotments section. Monitoring includes use of: manual and/or handheld equipment such as; electronic tablets, tape measures and rulers; to measure and document vegetation, water quality, and stream channel/streambed characteristics. The MNF Riparian Monitoring Strategy is discussed in detail in Malheur National Forest Riparian Monitoring Strategy section above. 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. Proposed Action: Common to all MNF Allotments section also 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 Proposed Action: Common to all MNF Allotments section.

7. The MNF has determined that unauthorized use or livestock trespass is not an action. However, the implementation of MNF enforcement actions regarding unauthorized use and livestock trespass is interrelated and will be discussed in the Unauthorized Grazing section.

Project Elements Dropped Form 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 (Consultation History section) described the Aquatic Restoration Biological Opinion (ARBO II). Range improvements are covered under that consultation. Range improvements in the ARBO II Biological Opinion described as: "e.g. exclosure fencing, off-site water developments within the same footprint." Consequently, many actions that are described by project elements 3 and 4 have existing ESA coverage under the Forest Aquatic EA and will not be further evaluated in this BA.

Project element 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 are provided in WINTER MEETINGS WITH PERMITTEES section and include reducing livestock numbers, changing the timing and duration of grazing, resting pastures, 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.

Of the six project elements for this consultation, project element 3, 4, and 6 have been addressed above. The remaining project elements: 1) Livestock use of allotments/pastures, 2) Permittee management of livestock and infrastructure maintenance, and 5) Monitoring will be analyzed below (in the DIRECT AND INDIRECT EFFECTS TO DESIGNATED CRITICAL HABITAT and DIRECT AND INDIRECT EFFECTS TO THE SPECIES sections).

Project Elements Analyzed

Project Element #1 Livestock Use of Pastures and Allotments – Livestock will graze the individual pastures that make up the allotment in the numbers, time frames, and locations described above in the ALLOTMENT PROPOSED ACTIONS section for each of the three allotments and in the term grazing permit.

Project Element #2 Permittee Management of Livestock and Infrastructure Maintenance – This project element includes the move-in and move-out of livestock using highway and off-road vehicles, and herding by range riders or the permittee on foot. While vehicles are also used to access sites for monitoring purposes (Project Element 5), the effects of vehicle use to CH and to the species will only be assessed for this project element to reduce redundancy in the analysis. Side-boards for vehicle use are provided by the PDCs described earlier in the proposed action section.

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

Project Element #5 Monitoring - Implementation is used for the evaluation of annual grazing effects. Effectiveness monitoring techniques are employed to help determine long term trends and if desired conditions are being met. The MNF Riparian Monitoring Strategy is presented in the MONITORING section. Workers use manual and electronic equipment to measure vegetation, water quality and stream channel/streambed characteristics. Some monitoring actions include wading in stream channels.

PHYSICAL AND BIOLOGICAL FEATURES (PBFs)

The three project elements above will be analyzed for their effects to designated CH, and effects to the species. The freshwater physical or biological features (PBFs) of MCR Steelhead CH applicable to the action area are presented in Table 47.

Table 47. Physical or Biological Features of MCR Steelhead Critical Habitat Applicable to the ESA Action Area.

PBF	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.

Physical and biological features have been determined by NMFS to be essential to the conservation of the species. The effects to each PBF, and ultimately to designated CH as a whole, can be determined by evaluating the effects to indicators of the NMFS Matrix of Pathways and Indicators (MPI) that correspond to each PBF. This consultation uses a crosswalk table format for this purpose. Measurable effects to habitat indicators that correspond to specific PBFs are identified. Table 48 summarizes the analysis for effects of the three project elements (livestock use, permittee livestock management and infrastructure maintenance, and monitoring) to the PBFs for MCR steelhead designated CH. The rational for the end of grazing use indicators and their role in reducing carryover impacts from annual grazing is presented in GRAZING USE INDICATORS AND SUBPORTING RATIONAL section. The analysis of the Proposed Action component effects on the existing environmental baseline and PBFs are presented in DIRECT AND INDIRECT EFFECTS TO DESIGNATED CRITICAL HABITAT and the DIRECT AND INDIRECT EFFECTS TO THE SPECIES sections. Analysis of direct and indirect effects to listed species and designated CH are identified and those indicators negatively and measurably impacted are specifically discussed.

The determination of effects of the project elements on the indicators is approached by looking at direct and indirect effects to the species and/or critical habitat. The analytical process considers:

Proximity – the geographic relationship between the project element of action and the species/designated critical habitat.

Probability – the likelihood that the species or habitat will be exposed to the biotic or abiotic effects of the project element or action to the indicator.

Magnitude – the severity and intensity of the effect.

Distribution – the geographic area in which the disturbance would occur (this may be several small effects or one large effect).

Frequency – how often the effect would occur

Duration – how long the effect would last. Potential categories include; short term events whose effects subside immediately (pulse effect); sustained, long-term effect, or chronic effect whose effects persist (press effect); and permanent event(s) that sets a new threshold for a species' environment (threshold effect).

Timing – when the effect would occur in relation to the species' life-history patterns.

Nature – effects of the action on elements of a species life cycle, population size or variability, or distribution; or on the primary constituent elements of critical habitat, including direct and indirect effects.

Table 48. Checklist for Documenting Environmental Baseline and Effects of Proposed Action(s) on Relevant Indicators

PATHWAY INDICATORS **Murderers Creek, Fields Peak, and Aldrich Allotments**		**ENVIRONMENTAL BASELINE**			**EFFECTS OF THE ACTION(S)**								
					PBF 1 Freshwater Spawning			**PBF 2 Freshwater Rearing**			**PBF 3 Fresh Water Migration**		
		Properly Functioning	**At Risk**	**Not Properly Functioning**	**Restore**	**Maintain Neutral**	**Degrade**	**Restore**	**Maintain Neutral**	**Degrade**	**Restore**	**Maintain Neutral**	**Degrade**
Water Quality	Temperature			x		PE 2 PE 5	**PE 1 M**		PE 2 PE 5	**PE 1 M**		PE 1 PE 2 PE 5	
	Sediment Turbidity		x				**PE 1 M** PE 2 NM PE 5 NM			**PE 1 M** PE 2 NM PE 5 NM		PE 1 PE 2 PE 5	
	Chemical Contaminants and Nutrients		x			PE 5	PE 1 NM PE 2 NM		PE 5	PE 1 NM PE 2 NM		PE 1 PE 2 PE 5	
Habitat Access	Physical Barriers			x		PE 1 PE 2 PE 5			PE 1 PE 2 PE 5			PE 1 PE 2 PE 5	
Habitat Elements	Substrate Embeddness			X		PE 5	**PE 1 M** PE 2 NM		PE 5	**PE 1 M** PE 2 NM		PE 1 PE 2 PE 5	
	Large Woody Debris			x		PE 2 PE 5	PE 1 NM		PE 2 PE 5	PE 1 NM		PE 1 PE 2 PE 5	
	Pool Frequency			X		PE 2 PE 5	PE 1 NM		PE 2 PE 5	PE 1 NM		PE 1 PE 2 PE 5	
	Pool Quality			X		PE 2 PE 5	PE 1 NM		PE 2 PE 5	PE 1 NM		PE 1 PE 2 PE 5	
	Off-Channel Habitat		X			PE 2 PE 5	PE 1 NM		PE 2 PE 5	PE 1 NM		PE 1 PE 2 PE 5	
	Refugia		X			PE 2 PE 5	**PE 1 M**		PE 2 PE 5	**PE 1 M**		PE 1 PE 2 PE 5	
Channel Condition	Width to Depth Ratio			x		PE 2 PE 5	PE 1 NM		PE 2 PE 5	PE 1 NM		PE 1 PE2	

PATHWAY INDICATORS Murderers Creek, Fields Peak, and Aldrich Allotments		ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)								
					PBF 1 Freshwater Spawning			PBF 2 Freshwater Rearing			PBF 3 Fresh Water Migration		
		Properly Functioning	At Risk	Not Properly Functioning	Restore	Maintain Neutral	Degrade	Restore	Maintain Neutral	Degrade	Restore	Maintain Neutral	Degrade
and Dynamics												PE5	
	Streambank Condition		x			PE 1 PE 2 PE 5			PE 1 PE 2 PE 5			PE 1 PE2 PE5	
	Floodplain Connectivity		X			PE 2 PE 5	PE 1 NM		PE 2 PE 5	PE 1 NM		PE 1 PE2 PE5	
Flow/ Hydrology	Change in Peak/Base Flows			x		PE 5	PE 1 NM PE 2 NM		PE 5	PE 1 NM PE 2 NM		PE 1 PE2 PE5	
	Drainage Network Increase			x		PE 1 PE 2 PE 5			PE 1 PE 2 PE 5			PE 1 PE2 PE5	
Watershed Conditions	Roads		X			PE 1 PE 2 PE 3			PE 1 PE 2 PE 3			PE 1 PE2 PE5	
	Riparian Habitat Conservation Areas (RHCA)s			x		PE 2 PE 5	PE 1NM		PE 2 PE 5	PE 1NM		PE 1 PE2 PE5	

M – Measurable

NM – Not Measurable

Project Element 1 = PE-1 (livestock use)

Project Element 2 = PE-2 (permittee management and infrastructure maintenance)

Project Element 3 = PE-3 (monitoring)

DIRECT AND INDIRECT EFFECTS TO DESIGNATED CRITICAL HABITAT

This analysis evaluates the direct and indirect effects to specific NMFS indicators that correspond to the physical or biological features (PBFs) of CH. The PBFs 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 PBFs also apply to the analysis of effects to the species below.

Those indicator/PE combinations for which a conclusion of effect to an indicator or a component of a PBF was "negative and measurable" are identified specifically below, as they have the potential to adversely affect designated CH. These conclusions were only found for PE 1 (livestock use) and not for PE 2 (permittee management and infrastructure maintenance) or PE 5 (monitoring). The indicators for which "negative and measurable" effects were concluded for the Murderers Creek, Fields Peak and Aldrich allotments are those bolded below:

Water Temperature
Sediment/Turbidity
Chemical Contaminants and Nutrients
Physical Barriers
Substrate Embeddedness
Large Woody Debris
Pool Frequency
Pool Quality
Off-Channel Habitat
Refugia
Width to Depth Ratio
Streambank Condition
Floodplain Connectivity
Change in Peak/Base Flows
Drainage Network Increase
Roads
Riparian Habitat Conservation Areas (RHCAs)

Water Temperature

Livestock use (PE 1) can result in measurable water temperature increases for certain stream reaches. These impacts are expected to be generally confined to low gradient stream channels less than 10 feet wide with grass/grass-like vegetation providing shade that are being actively grazed. Streams with woody browse species in the riparian community can also be effected by livestock use on plants such as willows and red-osier dogwood which are commonly found in riparian areas of the MNF.

Where existing temperatures are too high because of reduced shade, salmonid survival can decrease and some habitat may be abandoned as fish migrate to seek cooler temperatures. Many grass/grass-like species found on the MNF have an ungrazed potential height of 21 inches (Kinney and Clary 1994) and some species such as small-fruit bull rush (Scirpus microcarpus), big-leaf sedge (carex amplifolia), and tufted hairgrass (Deschampsia cespitosa) have potential heights of 3 feet or more (Rausch, personal communication).

In meadow streams with narrow channels, the grass and grass-like species are often the only plants that provide stream shade. PE 1 (livestock use) will potentially reduce vegetation heights to 6 inches (stubble height standard). This will reduce stream shade in those circumstances compared to the ungrazed potential vegetation heights.

Temperature monitoring data for the Murderers Creek allotment indicates that State water quality standards are not being met. Most of the streams within these three allotments would be considered NPF. Year round on Murderers Creek (21C in 2003 from PIBO and 24C during the 2015 stream survey). However, the temperature declined from 21C to 16C from 2003 to 2013 based on the PIBO data. The other surveyed stream that did not meet state standards was Thorn Creek as measured during the 2015 stream survey at 21C (but measured at 15C in 2008 and 18C in 2013 by the PIBO program). Deer Creek was listed on the State of Oregon 303(d) for temperature. Mainstem Deer Creek, South Fork Deer Creek at the mouth, and North Fork Deer Creek below the mouth of Dead Injun Creek were above the 17.8C (64F) standard during some years of that period. All other streams with temperature data (most from Region 6 Level II Stream Surveys) meet the MCR steelhead requirements.

Temperature monitoring data for Fields Peak allotment also indicates that Murderers Creek did not meet State standards for steelhead. Fields Creek was measured at 18C and 16C in 2003 and 2008 by the PIBO program, which was within or at steelhead requirements/state standards.

Aldrich Allotment critical habitat is on Todd Creek and Cabin Creek, Smoky Creek. No data are available for those streams.

The MCR steelhead recovery plan cites Northwest Power Planning Council (2005) when stating that vegetation disturbance, stream straightening/relocation, livestock grazing, forest practices, road building, irrigation water withdrawals, and historical mining and dredging cause elevated summer water temperatures in the UJDR (NMFS 2009). While Murderers Creek and Deer Creek have not met state standards in some of the years monitored, many of the tributary streams monitored within the allotments are spring fed systems that maintain cold water temperatures, or have no surface baseflow in the late summer. 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.

Livestock use (PE 1) along mainstem Murderers Creek in Murderers Creek and Fields Peak allotments is not likely to result in measurable water temperature increases from cattle for many stream reaches because of exclusionary fencing (see allotment maps). A greater portion of South Fork Murderers Creek remains available to grazing, including two parcels of State lands with unfenced critical habitat. Deer Creek and the tributary streams in Murderers Creek allotment remain vulnerable to riparian grazing from cattle, and wild horses.

Tex Creek in Fields Peak allotment is largely fenced. Temperature impacts from smaller tributary streams in the allotment are unknown. Fields Creek is available to cattle along the length of the stream, as are the tributary streams to Fields Creek, including Wickiup and Buck-Cabin creeks, which have critical habitat. PIBO series photos from Fields Creek indicate increased growth (and shading) of the riparian community from 2003 to 2013.

Impacts to Fields Creek and Deer Creek are primary areas of risk to temperature effects from the proposed action that is negative and measurable. The six-inch stubble height endpoint requirement is intended to help prevent stream temperature increases.

The effect to this indicator by PE 1 (livestock use) is negative and measurable.

PE 2 (permittee livestock management and infrastructure maintenance) and PE 5 (monitoring) activities will not remove vegetation that provides shade nor affect channel-forming processes that might widen stream channels. Consequently, there is no mechanism for PEs 2 and 5 to affect water temperature and the effect of the PEs **to the indicator is neutral**.

Sediment/Turbidity and Substrate Embeddedness

Livestock use (PE 1) along streams results in trampled and grazed riparian vegetation, and altered stream banks. Livestock trailing along streams and use of trails to access streams for water also creates disturbed areas of bare soil prone to erosion and can result in fine sediment entering stream channels, increasing turbidity. The effects to CH from increases in fine sediment are to fill in interstitial spaces of the streambed (see embeddedness) which include decreases in water quality, causes species composition shifts in macroinvertebrate communities to those more tolerant of pollution, and loss of cover for larval and juveniles fishes. Legacy conditions of some streams as indicated by stream surveys have created entrenched streams with exposed sections of streambank, which can also lead to increased sediment and turbidity during high flows from spring runoff or significant precipitation events. Excessive levels of sediment can be measured and are indicated in some streams in the allotments (Existing Condition section). Some of the areas accessible to cattle in allotments that are part of this consultation are adjacent to unfenced stream sections used by MCR steelhead for spawning, incubation, larval development, and rearing. Because of the duration of proposed grazing on unfenced (excluded) streams in the three allotments the likelihood of trailing, bank disturbance, and exposed soils is significant. Consequently, the effect to this indicator by **PE1 (livestock use) is negative and not expected to be insignificant and discountable but is expected to be measurable.**

The analysis of effects to the sediment/turbidity indicator, determined that use of riparian areas and some floodplains by livestock is expected to increase the amount of sediment entering streams. 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.

Some of the stream reaches in the Action Area were (and remain) naturally high in fine sediments due to the underlying geology and soils of the area. Historic and legacy uses greatly increased surface erosion and levels of sediments in many of the streams in the Action Area. All three PIBO Integrator sites (I), and six of the PIBO DMA (K) sites in the Murderers Creek allotment and two out PIBO K sites in the Fields Peak allotment, had high fine sediment (% fines <6mm) levels, exceeding PIBO managed (and reference) mean values, and fine sediment levels actually increased between 2003-2013. Based on the most current data only Crazy Creek and lower Murderers Creek PIBO sites have amounts of fine sediment <20% of fines 2mm in the Murderers Creek allotment. Based on 2015 Level II stream surveys, 17 out of 22 streams surveyed in the action area from 2007-2015 exceed >20% fines (< 2mm) for fine sediment and exceed the <20% cobble embeddedness Forest Plan standard.

Fields Peak allotment, Fields Creek - fine sediment the PIBO I site have decreased to < 20% (<2mm) from 2003 to 2013 and continued to improve between 2013 and 2018. In 2013 the Fields Peak K site was also <20% fines (<2mm in). Upper Murderers Creek and Murderers Creek in North Murderers pasture were over 20% (at 44% <2mm and 56% <6mm) in 2013. Tex Creek, reach 2 and 3 above the lower private land parcel had % fines <20%, and >20 % fines on reaches 3, 4, and 6 (2015 stream survey). There is no recent information for % fines in the critical habitat streams in Aldrich Allotment (Cabin Creek, Todd Creek, and Smoky Creek).

The monitoring results and discussion presented above indicate that multiple uses (road locations, background geology, historic grazing, fire impacts, wild horse use) likely contribute to high fines in the

action area. Livestock use (PE 1), may result in localized trampled and grazed riparian vegetation and altered stream banks in some areas along critical habitat. Grazing of cattle occurs along CH on streams in each of the three allotments from the proposed actions. The potential for increased fine sediment is likely to be measurable in some streams from increased grazing activity. In some cases the ability to measure the proportion of the indicator that is caused by cattle versus horses will be difficult to parse. Because there are critical habitat streams in each allotment that are not excluded or have grazing upstream from critical habitat the effect to this indicator by PE 1 (livestock use) of this indicator that are negative and measurable. Prior to cattle grazing, pre-season monitoring is required to document riparian conditions due to wild horses and wildlife. This will help inform whether adaptive management actions, such as limited timing or numbers of cattle are required as a response to conditions identified in the pre-season monitoring.

Large Woody Debris

Livestock use does not affect this indicator as readily in conifer-dominated riparian forests, but can negatively affect this indicator when grazing occurs within deciduous stands of aspen, alder, birch, and cottonwoods that could contribute larger pieces of wood to small streams. Most sites in the action area have a hardwood shrub (e.g. red osier dogwood and/or water birch) or grass/forb understory and a riparian forest overstory which may have localized patches of willow, alder, and aspen, along with conifers. Livestock use (PE 1) can result in preferential grazing on palatable young deciduous young trees and be linked to altered levels of mature tree recruitment, which would serve as future large woody debris (Kaufmann et al. 1983, Case and Kaufmann 1997, Beschta and Ripple 2005). Cottonwood occurs in the action area, but are somewhat limited, and aspen may have been present in greater amounts historically. Given the exclusion or riparian pasture fencing on large portions of Murderers Creek, Tex Creek, and smaller portions of South Fork Murderers, Bark-Cabin, South Fork Deer Creek, and Vester Creek some areas will continue to show the potential of the deciduous component in the action area. It is possible that cattle will turn to willow as a food source later in the season and graze available palatable young cottonwoods and aspen in the action area throughout the season.

Because there is a deciduous component in portions of the riparian areas in the three allotments, the potential for livestock to graze young deciduous trees is present. **The effect to this indicator by livestock use (PE 1) is negative and not measurable** without more information on the composition of the riparian areas and long term monitoring of instream large wood. Where riparian areas are not fenced, it is expected that wildlife and cattle may browse young deciduous trees. In addition, because riparian areas that were largely rested from permitted grazing from 2012-2015 and will now be grazed for almost two months (e.g. Fields Peak pasture 6/15-8/08) or used later in the season when cattle may turn more to hardwoods, there is a risk this indicator may be effected.

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.

Refugia

The availability of refugia is a limiting factor identified in the recovery plan for the Oregon steelhead population of the MCR steelhead distinct population segment (NMFS 2009). The condition of the streams in the Action Area is characterized by a lack of instream large wood, shallow pool depths, and high levels of fine sediment, all of which indicate poor quality refugia habitat for steelhead. The NMFS MPI (NMFS 1996) defines the Refugia indicator as: “important remnant habitat for sensitive aquatic species”, of which there likely exists localized remnants, especially in the roadless watersheds. All of the habitat indicators are potential components of Refugia. Analysis for the habitat indicators has determined that **PE 1 (livestock use) can have negative and meaningfully measured effects** to temperature, sediment, and

substrate/embeddedness from the project elements as proposed actions. This may occur in areas that meet the definition of Refugia. Stream surveys, temperature monitoring, and PIBO will be the primary methods to track refugia (as habitat complexity with appropriate thermal regimes) through time.

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 is not likely to but could impact the function of Refugia to provide important remnant habitat. **Therefore, the effect conclusion is negative but not meaningfully measurable and is discountable for PE 2.**

The highest level of effect to previous indicators by PE 5 (monitoring) was "negative but not meaningfully measurable" for small and transient increases in turbidity by wading in stream channels or crossing streams on foot or by horse. This level of effects will not impact the function of Refugia to provide important remnant habitat. **Therefore, the effect conclusion is neutral for the monitoring PE.**

The effects from the Proposed Action to the indicators below are not measurable.

Physical Barriers

No barriers to freshwater migration will be created or removed by the actions of any PE in the Action Area. **All PEs have a neutral effect on the physical barriers indicator.**

Pool Frequency

Pool frequency on the Level II surveyed streams is only meeting the NMFS MPI objectives on four of 56 survey reaches for which data is available (most collected from 2007-2015) within the Murderers Creek and Fields Peak allotments. The NMFS indicator definition also includes a LWD criterion and only one surveyed reach (SF Murderers Creek, 2009) of the 56 meets both proper functioning for pool frequency and proper functioning for large woody debris (LWD). Many stream reaches do not reach the pools/mile frequency of the Forest Plan Amendment 29.

Three streams exceed the PIBO reference values for percent pools (Deer Creek, Murderers Creek, and Thorn Creek I site). Crazy Creek, North Fork Deer Creek, South Fork Murderers Creek, and the Thorn Creek K site have low % pool habitat based on PIBO monitoring compared to reference value. In the Fields Peak allotment, Murderers Creek in the North Murderers Creek pasture has percent pools above the PIBO reference number (reference = 43.3% pools). Upper Murderers Creek and Fields Creek PIBO sites fall in the 30-39% range for pool habitat.

Historic utilization of large instream wood, and watershed impacts from road building, in addition to Forest Service channel clearing in the 1960's (e.g. Deer Creek), have left a legacy of low instream LWD that also contributes to the low amounts of pool habitat. 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 also affect this indicator. The exclusion of several stream reaches in CH, the use of BMP's for livestock management, the not exceeding the end of grazing use indicators, and adaptive management, should result in an overall effect by **PE 1 (livestock use) to pool frequency that is negative but not measurable.**

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 will not affect pool frequency. **The overall effect of PE 2 is a neutral affect to the indicator.**

PE 5 (monitoring) does not have any mechanisms to affect plants or bank and channel features that would impact pool frequency. **The monitoring PE has a neutral effect to the indicator.**

Pool Quality

Quality pool habitat is provided by the presence of deep pools that provide cover, forage and resting habitat for listed fishes. Overhead cover in the form of undercut banks, large wood, large substrate, and overhanging riparian bank vegetation are also components of quality pools. PIBO data within the Murderers Creek allotment indicates that undercut banks at the five sites with repeat measurements have improved from 2003-2013, but only one site (Murderers Creek 156-06-I) has a value that is greater than the PIBO reference value (I site = 47% in 2013 and the reference value = 32.7%). Overall for Murderers Creek four sites where data was collected in 2013 exceed the reference value and seven 2013 sites are less than (not in the desired condition) the reference value of 32.7% undercut banks. In addition, based on Level II stream surveys, residual pool depth is generally low with very few to no pools greater than 1 meter deep in surveyed stream reaches . Although W/D ratios at the PIBO sites seem to be improving (ranging from 14 to 40) many streams are still considered to be overly wide, which also results in low number of quality pools. Based upon the PIBO and stream survey data, pool quality would be considered to be NPF using NMFS MPI criteria and does not meet Forest Plan standards of 50-75% on most reaches.

Together with historic impacts previously discussed, the 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. With increased permitted grazing in the action area compared to the last consultation period, the overall effect by **PE 1 (livestock use) to pool quality is negative and not measurable.** It is difficult to separate from other disturbance impacts in the watershed, including the high road densities, location of roads near streams, and parent geologic material.

PE 2 (permittee management and infrastructure maintenance) includes on and off-road vehicle use. Road use and the presence of roads (especially native surface) may affect pool quality where roads are not properly maintained and occur adjacent to streams (e.g. poor drainage causing sediment inputs to a stream). PDC 12 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. The potential impacts from permittee management are difficult to separate from other ongoing activities in the watershed (e.g. recreation). Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect pool quality. **The overall effect of PE 2 is a neutral affect to the indicator.**

PE 5 (monitoring) does not have any mechanisms to affect plants or bank and channel features that would impact pool quality. **The monitoring PE has a neutral effect to the indicator.**

Off Channel Habitat

The current condition of off-channel habitat is likely degraded in the Action Area from legacy management and activities, including, timber harvest, home steading, mining and past livestock management in the allotments. Off-channel habitat is limited or non-existent in steeper gradient streams and is most often associated with larger or low gradient streams or stream reaches on the MNF.

At the larger scale there is very little off-channel habitat within tributaries of the South Fork John Day River. At the scale of the Action Area 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 four of the five streams where data is comparable (decrease on Crazy, Murderers, South Fork Murderers, and North Fork

Deer creeks, and increase on South Fork Deer Creek). It should be noted that past livestock management in the Murderers Creek allotment, exacerbated by the wild horse population at numbers exceeding Allowable Management Levels (AML), likely contributed to degradation of this indicator. The ability of a stream to increase off-channel habitat is a long-term process and unlikely to occur where streams have been channelized, are confined by a road, or have lost their connection to the floodplain (e.g. are entrenched); where active stream restoration is needed. **The overall effect by PE 1 (livestock use) to current off-channel habitat presence or formation is potentially negative, but not measurable.**

PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect off-channel habitat. PDC for off-road use will prevent bank damage and effects to off-channel habitat. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect off-channel habitat. **The overall effect of PE 2 is a neutral affect to the indicator.**

PE 5 (monitoring) does not have any mechanisms to affect off-channel habitat. **The monitoring PE has a neutral effect to the indicator.**

Width to Depth

Historic watershed impacts, including over-utilization of riparian vegetation, bank alteration and increases in sediment delivery are primary causes of increased W/D ratios. This is turn results in simplified habitat lacking in pools and undercut banks that reduces the quality of juvenile rearing habitat. Some streams within the Murderers Creek Allotment are still exhibiting over widened channels based on existing W/D ratios.

Based on the 2007-2015 stream survey data these streams met (all reaches <10) or closely met (<11) Forest Plan standards: Vester Creek, Tennessee Creek, South Fork Murderers (6 of 9 reaches), Orange Creek, North Fork Deer Creek, two tributaries to Duncan Creek (unnamed), Dewey Creek, Blue Creek, and Beaverdam Creek. Moderately high W/D streams were Dan's Creek and Corral Creek. Streams with high W/D (undesirable condition) were Murderers Creek, Deer Creek, Thorn Creek, Buck Creek, Bark Cabin Creek, and Alder Creek.

The 2003 to 2008 data from four PIBO sites showed an improvement in this indicator at two sites, Fields Creek and South Fork Murderers Creek. No change was measured at Murderers Creek or Thorn Creek. The W/D methodology of PIBO changed in 2009, making it difficult to use the 2013 data for trend.

Legacy effects of livestock management, road building, logging, and mining in the action area likely contributed to degradation of this indicator. **Livestock use (PE 1) use may have a negative, but not measurable effect to the indicator**. The potential for increases in width-depth ratio is less than in the past because of increased use of exclosure fencing (allowing for rest or exclusion of significant portions of streams), use of the 6 inch stubble height throughout the allotments (uplands and riparian areas, which includes use by wild ungulates and wild horse) and adaptive management.

PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use. PDCs for off-road use are intended to 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 could affect streambanks or riparian vegetation adjacent to CH, and therefore affect W/D ratio. Currently, it is unknown how many water developments are close to CH. **The overall effect of PE 2 has no measurable effect to the indicator.**

PE 5 (monitoring) does not remove vegetation or destabilize stream banks. **There is no potential for PE-5 (monitoring) to increase W/D ratio and it will have a neutral effect to the indicator.**

Chemical Contaminants and Nutrients

The potential for chemical contaminants or nutrients to effect CH is by the addition of specific materials such as petroleum, oil products, nitrogen, or phosphorus. Petroleum and oil products which reach stream systems or wetlands can impact organisms which depend on oxygen and the products or nutrients can travel to impact downstream areas. The relatively small amount of chemical materials in the action areas and associated with the Proposed Action, the limited time they are adjacent to streams (e.g. vehicles), and their proper storage prevents impacts to CH.

Excessive nutrients in stream systems are undesirable primarily because of their effect on CH includes increasing algal growth and accompanying oxygen demand, which has a negative effect on cold water fish habitat. Urine and feces 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. Distribution of livestock away from riparian areas helps to eliminate the effect from livestock nutrient contributions. The overall effect to this indicator is slightly negative, but difficult to measure the portion due to livestock in relation to wildlife or other sources such as leaf decay.

PE 2 (permittee management and infrastructure maintenance) includes vehicle use. The risk of chemical contamination to streams will be minimized by use of PDCs. Maintenance activities are typically distant from designated CH and vegetation provides a buffer to potential petroleum spills. Nutrient and salt blocks are not allowed near streams where they could contribute nutrients or chemicals to a waterway. **The overall effect from PE 2 is for slight negative effects to the indicator that are not expected to be measurable.**

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.**

Streambank Condition

Properly functioning (PF) stream bank condition is defined in the NMFS matrix as >90% stable andd not properly functioning (NPF) condition is <80% stable. Greenline vegetation, the type of channel (steep or lower gradient), and parent geologic material (coarse or fine materials) dictate the natural streambank condition. On the MNF legacy management, including timber harvest, mining, road development, and grazing has altered many systems leaving banks of coarse material that are not easily destabilized. In meadow and other sensitive systems livestock grazing can contribute to loss of bank stabilization. With the six inch stubble height end of grazing use, which helps prevent livestock from shifting to woody browse use (Clary and Webster 1989), added exclusion fencing, and adaptive management the conclusion is that the effect of **PE 1 to this indicator is negative and not measurable.**

PE 2 and PE 5 are not of the frequency, duration or magnitude to significantly affect bank stability and are neutral to this indicator.

Floodplain Connectivity

Channel entrenchment is a main concern for loss of floodplain connectivity. Indirect effects of livestock use (PE 1), including trailing and watering, on conditions of 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. Some of these conditions historically existed (legacy), yet streamside cattle and wild horse use in some locations is causing localized stream impacts.

The Ecology Program review of Murderers Creek allotment (2015) indicated improving riparian conditions. Fields Peak and Aldrich allotment pastures with critical habitat were rested in more years between 2012 and 2015 than grazed. The PIBO data collected in 2003, 2008, and 2013 at eight sites where at least two years of data is available shows improvement in W/D at six sites and % undercut bank improvements at five sites. Greenline wetland plant rating improved (but remains largely composed of lesser amounts of facultative wetland plants at each site). These indicators of improving conditions would indicate that floodplain connectivity is probably not decreasing. It should be noted that fires have compounded impacts to streams that may not be attributed to grazing by cattle, horses, or elk (e.g. the South Fork Fire of 2014 in the action area). The conclusion is that the effect to floodplain connectivity by livestock use in these allotments is negative but not measurable.

PE 2 (permittee management and infrastructure maintenance) includes on and off-road vehicle use. PDC for off-road use are intended to minimize impacts to stream channels. 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. Most infrastructure maintenance actions do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect floodplain connectivity. **The overall effect of PE 2 is a neutral affect to the indicator.**

Monitoring (PE 5) does not remove riparian vegetation or otherwise have mechanisms to impact habitat complexity. **PE 5 will have a neutral effect to the indicator and the environmental baseline.**

Change in Peak/Base Flows

PE 1 (livestock use), PE 2 (permittee management and infrastructure maintenance), and PE 5 (monitoring) do not have effects to this indicator, therefore the effects are neutral.

Drainage Network Increase

In the Action Area the drainage network environmental baseline has been expanded by the presence of roads and continued road building up into the 1980s. In a few locations roads in riparian areas are being relocated or used for short-term Forest vegetation management activities prior to decommissioning or obliteration.

Roads

In the consultation area the baseline road density and location rate as NPF in most sub-watersheds. Due to legacy management the MNF has many valley bottom roads adjacent to streams. Most sub-wastersheds also have relatively high road densities. None of the three project elements will affect this indicator because they will not increase the number or length of roads.

Riparian Habitat Conservation Areas (RHCAs)

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 condition of the streams in the action area is characterized by a lack of instream large wood, shallow pool depths, and high levels of fine sediment, all of which indicate poor quality refugia habitat for steelhead. The NMFS MPI (NMFS 1996) defines the Refugia indicator as: “important remnant habitat for sensitive aquatic species”, of which there likely exists localized remnants, especially in the roadless watersheds. All of the habitat indicators potential

components of Refugia. Analysis for the habitat indicators has determined that PE 1 (livestock use) can have negative and meaningfully measured effects to temperature, sediment, and substrate/embeddedness from the project elements as proposed actions. This may occur in areas that meet the definition of Refugia. **Therefore, PE 1 (livestock use) will have negative and meaningfully measured** effects to the Refugia indicator. Stream surveys, temperature monitoring, and PIBO will be the primary methods to track refugia (as habitat complexity with appropriate thermal regimes) through time.

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 is not likely to but could impact the function of Refugia to provide important remnant habitat. Therefore, **the effect conclusion is negative but not meaningfully measurable and is discountable for PE 2.**

PE 5 does not have any mechanisms to affect the processes and functions of RHCAs. **The monitoring PE has a neutral effect to the indicator.**

DIRECT AND INDIRECT EFFECTS TO THE SPECIES

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 of redds, resulting in injury or death to incubating embryos or alevins; 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.

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 for the NMFS MPI) 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 Proposed Action on habitat variables can be linked to effects to individuals of the species, and ultimately to an ESA effect determination.

Those indicator/PE combinations for which a conclusion of effect to an indicator or a component of a PBF was "negative and measurable" are identified specifically below, as they have the potential to adversely affect MCR steelhead. These conclusions were only found for PE 1 (livestock use) and not for PE 2 (permittee management and infrastructure maintenance) or PE 5 (monitoring). The indicators for which "negative and measurable" effects were concluded for the Murderers Creek, Fields Peak and Aldrich allotments and are bolded below:

Water Temperature
Sediment/Turbidity
Chemical Contaminants and Nutrients
Physical Barriers
Substrate Embeddedness
Large Woody Debris
Pool Frequency
Pool Quality
Off-Channel Habitat
Refugia
Width to Depth Ratio
Streambank Condition
Floodplain Connectivity

Change in Peak/Base Flows
Drainage Network Increase
Roads
Riparian Habitat Conservation Areas (RHCAs)

Water Temperature

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.

The discussion in the DIRECT AND INDIRECT EFFECTS TO DESIGNATED CRITICAL HABITAT section described negative effects to habitat and vegetation characteristics from the livestock use PE "effects to water temperature". Effects to these characteristics result in negative impacts to water temperature. The effect to this indicator by livestock use is negative and measurable. This will occur as a result of reducing the height of shade-producing vegetation by grazing. As described earlier, if pre-season monitoring indicates that wild horse and other wildlife use is resulting in measurements near or exceeding an endpoint use indicator prior to livestock grazing, livestock will not be turned-out into that specific pasture.

The livestock use PE1 (PE 1) is therefore likely to result in measurable water temperature increases for certain stream reaches. The assumption is that meeting these end of grazing use 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 MCR steelhead. **The effect to this indicator by PE 1 (livestock use) is negative and measurable.**

PE 2 (permittee livestock management and infrastructure maintenance) and PE 5 (monitoring) activities will not remove vegetation that provides shade nor affect channel-forming processes that might widen stream channels. Consequently, there is no mechanism for PEs 2 and 5 to affect water temperature and the effect of the PEs **to the indicator is neutral**.

Sediment/Turbidity and Substrate Embeddedness

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

Small amounts of fine sediment are likely to enter streams where livestock access streams to cross, loaf, or water, or tail along. 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 egg-to-fry survival (Spence et al. 1996).

In addition, inputs of fine sediment resulting from livestock trampling banks can shift benthic community composition or 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).

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 can negatively impact bank stability, resulting in increased width to depth, erosion, and increase fines downstream. The increases in fine sediment will negatively and measurably affect the Sediment/Turbidity and Substrate Embeddedness NMFS MPI.

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

Direct impacts are likely to occur if livestock wade into a stream and disturb rearing juveniles or spawning adults, and/or step on redds. Juveniles in close proximity to stream crossings or watering sites are likely to move out of an area when livestock enter or approach the stream. Juveniles are likely to be at increased risk of predation. Livestock will have access to spawning CH in the allotments during the spawning period. It is likely that spawning behavior will be interrupted, forcing adults to retreat to nearby cover, and that redds will be at risk of being stepped on. Risks will be minimized by implementation of the spawning surveys and redd avoidance as described in the Proposed Action: Common to all MNF Allotments section.

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. PDC 12 do not allow off-road vehicles to cross streams except for use of existing fords on road crossings. Grazing will not occur in pastures with steelhead spawning prior to emergence (July 1) or range riders on horses will occasionally cross streams, but redds will be identified by provided maps and flagging. Those areas should be avoided. Infrastructure maintenance actions are not located in stream channels, so there is no mechanism for direct impacts to the species.

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

Large Woody Material

See discussion above

Refugia

The concept of "Refugia" is not described in detail in the NMFS MPI (NMFS 1996). The definition provided in NMFS (1998) is: "important remnant habitat for sensitive aquatic species." The availability of various types of habitat refugia are described as limiting factors in the NMFS 2009 recovery plan for the Oregon steelhead populations of the MCR steelhead DPS (e.g., loss of side-channels that provided high flow refugia; cold water refugia provided by Columbia River tributary streams such as the Deschutes River).

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

PE 1 will result in negative and measurable impacts to several habitat indicators associated with Refugia. The effects are not expected to be distributed evenly across the Action Area, because stream reaches providing characteristics of refugia occur in areas less accessible by livestock, or some streams lack the characteristics of refugia due to the current degraded baseline from legacy impacts. Negative impacts to the Refugia indicator will be minimized by the end of grazing use of the endpoint indicators and PDCs.

Recovery of riparian vegetation results in the development of more complex habitat. Riparian recovery allows roots to stabilize streambanks, and stems and foliage to slow water velocities, trap fine sediment, provide overhead cover for fish, provide shade that may aid in keeping stream temperatures cool, and provide surfaces for macroinvertebrates to inhabit. Stable stream banks and fine sediment trapping result in less fine sediment in spawning substrate that would improve egg-to-fry survival (Bjornn and Reiser 1991). Reduced water velocities along stream edges increase the amount of available habitat for young salmonids (Bjorn and Reiser 1991). Spawning salmonids appear to prefer spawning in areas in close proximity of overhead cover (Bjorn and Reiser 1991), and overhead cover protects juvenile salmonids from predation. Shade provided by vegetation can be important in keeping stream temperatures cool for salmonids. Li et al. (1994) found that trout abundance decreased as solar input and water temperature increased. Macroinvertebrates inhabiting overhanging vegetation provide forage for juvenile MCR steelhead 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.

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.**

Pool Frequency

See discussion above.

Pool Quality

See discussion above.

Off Channel Habitat

Off-channel habitat is often naturally limited to low gradient stream reaches. The greatest amount of off-channel habitat is normally associated with larger streams in these low gradient areas. The existing condition of off-channel habitat in the Action Area is degraded due to legacy impacts, including removal of beavers, logging, mining, and road construction. Off-channel habitat provides important areas for rearing of juvenile fish and indicates floodplain connectivity that helps maintain baseflows, moderate stream temperatures, and absorb scouring energy during high flow events. **PE 1 (livestock use) does not have a measurable effect on off-channel habitat.**

PE 2 (permittee management of livestock and infrastructure maintenance) has no measurable effect due the location of infrastructure away from streams, the limited footprint of infrastructure, and because PDC 12 guides off-road vehicle use in sensitive areas such as off-channel or side-channel habitat.

PE 5 (monitoring) does not have any mechanisms to affect off-channel habitat.

Width to Depth

See discussion above.

Chemical Contaminants and Nutrients

See discussion above.

Streambank Condition

See discussion above.

Floodplain Connectivity

See discussion above.

Change in Peak/Base Flows

See discussion above.

Drainage Network Increase

See discussion above.

Roads

See discussion above.

Riparian Habitat Conservation Areas (RHCAs)

See discussion above.

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.

Unauthorized Grazing

Forest Service terminology is “excess use” when done by permittees, and “unauthorized grazing” when done by non-permit holders. The Government Accounting Office (GAO) recently conducted a report (2016) on unauthorized grazing, and referred to all grazing violations by permittees or non-permittees as “unauthorized grazing”. They considered grazing at an unauthorized time of year, grazing more livestock than allowed under a permit, or grazing outside of permitted areas, and looked at how often formal actions were taken. Excess use has occurred at times in these allotments during the past consultation period, as evidenced by monitoring and photos included in this consultation and the End of Year reports. Ranger District staff most often notifies livestock owners when unauthorized use or excess use is documented with a phone call, followed up by in-person meetings or written communication. Formal letters are documented to their permit files for certain exceedances or actions. As long as the MNF takes timely action whenever unauthorized or excess use occurs, habitat degradation is likely to be minimized. See “Common to All” for FS procedures if excess use or unauthorized grazing occurs.

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 PBFs of critical habitat of activities on private property, such as livestock grazing, are expected to continue at the same rate as they have been. At this time, we know of no future private activities that are reasonably certain to occur that are outside the range of activities currently taking place.

Private land activities are often more intensive than on Forest Service lands. Activities on private lands include: residential and commercial developments; water developments; grazing; etc. Because private land is often located along the downstream portions of streams within the action area, adverse impacts to streams and riparian areas from private land activities are disproportionate to their total area in the drainage. Water diversions for irrigation water are particularly damaging to ESA-listed species, although less so than in the recent past.

ODFW Elk and Deer Management

The ODFW manages Rocky Mountain elk and mule deer populations in the action area. The action area is located entirely within the state of Oregon's Murderers Creek Wildlife Management Unit (WMU). A forage production and utilization study was conducted in 1983 in the MNF Murderers Creek allotment (MNF 1983). Percent utilization of forage was determined by evaluating pellet groups.

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.

Oregon Department of Fish and Wildlife (ODFW) manages Rocky Mountain elk and mule deer populations in the ESA action area. The action area is located entirely within the state of Oregon's Murderers Creek Wildlife Management Unit (WMU). Current management objectives for mule deer are 9,000 for the unit, with the population estimated between 5,056 and 5,858 from 2017 - 2021. Current management objectives for elk in the Murderers Creek WMU are 1,700 with the population estimated between 1,900 and 2,000 from 2017 - 2021. It is not known what elk or mule deer population level in the WMU would result in detectable effects to the PBFs of CH for MCR Steelhead.

There is a potential for cumulative effects to MCRS steelhead designated CH from the combined use of wild horses, elk and deer, particularly when the population of wild horses exceeds AML. 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) increase in water temperature as a result of shade loss along stream channels from grazing/browsing of riparian vegetation.

Philip W. Schneider Wildlife Area

Land managed by the state of Oregon is located within and adjacent to the Murderers Creek Allotment. The ODFW manages the Phillip W. Schneider Wildlife Area (PWSWA). It is located west (downstream) from the allotment and includes the State lands depicted (in blue coloration) in Figure 1 that are immediately adjacent to the MNF on Murderers Creek and Deer Creek. The PWSWA was acquired in 1972 to protect and enhance winter habitat for the mule deer population. The PWSWA consists of 24,727 acres of deeded land, with 27,200 acres of BLM land within the area boundaries (ODFW 2006). Much of the deeded land is within the Murderers Creek Wild Horse Territory managed by the MNF (Figure 1). The PWSWA includes 37 miles of MCR Steelhead CH along the mainstem South Fork John Day River and tributaries. Primary tributaries are Deer Creek, Cougar Gulch and Murderers Creek. Management at the PWSWA will continue at levels similar to those in recent years.

The Oregon Fish and Wildlife Commission adopted the goals and objectives of the PWSWA Management Plan in October 2006 (ODFW 2006). Goals and objectives are presented below:

- Goal 1: To protect, enhance, and restore range conditions that will provide key winter habitat for mule deer;

- Goal 2: To protect, enhance, and restore habitat diversity for all other beneficial wildlife, compatible with Goal 1;
- Goal 3: To provide a variety of quality recreational and educational opportunities to the public which are compatible with Goals 1 and 2;
- Objective 2.1 specifically addresses habitat for anadromous fish;
- Objective 2.2: To protect, enhance and restore high quality instream habitat, water quality and quantity, and riparian/wetland systems for resident and anadromous fish, native wildlife, and desirable non-native fish and wildlife.

Strategies are presented in the PWSWA Management Plan to attain the objectives. The PWSWA Management Plan states on page 24 that the Department (ODFW) actively supports USFS and BLM efforts to control the local feral horse population. Strategy 2 to implement Goal 1.1 states:

Strategy 2. Negotiate with the USFS to maintain the feral horse herd at the stated management objective of 100 head, to reduce destructive use of native rangeland plants.

Other strategies describe actions such as juniper removal, weed control, controlled burns, shrub plantings, livestock grazing and the planting of agricultural crops important to wildlife. In the last three years, approximately 750 acres of juniper removal took place in the Water and Wiley Gulch areas of the Murderers Creek drainage, and approximately 420 acres were treated in the Olive Creek drainage, tributary to the South Fork John Day River (Sponseller 2011). In addition, a 16-acre site along the South Fork John Day River is planted each year. Half of it is in alfalfa and the other half is in cereal grains (Sponseller 2011).

Grazing is used as a tool to remove senesced grass stems and leaves to improve plant vigor and increase the nutritive value of winter forage for wildlife. Grazing is managed by use of twenty fenced pastures, with several pastures rested each year. Riparian fences protect stream corridors.

In addition, the PWSWA provides opportunities for the public to hunt, trap, fish, and engage in non-consumptive recreation activities. The plan also provides for adaptive management informed by monitoring.

Some of the actions, such as those to attain Objective 2.2 and Strategy 2 above, may restore PBFs of MCR Steelhead CH. Ground-disturbing activities and those removing duff (e.g. controlled burns) conducted at the PWSWA may increase the potential for sediment to enter stream channels. Increased sediment may increase streambed embeddedness, increase turbidity, affect the quality of spawning gravel and decrease macroinvertebrate production. Vegetation treatments may temporarily reduce shade canopy along streams, with the potential for water temperature increases. However, the locations, extent and PDCs of these actions are not known and these potential effects may not be realized.

Other state lands totaling 1,432 acres are inholdings within the MNF (Appendix A). Approximately 792 acres of state land within the allotment are unfenced and management of these lands has not been waived to the Forest Service. They include stream frontage along Murderers Creek and Tex Creek near where the two streams join, reaches of upper South Fork Murderers Creek, and a reach of Deer Creek just upstream from its tributary junction with Buck Creek. Other state lands, such as the section located at Maggot Springs, are fenced and not proximal to MCR steelhead CH. Livestock grazing will continue on these state lands at similar levels to recent years. The effects of livestock grazing on state lands 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.

Murderers Creek Wild Horse Territory and Joint Management Area

Murderers Creek Wild Horse Territory/Herd Management Area is presented here to provide context for the analysis of effects of livestock grazing in the Murderers Creek allotment. The wild horse population has fluctuated over the years. The Management Plan (MNF et al. 2007) stated that the 2006 summer census counted 436 horses. There was no population census in 2007 or 2008. An estimate of 230 horses was made for 2009 and as of the winter 2010-2011, the population estimate is approximately 198 horses. Since 2007, 317 horses have been removed from the territory. The latest census was conducted in 2022 with an estimated population size of 503 horses. As stated above, there is a potential for cumulative effects to MCRS steelhead designated CH from the combined use of wild horses, elk and deer, particularly when the population of wild horses exceeds AML. 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) increase in water temperature as a result of shade loss along stream channels from grazing/browsing of riparian vegetation.

The 2007 Management Plan set an Appropriate Management Level (AML) of 50-140 horses, averaging 100 horses.

Murderers Creek Wild Horse Territory/ Herd Management Area (Territory) is currently undergoing a NEPA review process to authorize management with an expected Decision in 2023. The Territory was established in 1972, and encompasses approximately 143,000 acres of Federal, State and private lands, including the Blue Mountain Ranger District of the MNF, Prineville District Bureau of Land Management (PD BLM), Oregon Department of Fish & Wildlife (ODFW) and numerous private landowners (Figure 1). Approximately 75% of the lands within the territory are on the Malheur National Forest. The Territory name “Murderers Creek Wild Horse Territory/Herd Management Area” incorporates terminology for both the FS and BLM. The FS uses the term “Territory” and the BLM uses the term “Herd Management Area” when describing areas designated for management of wild horses.

Figure 18. Wild horses Fields Peak allotment, near the Tex Creek DMA, June 4, 2015.

ESA Effects Determination

ESA effect determinations are presented in Table 1. The determination is “MAY AFFECT, LIKELY TO ADVERSELY AFFECT” MCR Steelhead and its designated CH for the Murderers Creek, Fields Peak and Aldrich allotments. The conclusion was that the effects to the indicators that were measurable, do not meet the definition of “insignificant” effects. They are not “discountable” because the effects are likely to occur.

References

Abt. S.R. Sediment deposition and entrapment in vegetated streambeds. J. Irrig. Drain. Eng. 1994. 120:1098–1111.

Agee, J.K. 1996. Fire ecology of Pacific Northwest forests. Island press.

Al-Chokhachy, R., Roper, B.B. and Archer, E.K., 2010. Evaluating the status and trends of physical stream habitat in headwater streams within the interior Columbia River and upper Missouri River basins using an index approach. Transactions of the American Fisheries Society, 139(4), pp.1041-1059.

American Fisheries Society. 1991. Pacific Salmon at the Crossroads: Stocks at Risk from California, Oregon, Idaho, and Washington. Nehlsen, W., J.E. Williams, and J.A. Lichatowich. Fisheries 16(2): Pages 4-21.

Archer E. and J.V. Ojala. 2017. Stream Habitat Condition for Sites in the Malheur National Forest. PacFish /InFish Biological Opinion (PIBO) Monitoring Program, USDA Forest Service, Logan, UT. January 2017.

Armour, C.L., D.A. Duff and W. Elmore. 1991. The effects of livestock grazing on riparian and stream ecosystems. Fisheries 16(1): 7–11.

Bayley, P.B., and H.W. Li. 2008. Stream Fish Responses to Grazing Exclosures. North American Journal of Fisheries Management 28:135-147.

Belsky, A.J., A. Matzke, and S. Uselman. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. In: Warren P. Clary andWayne C. Lenniger. 2000. Stubble height as a tool for management of riparian areas. Journal of Range Management 53: 562-573.

Benda, L. E., D. Miller, T. Dunne, J. Agee, and G. H. Reeves. 1998. Dynamic landscape systems. Pages 261-288 in R. J. Naiman and R. E. Bilby eds. River ecology and management: lessons from the Pacific Coastal Region. Springer Verlag, New York.

Bengeyfield, P. 2006. Managing Cows with Streams in Mind. Rangelands 28(1): 3-6.

Berg, L. and T.G. Northcote. 1985. Changes in territorial, gill-flaring, and feeding behavior in juvenile coho salmon (Oncorhynchus kisutch) following short-term pulses of suspended sediment. Canadian Journal of Fisheries and Aquatic Sciences 42:1410-1417

Beschta, R. L., and W.J. Ripple. 2005. Rapid Assessment of Riparian Cottonwood Recruitment: Middle Fork John Day River, Northeastern Oregon. Ecological Restoration. 23(3), 150-156.

Beschta, R.L. 1997. Riparian shade and stream temperature: an alternative perspective. Rangelands. 19(2): 25-28.

Bestcha, R.L., and J. Weatherred. 1984. A computer model for predicting stream temperatures resulting from the management of streamside vegetation. USDA Forest Service. WSDG-AD-00009.

Bestcha, R.L., R.E. Bilby, G.W. Brown, L.B. Holtby, and T.D. Hofstra. 1987. Stream temperature and aquatic habitat: Fisheries and Forestry Interaction. Pages 191-232. University of Washington, Institute of Forest Resources, Contribution 57. Seattle, WA.

Bjornn, T.C., and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. Pages 83-138, In W.R. Meehan (editor) Influences of forest and rangeland management on salmonid fishes and their habitats. Special Publication 19. American Fisheries Society. Boyd, M.S. 1996. Heat Source: Stream Temperature Prediction. Master's Thesis. Department of Civil Engineering, Oregon State University, Corvallis, Oregon.

Boyd, C.S., Svejcar, T.J., 2012. Biomass production and net ecosystem exchange following defoliation in a wet sedge community. Rangeland Ecology & Management 65, 394–400.

Braatne, J. H., Rood, S. B., and P.E. Heilman. 1996. Life history, ecology, and conservation of riparian cottonwoods in North America. Biology of Populus and its Implications for Management and Conservation, (Part I), 57-85.

Brown, G.W. 1969. Predicting temperatures of small streams. Water Resour. Res. 5(1):68-75.

Brown, G.W. 1972. An improved temperature model for small streams. Water Resources Report 16. Oregon State University, Corvallis, Oregon.

Bunte, K. and S.R. Abt. 2001. Sampling surface and sub-surface particle size distributions in wadeable gravel- and cobble-bed streams for analysis I sediment transport, hydraulics, and streambed monitoring. General Technical Report RMRS-GTR-74. U.S. Department of Agriculture, Forest Service, Rocky Mountain Experiment Station. http://stream.fs.fed.us/publications/PDFs/rmrs_gtr74.pdf

Burton, T.A., E.R. Cowley, and S.J. Smith. 2008. Monitoring Stream Channels and Riparian Vegetation-Multiple Indicators. Version 5.0. BLM/ID/GI-08/001+1150. Interagency Technical Bulletin: Idaho State Office, BLM and Intermountain Region, USFS. 53 pages plus appendices.

Burton, T.A., S.J. Smith, and E.R. Cowley. 2011. Riparian area management: Multiple indicator monitoring (MIM) of stream channels and streamside vegetation. Technical Reference 1737-23. BLM/OC/ST-10/003+1737+REV. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. www.blm.gov/nstc/library/pdf/MIM.pdf.

Case, R.L., and J.B Kauffman. 1997. Wild ungulate influences on the recovery of willows, black cottonwood and thin-leaf alder following cessation of cattle grazing in northeastern Oregon: Northwest Science, vol. 71, no. 2, pp. 115-126.

CBMRCD. 2005. John Day Subbasin Plan. Prepared by Columbia-Blue Mountain Resource Conservation and Development Area (CBMRC&D) for The Northwest Power and Conservation Council (NWPCC). Pendleton.

Chadwick, A.C. 2002. Difficulties in determining the benefits of riparian grazing level indicators to water quality and stream corridor condition in southwestern Montana. Master's Thesis. University of Montana. Paper 6892. 95 pages.

Claire, E.W., and R.L. Storch. 1977. Streamside Management and Livestock Grazing: An Objective Look at the Situation. In: Proceedings Symposia. Livestock and Wildlife-Fisheries Relationships in the Great Basin. Sparks, Nevada. May3-5, 1077.

Clary, W. P. and D. E. Medin. 1990. Differences in vegetation biomass and structure due to cattle grazing in a northern Nevada riparian ecosystem. Gen. Tech. Rep. INT -427. U.S. Dep. of Agr., Forest Service. Ogden, Ut.

Clary, W.P. 1999. Stream channel and vegetation responses to late spring cattle grazing. Journal of Range Management 52:218-227.

Clary, W.P. and B.F. Webster. 1989. Managing grazing of riparian areas in the intermountain region. Gen. Tech. Rep. INT-263. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 11p.

Clary, W.P., and W.C. Leininger. 2000. Stubble height as a tool for management of riparian areas. J. Range Management. 53: 562-573.

Coles-Ritchie, M.C., D.W. Roberts, J.L. Kershner, and R.C. Henderson. 2007. Use of a Wetland Index to Evaluate Changes in Riparian Vegetation After Livestock Exclusion. Journal of the American Water Resources Association 43(3):731-743.

Cowley, E.R. 2002. Guidelines for Establishing Allowable Levels of Streambank Alteration. USDI, Bureau of Land Management, Idaho State Office. Information Bulletin No. ID-2002-172. Boise, Idaho.

Cowley, E.R. and T.A. Burton. 2005. Monitoring Streambanks and Riparian Vegetation – Multiple Indicators. Tech. Bull. No. 2005-002. USDI, BLM, Idaho State Office. Boise, ID. http://www.id.blm.gov/techbuls/05_02/doc.pdf

Crowe, E.A., and R.R. Clausnitzer. 1997. Mid-Montane Wetland Plant Associations of the Malheur, Umatilla, and Wallowa-Whitman National Forests. USDA FS Pacific Northwest Region R6-NR-ECOL-TP 22-97. 299 pages.

Elliott, J. M. 1994. Quantitative ecology and the brown trout. Oxford University Press, Oxford, UK.

Elmore, Wayne. 1992. Riparian responses to grazing practices. In: Watershed management: balancing sustainability and environmental change. New York: Springer-Verlag: 442-457.

Gillen, R.L., W.C. Krueger, and R.F. Miller. 1985. Cattle use of riparian meadows in the Blue Mountains of northeastern Oregon. Journal of Range Management 38:205–209.

Goss, L.M. 2013. Understanding the relationship between livestock disturbance, the protocols used to measure that disturbance, and stream conditions. Masters Thesis, Utah State University. 107pp.

Government Accountability Office. 2016. Unauthorized Grazing: Actions Needed to Improve Tracking and Deterrence Efforts. A Report to the Committee on Natural Resources, House of Represetntatives. GAO-16-559. 63 pages.

Gregory, S. V., Meleason, M. A., and D.J. Sobota. 2003. Modeling the dynamics of wood in streams and rivers. In American Fisheries Society Symposium. 37:315-335.

Gurnell, A. M., Piegay, H., Swanson, F. J., and S.V. Gregory. 2002. Large wood and fluvial processes. Freshwater Biology, 47(4), 601-619.

Hall, F. C., and L. Bryant. 1995. Herbaceous stubble height as a warning of impending cattle grazing damage to riparian areas. General Technical Report PNW-GTR-362. U.S. Forest Service Pacific Northwest Research Station, Portland, Oregon, USA.

Hanson, Paul. 1993. Developing a successful riparian wet land grazing management plan for the upper Ruby River cattle and horse allotment in southwestern Montana. In: Riparian management: common threads and shared interests: a western regional conference on river management strategies; 1993 February 4-6; Albuquerque, NM. Gen. Tech. Rep. RM-226. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station: 328-335.

Hargett, E.G., J.R. Zumberge, C.P. Hawkins, and J.R. Olson. 2007. Development of RIVPACS-type predictive model for bioassessment of wadeable streams in Wyoming. Ecological Indicators 7:807-826.

Heitke, J.D., Archer, E.K., Leary, R.J.; and Roper, B.B. 2011. Effectiveness monitoring for streams and riparian areas: sampling protocol for stream channel attributes. PIBO program manual. 102 pages.

Henderson, R. C., E. K. Archer, B. A. Bouwes, M. S. Coles-Ritchie, and J. L. Kershner. 2005. PACFISH/INFISH Biological Opinion (PIBO): Effectiveness Monitoring Program seven-year status report 1998 through 2004. General Technical Report RMRS-GTR-162. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station Fort Collins, Colorado.

Herbst, D.B., M.T. Bogan, S.K, Roll, and H.D. Safford. 2012. Effects of Livestock Exclusion on In-Stream Habitat and Benthic Invertebrate Assemblages in Montane Streams. Freshwater Biology 57:204-217.

Jensen, D.W., E.A. Steel, A.H. Fullerton, and G.R. Pess. 2009 Impact of Fine Sediment on Egg-To-Fry Survival of Pacific Salmon: A Meta-Analysis of Published Studies. Reviews in Fisheries Science, 17(3):348-359. DOI:10.1080/10641260902716954.

Johnson, S.L. 2004. Factors influencing stream temperatures in small streams: substrate effects and a shading experiment. Canadian Journal of Fisheries and Aquatic Sciences, 61(6), pp.913-923.

Kauffman, J. B. and W. C. Krueger. 1984. Livestock impacts on riparian ecosystems and streamside management implications - a review. Journal of Range Management 37(5):430-438.

Kauffman, J. B., and R.L. Case. 1997. Wild ungulate influences on the recovery of willows, black cottonwood and thin-leaf alder following cessation of cattle grazing in northeastern Oregon. 1997

Kauffman, J. B., W. C. Krueger, and M. Vavra. 1983. Impacts of cattle on streambanks in northeastern Oregon. Journal of Range Management (1983): 683-685.

Kershner J.L., B.B. Roper, N. Bouwes, R. Henderson, and E. Archer. 2004. An Analysis of stream Habitat Conditions in Reference and Managed Watersheds on Some Federal Lands within the Columbia River Basin. North American Journal of Fisheries Management 24: 1363-1375.

Kershner, J. and B. Roper. 2010. An evaluation of management objectives used to assess stream habitat conditions on Federal lands within the Interior Columbia Basin. Fisheries 35(6):269-278.

Kinney, J.W., and W.P. Clary. 1994. A Photographic Utilization Guide for Key Riparian Graminoids. USDA FS Intermountain Research Station. General Technical Report INT-GTR-308. 13 pages.

Kovalchik, Bernard L.; Elmore, Wayne. 1992. Effects of cattle grazing systems on willow-dominated plant associations in central Oregon. In: Proceedings Symposium on ecology and management of riparian shrub communities; 1991 May 29-31; Sun Valley, ID. Gen. Tech. Rep. INT-289. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station: 111-119.

Lee, R. 1980. Forest Hydrology. Columbia University Press. New York.

Li, H.W. G.A. Lamberti, T.N. Pearsons, C.K. Tait, and J.L. Li. 1994. Cumulative effects of riparian disturbances along high desert trout streams of the John Day Basin, Oregon. Transactions of the American Fisheries Society. 123:629-640.

Lisle, T.E. 1987. Using "Residual Depths" to monitor pool depths independently of discharge. Research Note PSW-394. USDA, Pacific Southwest Forest and Range Experiment Station. 4 pages.

Lyons, J., Trimble, S.W., Paine, L.K., 2000. Grass versus trees: managing riparian areas to benefit streams of central North America. J. Am. Water Resour. Assoc. 36, 919–930. Magurran, A.E., 1988

Malheur National Forest (MNF). 1990. Malheur National Forest Land and Resource Management Plan.

Malheur National Forest (MNF). 1994. Amendment 29 to the MNF Land and Resource Management Plan.

Malheur National Forest (MNF). 2003. Fifty years of change on the range – Malheur National Forest. October 2003, 38p.

Malheur National Forest (NMF). 2007. Biological Assessment for Grazing Activities on the Rail Creek Allotment. Prairie City Ranger District. September 2007. 23 Pages.

McIver, J.D.; Ottmar, R. 2006. Fuel mass and stand structure after post-fire logging of a severely burned ponderosa pine forest in northeastern Oregon. Forest Ecology and Management. 238(1-3): 268-279.

Meredith, C., B.R. Roper, and E. Archer. 2014. Reductions in Instream Wood in Streams near Roads in the Interior Columbia River Basin, North American Journal of Fisheries Management, 34:3, 493-506.

MIM TR - U.S. Department of the Interior. 2011. Riparian area management: Multiple indicator monitoring (MIM) of stream channels and streamside vegetation. Technical Reference 1737-23. BLM/OC/ST-10/003+1737+REV. Bureau of Land Management, National Operations Center, Denver, CO. 155 pp.

Muck, J. 2010. Biological Effects of Sediment on Bull Trout and their Habitat: Guidance for Evaluating Effects. U.S. Fish and Wildlife Service, Lacey Washington. 57 pages.

National Marine Fisheries Service (NMFS). 2009. Middle Columbia River Steelhead ESA Recovery Plan. NMFS Northwest Region. 260 Pages.

National Marine Fisheries Service (NMFS). 2011. Five Year Review: Summary and Evaluation of Mid-Columbia River Steelhead. NMFS Northwest Region, Portland Oregon. 36 Pages.

National Marine Fisheries Service (NMFS). 2012. Endangered Species Act Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Administration of the Dark Canyon, Fawn Springs, Hanscomb, Dixie, Fields Peak, Roundtop, John Day, Beech Creek, Mt Vernon, Blue Mountain, Upper Middle Fork, Lower Middle Fork, Long Creek, Fox, Camp Creek, Slide Creek, York, Donaldson, Deer Creek Indian Ridge and Murderers Creek Allotments for 2012-2016. Malheur National Forest. North Fork John Day (HUC 17070202), Middle Fork John Day (HUC 17070203), and Upper John Day (HUC 17070201) Subbasins Grant County, Oregon. NMFS Consultation Number 2011/05362. Issued April 2, 2012. Seattle, WA. 268 pages.

National Marine Fisheries Service (NMFS). 2016. 2016 5-Year Review: Summary and Evaluation of Middle Columbia River Steelhead. National Marine Fisheries Service. West Coast Region, Portland, OR. 63 Pages.

National Marine Fisheries Service. 1996. Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale. NMFS Environmental and Technical Services Division, Habitat Conservation Branch. 31 pages.

Northwest Power and Conservation Council. 2005. John Day Sub-basin Revised Draft Plan. Prepared by Columbia-Blue Mountain Resource Conservation and Development Area, for the NWPPC. 336 Pages.

Nussle, S., K.R. Matthews, and S.M. Carlson. 2015. Mediating Water Temperature Increases Due to Livestock and Global Change in High Elevation Meadow Streams of the Golden Trout Wilderness. PLoS ONE 10(11): e0142426| DOI: 10.1371.

Oregon Department of Environmental Quality (ODEQ). 2010. John Day River Basin Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP). Portland, Oregon.

Oregon/Washington Interagency Wildlife Committee. 1979. Managing Riparian Ecosystems (Zones) for Fish and Wildlife in Eastern Oregon and Washington.

PACFISH/INFISH Biological Opinion Effectiveness Monitoring Program (PIBO-EMP) Staff Multi-federal Agency Monitoring Program. 2011. PIBO-EMP PACFISH INFISH Biological 2011 Opinion Effectiveness Monitoring Program for Streams and Riparian Areas. Sampling Protocol for Stream Channel Attributes. Heitke, Jeremiah D.; Archer, Eric K.; Leary, Ryan J.; and Roper, Brett B. 2011. Logan, UT.

Pacific Northwest Region Stream Inventory Handbook, Level I & II, 2016, Version 2.16. (http://www.fs.fed.us/r6/water/fhr/sida/handbook/Stream-Inv-2016.pdf)

Park, C.S. 1993. SHADOW stream temperature management program. USDA Forest Service, Pacific Northwest Region.

Pelster, A.J., S.G. Evans, W.C. Leininger, W.P.Clary, and M.J. Trlica. 2004. Steer diets in a montane riparian community. J. Range Manage. 57:546 -552.

Platts, W. S. 1981. Influence of forest and rangeland management on anadromous fish habitat in western North America -effects of livestock grazing. USDA Forest Service Gen. Tech. Report PNW-124. 25 p.

Platts, W.S. 1991. Livestock Grazing. In: Influence of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society, Special Publication 19:389-423.

Platts, William S. 1989. Compatibility of livestock grazing strategies with fisheries. In: Practical approaches to riparian resource management: an educational workshop; 1989 May 8-11; Billings, MT Billings, MT: U.S. Department of the Interior, Bureau of Land Management: 103-110.

Rosgen D. 1996. Applied river morphology. Wildland Hydrology. Pagosa Springs, CO. 363 pp.

Saunders W.C. and K.D. Fausch. 2007. Improved grazing management increases terrestrial invertebrate inputs that feed trout in Wyoming rangeland streams. Transactions of the American Fisheries Society 136, 1216–1230.

Saunders, W.C. and K.D. Fausch. 2012. Grazing management influences the subsidy of terrestrial prey to trout in Central Rocky Mountain streams (USA). Freshwater Biology 57, 1512-1529.

Sheer, M.B., Busch, D.S., Gilbert, E., Bayer, J.M., Lanigan, S., Schei, J.L., Burnett, K.M. and D. Miller. 2009. Development and management of fish intrinsic potential data and methodologies: state of the IP 2008 summary report. Pacific Northwest Aquatic Monitoring Partnership Series, 4.

Spence, B.C. and G.A. Lomnicky, R.M. Huges, R.P. Novitzki. 1996. An Ecosystem Approach to Salmonid Conservation. TR-4501-96-6057. Management Technology. 356 pp.

Ungar, E.D., A. Genizi, and M.W. Demment. 1991. Bite dimensions and herbage intake by cattle grazing short hand-constructed swards. Agron J. 83:973–978.

University of Idaho Stubble Height Review Team. 2004. University of Idaho Stubble Height Study Report. University of Idaho Forest, Wildlife, and Range Experiment Station Contribution No. 986. Submitted to the Idaho State Director, BLM, and Regional Forester of the Intermountain Region U.S. Forest Service. 26 pages.

USDA Forest Service 1995a. Decision Notice and Finding of No Significant Impact for the Inland Native Fish Strategy. Interim Strategies for Managing Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana, and Portions of Nevada (July 29, 1995). Intermountain, Northern, and Pacific Northwest Regions.

USDA Forest Service and USDI BLM. 1995. DN/DR, FONSI, and Environmental Assessment for the Interim Strategies for Managing Anadromous Fish Producing Watersheds on Federal Lands in eastern Oregon, Washington, Idaho, and Portions of California, PACFISH (February 24, 1995).

USDA Forest Service Pacific NW Region. 2014. Memorandum of Understanding between State of Oregon Department of Environmental Quality and the USDA Forest Service, Pacific Northwest Region. 17 pages.

USDA Forest Service, USDI Bureau of Land Management, USDI Fish and Wildlife Service, and USDC NOAA Fisheries. 2003. Implementation Monitoring Program Module for PACFISH/INFISH and the 1998 Biological Opinions for Salmon, Steelhead, and Bull Trout.

USDA Forest Service. 1991. Columbia River Basin Anadromous Fish Habitat Management Policy and Implementation Guide.

USDA Forest Service. 1995b. Revision of Enclosure B. Recommended Livestock Grazing Guidelines Memo Dated May 24, 1995. Replacement of the original Enclosure B with this revision dated July 31, 1995. Regional Officer Letter dated August 14, 1995. Columbia River Basin Coordinator. Portland, Oregon.

USDA Forest Service. 2011. Watershed Condition Framework. Publication FS 977. 24 pages. Washington, D.C.

USDA Forest Service. 2014. John Day River Basin Water Quality Restoration Plan: North Fork John Day, Middle Fork John Day, Upper John Day and Lower John Day River Sub-Basins. Umatilla, Wallowa Whitman, Malheur, and Ochoco National Forests. 52 pages.

USDA FS, USDC NMFS, USDI BLM, and USDI FWS. 1999. Streamlined Consultation Procedures for Section 7 of the Endangered Species Act (ESA) July, 1999. Revision guidance plus appendices.

USDC NMFS. 1996. Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale. The National Marine Fisheries Service Environmental and Technical Services Division, Habitat Conservation Branch. August 1996.

USDC NMFS. 1998. PACFISH Biological Opinion.

USDI BLM. 1996. Riparian are management: process for assessing proper functioning condition. Technical Reference 1737-9, National Applied Science Center, Denver, CO.

Waters, T. 1995. Sediment in streams: sources, biological effects and control. American Fisheries Society Monograph 7.

Wingett, R.N., and F.A. Magnum. 1979. Biotic Condition Index: integrated biological, physical, and parameters for management. USDA Forest Service, Intermountain Region. Ogden, Utah.

Winward, A. H. 2000. Monitoring the vegetation resources in riparian areas. Gen. Tech. Rep. RMRS-GTR-47. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Appendices

Appendix A. Allotment Maps
Appendix B. Malheur National Forest PIBO Report
Appendix C. Monitoring Protocols
Appendix D. Level 2 Stream Survey Reports
Appendix E. 2012-2016 Redd Survey and Protection Strategy
Appendix F. 2021 End of Year Report
Appendix G. 50 Years of Grazing on the MNF
Appendix H. Range Readiness Form (R6-2210-22)
Appendix I. Water Temperature Monitoring
Appendix K. DMA Master Table
Appendix L. Compliance Summary
Appendix M. Malheur National Forest Road Analysis